SIEMENS

Opcenter Intelligence 2401.0001

User Manual

Guidelines

This manual contains notes of varying importance that should be read with care; i.e.:

Important:

Highlights key information on handling the product, the product itself or to a particular part of the documentation.

Note: Provides supplementary information regarding handling the product, the product itself or a specific part of the documentation.

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Cybersecurity Information

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To stay informed about product updates, subscribe to the Siemens Industrial Cybersecurity RSS feed under https://www.siemens.com/cert.

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ID	OpcenterIN_UserManual
Title	User Manual
Product Title	Opcenter Intelligence
Version Title	2401.0001
Product Version	OpcenterIN_2401.0001
Category	Configuration, Usage, Support
Summary	Illustrates the procedures that must be performed to use Opcenter Intelligence, from both Engineering and Runtime standpoints.
Audience	System Integrator, Support Engineer, Project Engineer
Revision	PL20240130630874732
State	Published
Author	Siemens AG
Language	en-US

1 Before you Start

Accessing the Application

To access Opcenter Intelligence, double click the desktop icon and do either of the following:

- If you are logged in with the credentials specified for Opcenter Intelligence Administrator, you are directly logged in to the application.
- If the authentication is performed using UMC, you are redirected to UMC Log In page. Log in as the Administrator user defined in Opcenter Intelligence Configurator, which is the only user who can grant access to other users.

The Home Page

The **Home** page is made up of the following cards. Some of the cards may be displayed or not depending on the role of the logged-in user.

Card	Description
Analytical Solutions	This card gives you access to the Solutions page, where you can carry out all the steps required to configure a manufacturing intelligence solution. Analytical solutions allow you to configure information ingestion (that is the process of obtaining and importing data in a manufacturing data warehouse) and to design the analytical model.
Analytical Tools	This card gives you access to the Runtime page, where you can manage dashboards and reports.
Access Control	This card gives you access to the Roles page, where you can manage users and assign roles.

The Primary Navigation Bar

The Primary Navigation Bar is displayed on the left-hand side of the page and includes the following commands:

Command	Action
⟲ **Previous Location**	Go to the previously-visited page.
⌂ **Home**	Go to the **Home** page.
License Management	(*This command is only visible if you are using the licensing model introduced starting from version 3.2*) Go to the License Management page, where you can view and check information about licenses.
Monitoring Messages	Go to the Monitoring Messages page, where you can monitor the progress of operations.

Command	Action
ⓘ **Information on version**	Click this icon to display the **About** pop-up window that contains information about Opcenter Intelligence version number.
⑦ **Third-Party license information**	Open the Siemens Third-Party Software disclosure document.

The User Commands

When you click 👤 a panel opens, where you can execute the following operations. You can pin or unpin the panel to the current page.

Command	Action
⏻ **Logout**	Log out from Opcenter Intelligence.
⚙ **Settings**	Configure the following options: • **Full Screen Mode** or **Exit Full Screen Mode** to enable or disable this option. • **Command Labels** to show labels under commands.
🅰 **Change Language**	Change the UI language from those available: • English • Simplified Chinese • French • German • Spanish

2 Quick Start to Using Opcenter Intelligence

This manual provides a general outline of the main steps that must be executed to use Opcenter Intelligence. The working environment is a web engineering client from which any authorized user can configure and deploy a manufacturing intelligence solution.

Workflow

1. Manage Access Control
2. Configure a Solution
3. Configure a Project
4. Configure the Time Definition
5. Configure a Scenario
6. Configure Flows
7. Configure and Deploy an Environment
8. Perform Runtime Operations

Additional Operations

- Configure Smart Views
- Manage the Update of a Data Source Product Version

3 Managing Access Control

In this page Administrators can grant users access to the application functionalities by assigning them a predefined role.

> ⬧ Users to whom the **Solution Engineer** role has been assigned must be advanced users and be aware that any misuse of Opcenter Intelligence, like the creation of custom SQL Scripts, may alter the source database. Siemens strongly advises Customers to include in their custom SQL Scripts design process a dedicated security review to double-check script source code. Siemens strongly advises Customers to grant access to the Solution Engineering module only to a restricted group of users.

Prerequisites

You are logged in with the credentials specified for Opcenter Intelligence Administrator.

Procedure

1. In the **Home** page, click the **Access Control** card.
2. In the **Roles** page, select a role and click ⬀ **Open**. The available roles are:

Role	Permissions
Administrator	The first time this user logs in, he can only assign roles to other users. He can then upgrade his permissions by assigning himself more roles. This role can also access the **Monitoring Messages** page.
Solution Engineer	Perform the main engineering operations, access the **Monitoring Messages** page.
SmartView Engineer	Create and modify smart views, access the **Monitoring Messages** page.
Desktop Explorer	(*Available for Opcenter Intelligence Analytics*) Create and modify dashboards and publish data sources. To publish data sources in Opcenter Intelligence Analytics using Opcenter Intelligence Analytics Desktop, you have to reset the password for this role. ⚠ If the Opcenter Intelligence Analytics Server needs to be reinstalled, after the new installation has been completed you must delete the Desktop Explorer, Analytics Explorer and Analytics Viewer roles in order to create the corresponding users in Tableau® again, as the latter are deleted when the program is uninstalled.
Analytics Explorer	(*Available for Opcenter Intelligence Analytics*) Create and modify dashboards.

Role	Permissions
Analytics Viewer	(*Available for Opcenter Intelligence Analytics*) Only view dashboards.

3. In the ***<role name>*** page, click ⊕ **Add Users** and select one of the previously imported users.

> ⚠ The **Groups** tab is visible and maintained for compatibility only for existing installations based on previous Opcenter Intelligence versions. Starting from version 3.2, assigning roles to groups is no longer allowed.

4. Click **Save**.

3.1 Resetting the Password for the Desktop Explorer Role

If you have been assigned the Desktop Explorer role, you need to reset your password to be able to publish data sources in Opcenter Intelligence Analytics using Opcenter Intelligence Analytics Desktop.

Prerequisites

You have signed in to Tableau® Server from Tableau® Desktop. For more details, see https://help.tableau.com/v2021.4/pro/desktop/en-us/sign_in_server.htm

> ⓘ When you sign in, you must enter your user name without the domain.

Procedure

1. In the **Roles** page, select the **Desktop Explorer** tile and click ↗ **Open**.
2. In the **Desktop Explorer** page, select a user and click 🔑 **Reset Analytics Desktop Password**.
3. In the **Reset Analytics Desktop Password** panel, insert a new password, which must contain:
   - at least 1 lower-case alphabetical character,
   - at least 1 upper-case alphabetical character,
   - at least 1 numeric character,
   - at least 1 special character,
   - at least 8 characters.
4. Click **Save**.

4 Managing Licenses

This page is only visible to users for which the licensing model available from version 3.2 is applied.

The page shows an up-to-date overview of the number of purchased and consumed seats for each user, as well as the roles assigned to users. Seats correspond to the number of users that can access the application at the same time, depending on the type of license that has been purchased. A seat is consumed for each logged-in user.

For more information on licenses, see *Opcenter Intelligence Installation Manual*.

Accessing the page

To access the **License Management** page, click 🗒 **License Management** on the Primary Navigation Bar.

Available Details

Section	License Details	Description
License Status	**License Name**	Name of the license(s) currently in use.
	Purchased Seats	Number of seats purchased for this license.
	Consumed Seats	Number of seats currently consumed to access the application.
Users	**User Name**	Name of the user who is using the licensing model.
	Consumed Licenses	Name of the license model(s) that this user has consumed.
	Assigned Roles	Name of the role(s) assigned to this user.

5 How to Configure a Solution

A Solution is a container of objects that represent manufacturing intelligence business requirements. You can either create a solution from scratch or import an already-existing solution.

Accessing the Page

To access the **Solutions** page, click the **Analytical Solutions** card in the **Home** page.

Workflow

1. Create a Solution
2. Create a Project
3. Configure the Time Definition
4. Configure a Scenario
5. Create an Environment
6. Deploy an Environment

Additional Operations

Export a Solution

5.1 Creating a Solution

A solution can be created by performing either of the following operations:

- Creating a solution from scratch
- Importing a solution created and exported using a previous version of the product

Creating a Solution From Scratch

1. In the **Solutions** page, click ⊕ **Create Solution**.
2. Insert the following details:

Parameter	Description	Naming Convention
Name	A meaningful name that you want to assign to the Solution.	- The first letter of the name must be an uppercase, lowercase or numeric character. - For the remaining characters of the name, only alphanumeric characters, underscores and spaces should be used. - Special characters (such as %, |, §, &, #, +, -, etc.) are not allowed. - The maximum length for names must not exceed 255 characters.

Parameter	Description	Naming Convention
Description	Optional. A description to provide further information for the Solution.	• The first letter of the description must be an uppercase, lowercase or numeric character. • Other character types are allowed for the remaining text of the description. • The maximum length for the description must not exceed 1000 characters.

3. Click **Create**.

Importing an existing Solution

Follow this procedure to import a solution that has been created using a previous version of the product and exported, or that has been duplicated using the export functionality.

> ⓘ The format of files exported from previous versions of the product is .xml, while currently the .json format has replaced .xml.

1. In the **Solutions** page, click 🔼 **Import Solution**. The **Import Solution** page is displayed.
2. Click **Choose File** and browse for the required .xml or .json file.
3. Select the file and click **Open**.
4. Insert a name for the solution in the **SOLUTION NAME** edit box.
5. Click the 🔼 **Import** button. The new solution is displayed in the **Solutions** page.

Import of Custom Entities

If you are warned that the solution you are importing contains custom entities, you should verify that after the migration they have been exposed correctly. In particular, you should check the data types to make sure that the semantics has been properly formulated according to your requirements.

> ⚠ The data configured in Smart Views will not be imported, since they are generated by runtime operations.

5.2 Exporting a Solution

Follow this procedure to export a solution. If you need to duplicate a specific solution, you can use this functionality to export it and then import it again.

Procedure

1. In the **Solutions** page, select the solution you want to export and click ↗ **Export Solution**.
2. Click **OK** to confirm: you are prompted to save the .json file.

> ⚠ The data configured in Smart Views will not be exported, since they are generated by runtime operations.

6 How to Configure a Project

In this step you can create a project and select a number of functionalities, which are the first necessary items to configure a data warehouse.

Prerequisites

You have created a solution.

Accessing the Page

To access the **Projects** page:

1. Select a solution in the **Solutions** page.
2. Click ⬀ **Open Solution**.
3. Click the **Projects** card.

Workflow

1. Create a Project
2. (Optional) Edit a Project
3. Add a Site
4. Select Sources
5. (Optional) Configure Model Extensions
6. (Optional) Configure Entity Extensions
7. Plan a Schedule

Additional Operations

Display the Data Model

6.1 Creating a Project

In this step you can create a a self-consistent project whose execution results in information ingestion, that is the process of obtaining and importing data for immediate use or storage in a database.

Procedure

1. In the **Projects** page, click ⊕ **Create Project**.
2. Insert the following details:

Parameter	Description	Naming Convention
Name	A meaningful name that you want to assign to the Project.	• The first letter of the name must be an uppercase, lowercase or numeric character. • For the remaining characters of the name, only alphanumeric characters, underscores and spaces should be used. • Special characters (such as %, |, §, &, #, +, -, etc.) are not allowed. • The maximum length for names must not exceed 255 characters.
Description	Optional. A description to provide further information for the Project.	• The first letter of the description must be an uppercase, lowercase or numeric character. • Other character types are allowed for the remaining text of the description. • The maximum length for the description must not exceed 1000 characters.

3. In the pie menu on the left, select the slice that represents the required family. The pie will open to show more category sub-fields. To display the parent slices again, click on the center of the pie menu.

> ⚠ • If you mean to use SIMATIC IT MDW 1.0 database as a source, you must select the **Generic MOM** slice in the pie menu (for either the **Process** or the **Discrete** family) and then select all the available functionalities. This action is required to maintain the compatibility between the MDW 1.0 database and the data warehouse. In particular, it is necessary to include all the existing MOM functionalities in the emulation process, which cannot be customized and affects all the Generic MOM entities.
> • If the data source is SIMATIC IT LMS and you want to display SIMATIC IT LMS OOTB Reports, you must select the **Generic MOM** slice in the pie menu. For more details, see *SIMATIC IT LMS documentation* for the LMS versions where the integration of these reports is available.

4. Select one or more functionalities. You can select all the available functionalities or select a subset of them. In the same project you cannot select functionalities belonging to different families (for example Generic MOM and Process Industry), you can only add more functionalities for the same family after you have saved the project if you did not select all the available ones.

> ⚠ If you are using Opcenter Execution Process 4.0 or higher as a data source, select the **Sampling Management** functionality only if you are sure you have selected the **Sampling App** in Opcenter EX PR.

5. Click **Create**.

6.2 Editing a Project

In this step you can add more functionalities if you have selected only a subset of them during the creation of the project, but you cannot delete the functionalities you have already selected.

Prerequisites

You have created a project.

Procedure

1. In the **Projects** page, select a project.
2. Click ⬈ **Open Project**.
3. Click ✎ **Edit Project**.
4. Modify the project details. You can add more functionalities for the same family if you did not select all the available ones when you have created the project. You cannot select functionalities belonging to different families (for example Generic MOM and Process Industry) in the same project.
5. Click **Save**.

6.3 Adding a Site

Opcenter Intelligence supports multi-site scenarios; a site might be a plant, department, or another physical or logical point. In this step you must identify the sites where your working activity is carried out and choose a unique identifier for each of them. In the following step you will then associate the sites with the data sources selected for your project.

> ⓘ You must add at least one site. The other items of the command bar will not be enabled until a site has been created.

Prerequisites

You have created a project.

Procedure

1. In the **Projects** page, select a project.
2. In the **Physical Sites** tab, click ⊕ **Add Site**. The browser may ask you at this point the authorization to locate your position. If you deny it, you can insert the address manually.
3. Insert the following details:

Parameter	Description
Name	A meaningful name that you want to assign to the site. ⚠ This value must be unique within the project.
Description	Optional. A description to provide further information for the site.

Parameter	Description
Site Number	Integer greater than zero that cannot exceed 32,000. This field is mandatory and must be unique within the project. The default value is 1, therefore it must be modified if more than one site needs to be defined. It is used to generate the (numeric) identifier in the data warehouse and also to identify the sites in data sources when the latter are multi-site (for example MDW or QMS). Depending on the data source type, the system follows either of these behaviors: • **Single-site source**: the site identifier is related to the source and all incoming data is "marked" with the configured **SiteNumber**. This means that the **bm20.Site** table in the MDW will contain a single row and the **SiteId** will be the same as the configured **SiteNumber**. • **Multi-site source**: the **SiteNumber** is used to differentiate data coming from the source and to generate records in the DWH. This means that the **bm20.Site** table will contain as many rows as the number of configured sites and their **SiteId** will be the same as the **SiteNumber**. The association of data coming from the source will be based on the **SiteNumber**, which will need to be the same as the one used in the source.
Time Zone	Select the Time Zone for the country where the site is located.
Latitude	Optional. This value can be inserted manually or detected by the system when you select a point from the map or insert an address.
Longitude	Optional. This value can be inserted manually or detected by the system when you select a point from the map or insert an address.
Address	The site address, which can be inserted manually or detected by the system when you insert the latitude and longitude or select a place from the map. If you want to enable the Google Maps control, you must obtain a Google Account Key and insert it in a specific field of the Opcenter Intelligence Configurator. For more details, see *Opcenter Intelligence Installation Manual*. If the Web service cannot be reached (for example if a firewall is blocking the server), the system will not be able to detect the position. In that case you will have to insert the latitude and longitude manually. This parameter is not stored by the system but is used to determine the latitude and the longitude.

4. Click **Save**.

6.4 Selecting Sources

In this step, you can select the entities that supply data. They may include Opcenter products, a data warehouse (MDW) that has been generated by previous versions of the product or the data warehouse generated by Opcenter Intelligence. Third-party systems, such as SQL Server or Oracle, can also be used as data sources.

If you want to add a security encryption to enhance protection of your system, you should add a property after SQL Server configuration. See the page on environment configuration for more details.

Prerequisites

- Prerequisites may vary depending on the type of source database. For more details, see each source specific page.
- You must make sure that the selected source supports more than one site.

Procedure

1. In the **Project** page, select the **Sources** tab.
2. Click ⊕ **Create Source**.
3. Insert a name for the source. When you name an item, you must follow these rules:
    - The first letter of the name must be an uppercase, lowercase or numeric character.
    - For the remaining characters of the name, only alphanumeric characters, underscores and spaces should be used.
    - Special characters (such as %, |, §, &, #, +, -, etc.) are not allowed.
    - The maximum length for names must not exceed 255 characters.
4. Select one or more **Physical Sites** for the source you are selecting.
5. In the pie menu, click on the required source family.
6. Select a product and a product version within the family.
7. Select the product functionalities in line with those you have already selected during the project creation.
8. Click 🖫 **Save**.

Opcenter Intelligence Sources

The following sources are available:

Product Families	Products	Product Versions
Opcenter EX	Opcenter Execution Core (SQL Server)	- 8.0 to 8.6 - 8.7 or higher
	Opcenter Execution Core (Oracle)	- 8.0 to 8.6 - 8.7 or higher
	Opcenter Execution Discrete (SQL Server)	- 3.0 - 3.1 - 3.2 - 3.3 - 4.0 - 4.1 - 4.2 - 4.3 - 4.4 or higher
	Opcenter Execution Electronics (SQL Server)	8.9 or higher
	Opcenter Execution Process	- 3.0 to 3.3 - 4.0 or higher

Product Families	Products	Product Versions
	Opcenter Execution Foundation OEE	2207 or higher
	Opcenter Execution Pharma (Oracle)	2211 or higher
Opcenter IN	Intelligence Analytical Model	2.x - 3.x (MDW 2.0)
Opcenter QL	Opcenter Quality (SQL Server)	• 11.0 to 11.3 • 12.0
	Opcenter Quality (Oracle)	• 11.0 to 11.3 • 12.0
Opcenter IPL	Opcenter Intra Plant Logistics (SQL Server)	2210 or higher
SIMATIC IT UA	Discrete Manufacturing	• 1.0 - 1.1 - 1.2 - 1.3 • 2.3 - 2.4 - 2.5
	Process Industries	• 1.1 Update 1 - 1.2 • 2.3 • 2.4 - 2.5
CEP	Camstar Enterprise Platform Core (SQL Server)	V7 SU4 - SU5 - SU6 - SU7 - SU8
	Camstar Enterprise Platform Core (Oracle)	V7 SU4 - SU5 - SU6 - SU7 - SU8
QMS	QMS Professional (SQL Server)	10.03 - 10.04 - 10.05 - 10.06 - 10.07
	QMS Professional (Oracle)	10.03 - 10.04 - 10.05 - 10.06 - 10.07
SIMATIC IT	Line Monitoring System	• 2.2 SP1 HF1 • 2.3 - 2.4 - 2.5 - 2.6 - 2.7
	Production Suite	7.0 SPx - 7.1 - 7.2 - 8.0
	Historian	7.2
	Reporting Framework	MDW 1.0

Product Families	Products	Product Versions
	Electronic Batch Recording (Oracle)	6.1.6
Third-Party Systems	SQL Server	2012 or higher
	Oracle	12c or higher

6.4.1 Opcenter Execution Core 8.0 to 8.6 SQL Server

The following functionalities are available for **Opcenter Execution Core (Opcenter EX CR) 8.0 to 8.6** as SQL Server data source.

For more information on Opcenter Execution Core, see *Opcenter Execution Core Documentation*.

Prerequisites

When you create a SQL Server source, you must add a login with the following roles:

- **dbcreator** Server role in the SQL Server instance of the source database using the credentials of the **Domain User** you inserted in the Opcenter Intelligence Configurator (Opcenter Intelligence Core section - for more details, see *Opcenter Intelligence Installation Manual*);
- **db_datareader** Database role for each source database you want to access and from which you want to extract data.

Functionalities

The available functionalities for this source are the following:

- Defect and Non Conformance
- Downtime Management
- Equipment Management
- Labor Management
- Location Management
- Material Management
- Production Execution
- Quality APC

6.4.2 Opcenter Execution Core 8.7 or higher SQL Server

The following functionalities are available for **Opcenter Execution Core (Opcenter EX CR) 8.7 or higher** as a SQL Server data source.

For more information on Opcenter Execution Core, see *Opcenter Execution Core Documentation*.

Prerequisites

When you create a SQL Server source, you must add a login with the following roles:

- **dbcreator** Server role in the SQL Server instance of the source database using the credentials of the **Domain User** you inserted in the Opcenter Intelligence Configurator (Opcenter Intelligence Core section - for more details, see *Opcenter Intelligence Installation Manual*);

- **db_datareader** Database role for each source database you want to access and from which you want to extract data.

Functionalities

- Completed WIP
- Container Management
- Defect and Non Conformance
- Device History
- Downtime Management
- Equipment Management
- Equipment Performance
- Labor Management
- Location Management
- Material Management
- Operational Performance and Quality
- Product and Material Traceability
- Production Execution
- Quality APC

6.4.3 Opcenter Execution Core 8.0 to 8.6 Oracle

The following functionalities are available for **Opcenter Execution Core (Opcenter EX CR) 8.0 to 8.6** as an Oracle data source.

Before you execute the deploy of a solution where the Opcenter Execution Core source has been selected, check that the following requirements have been met:

Prerequisites

- Oracle Data Provider for .NET (ODP.NET) must be installed on the same computer where Opcenter Intelligence is running.
- The user who has been configured in Oracle for Windows Authentication must be the same user who owns the rights to run Opcenter Intelligence service. For more information, see *Opcenter Intelligence Installation Manual*.
- The **BM20LOAD**, **DELETEDBM20LOAD** and **BM20PRIVATE** users must have been created before you execute the deploy of a solution where the Oracle source has been selected.

Role and Minimum Privileges for BM20LOAD users

The following role and system privileges are sufficient for the BM20LOAD user:

Role

CONNECT

Privileges

GRANT CREATE any type TO BM20LOAD;
GRANT CREATE type TO BM20LOAD;
GRANT DROP any type TO BM20LOAD;
GRANT ALTER any procedure TO BM20LOAD;
GRANT ALTER any type TO BM20LOAD;
GRANT CREATE procedure TO BM20LOAD;
GRANT CREATE any procedure TO BM20LOAD;

Role and Minimum Privileges for DELETEDBM20LOAD and BM20PRIVATE users

The following role and system privileges are sufficient for the DELETEDBM20LOAD and BM20PRIVATE users:

Role

CONNECT

Privileges

GRANT CREATE ANY VIEW
GRANT CREATE PROCEDURE
GRANT CREATE VIEW
GRANT DROP ANY VIEW
GRANT EXECUTE ANY PROCEDURE
GRANT SELECT ANY TABLE

Functionalities

The available functionalities for this source are the following:

- Defect and Non Conformance
- Downtime Management
- Equipment Management
- Labor Management
- Location Management
- Material Management
- Production Execution
- Quality APC

6.4.4 Opcenter Execution Core 8.7 or higher Oracle

The following functionalities are available for **Opcenter Execution Core (Opcenter EX CR) 8.7 or higher** as Oracle data source.

For more information on Opcenter Execution Core, see *Opcenter Execution Core Documentation*.

Prerequisites

- Oracle Data Provider for .NET (ODP.NET) must be installed on the same computer where Opcenter Intelligence is running.
- The user who has been configured in Oracle for Windows Authentication must be the same user who owns the rights to run Opcenter Intelligence service. For more information, see *Opcenter Intelligence Installation Manual*.
- The **BM20LOAD**, **DELETEDBM20LOAD** and **BM20PRIVATE** users must have been created before you execute the deploy of a solution where the Oracle source has been selected.

Role and Minimum Privileges for BM20LOAD users

The following role and system privileges are sufficient for the BM20LOAD user:

Role

CONNECT

Privileges

GRANT CREATE any type TO BM20LOAD;
GRANT CREATE type TO BM20LOAD;

GRANT DROP any type TO BM20LOAD;
GRANT ALTER any procedure TO BM20LOAD;
GRANT ALTER any type TO BM20LOAD;
GRANT CREATE procedure TO BM20LOAD;
GRANT CREATE any procedure TO BM20LOAD;

Role and Minimum Privileges for DELETEDBM20LOAD and BM20PRIVATE users

The following role and system privileges are sufficient for the DELETEDBM20LOAD and BM20PRIVATE users:

Role

CONNECT

Privileges

GRANT CREATE ANY VIEW
GRANT CREATE PROCEDURE
GRANT CREATE VIEW
GRANT DROP ANY VIEW
GRANT EXECUTE ANY PROCEDURE
GRANT SELECT ANY TABLE

Functionalities

- Completed WIP
- Container Management
- Defect and Non Conformance
- Downtime Management
- Equipment Management
- Equipment Performance
- Labor Management
- Location Management
- Material Management
- Operational Performance and Quality
- Production Execution
- Quality APC

6.4.5 Opcenter Execution Discrete SQL Server

The following functionalities are available for these SQL Server data sources:

- **Opcenter Execution Discrete (Opcenter EX DS) 3.0**
- **Opcenter Execution Discrete (Opcenter EX DS) 3.1 - 3.2 - 3.3**
- **Opcenter Execution Discrete (Opcenter EX DS) 4.0**
- **Opcenter Execution Discrete (Opcenter EX DS) 4.1 - 4.2 - 4.3**
- **Opcenter Execution Discrete (Opcenter EX DS) 4.4 or higher**

> ⓘ If you are upgrading from Opcenter EX DS 3.x or 4.0 to Opcenter EX DS 4.1 or higher, you have to follow the procedure to Migrate the EquipmentKey in Opcenter Execution Discrete.

> ⚠ If you are using Opcenter Execution Discrete 2301.0001 or higher as a data source, when more than one equipment hierarchy has been configured, only the equipment hierarchy flagged as default is loaded into the Manufacturing Data Warehouse by Opcenter Intelligence. If only one equipment hierarchy exists in Opcenter EX DS, it is loaded into the MDW.

Prerequisites

When you create a SQL Server source, you must add a login with the following roles:

- **dbcreator** Server role in the SQL Server instance of the source database using the credentials of the **Domain User** you inserted in the Opcenter Intelligence Configurator (Opcenter Intelligence Core section - for more details, see *Opcenter Intelligence Installation Manual*);
- **db_datareader** and **db_datawriter** Database roles for each source database you want to access and from which you want to extract data.

> ⚠ If you have configured cleaning rules in Opcenter EX DS database, please [check these important recommendations](#) to avoid overlap between them and Opcenter Intelligence flow schedules.

Functionalities

- Certification Management (*available starting from Opcenter EX DS 4.4*)
- Defect and Non Conformance
- Equipment Management
- Equipment Performance
- Labor Management
- Labor Performance
- Location Management
- Material Management
- Production Definition
- Production Execution
- Production Scheduling
- Quality APC

6.4.6 Opcenter Execution Electronics 8.9 or higher SQL Server

The following functionalities are available for **Opcenter Execution Electronics (Opcenter EX EL) 8.9 or higher** as a SQL Server data source.

For more information on Opcenter Execution Electronics, see *Opcenter Execution Electronics Documentation*.

Prerequisites

When you create a SQL Server source, you must add a login with the following roles:

- **dbcreator** Server role in the SQL Server instance of the source database using the credentials of the **Domain User** you inserted in the Opcenter Intelligence Configurator (Opcenter Intelligence Core section - for more details, see *Opcenter Intelligence Installation Manual*);
- **db_datareader** Database role for each source database you want to access and from which you want to extract data.

Functionalities

- Completed WIP

- Container Management
- Defect and Non Conformance
- Downtime Management
- Equipment Management
- Equipment Performance
- Labor Management
- Location Management
- Material Management
- Operational Performance and Quality
- Product and Material Traceability
- Production Execution
- Quality APC

6.4.7 Opcenter Execution Process 3.x

The following functionalities are available for the **Opcenter Execution Process (Opcenter EX PR) 3.0 to 3.3** data sources.

For more information on this product, see *Opcenter Execution Process Documentation*.

Prerequisites

When you create a SQL Server source, you must add a login with the following roles:

- **dbcreator** Server role in the SQL Server instance of the source database using the credentials of the **Domain User** you inserted in the Opcenter Intelligence Configurator (Opcenter Intelligence Core section - for more details, see *Opcenter Intelligence Installation Manual*);
- **db_datareader** Database role for each source database you want to access and from which you want to extract data.

> ⚠ If you have configured cleaning rules in Opcenter EX PR database, please check these important recommendations to avoid overlap between them and Opcenter Intelligence flow schedules.

Functionalities

The following functionalities are available for this source:

- Equipment Management
- Location Management
- Material Management
- Production Definition
- Production Execution
- Production Scheduling

6.4.8 Opcenter Execution Process 4.0 or higher

The following functionalities are available for the **Opcenter Execution Process (Opcenter EX PR) 4.0 or higher** data source.

For more information on this product, see *Opcenter Execution Process Documentation*.

Prerequisites

When you create a SQL Server source, you must add a login with the following roles:

- **dbcreator** Server role in the SQL Server instance of the source database using the credentials of the **Domain User** you inserted in the Opcenter Intelligence Configurator (Opcenter Intelligence Core section - for more details, see *Opcenter Intelligence Installation Manual*);
- **db_datareader** Database role for each source database you want to access and from which you want to extract data.

> ⚠ If you are using Opcenter Execution Process 2301.0001 or higher as a data source, when more than one equipment hierarchy has been configured, only the equipment hierarchy flagged as default is loaded into the Manufacturing Data Warehouse by Opcenter Intelligence. If only one equipment hierarchy exists in Opcenter EX PR, it is loaded into the MDW.

> ⚠ If you have configured cleaning rules in Opcenter EX PR database, please check these important recommendations to avoid overlap between them and Opcenter Intelligence flow schedules.

Functionalities

- Equipment Management
- Labor Management
- Location Management
- Material Management
- Production Definition
- Production Execution
- Production Scheduling
- Sampling Management
- Quality APC

> ⚠ Select the Sampling Management functionality only if you are sure you have selected the **Sampling App** in Opcenter EX PR.

6.4.9 Opcenter Execution Foundation OEE

The following functionalities are available for **Opcenter Execution Foundation OEE 2207 or higher**.

> ⚠ To select the Opcenter Execution Foundation OEE data source on the pie menu, select the Line Monitoring System 2.3-2.4-2.5-2.6-2.7 product version.

For more information on this product, see *Opcenter Execution Foundation OEE documentation*.

Prerequisites

When you create a SQL Server source, you must add a login with the following roles:

- **dbcreator** Server role in the SQL Server instance of the source database using the credentials of the **Domain User** you inserted in the Opcenter Intelligence Configurator (Opcenter Intelligence Core section - for more details, see *Opcenter Intelligence Installation Manual*);
- **db_datareader** and **db_datawriter** Database roles for each source database you want to access and from which you want to extract data.

Functionalities

The available functionalities for this source are the following:

- Context Management
- Downtime Management
- Equipment Capacity
- Equipment Management
- Equipment Performance

6.4.10 Opcenter Execution Pharma Oracle

The following functionalities are available for **Opcenter Execution Pharma (Opcenter EX PH) 2211 or higher** as an **Oracle** data source.

For information on the steps that involve operating directly on Opcenter EX PH, see *Opcenter Execution Pharma documentation*.

Before you execute the deploy of a solution where the Opcenter EX PH Oracle source has been selected, check that the following requirements have been met.

Prerequisites

- Oracle Data Provider for .NET (ODP.NET) must be installed on the same computer where Opcenter Intelligence is running, otherwise the error "*The OraOLEDB.Oracle provider is not registered on the local machine*" will be raised during deploy.
- (Only if Windows Authentication is used) The user who has been configured in Oracle for Windows Authentication must be the same user who owns the rights to run Opcenter IN service (otherwise the error "*Login Failed*" is raised). For more information, see *Opcenter Intelligence Installation Manual*.
- The **BM20LOAD**, **DELETEDBM20LOAD** and **BM20PRIVATE** users must have been created before you execute the deploy of a solution where the Oracle source has been selected

Role and Minimum Privileges for BM20LOAD users

The following role and system privileges are sufficient for the BM20LOAD user:

Role

CONNECT

Privileges

GRANT CREATE any type TO BM20LOAD;
GRANT CREATE type TO BM20LOAD;
GRANT DROP any type TO BM20LOAD;
GRANT ALTER any procedure TO BM20LOAD;
GRANT ALTER any type TO BM20LOAD;
GRANT CREATE procedure TO BM20LOAD;
GRANT CREATE any procedure TO BM20LOAD;

Role and Minimum Privileges for DELETEDBM20LOAD and BM20PRIVATE users

The following role and system privileges are sufficient for the DELETEDBM20LOAD and BM20PRIVATE users:

Role

CONNECT

Privileges

GRANT CREATE ANY VIEW
GRANT CREATE PROCEDURE
GRANT CREATE VIEW

GRANT DROP ANY VIEW
GRANT EXECUTE ANY PROCEDURE
GRANT SELECT ANY TABLE

Functionalities

- Equipment Management
- Labor Management
- Location Management
- Material Management
- Production Execution
- Production Scheduling

6.4.11 Intelligence Analytical Model

The following functionalities are available for **Intelligence Analytical Model 2.x - 3.x (MDW 2.0)**.

Prerequisites

When you create a SQL Server source, you must add a login with the following roles:

- **dbcreator** Server role in the SQL Server instance of the source database using the credentials of the **Domain User** you inserted in the Opcenter Intelligence Configurator (Opcenter Intelligence Core section - for more details, see *Opcenter Intelligence Installation Manual*);
- **db_datareader** Database role for each source database you want to access and from which you want to extract data.

Functionalities

- Defect and Non Conformance
- Downtime Management
- Equipment Management
- Equipment Performance
- Labor Management
- Labor Performance
- Location Management
- Maintenance Management
- Material Management
- Production Definition
- Production Execution
- Production Scheduling
- Quality APC
- Quality SPC
- Tag Management

6.4.12 Opcenter Quality SQL Server

The following functionalities are available for **Opcenter Quality (Opcenter QL) 11.0 to 11.3 - 12.0** as a **SQL Server** data source.

For information on the steps that involve operating directly on Opcenter QL, see the *Opcenter Quality documentation*.

Prerequisites

When you create a SQL Server source, you must add a login with the following roles:

- **dbcreator** Server role in the SQL Server instance of the source database using the credentials of the **Domain User** you inserted in the Opcenter Intelligence Configurator (Opcenter Intelligence Core section - for more details, see *Opcenter Intelligence Installation Manual*);
- **db_datareader** Database role for each source database you want to access and from which you want to extract data.

> ⚠️ If you have selected Opcenter Quality as a SQL Server data source, you must configure the Opcenter Quality database to support incremental data load before deploying the environment.
> For more information, see *Opcenter Intelligence Installation Manual*.

Functionalities

The available functionalities for this source are the following:

- Defect and Non Conformance
- Equipment Management
- Labor Management
- Material Management
- Quality SPC

6.4.13 Opcenter Quality Oracle

The following functionalities are available for **Opcenter Quality (Opcenter QL) 11.0 to 11.3 - 12.0** as an **Oracle** data source.

For information on the steps that involve operating directly on Opcenter QL, see the *Opcenter Quality documentation*.

Before you execute the deploy of a solution where the Opcenter QL Oracle source has been selected, check that the following requirements have been met.

Prerequisites

- Oracle Data Provider for .NET (ODP.NET) must be installed on the same computer where Opcenter Intelligence is running.
- The user who has been configured in Oracle for Windows Authentication must be the same user who owns the rights to run Opcenter Intelligence service. For more information, see *Opcenter Intelligence Installation Manual*.
- The **BM20LOAD**, **DELETEDBM20LOAD** and **BM20PRIVATE** users must have been created before you execute the deploy of a solution where the Oracle source has been selected.

Role and Minimum Privileges for BM20LOAD users

The following role and system privileges are sufficient for the BM20LOAD user:

Role

CONNECT

Privileges

GRANT CREATE any type TO BM20LOAD;
GRANT CREATE type TO BM20LOAD;
GRANT DROP any type TO BM20LOAD;
GRANT ALTER any procedure TO BM20LOAD;
GRANT ALTER any type TO BM20LOAD;

GRANT CREATE procedure TO BM20LOAD;
GRANT CREATE any procedure TO BM20LOAD;

Role and Minimum Privileges for DELETEDBM20LOAD and BM20PRIVATE users

The following role and system privileges are sufficient for the DELETEDBM20LOAD and BM20PRIVATE users:

Role

CONNECT

Privileges

GRANT CREATE ANY VIEW
GRANT CREATE PROCEDURE
GRANT CREATE VIEW
GRANT DROP ANY VIEW
GRANT EXECUTE ANY PROCEDURE
GRANT SELECT ANY TABLE

Functionalities

- Defect and Non Conformance
- Equipment Management
- Labor Management
- Material Management
- Quality SPC

6.4.14 Opcenter Intra Plant Logistics SQL Server

The following functionalities are available for **Opcenter Intra Plant Logistics (Opcenter IPL) 2210 or higher** as a SQL Server data source.

> ⚠ Opcenter IPL 2404 supports non-integer quantity of inventory and consumption for specific use cases. At the moment the management of these values is not supported by Opcenter Intelligence, where values are rounded to the nearest integer.

For information on the steps that involve operating directly on Opcenter IPL, see the *Opcenter Intra Plant Logistics documentation*.

> ⚠ When you configure the Opcenter IPL data source, you must also configure another source for Opcenter Execution Electronics to load data in combination with Opcenter IPL.
> As Opcenter IPL will therefore load data from two different databases, if the two systems are located on different servers, a linked server needs to be created.
> For information on this operation, see https://learn.microsoft.com/en-us/sql/relational-databases/linked-servers/create-linked-servers-sql-server-database-engine?view=sql-server-ver16
> Opcenter Execution Electronics flows must be run before Opcenter IPL flows.

Prerequisites

Prerequisites

When you create a SQL Server source, you must add a login with the following roles:

- **dbcreator** Server role in the SQL Server instance of the source database using the credentials of the **Domain User** you inserted in the Opcenter Intelligence Configurator (Opcenter Intelligence Core section - for more details, see *Opcenter Intelligence Installation Manual*);
- **db_datareader** Database role for each source database you want to access and from which you want to extract data.

Functionalities

- Inventory Management
- Labor Management
- Material Consumption
- Material Container History

Important recommendation on Material Consumption data load

It is strongly recommended that you do not load a high amount of data (6 months at the maximum is the recommended amount) for the **MaterialConsumption** entity.

1. In Opcenter Intelligence Analytical Solution > Scenario > Data source server, select the data source database and click **Open**.
2. In the **Scripts** page, click **Create Script**. See also Loading a Script.
3. Select the **Material Consumption** model.
4. Select the **MaterialConsumption** entity.
5. Select the **Delete Script** type.
6. Replace the default script with the following SQL Statement. This example shows how to delete 6 months of data.

```sql
SELECT
    CAST(0 as smallint) as MaterialConsumptionSiteId,
    CAST(CAST(PcbID as nvarchar(255))+'_'+CAST(McID as nvarchar(255))+'_'+CAST(Operat
ion as nvarchar(255))+'_'+CONVERT(NVARCHAR(255), TimeDone, 113)+'_'+CAST(CompID as
 nvarchar(255)) as nvarchar(255)) as MaterialConsumptionKey,
    CAST(DATEADD(MINUTE,-5,GETUTCDATE()) as datetime) AS [RowInserted]
FROM [#IPLDB#].dbo.PCBTRACECONSUMPTIONDATA
WHERE DATEDIFF(DAY, InsertDate, GETUTCDATE()) > 182
```

6.4.15 SIMATIC IT Unified Architecture Discrete Manufacturing

The following functionalities are available for **SIMATIC IT Unified Architecture Discrete Manufacturing (SIMATIC IT UADM) 1.0 - 1.1 - 1.2 - 1.3 - 2.3 - 2.4 - 2.5**.

For more information on this product, see *SIMATIC IT Unified Architecture Discrete Manufacturing Documentation*.

Prerequisites

When you create a SQL Server source, you must add a login with the following roles:

- **dbcreator** Server role in the SQL Server instance of the source database using the credentials of the **Domain User** you inserted in the Opcenter Intelligence Configurator (Opcenter Intelligence Core section - for more details, see *Opcenter Intelligence Installation Manual*);
- **db_datareader** and **db_datawriter** Database roles for each source database you want to access and from which you want to extract data.

Functionalities

The available functionalities for this source are the following:

- Defect and Non Conformance
- Equipment Management
- Labor Management
- Labor Performance
- Location Management
- Material Management
- Production Definition
- Production Execution
- Production Scheduling
- Quality APC

6.4.16 SIMATIC IT Unified Architecture Process Industries

The following functionalities are available for **SIMATIC IT Unified Architecture Process Industries (SIMATIC IT UAPI) 1.1 Update 1 - 1.2 - 2.3 - 2.4 - 2.5**.

For more information on this product, see *SIMATIC IT Unified Architecture Process Industries Documentation*.

Prerequisites

When you create a SQL Server source, you must add a login with the following roles:

- **dbcreator** Server role in the SQL Server instance of the source database using the credentials of the **Domain User** you inserted in the Opcenter Intelligence Configurator (Opcenter Intelligence Core section - for more details, see *Opcenter Intelligence Installation Manual*);
- **db_datareader** Database role for each source database you want to access and from which you want to extract data.

Functionalities

The following functionalities are available for this source:

- Equipment Management
- Location Management
- Material Management
- Production Definition
- Production Execution
- Production Scheduling

6.4.17 Camstar Enterprise Platform Core SQL Server

The following functionalities are available for **Camstar Enterprise Platform (CEP) Core V7 SU4-SU5-SU6-SU7-SU8** as a **SQL Server** data source.

For more information on this product, see *Camstar Enterprise Platform Documentation*.

Prerequisites

When you create a SQL Server source, you must add a login with the following roles:

- **dbcreator** Server role in the SQL Server instance of the source database using the credentials of the **Domain User** you inserted in the Opcenter Intelligence Configurator (Opcenter Intelligence Core section - for more details, see *Opcenter Intelligence Installation Manual*);
- **db_datareader** Database role for each source database you want to access and from which you want to extract data.

Functionalities

The available functionalities for this source are the following:

- Defect and Non Conformance
- Downtime Management
- Equipment Management
- Labor Management
- Location Management
- Material Management
- Production Execution
- Quality APC

6.4.18 Camstar Enterprise Platform Core Oracle

The following functionalities are available for **Camstar Enterprise Platform (CEP) Core V7 SU4-SU5-SU6-SU7-SU8** as an **Oracle** data source.

Before you execute the deploy of a solution where the Camstar Enterprise Platform Oracle source has been selected, check that the following requirements have been met.

Prerequisites

- Oracle Data Provider for .NET (ODP.NET) must be installed on the same computer where Opcenter Intelligence is running.
- The user who has been configured in Oracle for Windows Authentication must be the same user who owns the rights to run Opcenter Intelligence service. For more information, see *Opcenter Intelligence Installation Manual*.
- The **BM20LOAD**, **DELETEDBM20LOAD** and **BM20PRIVATE** users must have been created before you execute the deploy of a solution where the Oracle source has been selected.

Role and Minimum Privileges for BM20LOAD users

The following role and system privileges are sufficient for the BM20LOAD user:

Role

CONNECT

Privileges

GRANT CREATE any type TO BM20LOAD;
GRANT CREATE type TO BM20LOAD;
GRANT DROP any type TO BM20LOAD;
GRANT ALTER any procedure TO BM20LOAD;
GRANT ALTER any type TO BM20LOAD;
GRANT CREATE procedure TO BM20LOAD;
GRANT CREATE any procedure TO BM20LOAD;

Role and Minimum Privileges for DELETEDBM20LOAD and BM20PRIVATE users

The following role and system privileges are sufficient for the DELETEDBM20LOAD and BM20PRIVATE users:

Role

CONNECT

Privileges

GRANT CREATE ANY VIEW
GRANT CREATE PROCEDURE
GRANT CREATE VIEW
GRANT DROP ANY VIEW
GRANT EXECUTE ANY PROCEDURE
GRANT SELECT ANY TABLE

Functionalities

The available functionalities for this source are the following:

- Defect and Non Conformance
- Downtime Management
- Equipment Management
- Labor Management
- Location Management
- Material Management
- Production Execution
- Quality APC

6.4.19 QMS Professional SQL Server source

The following functionalities are available for **QMS Professional 10.03 - 10.04 - 10.05 - 10.06 - 10.07** as a **SQL Server** data source.

For information on the steps that involve operating directly on QMS Professional, see the *QMS Professional CCM (Concern and Complaint Management)* and *SPC (Statistical Process Control)* documentation.

Prerequisites

When you create a SQL Server source, you must add a login with the following roles:

- **dbcreator** Server role in the SQL Server instance of the source database using the credentials of the **Domain User** you inserted in the Opcenter Intelligence Configurator (Opcenter Intelligence Core section - for more details, see *Opcenter Intelligence Installation Manual*);
- **db_datareader** Database role for each source database you want to access and from which you want to extract data.

> ⚠ If you have selected QMS Professional as a SQL Server data source, you must configure the QMS database to support incremental data load before deploying the environment.
> For more information, see *Opcenter Intelligence Installation Manual*.

Functionalities

The available functionalities for this source are the following:

- Defect and Non Conformance
- Equipment Management
- Labor Management
- Material Management

- Quality SPC

6.4.20 QMS Professional Oracle source

The following functionalities are available for **QMS Professional 10.03 - 10.04 - 10.05 - 10.06 - 10.07** as an **Oracle** data source.

For information on the steps that involve operating directly on QMS Professional, see the *QMS Professional CCM (Concern and Complaint Management)* and *SPC (Statistical Process Control)* documentation.

Before you execute the deploy of a solution where the QMS Oracle source has been selected, check that the following requirements have been met.

Prerequisites

- Oracle Data Provider for .NET (ODP.NET) must be installed on the same computer where Opcenter Intelligence is running.
- The user who has been configured in Oracle for Windows Authentication must be the same user who owns the rights to run Opcenter Intelligence service. For more information, see *Opcenter Intelligence Installation Manual*.
- The **BM20LOAD**, **DELETEDBM20LOAD** and **BM20PRIVATE** users must have been created before you execute the deploy of a solution where the Oracle source has been selected.

Role and Minimum Privileges for BM20LOAD users

The following role and system privileges are sufficient for the BM20LOAD user:

Role

CONNECT

Privileges

GRANT CREATE any type TO BM20LOAD;
GRANT CREATE type TO BM20LOAD;
GRANT DROP any type TO BM20LOAD;
GRANT ALTER any procedure TO BM20LOAD;
GRANT ALTER any type TO BM20LOAD;
GRANT CREATE procedure TO BM20LOAD;
GRANT CREATE any procedure TO BM20LOAD;

Role and Minimum Privileges for DELETEDBM20LOAD and BM20PRIVATE users

The following role and system privileges are sufficient for the DELETEDBM20LOAD and BM20PRIVATE users:

Role

CONNECT

Privileges

GRANT CREATE ANY VIEW
GRANT CREATE PROCEDURE
GRANT CREATE VIEW
GRANT DROP ANY VIEW
GRANT EXECUTE ANY PROCEDURE
GRANT SELECT ANY TABLE

Functionalities

- Defect and Non Conformance
- Equipment Management
- Labor Management
- Material Management
- Quality SPC

6.4.21 SIMATIC IT Line Monitoring System

The following functionalities are available for **SIMATIC IT Line Monitoring System (SIMATIC IT LMS) 2.2 SP1 HF1 - 2.3 - 2.4 - 2.5 - 2.6 - 2.7**.

For more information on this product, see the *SIMATIC IT Line Monitoring System Documentation*.

Prerequisites

When you create a SQL Server source, you must add a login with the following roles:

- **dbcreator** Server role in the SQL Server instance of the source database using the credentials of the **Domain User** you inserted in the Opcenter Intelligence Configurator (Opcenter Intelligence Core section - for more details, see *Opcenter Intelligence Installation Manual*);
- **db_datareader** and **db_datawriter** Database roles for each source database you want to access and from which you want to extract data.

Functionalities

The available functionalities for this source are the following:

- Context Management
- Downtime Management
- Equipment Capacity
- Equipment Management
- Equipment Performance

6.4.22 SIMATIC IT Production Suite

The following functionalities are available for **SIMATIC IT Production Suite (SIMATIC IT PRS) 7.0 SPx - 7.1 - 7.2 - 8.0**.

For more information on this product, see the *SIMATIC IT Production Suite Documentation*.

Prerequisites

When you create a SQL Server source, you must add a login with the following roles:

- **dbcreator** Server role in the SQL Server instance of the source database using the credentials of the **Domain User** you inserted in the Opcenter Intelligence Configurator (Opcenter Intelligence Core section - for more details, see *Opcenter Intelligence Installation Manual*);
- **db_datareader** and **db_datawriter** Database roles for each source database you want to access and from which you want to extract data.

Functionalities

The available functionalities for this source are the following:

- Equipment Management
- Labor Management
- Location Management

- Maintenance Management
- Material Management
- Production Definition
- Production Execution
- Production Scheduling

6.4.23 SIMATIC IT Historian

The following functionalities are available for **SIMATIC IT Historian 7.2**.

For more information on this product, see *SIMATIC IT Historian documentation*.

Prerequisites

When you create a SQL Server source, you must add a login with the following roles:

- **dbcreator** Server role in the SQL Server instance of the source database using the credentials of the **Domain User** you inserted in the Opcenter Intelligence Configurator (Opcenter Intelligence Core section - for more details, see *Opcenter Intelligence Installation Manual*);
- **db_datareader** and **db_datawriter** Database roles for each source database you want to access and from which you want to extract data.

Functionalities

The available functionality for this source is the following:

- Tag Management

6.4.24 SIMATIC IT Reporting Framework

The following functionalities are available for **SIMATIC IT Reporting Framework (Manufacturing Data Warehouse 1.0)**.

Prerequisites

When you create a SQL Server source, you must add a login with the following roles:

- **dbcreator** Server role in the SQL Server instance of the source database using the credentials of the **Domain User** you inserted in the Opcenter Intelligence Configurator (Opcenter Intelligence Core section - for more details, see *Opcenter Intelligence Installation Manual*);
- **db_datareader** Database role for each source database you want to access and from which you want to extract data.

Functionalities

- Defect and Non Conformance
- Downtime Management
- Equipment Management
- Equipment Performance
- Labor Management
- Labor Performance
- Location Management
- Maintenance Management
- Material Management
- Production Definition
- Production Execution

- Production Scheduling
- Quality APC
- Quality SPC

6.4.25 SIMATIC IT Electronic Batch Recording Oracle

The following functionalities are available for **SIMATIC IT Electronic Batch Recording (SIMATIC IT eBR) 6.1.6** as an **Oracle** data source.

For information on the steps that involve operating directly on SIMATIC IT Electronic Batch Recording, see *SIMATIC IT eBR documentation*.

Before you execute the deploy of a solution where the SIMATIC IT eBR Oracle source has been selected, check that the following requirements have been met.

Prerequisites

- Oracle Data Provider for .NET (ODP.NET) must be installed on the same computer where Opcenter Intelligence is running, otherwise the error "*The OraOLEDB.Oracle provider is not registered on the local machine*" will be raised during deploy.
- The user who has been configured in Oracle for Windows Authentication must be the same user who owns the rights to runOpcenter Intelligence service (otherwise the error "*Login Failed*" is raised). For more information, see *Opcenter Intelligence Installation Manual*.
- The **BM20LOAD**, **DELETEDBM20LOAD** and **BM20PRIVATE** users must have been created before you execute the deploy of a solution where the Oracle source has been selected.

Role and Minimum Privileges for BM20LOAD users

The following role and system privileges are sufficient for the BM20LOAD user:

Role

CONNECT

Privileges

GRANT CREATE any type TO BM20LOAD;
GRANT CREATE type TO BM20LOAD;
GRANT DROP any type TO BM20LOAD;
GRANT ALTER any procedure TO BM20LOAD;
GRANT ALTER any type TO BM20LOAD;
GRANT CREATE procedure TO BM20LOAD;
GRANT CREATE any procedure TO BM20LOAD;

Role and Minimum Privileges for DELETEDBM20LOAD and BM20PRIVATE users

The following role and system privileges are sufficient for the DELETEDBM20LOAD and BM20PRIVATE users:

Role

CONNECT

Privileges

GRANT CREATE ANY VIEW
GRANT CREATE PROCEDURE
GRANT CREATE VIEW
GRANT DROP ANY VIEW

GRANT EXECUTE ANY PROCEDURE
GRANT SELECT ANY TABLE

Functionalities

- Labor Management
- Material Management
- Production Execution
- Production Scheduling

6.4.26 Third-Party Systems SQL Server source

You can select third-party SQL Server database management system as a data source when you create a project.

Depending of the type of project, the available functionalities may vary. For example, if you have selected **Generic MOM > Discrete** during the project creation, in the pie menu the **Defect and Non Conformance** functionality will be present, while it will not be shown if the **Generic MOM > Process** slice has been chosen.

Before you execute the deploy of a solution where the third-party SQL Server source has been selected, take into account that by default the deploy operation creates the database views in the source database. If you want to avoid any overlap between Opcenter Intelligence database and the source database, you need to manually create a new intermediate database and insert the name of this database in the **Databases** tab, under the column **Database Name**.

Prerequisites

When you create a SQL Server source, you must add a login with the following roles:

- **dbcreator** Server role in the SQL Server instance of the source database using the credentials of the **Domain User** you inserted in the Opcenter Intelligence Configurator (Opcenter Intelligence Core section - for more details, see *Opcenter Intelligence Installation Manual*);
- **db_datareader** Database role for each source database you want to access and from which you want to extract data.

Functionalities

- Defect and Non Conformance
- Downtime Management
- Equipment Capacity
- Equipment Management
- Equipment Performance
- Labor Management
- Labor Performance
- Location Management
- Maintenance Management
- Material Management
- Production Definition
- Production Execution
- Production Scheduling
- Quality APC
- Quality SPC
- Tag Management

6.4.27 Third-Party Systems Oracle source

You can select Oracle database management system as a data source when you create a project.

Depending of the type of project, the available functionalities may vary. For example, if you have selected **Generic MOM > Discrete** during the project creation, in the pie menu the **Defect and Non Conformance** functionality will be present, while it will not be shown if the **Generic MOM > Process** slice has been chosen.

Before you execute the deploy of a solution where the Oracle source has been selected, check that the following requirements have been met.

Prerequisites

- Oracle Data Provider for .NET (ODP.NET) must be installed on the same computer where Opcenter Intelligence is running.
- The user who has been configured in Oracle for Windows Authentication must be the same user who owns the rights to run Opcenter Intelligence service. For more information, see *Opcenter Intelligence Installation Manual*.
- The **BM20LOAD**, **DELETEDBM20LOAD** and **BM20PRIVATE** users must have been created before you execute the deploy of a solution where the Oracle source has been selected.

Role and Minimum Privileges for BM20LOAD users

The following role and system privileges are sufficient for the BM20LOAD user:

Role

CONNECT

Privileges

GRANT CREATE any type TO BM20LOAD;
GRANT CREATE type TO BM20LOAD;
GRANT DROP any type TO BM20LOAD;
GRANT ALTER any procedure TO BM20LOAD;
GRANT ALTER any type TO BM20LOAD;
GRANT CREATE procedure TO BM20LOAD;
GRANT CREATE any procedure TO BM20LOAD;

Role and Minimum Privileges for DELETEDBM20LOAD and BM20PRIVATE users

The following role and system privileges are sufficient for the DELETEDBM20LOAD and BM20PRIVATE users:

Role

CONNECT

Privileges

GRANT CREATE ANY VIEW
GRANT CREATE PROCEDURE
GRANT CREATE VIEW
GRANT DROP ANY VIEW
GRANT EXECUTE ANY PROCEDURE
GRANT SELECT ANY TABLE

Functionalities

The available functionalities for this source are the following:

- Defect and Non Conformance

- Downtime Management
- Equipment Capacity
- Equipment Management
- Equipment Performance
- Labor Management
- Labor Performance
- Location Management
- Maintenance Management
- Material Management
- Production Definition
- Production Execution
- Production Scheduling
- Quality APC
- Quality SPC
- Tag Management

6.5 How to Configure Model Extensions

This optional step allows you to add new entities to the project, which can only be a subset of the entities managed by the system. In this page you can add a new entity to those that already exist for the project to customize the OOTB model. Every extension is specific to the project.

Workflow

1. Create a Model Extension
2. Select a Source for the Model Extension
3. (Optional) Delete a Model Extension
4. Load Custom Scripts
5. Deploy the Environment (for the first time or deploy the environment again)
6. Run a Flow
   - if the data warehouse is empty, run an initial flow to load custom entities;
   - if the data warehouse has already been populated (by means of an initial flow and possibly a number of incremental flows) you can launch a Run Single Entity operation to retrieve the extension data.

6.5.1 Creating a Model Extension

Follow this procedure to create a model extension.

If you create model extensions and then set a relationship between them and other extensions, when you want to delete data please keep in mind these recommendations.

Procedure

1. In the **Project** page, select the **Model Extensions** tab.
2. Click ⊕ **Create Model Extension**.
3. Insert the following details:

Parameter	Description
Name	A meaningful name that you want to assign to the model extension. ⚠ You cannot use the name of a standard entity or an existing model extension. • The first letter of the name must be an uppercase, lowercase or numeric character. • For the remaining characters of the name, only alphanumeric characters, underscores and spaces should be used. • Special characters (such as %, |, §, &, #, +, -, etc.) are not allowed. • The maximum length for names must not exceed 255 characters.
Description	Optional. A description to provide further information for the model extension. • The first letter of the description must be an uppercase, lowercase or numeric character. • Other character types are allowed for the remaining text of the description. • The maximum length for the description must not exceed 1000 characters.

4. Select the **Granularity Type**, which provides the system with the information necessary to estimate space and index requirements for the entity, together with the capacity to optimize the access to this entity. The three following types of granularity have been defined:
    - **Small**: entities that typically amount to a few dozen/hundred records, such as classification, type or state entities.
    - **Standard**: entities that amount to a few thousand records and that typically represent analysis contexts such as equipment, material definition, labor, etc.
    - **Large**: entities that exceed hundreds of thousands or millions of records, typically entities that represent facts.

5. Select the **Entity Type**, which can be one of the following:
    - **Analytical Context**: dimension tables, which contain descriptive attributes. Each dimension table has a single field primary key (PK) which has a one-to-many relationship with a foreign key (FK) in the fact table. As a consequence, dimensions can only contain textual data.
    - **Analytical Fact**: a fact table, which contains measurable, quantitative data about the business. The fact table can only include numerical data and relationships with Analytical Context.
    - **Generic Entity**: entity type that is not strictly related to star schema modeling but that permits to model entities that contain both numeric and textual information useful for the generation of reports. If you select this entity type, you can add columns of any type, i.e. all the types available for Analytical Facts and Analytical Context entity types and relationships with Analytical Context..

6. Insert the **Column Name**.

    ⓘ The [Name]Id, [Name]SiteId, [Name]Key, RowUpdated and RowInserted columns are automatically added.

7. Select the **Column Type**, which, depending on the entity type you have previously selected. It can be one of the following:

Entity Type	Column Type	Description
Analytical Facts and **Generic Entity**	**Relationship**	To set a relationship with another entity. If you have added a **Relationship** column to an extension of analytical fact type, you can only set a relationship with an analytical context. On the contrary, if you have created an extension of analytical context type, you cannot set any relationship. If a **Relationship** column is added, the name of the column always ends with the name of the unique identifier of the target context (e.g. if the target context is Equipment, the name always ends with EquipmentId) and the name provided for the user is used as a prefix.
	Quantity	Numeric value (float) that can be aggregated by any type of aggregation (for example by a sum, average, min, max...) on the basis of a time dimension and of any other type of dimension.
	Level Quantity	Numeric value (float) that implicitly expresses the Sum aggregation based on time from the moment 0 to NOW. Therefore it provides the total quantity compared to the latest check. The Sum aggregation can only be used for non-time dimensions. All other aggregations can be performed on the basis of all possible dimensions (including time dimensions). For example, this value can express the liters of liquid in a tank at a certain moment. **Example** In a plant, two different tanks contain a liquid which can be either added to the tank or removed from it. • *Tank 1* contains **5** liters at 10 a.m. and **7** liters at 11 a.m. • *Tank 2* contains **8** liters at 10 a.m. and **4** liters at 11 a.m. If you add **5** to **7**, the result is not meaningful, because you would aggregate the values by a sum on the basis of a time dimension. However, if you add **5** to **8**, you can obtain the average number of liters available in the plant at 10 a.m., i.e. the aggregation is based on a non-time dimension.

Entity Type	Column Type	Description
	Unitary Quantity	Numeric value (float). The two following types exist: • measures that express a value compared to another unitary quantity (pieces per second, Euros per piece, etc.) • measures that can never be added together (for example temperature, humidity, etc.) These measures can never be aggregated by a sum, neither for time dimensions nor for non-time dimensions. Other aggregation functions, such as Average, Min and Max, can however be used for any type of dimension (including time dimensions). These types of quantity can be aggregated using a Sum when they are multiplied by a numeric value they have a relationship with. **Example 1** The unitary quantity "pieces per second" can be aggregated for time and non-time dimensions after you have multiplied it by the time required for the analysis. If a piece of equipment produces 5 items per second and you multiply it by 10 seconds you obtain 50 pieces, which is a quantity value that can be used for any type of dimension and aggregation. **Example 2** The temperature of two different equipment units (ovens) is measured by means of two sensors. You can calculate the Average, Min or Max temperature at a specific time, but it would make no sense to add the temperatures together.
	Duration	Numeric value that contains information about the duration.
	StartDateTime	Starting date and time of an event. For this field the UTC format must be applied. Local time columns will be automatically added by the system for each UTC time column.
	EndDateTime	Ending date and time of an event. For this field the UTC format must be applied. Local time columns will be automatically added by the system for each UTC time column.

Entity Type	Column Type	Description
	EventDateTime	Precise date and time of an event. For this field the UTC format must be applied. Local time columns will be automatically added by the system for each UTC time column.
Analytical Context and **Generic Entity**	**Name**	Field of "nvarchar" type that is used to create a column in the data warehouse to manage specific types of textual information. Identifies a property of 255 characters in length. This field is always mandatory ("not null").
	Description	Field of "nvarchar" type that is used to create a column in the data warehouse to manage specific types of textual information. Identifies a property of 1000 characters in length.
	Note	Field of "nvarchar" type that is used to create a column in the data warehouse to manage specific types of textual information. Identifies a property of 4000 characters in length.
	TextAttribute	Field of "nvarchar" type that is used to create a column in the data warehouse to manage specific types of textual information. Identifies a property of 255 characters in length.

8. Click ⊕ **Add Column**.
9. Click 💾 **Save**.

Deleting data when a relationship with other entities has been set

If you want to delete an extension and have previously set a relationship between this extension and other entities, the deletion must be performed first for the entities that have a relationship with it and then for the entity itself.

Example

You have created a model extension for the "Manufacturer" entity and an entity extension for the "Equipment" entity. You have then set a relationship in the "Equipment Extension" to the "Manufacturer".
If you want to delete the Manufacturer entity, you have to delete Equipment first, or remove the relationship between Manufacturer and Equipment, and then delete Manufacturer, otherwise the deletion will fail.

6.5.2 Selecting the Model Extension Source

Follow this procedure to select a model extension source.

Procedure

1. In the **Model Extensions** tab, select a model extension for which you want to select a source.

2. Click ⬀ **Open**.
3. In the **Extension Sources** page, click ⊕ **Create Extension Source**.
4. In the **Create Extension Source** panel, select one or more sources among those you have already created.
5. Click **Save**.

6.5.3 Deleting a Model Extension

You can delete a model extension when it is no longer used in dashboards nor reports. Before you delete it, you can choose whether you want to remove it permanently from the Manufacturing Data Warehouse or not. If you choose the first option, at the next deploy of the environment the entity is physically deleted from the data warehouse and views and stored procedures are removed from the data source contract.

Procedure

1. In the **Model Extensions** tab, select a model extension and click 🗑 **Delete Model Extension**.
2. In the **Delete Model Extension** panel, do either of the following:
    • leave the **Delete from Data Warehouse** check box selected if you want to remove the entity from the MDW.
    • deselect the **Delete from Data Warehouse** check box if you only want to remove the the views from the data source contracts.
3. Click **Delete**.

6.6 How to Configure Entity Extensions

In this step you can add a new column to those that already exist for the project entities. Every extension is specific to the project.

Workflow

1. Create an Entity Extension
2. Select a Source for the Entity Extension
3. (Optional) Delete an Entity Extension
4. Load Custom Scripts
5. Deploy the Environment
6. Run a Flow
    • if the data warehouse is empty, run an initial flow to load custom entities;
    • if the data warehouse has already been populated (by means of an initial flow and possibly a number of incremental flows) you can launch a Run Single Entity operation to retrieve the extension data.

6.6.1 Creating an Entity Extension

Follow this procedure to create an Entity Extension.

Procedure

1. In the **Project** page, select the **Entity Extensions** tab.
2. Click ⊕ **Create Entity Extension**.
3. From the **Entity** drop-down list, choose an entity.
4. In the **Column Name** field, insert a name for the column.
5. Select the **Column Type** from the available list, whose elements depend on the characteristics of the entity you have previously selected. Column types can be categorized as follows.

> ⚠ Depending on the type of entity you have selected, the **Column Type** drop-down list may contain columns of type "datetime".

Entity Type	Column Type	Description
Fact and **Generic Entity**	**Relationship**	To set a relationship with another entity. If you have added a **Relationship** column to an extension of analytical fact type, you can only set a relationship with an analytical context. On the contrary, if you have created an extension of analytical context type, you cannot set any relationship. If a **Relationship** column is added, the name of the column always ends with the name of the unique identifier of the target context (e.g. if the target context is Equipment, the name always ends with EquipmentId) and the name provided for the user is used as a prefix.
	Quantity	Numeric value (float) that can be aggregated by any type of aggregation (for example by a sum, average, min, max…) on the basis of a time dimension and of any other type of dimension.
	Level Quantity	Numeric value (float) that implicitly expresses the Sum aggregation based on time from the moment 0 to NOW. Therefore it provides the total quantity compared to the latest check. The Sum aggregation can only be used for non-time dimensions. All other aggregations can be performed on the basis of all possible dimensions (including time dimensions). For example, this value can express the liters of liquid in a tank at a certain moment. **Example** In a plant, two different tanks contain a liquid which can be either added to the tank or removed from it. • Tank 1 contains **5** liters at 10 a.m. and **7** liters at 11 a.m. • Tank 2 contains **8** liters at 10 a.m. and **4** liters at 11 a.m. If you add **5** to **7**, the result is not meaningful, because you would aggregate the values by a sum on the basis of a time dimension. However, if you add **5** to **8**, you can obtain the average number of liters available in the plant at 10 a.m., i.e. the aggregation is based on a non-time dimension.

Entity Type	Column Type	Description
	Unitary Quantity	Numeric value (float). The two following types exist: • measures that express a value compared to another unitary quantity (pieces per second, Euros per piece, etc.) • measures that can never be added together (for example temperature, humidity, etc.) These measures can never be aggregated by a sum, neither for time dimensions nor for non-time dimensions. Other aggregation functions, such as Average, Min and Max, can however be used for any type of dimension (including time dimensions). These types of quantity can be aggregated using a Sum when they are multiplied by a numeric value they have a relationship with. **Example 1** The unitary quantity "pieces per second" can be aggregated for time and non-time dimensions after you have multiplied it by the time required for the analysis. If a piece of equipment produces 5 items per second and you multiply it by 10 seconds you obtain 50 pieces, which is a quantity value that can be used for any type of dimension and aggregation. **Example 2** The temperature of two different equipment units (ovens) is measured by means of two sensors. You can calculate the Average, Min or Max temperature at a specific time, but it would make no sense to add the temperatures together.
	Duration	Numeric value that contains information about the duration.

Entity Type	Column Type	Description
Context and **Generic Entity**	**Name**	Field of "nvarchar" type that is used to create a column in the data warehouse to manage specific types of textual information. Identifies a property of 255 characters in length. ⚠ If you modify an entity extension that was already deployed and on which data was stored, you cannot use mandatory column types such as **Name**, otherwise the next deployment will fail because the system will not automatically add a value for that column. The recommended alternative is to use the **TextAttribute** or **Note** column types.
	Description	Field of "nvarchar" type that is used to create a column in the data warehouse to manage specific types of textual information. Identifies a property of 1000 characters in length.
	Note	Field of "nvarchar" type that is used to create a column in the data warehouse to manage specific types of textual information. Identifies a property of 4000 characters in length.
	TextAttribute	Field of "nvarchar" type that is used to create a column in the data warehouse to manage specific types of textual information. Identifies a property of 255 characters in length.
Hybrid	**StartDateTime**	Starting date and time of an event. For this field the UTC format must be applied. Local time columns will be automatically added by the system for each UTC time column.
	EndDateTime	Ending date and time of an event. For this field the UTC format must be applied. Local time columns will be automatically added by the system for each UTC time column.
	EventDateTime	Precise date and time of an event. For this field the UTC format must be applied. Local time columns will be automatically added by the system for each UTC time column.

6. Select the **Relationship** (only if the selected entity is a fact).
7. Click ⊕ **Add Column**.
8. Click 🖫 **Save**.

> ⚠ If the extended entity has already been selected in a smart view and you add relations to existing contexts in the extension, you must save measures again to display these relations in the **Attributes** tab of the smart view.

6.6.2 Selecting the Entity Extension Source

Follow this procedure to select the Entity Extension source.

Procedure

1. In the **Entity Extensions** tab, select an entity extension for which you want to select a source.
2. Click 🗗 **Open**.
3. In the **Extension Sources** page, click ⊕ **Create Extension Source**.
4. In the **Create Extension Source** panel, select one or more sources among those you have already created.
5. Click **Save**.

6.6.3 Deleting an Entity Extension

You can delete an entity extension when it is no longer used in dashboards nor reports. Before you delete it, you can choose whether you want to remove it permanently from the Manufacturing Data Warehouse or not. If you choose the first option, at the next deploy of the environment the entity is physically deleted from the data warehouse and views and stored procedures are removed from the data source contract.

Procedure

1. In the **Entity Extensions** tab, select an entity extension and click 🗑 **Delete Entity Extension**.
2. In the **Delete Entity Extension** panel, do either of the following:
   - leave the **Delete from Data Warehouse** check box selected if you want to remove the entity from the MDW.
   - deselect the **Delete from Data Warehouse** check box if you only want to remove the the views from the data source contracts.
3. Click **Delete**.

6.7 Planning a Schedule

In this step you can generate one or more periodic schedules in order to run ETL incremental loads to keep the data warehouse aligned with the sources. Subsequently, during the scenario configuration, you will be able to adapt the template created in this step to the actual scheduling of your plant.

Procedure

1. In the **Project** page, select the **Schedules** tab.
2. Click ⊕ **Create Schedule**.
3. Insert a name for the schedule. When you name an item, you must follow these rules:
   - The first letter of the name must be an uppercase, lowercase or numeric character.

- For the remaining characters of the name, only alphanumeric characters, underscores and spaces should be used.
- Special characters (such as %, |, §, &, #, +, -, etc.) are not allowed.
- The maximum length for names must not exceed 255 characters.

4. Select the **Project Source** from which data should be loaded.
5. In the **Frequency** area, select the frequency with which the ETL execution occurs:

Area	Options	Action
Frequency	**Daily**	Insert the number of days in the **Recurs** every box
	Weekly	Insert the number of weeks in the **Recurs every** box and select the day(s) of the week when the ETL execution occurs

	Monthly	Select the occurrence **Type**:
		- **Day**: insert a number from 1 to 31 in the **Day** box and the frequency in the **Recurs every** box.
		- **Custom**: select the following options:
		  - **First**, **Second**, **Third**, **Fourth** or **Last**;
		  - the corresponding day of the week or weekday/weekend day;
		  - the frequency in the **Recurs every** box.

6. In the **Daily Frequency** area, from the **Frequency Mode** drop down box, select the occurrence frequency, which can be either **Once At** or **Every**.
7. Depending on this selection, do one of the following:
   - set the occurrence time in the the number of **Hours** or **Minutes** in the **Occurs Every** fields
   - or set the occurrence time in the **Occurs Once At** field.
8. In the **Duration** area, set a **Start Date** and (optional) an **End Date**.
9. Click **Save**.

Result

A summary of your settings is shown when you select the saved schedule in the **Schedules** tab.

6.8 Displaying the MDW Data Model

In this page you can display a graphical visualization of the MDW data model as well as of any model extension or entity extension you have created. The displayed entities depend on the functionalities and data source(s) you have selected when you created the project.

A description of functionalities, models, entities and their attributes is available in *Opcenter Intelligence Reference Manual*.

Prerequisites

- You have created a project and selected a number of functionalities.
- (Optional) You have created one or more data sources for the project.
- (Optional) You have created model or entity extensions.

Procedure

1. In the **Data Model** tab, click ▽ to display the **Filters** panel.
2. Select a functionality: the list of associated models is displayed.
3. Select one or more models.

> ⓘ   If you select the **Custom Extension** check box, you can display entity extensions, that is new entities linked to standard entities that contain custom columns.

4. Click **Apply**.

Result

You can expand the single entities and display their attributes by clicking ⌄. You can also move the entities on the page for a better visualization. If more than one model is selected, they are displayed using different colors.
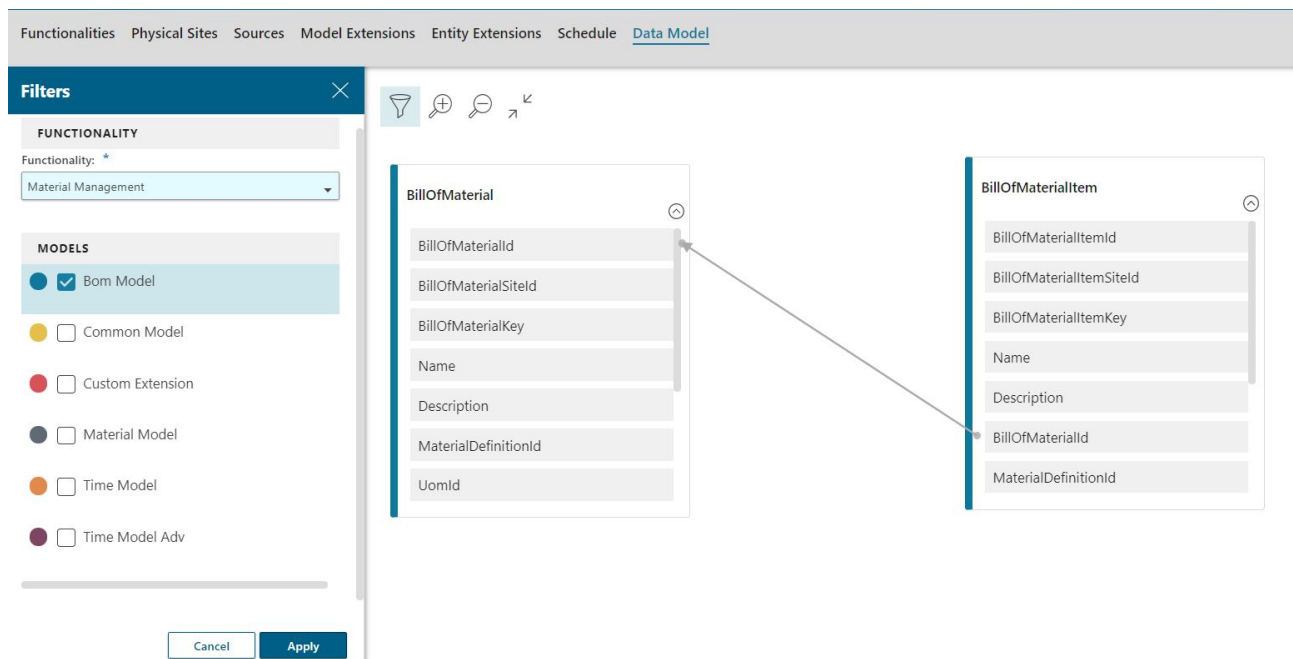
Other Available Operations

Command	Action
⊕	Zoom In
⊖	Zoom Out

Command	Action
↙↗	Collapse the visualization

7 How to Configure the Time Definition

In this step you can manage the time settings for your project, which means that you can decide how to aggregate and display data based on time.

In the **Time Definitions** page, the Time Definitions are grouped according to the projects associated during their creation.

> ⓘ Before you configure the Time Definition, please read important information on how time is managed in Smart Views.

Accessing the Page

To access the **Time Definition** page:

1. Select a solution in the **Solutions** page.
2. Click ↗ **Open Solution**.
3. Click the **Time Definitions** card.

Workflow

1. Create a Time Definition
2. Create a Time Hierarchy

7.1 Time Management in Smart Views

How Time Definition is used in Data Storage and Smart Views

If you are going to configure a smart view, the time settings for the attributes will allow you to display a time for each card and time hierarchies as subgroups. The attributes will include year, month, hour and minute, which represent the possible clusters you can create and on which the data analysis can be based.

You will also be able to cluster data on the basis of a specific day, month, quarter and so on for all the years of the database life. To this end, the fields of type **ofyear** are used, for example **monthofyearname** to analyze the plant production in a particular month starting from the date of the database creation to the present day.

The system employs time and geographical information (provided during the site configuration) to identify the time zone and daylight time saving to be adopted to reproduce the correct time context for the analysis phase. Therefore, while information in the data warehouse bm20 schemas is stored in UTC format, the facts included in smart views are transformed and contextualized on the basis of an analytical time concept linked to the perception of a person working in a plant, regardless of where the plant is located.

This analytical time is fundamental in a comparative analysis, because it puts on the same level facts that have taken place hours later or before the UTC due to different time zones, but from an analytical point of view generate the same perception for the analyst or the plant manager.

Balancing Data Detail Level and Performance in Time Management for Smart Views

Time in smart views is managed as any other context: this means that fact tables, which natively contain information on time (like in columns of type **StartDataTime**, **EndDateTime** and/or **EventDateTime**), are automatically linked to the time context.

> ⓘ Time is associated depending on the value of the **Time Evaluation** parameter configured when you [create a Time Definition](#).
> The following rules are applied:
> - If **TimeEvaluation** is set to **Start Time**, the **StartDateTime** column (if existing) is associated, otherwise the **EventDateTime** column is used.
> - If **TimeEvaluation** is set to **End Time**, the **EndDateTime** column (if existing) is associated, otherwise the **EventDateTime** column is used.
> - **Time Evaluation** in the **TimeDefault** time definition is always set to **EndDateTime**.

Even though the time context is totally comparable to other contexts, special attention should be paid to its management, because linking an event to a specific point in time implies the creation of a table containing "all" the points in time. As a consequence, the high granularity of this type of table would generate a huge table, which does not make sense in a data mart and therefore in smart views.

Data granularity is a specific characteristic of the data warehouse that allows you to set various levels of detail for units of data. Since granularity affects database performance, it is of paramount importance to reach a compromise between level of detail and performance by discretizing data in order to balance the amount of records to be processed and the storage space in use.
As a result, to guarantee an adequate performance for calculations, a common BI best practice consists in discretizing time units to avoid an excessive amount of rows in the Time table of the data warehouse. This is the reason why in smart views the information related to the time dimension is clustered in ten-minute intervals.
For example, if values are measured at 16.41, 16.42 and 16.43, they are clustered at 16.40, because they are included in the 10-minute interval previous to their occurrence.

7.2 Creating a Time Definition

In this step you can manage the time settings for your project, which means that you can decide how to aggregate and display data based on time.

> ⓘ A default time, named **TimeDefault**, is automatically generated when you create a project. For this item the **Time Evaluation** field is set to **End Time**. **TimeDefault** cannot be edited nor deleted.

Procedure

1. In the **Time Definitions** page, click ⊕ **Create Time Definition**.
2. Insert the following details:

Parameter	Description
Name	A meaningful name that you want to assign to the Time Definition.
Description	Optional. A description to provide further information for the Time Definition.
Time Evaluation	To cluster information based on time, you must define whether you want to evaluate the information according to the **Start Time** or to the **End Time** of the required time interval.

Parameter	Description
Project	Select the project with which you want to associate the new time definition.

3. Click **Save**.

Default Attributes for Time

When a Time Definition is created, the system generates additional columns that define standard attributes as well as other attributes whose generation is based on the time definition configuration.
This table lists the default attributes:

Attribute Name	Example
Year	01/01/2017 00:00:00
Minute	25/05/2017 09:10:00
Month	01/05/2017 00:00:00
Hour	25/05/2017 09:00:00
Quarter	01/04/2017 00:00:00
Trimester	01/05/2017 00:00:00
Day	25/05/2017 00:00:00
Week	22/05/2017 00:00:00
HalfYear	01/01/2017 00:00:00
DayOfMonth	Day 25
MinuteOfHour	Minute 10
YearDescription	Calendar 2017
HourOfDay	Hour 09
QuarterDescription	Quarter 2, 2017

Attribute Name	Example
HalfYearDescription	Semester 1, 2017
QuarterOfYear	Quarter 2
HalfYearOfYear	Semester 1
DayDescription	Thursday, May 25 2017
MonthDescription	May 2017
TrimesterOfYear	Trimester 2
DayOfYear	Day 145
WeekDescription	Week 22, 2017
MonthOfYear	May
TrimesterDescription	Fiscal Trimester 2, 2017
HourDescription	Thursday, May 25 2017 9 hour
MinuteDescription	Thursday, May 25 2017 09:10

7.3 Creating a Time Hierarchy

You can create time hierarchies to specify a calendar structure that defines how time periods are managed and distributed in your site.

Procedure

1. In the **Time Definitions** page, select the default time or another time definition and click ↗ **Open**.
2. Click ⊕ **Create Time Hierarchy**.
3. Insert the following details:

Parameter	Description
Name	A meaningful name that you want to assign to the Time Hierarchy.

Parameter	Description
Description	Optional. A description to provide further information for the Time Hierarchy.
Time Category	Select either of the following: • **FiscalTime:** to set the start of the fiscal year for your plant. • **WorkingTime:** if you select it, you are not able to change this date.
Day Starts At	The number of hours to or from midnight of the calendar day, which can be either a negative or a positive number and states the start of the working day for a specific plant.
Year Starts On	Starting day, month and year of the fiscal year. This field is enabled only if the **FiscalTime** Time Category has been selected.
Shifts In A Day	The number of periods into which the 24-hour day is split for your plant. The available values are: 1, 2, 3, 4, 6, 8, 12, 24.

4. Click **Save**.

8 How to Configure a Scenario

In this step you can configure a scenario, which is an abstract representation of the physical distribution of servers, services, databases and flows in a network.

You can either configure a custom scenario or you can generate a predefined scenario.

Configuring a scenario is also a prerequisite for deploying smart views.

Accessing the Page

To access the **Scenarios** page:

1. Select a solution in the **Solutions** page.
2. Click ⬈ **Open**.
3. Click the **Scenarios** card.

Prerequisites

You have configured a project.

Workflow

1. Create or Generate a Scenario
2. Configure Servers
3. Add one or more Services
4. Configure Databases
5. Configure Flows

8.1 Creating a Scenario

You can either create a custom scenario or generate a predefined scenario.

Procedure

1. In the **Scenarios** page, click ⊕ **Create Scenario**.
2. Insert the following details:

Parameter	Description	Naming Convention
Name	A meaningful name that you want to assign to the Scenario.	- The first letter of the name must be an uppercase, lowercase or numeric character. - For the remaining characters of the name, only alphanumeric characters, underscores and spaces should be used. - Special characters (such as %, |, §, &, #, +, -, etc.) are not allowed. - The maximum length for names must not exceed 255 characters.

Parameter	Description	Naming Convention
Description	Optional. A description to provide further information for the Scenario.	• The first letter of the description must be an uppercase, lowercase or numeric character. • Other character types are allowed for the remaining text of the description. • The maximum length for the description must not exceed 1000 characters.

3. From the **Project** drop-down list box, select the project you want to associate with the scenario you are creating.
4. Leave the **Auto-generate** check box selected (default setting) to generate a predefined scenario, or deselect it to create a custom scenario.
5. Click **Save**.

Result

If you have left the **Auto-generate** check box selected, the scenario that is generated will include the following items:

- A destination server of type SQL Server 2022-2019-2017-2016 Standard or Enterprise and a database of type MDW 2.0.
- A server for each project source. The server type, which contains a source database, is defined according to the most recent version.
- A flow from the source database to the destination database for each source of the project.

8.2 How to Configure a Server

In this step you can define the servers to be configured in the Solution.

Accessing the Page

1. In the **Scenarios** page, select a scenario.
2. Click ⬆ **Open Scenario**: the list of servers for that scenario is displayed.

Prerequisite

You have configured a project.

Workflow

1. Create a Server
2. Add one or more Services

8.2.1 Creating a Server

Follow this procedure to add a server to your scenario.

Procedure

1. Click ⊕ **Create Server**.
2. Insert the following details:

Parameter	Description	Naming Convention
Name	A meaningful name that you want to assign to the server.	- The first letter of the name must be an uppercase, lowercase or numeric character. - For the remaining characters of the name, only alphanumeric characters, underscores and spaces should be used. - Special characters (such as %, |, §, &, #, +, -, etc.) are not allowed. - The maximum length for names must not exceed 255 characters.
Description	Optional. A description to provide further information for the server.	- The first letter of the description must be an uppercase, lowercase or numeric character. - Other character types are allowed for the remaining text of the description. - The maximum length for the description must not exceed 1000 characters.

3. Select the server **Type**, which can be one of the following:
    - **On-Premise SQL Server 2014 and 2012**
    - **On-Premise SQL Server 2019-2017-2016 Standard or Enterprise**
    - **Oracle**
4. Under **Installed Services**, select the **Databases** and/or **Flows** tile(s) if you want to add them to the server or, alternatively, you can add these services after you have created the server.
5. Click **Save**.

8.2.2 Adding Services to a Server

If you have not associated any Services (that is Databases and Flows) with a server during its creation, you can add them in this step.

Procedure

1. In the **Servers** page, select a server.
2. Click ↗ **Open Server**.
3. Click ✎ **Edit Server**.
4. In the **Edit Server** panel, select one of the following or both to add them to the server:
    - **Databases** (the service that manages databases).
    - **Flows** (the service that manages flows).
5. Click **Save**.

8.3 How to Configure a Database

In this step you can configure the databases residing on the machines involved in the scenario (both DBs containing source data and data warehouses to which data will be moved).

In the **Databases** page, the databases you have created are grouped according to the sources you have selected during the project configuration. After you have created a database, you can load custom scripts to retrieve data from the database.

Workflow

1. Create a Database
2. Edit a Database
3. (Optional) Load a Custom Script

8.3.1 Creating a Database

Follow this procedure to create a database.

Procedure

1. In the **Servers** page, select a server and click ⤴ **Open**.
2. Click ⊕ **Create Database**.
3. In the **Create Database** panel, insert a name for the database. When you name an item, you must follow these rules:
      - The first letter of the name must be an uppercase, lowercase or numeric character.
      - For the remaining characters of the name, only alphanumeric characters, underscores and spaces should be used.
      - Special characters (such as %, |, §, &, #, +, -, etc.) are not allowed.
      - The maximum length for names must not exceed 255 characters.
4. Select a **Project** or **Project Source**, that is the project you have associated with the scenario during its creation or one of the project sources. The items in this list are filtered by database type, so that server type and project or project source type may match.
5. Click **Save**.

8.3.2 Editing a Database

Follow this procedure to continue and complete the configuration of a database.

It is recommended that you set up a maintenance plan to manage the log file growth and fine-tune the data warehouse configuration to provide the best performance.

Procedure

1. In the **Databases** tab, select a database.
2. Click ✎ **Edit Database**.
3. In the **Standard** tab, you can modify the database details.
4. In the **Advanced** tab, the available options vary according to the source you have selected during the creation of the database.
5. (For the source database) Select the **Snapshot Enabled** check box if you want to enable the snapshot isolation in SQL Server.
6. Select the **Smart Time Window Enabled** check box if you want to manage data that change rapidly (and therefore also during ETL incremental execution) and that would be otherwise excluded from the data load.

> ⓘ
> - This check box is enabled by default (and cannot be disabled) for Opcenter EX DS, Opcenter EX PR, Intelligence Analytical Model and SIMATIC IT Reporting Framework data sources, is configurable for third-party databases and is disabled by default for all other data sources.
> - If you have configured a third-party database and selected this check box, the **RowInserted** column must contain a value in all entities.

7. (For the destination database) Modify the following parameters or leave the default values.

Parameter	Default Value
Initial Size Primary (MB)	10
Initial Size Data (MB)	10
Initial Size Index (MB)	10
Initial Size Log (MB)	10
Initial Size Error (MB)	10
Initial Size Deleted (MB)	10
Collation	Latin1_General_CI_AS

> ⚠ In the **Collation** field, it is mandatory to select the same collation used for the **tempdb**.

8. Click **Save**.

8.3.3 Loading a Script

When the solution is deployed, the system installs a set of objects contained in a contract layer on top of each supported data source database or smart view involved in the solution in order to retrieve data to be loaded in the Manufacturing Data Warehouse. These objects have been modeled according to a standard data storage pattern which assumes that specific data has been saved in given tables within the databases. If, due to particular project requirements, data has been stored in different tables, it is necessary to manually modify the relative objects in order to correctly retrieve data in the MDW.

This can be done by either specifying a SELECT statement or by using a Stored Procedure.

You can load three types of scripts:

- **Load Script**: to load data on the Manufacturing Data Warehouse.
- **Delete Script**: to delete data from the Manufacturing Data Warehouse.
- **Localize Script**: to load localized data.

If you have created extensions for your project, you need to load custom scripts to retrieve data from the database.

> ⚠ Perform these operations only if you are an advanced user.

Recommendations

Before starting, please read a set of important recommendations.

Procedure

1. In the **Databases** page, select a database and click ⬀ **Open**.
2. In the **Custom Scripts** page, click ⊕ **Create Script**.
3. In the **Models** drop-down list, select **Custom Model**.
4. In the **Model Entities** drop-down list, select one of the extensions you have previously configured.
5. From the **Entity Script Type** drop-down list box, select one of the following options depending on the fields selected previously: **Load Script**, **Delete Script**, **Localize Script**. This procedure is valid for deleted and localized scripts as well.
6. From the **Script Type** drop-down list box, select either **View** or **Stored Procedure** (**View** is the default setting). This box is enabled only for the extensions for which you have selected a **Large** granularity and only if an OOTB script has not been provided.
7. In the **Entity Scripts** area, a script template is shown. Depending on the script type you have selected, you can edit either the script or the stored procedure.
8. Add a **FROM** clause to specify the source database from where you want to retrieve data.
9. Add the mapping for the fields.

> ⚠ • Do not modify field names and types, otherwise the deploy operation may not be completed correctly.
> • If you are loading data from a third-party database and the **Smart Time Window Enabled** check box has been selected, the **RowInserted** column must always contain a value, otherwise data flows may not be completed correctly. See also: Example of Custom Script Using the SELECT Statement (Opcenter EX DS source) and Example of Custom Script Using a Stored Procedure.

10. Click 💾 **Save**.
11. Click ◎ **Show Original** to view the original script below the one you are editing.

Editing scripts to retrieve context data for entities generated by a smart view

If you have added contexts to a smart view, you must edit the SQL script to retrieve their values in the MDW.

1. In the **Models** drop-down list, select the smart view for which you have added custom contexts.
2. In the **Model Entities** drop-down list, select one of the facts to which you have added custom contexts. Please note that this list will include all the entities for that smart view, including those you have selected for contexts.
3. Edit the script according to your needs.
4. Click 💾 **Save**.

> ⚠ It is highly recommended that you only edit the script when you are totally sure that the smart view configuration has been completed, because when a smart view is modified, it is deleted and created again. As a result, if you have already edited the script and then modify the smart view, your changes to the script may not be maintained.
> To prevent errors, make sure that the script is still correct after you have modified the smart view and if that is not the case, merge the original script with the one you modified.

Examples

- Example of Custom Script for LMS source using the SELECT statement

- [Example of Custom Script for Opcenter EX DS source using the SELECT statement](#)
- [Example of Custom Script using a Stored Procedure](#)

8.3.3.1 Recommendations Before Getting Started

In this page you can find a set of basic recommendations to be read before you start loading scripts.

When a stored procedure should be used

Data load using a stored procedure is typically designed to execute paged data reading. It is recommended that you use a stored procedure when the complexity of the load query is such that a view would not guarantee an adequate performance, for example when you want to join multiple tables and/or temporary support tables are required.

In the script set in the stored procedure you must always sort by a unique field (source key), that is, never use the date for ORDER BY because the date could change and therefore the sorting, so some data may not enter.

No fixed value in the past or equal to GetUtcDate for RowInserted and RowUpdated columns

The "RowInserted" and "RowUpdated" columns are used by ETLs to understand which data has been inserted or modified starting from the last successful execution. If the RowUpdated column in particular has a fixed value in the past or a value equal to the "GetUtcDate", that data may never be loaded nor updated because the entity will always be outside the ETL time window. This is why the real insertion and update dates of the data source must always be retrieved to fill the RowInserted and RowUpdated columns. In particular, they need to be retrieved when multiple joins between different entities are executed, as in that case all possible updates of all related entities have to be considered.

Every time they are executed, ETLs define the time window to be considered at the beginning of the execution (T0, T1) using T0 as the final date and time of the last time window completed successfully and T1 as "GetUtcDate".

The example below shows what happens if the GetUtcDate is put in the RowUpdated column. As the two "GetUtcDate" functions would be executed in different moments, the one inserted in the custom entity script would always be after the one in the time window. As a consequence, data are never stored in the data warehouse or are never updated.
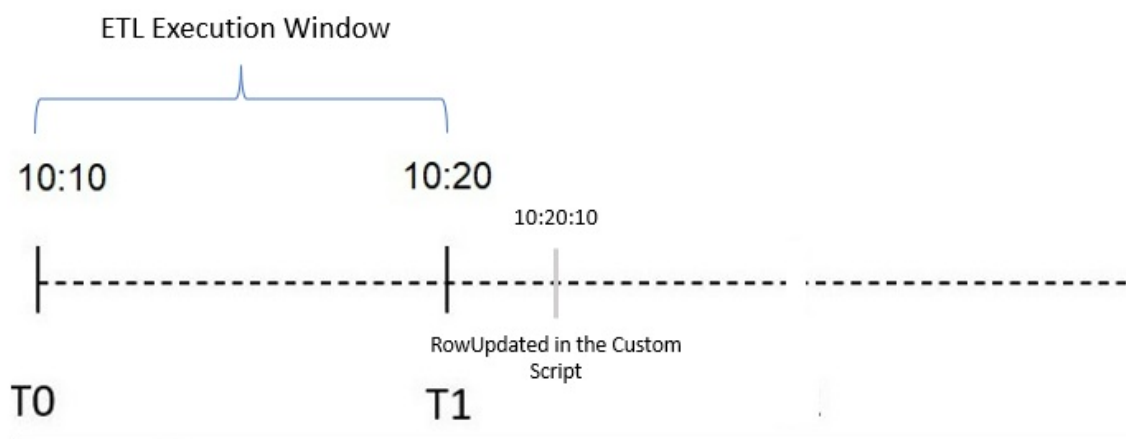
In the script only refer to data source entities

Custom entity scripts must not contain any reference to bm20Load entities, nor to any other structure created by in the contract layer, but only refer to the entities of the current data source.

8.3.3.2 Example of Custom Script Using the SELECT Statement (LMS source)

This example shows a custom entity script for the source LMS:

```
SELECT
CAST(0 AS smallint) as MyCustomEntitySiteId,
CAST(MyTableKey AS nvarchar(255)) as MyCustomEntityKey,
CAST(MyTableMeasure1 AS float) as MyTableMeasure1,
CAST(0 AS smallint) as EquipmentSiteId,
CAST(MyEquipmentColumn AS nvarchar(255)) as EquipmentKey,
CAST(MyRowInserted AS datetime) as RowInserted,
CAST(MyRowUpdated AS datetime) as RowUpdated
FROM [#PPADB#].MyTable
```

Important Recommendations

- The FROM clause can be more complex (JOIN, GROUP etc.)
- The first two columns represent the natural key. They must therefore be unique.
- If the source is a product of the SIMATIC IT family, it is recommended that you use the [#SITMESDB#] [#PPADB#] [#UAFDB#] tags instead of the real database names. If you use these tags, the system will apply the names used in the environment.
- If the source is a product of the Opcenter Execution Core family, it is recommended that you use the [#CEPSCHEMA#] [#CEPDB#] tags instead of the real database names. If you use these tags, the system will apply the names used in the environment.

8.3.3.3 Example of Custom Script Using the SELECT Statement (Opcenter EX DS source)

This example shows a custom entity script for the source Opcenter EX DS:

```
SELECT
CAST(0 AS smallint) as MyCustomEntitySiteId,
CAST(MyTableKey AS nvarchar(255)) as MyCustomEntityKey,
CAST(MyTableMeasure1 AS float) as MyTableMeasure1,
CAST(0 AS smallint) as EquipmentSiteId,
CAST(MyEquipmentColumn AS nvarchar(255)) as EquipmentKey,
CAST(MyRowInserted AS datetime) as RowInserted,
CAST(MyRowUpdated AS datetime) as RowUpdated
FROM [#UAFDB#].MyTable
```

Important Recommendations

- The **RowInserted** and **RowUpdated** columns are mandatory, as the **Smart Time Window Enabled** check box was selected by default in the **Edit Database** panel. If you do not include them in the script, the flows to load data will not be completed correctly.
- The FROM clause can be more complex (JOIN, GROUP etc.)
- The first two columns represent the natural key. They must therefore be unique.

8.3.3.4 Example of Custom Script Using a Stored Procedure

This example shows a Stored Procedure written to read data in pages or windows.

```sql
CREATE PROCEDURE [bm20Load].[USP_OperationExecutionPropertyStaticValueSelect]
@ChunkSize AS [int],
@PageNumber AS [int],
@RowFrom AS [datetime],
@RowTo AS [datetime]
AS
BEGIN
SELECT
CAST(MyOperationExecutionPropertyStaticValueSiteId AS smallint) AS
[OperationExecutionPropertyStaticValueSiteId],
CAST(MyOperationExecutionPropertyStaticValueKey AS nvarchar(255)) AS
[OperationExecutionPropertyStaticValueKey],
CAST(MyOperationExecutionPropertyKey AS nvarchar(255)) AS
[OperationExecutionPropertyKey],
CAST(MyOperationExecutionPropertySiteId AS smallint) AS
[OperationExecutionPropertySiteId],
CAST(MyOperationExecutionSiteId AS smallint) AS [OperationExecutionSiteId],
CAST(MyOperationExecutionKey AS nvarchar(255)) AS [OperationExecutionKey],
CAST(NULL AS datetime) AS [DatetimeValue],
CAST(NULL AS float) AS [FloatValue],
CAST(0 AS smallint) AS [Sequence],
CAST(MyStringValue AS nvarchar(255)) AS [StringValue],
CAST(MyRowInserted AS datetime) AS [RowInserted],
CAST(MyRowUpdated AS datetime) AS [RowUpdated]
FROM mySchema.MyTable
WHERE (ISNULL(MyRowUpdated, MyRowInserted) >= @RowFrom AND ISNULL(MyRowUpdated,
MyRowInserted) < @RowTo)
ORDER BY MyOperationExecutionPropertyStaticValueKey
OFFSET @ChunkSize * (@PageNumber - 1) ROWS FETCH NEXT @ChunkSize ROWS ONLY
option (recompile)
END
```

Important Recommendations

- If the **Smart Time Window Enabled** check box was selected when editing the database, the **RowInserted** and **RowUpdated** columns are mandatory. If you do not include them in the script, the flows to load data will not be completed correctly.
- The WHERE condition must include a filter on the time interval using the **RowFrom** and **RowTo** parameters as shown in the example.
- The ORDER BY and OFFSET/FETCH instructions allow you to execute a paged load and must not be modified.
- You must not modify the schema, the name or the parameters of the stored procedure.
- The FROM clause can be more complex (JOIN, GROUP etc).
- The first two columns represent the natural key. They must therefore be unique.
- If the source is a product of the SIMATIC IT family, it is recommended that you use the [#SITMESDB#] [#PPADB#] [#UAFDB#] tags instead of the real database names. If you use these tags, the system will apply the names used in the environment.

- If the source is a product of the Opcenter Execution Core family, it is recommended that you use the [#CEPSCHEMA#] [#CEPDB#] tags instead of the real database names. If you use these tags, the system will apply the names used in the environment.

9 How to Configure and Manage Flows

In the **Flows** pages, you can configure the flows involved in the scenario. You have to run an initial load when the target database is empty, then, to keep the data warehouse aligned with the sources, you should schedule periodical incremental loads to load all the changes which occur in the source database.

Accessing the Flows pages

Depending on the page from which you access flows, the operations you can perform on them vary. There are two ways to access flows:

- from within the **Scenarios** page, where you can perform all operations on flows, including creating new ones.
- from the **Solutions** page, where you cannot create new flows but only run or edit existing flows.

From the Scenarios page

1. Select a solution in the **Solutions** page.
2. Click ⤴ **Open Solution**.
3. Click the **Flows** card.

From the Solutions page

1. Select a solution in the **Solutions** page and click ⤴ **Open Solution**.
2. Click the **Scenarios** card.
3. Select the **Scenario** and click ⤴ **Open Scenario**.
4. Click ⤴ **Open Server** on the Flow Server.

Workflow

1. Create a Flow
2. Create a Flow Schedule
3. Edit a Flow
4. Run a Flow

9.1 Creating a Flow

Follow this procedure to create a flow.

Procedure

1. In the **Flows** page, click ⊕ **Create Flow**.
2. Insert a name for the flow. When you name an item, you must follow these rules:
   - The first letter of the name must be an uppercase, lowercase or numeric character.
   - For the remaining characters of the name, only alphanumeric characters, underscores and spaces should be used.
   - Special characters (such as %, |, §, &, #, +, -, etc.) are not allowed.
   - The maximum length for names must not exceed 255 characters.
3. From the **Project Flow** drop-down list, select one of the available sources among those you have created during the project configuration. This list will only show the sources that have not been associated with a flow yet, as they will disappear from the list once they have been used.

> ⚠ When auto-generation is done, the flows for all sources are created on the destination server.

4. Click **Save**.

9.2 Creating a Flow Schedule

A flow schedule is used to plan an incremental data load. If you have configured a schedule during the creation of the project, a default flow schedule is created and displayed after you have created a flow.

Important Recommendation

It is strongly recommended that you avoid the overlap between data loads from any source to the data warehouse or a smart view. To this purpose, it is advisable to distribute over time the start of each flow. The flows can be totally or partially executed in parallel only if disk speed, RAM and CPU are sufficient to manage the requested operations, including data reading from clients. To optimize your configurations, you should monitor the working environment for a few weeks.

Example: if the flow duration is 3 minutes and you want to run 4 flows, schedule each flow every 16 minutes (**Occurs Every** parameter) and distribute the start time of each flow within the defined time interval in order to prevent overlapping (e.g. at 00.00, 00.04, 00.08 and 00.12).

Procedure

1. In the **Flows** page, click ⬀ **Open Flow**.
2. Click ⊕ **Create Flow Schedule**.
3. Insert a name for the Flow Schedule. When you name an item, you must follow these rules:
   - The first letter of the name must be an uppercase, lowercase or numeric character.
   - For the remaining characters of the name, only alphanumeric characters, underscores and spaces should be used.
   - Special characters (such as %, |, §, &, #, +, -, etc.) are not allowed.
   - The maximum length for names must not exceed 255 characters.
4. In the **Frequency** area, select the frequency (**Daily**, **Weekly**, **Monthly**) with which the ETL execution occurs and insert the number of days, weeks or months in the **Recurs Every** field.
5. In the **Daily Frequency** area, select the **Frequency Mode**, which can be either **Once At** or **Every**.
6. In the **Occurs Every** field, insert the number of hours or minutes and then set an interval, with the relative start and end time.
7. In the **Duration** area, set a start date and (optional) an end date.
8. Click **Save**.
9. [Deploy the Environment](#) to physically enable the running of scheduled incremental flows.

Enabling or Disabling a Flow Schedule

To perform these operations, you must have deployed the environment at least once.

1. Select a flow schedule.
2. Do either of the following actions:
   - Click ⬤ **Enable Flow Schedule** to enable in SQL Server the job corresponding to the selected flow schedule.
   - Click ⬭ **Disable Flow Schedule** to disable in SQL Server the job corresponding to the selected flow schedule.

9.3 Editing a Flow

Follow this procedure to either edit a flow and/or to configure additional parameters.

Procedure

1. In the **Flows** page, select a flow.
2. Click ✎ **Edit Flow**.
3. In the **Standard** tab, you can modify the previously-inserted flow details.
4. In the **Advanced** tab, you can change the default values for the following parameters:

Parameter	Description	Default Value
Chunk Size	Number of records of the **tempdb**. This is also the value used to commit data.	500000
Time window tolerance	Time window for ETLs execution delay expressed in seconds.	60

5. Click **Save**.

> ⚠ Please remember to be extremely careful when you are setting the **Time window tolerance** parameter. For example, if the flow schedule frequency is lower than the time window tolerance, or if you run a manual incremental flow, data load would not be executed.

9.4 How to Run a Flow

In this step you can start the execution of the ETL package associated with a flow to either load initial data from the source to the target database or to load incremental data to maintain databases aligned.

Prerequisites

- When you run a flow, you must check that no other operation, such as a purge database or a deploy, is running at the same time. If that is the case, wait for this operation to end before running the flow.
- Before running a flow, you must have deployed the environment at least once.
- It is recommended that you stop the source system before running an initial flow when you cannot determine the adequacy of the system hardware to support the production activities generated by the flow.
- If the selected source is SIMATIC IT UAPI or Opcenter Execution Process, only the following format is supported for datetime fields: yyyy-mm-dd hh:mm:ss. Any other format will be discarded from the system. Non-standard formats can, however, be loaded by overriding the contract layer.

Available Operations

- Run an Initial Flow
- Run an Incremental Flow
- Run a Single Entity

9.4.1 Running an Initial Flow

Follow this procedure to run an initial flow.

Important Recommendation

An initial load can only be executed when the target database is empty. To clean the target structure, it is suggested that you use the purge data functionality. The purge operation must not however be executed when you are upgrading from a previous version of the product.

Procedure

1. In the **Flows** page, select the flow you want to run.
2. Click ⏩ **Run Flow**.
3. In the **Execute Flow** page, select the environment where you want to execute the flow to load your data.
4. In the **Load Mode** drop-down list, select **Initial**.
5. Click the **Configuration Type Advanced** check box and select one of the following options:
    - **Rebuild Indexes after the flow has finished running**
    - **Enable Schedules after the flow has finished running**
    - **Execute Project Synchronization after the flow has finished running**
6. Select the **Start Mode**, which can be either of the following:
    - **Autodetect**. If you select this option, the system considers as initial date the oldest date in the production database.
    - **Manual**. If you select this option, you can set the loading time interval by browsing for the **Start Date and Time** and **End Date and Time** in the available calendars.
7. Click **Start** to run the flow.

9.4.2 Running an Incremental Flow

Follow this procedure to run an incremental flow.

Procedure

1. In the **Flows** page, select the flow you want to run.
2. Click ⏩ **Run Flow**.
3. In the **Execute Flow** page, select the environment where you want to execute the flow to load your data.
4. In the **Load Mode** drop-down list, select **Incremental**.
5. Click **Start** to run the flow.

9.4.3 Running a Single Entity

Follow this procedure to run a single entity.

Procedure

1. In the **Flows** page, select a flow.
2. Click ▶ **Run Single Entity**.
3. In the **Run Single Entity** page, select the environment where you want the entity to be executed.
4. Specify a **Start Date** and an **End Date** to define the time interval for the data you want to load.
5. Select the entity for which you want to run the flow.
6. Click **Start** to run the flow.

10 How to Configure and Deploy an Environment

Opcenter Intelligence employs the environment to implement the concrete realization of the abstract configuration of the scenario you have performed until now.

In this step you can map all the items included in the scenario on real items that exist in a physical environment.

Accessing the Page

To access the **Environments** page:

1. Select a solution in the **Solutions** page.
2. Click ⬈ **Open Solution**.
3. Click the **Environments** card.

Workflow

1. [Create an Environment](#)
2. [Edit an Environment](#)
3. [Deploy an Environment](#)

Additional Operations

- [Undeploy an Environment](#)
- [Purge the Manufacturing Data Warehouse](#)

10.1 Creating an Environment

Follow this procedure to create an environment.

When you create the environment, you can configure the year starting from which the "Time" table of the MDW is populated during the environment deploy. The end of the following year is assumed as ending point and the daylight time saving table is populated as well.

This field must be configured according to the age of data in the source database. When the environment is deployed, time is generated automatically based on the selected year. Subsequently, the future time is managed by a scheduler that each month creates the missing rows for the corresponding month of the following year (for example, in November 2020 the rows until November 2021 are generated).

This settings makes an impact on smart view entities, which are generated starting from the information contained in this MDW table.

Procedure

1. In the **Environments** page, click ⊕ **Create Environment**.
2. Insert a name and a description (optional) for the environment.
3. In the **Generate Time From** drop-down list, select the year starting from which the Time table in the MDW will be populated during the deploy operation. The default value is the previous year. This value can always be changed by editing the environment.
4. Select the scenario with which you want to associate the new environment.
5. Click **Save**.

10.2 Editing an Environment

Follow this procedure to edit the environment and complete its configuration.

On this page you may also want to [rebuild the database indexes](#) to remove fragmentation, reclaim disk space and reorder index rows.

Procedure

1. In the **Environments** page, select the environment and click ✎ **Edit Environment**.
2. In the **Edit Environment** panel, in the **Generate Time From** drop-down list, you can select the year from which the Time table in the MDW will be populated during the deploy operation.

> ⚠ Time in the MDW is generated for the first time during the deploy and afterwards is progressively generated by a scheduler.
> If you need to purge the MDW, you have to deploy the environment again after the purge or wait for the scheduler to generate the rows of the Time table for the following year.

3. In the **Servers** tab, type the name or the IP address of the corresponding physical machine for each server contained in the solution. This is the real instance of the server(s).
4. In the **Services** tab, type for each server the instance name of the required Microsoft Services for each item of the column **Object Name**. This field can be empty in the case of a default instance, or can be the name of the SQL Server instance. This instance name is the same for databases and flows.
5. In the **Databases** tab, for each database listed under the column **Database Name**, type the real name of the physical database to be created or used during the deploy.

> ⚠ • Since you can enter any source database name in this field, make sure you do not type the name of any system database, such as **TempDB**, otherwise bm20 views will be created there after the deploy.
> • If the source is LMS, the name to be inserted here is the name of the empty database that will be created to avoid writing views into the LMS database. This operation is done in order to avoid any overlap between Opcenter Intelligence database and the database of a different product.
> • If the source is a third-party SQL Server database, you need to manually create a new intermediate database and insert the name of this database under the column **Database Name**. For more details, see [Selecting Sources > Third-Party Systems SQL Server](#).

6. In the **[Properties](#)** [tab, insert the correct parameters](#) depending on your scenario configuration.
7. Click **Save**.

Rebuilding Database Indexes

1. In the **Environments** page, select an environment.
2. Click ✐ **Rebuild Indexes**.
3. Click **Rebuild Indexes**.

10.2.1 Configuring the Properties tab

The parameters to be inserted in the **Properties** tab may vary depending on the data sources you have selected and your scenario configuration.

> ⚠ To ensure an adequate performance, it is strongly recommended that you dedicate a drive to each database filegroup.

The following links contain the list of properties available for the corresponding sources:

- [Opcenter Execution Discrete (Opcenter EX DS) SQL Server](#)
- [Opcenter Execution Process (Opcenter EX PR)](#)

- [Opcenter Execution Foundation OEE (Opcenter EX FN OEE)](#)
- [Opcenter Execution Core (Opcenter EX CR) SQL Server](#)
- [Opcenter Execution Core (Opcenter EX CR) Oracle](#)
- [Opcenter Execution Electronics (Opcenter EX EL) SQL Server](#)
- [Opcenter Execution Pharma (Opcenter EX PH) Oracle](#)
- [Opcenter Quality (Opcenter QL) SQL Server](#)
- [Opcenter Quality (Opcenter QL) Oracle](#)
- [Opcenter Intra Plant Logistics (Opcenter IPL) SQL Server](#)
- [SIMATIC IT Unified Architecture Discrete Manufacturing (UADM)](#)
- [SIMATIC IT Unified Architecture Process Industries (UAPI)](#)
- [Camstar Enterprise Platform (CEP) SQL Server](#)
- [Camstar Enterprise Platform (CEP) Oracle](#)
- [QMS Professional SQL Server](#)
- [QMS Professional Oracle](#)
- [SIMATIC IT eBR Oracle](#)
- [SIMATIC IT Production Suite (PRS)](#)
- [SIMATIC IT Historian](#)
- [SIMATIC IT Line Monitoring System (LMS)](#)
- [SIMATIC IT Manufacturing Data Warehouse (MDW)](#)
- [Third-Party Systems SQL Server](#)
- [Third-Party Systems Oracle](#)

10.2.1.1 Opcenter Execution Discrete SQL Server

The following properties must be configured for these SQL Server data sources:

- Opcenter Execution Discrete (Opcenter EX DS) 3.0 - 3.1 - 3.2 - 3.3
- Opcenter Execution Discrete (Opcenter EX DS) 4.0
- Opcenter Execution Discrete (Opcenter EX DS) 4.1 - 4.2 - 4.3
- Opcenter Execution Discrete (Opcenter EX DS) 4.4 or higher

Property	Description
Data Path	The physical path of the folder in which SQL files necessary for the database creation are saved.
Encrypt Connection	This property (whose default value is False) can be set to True if you want to add a security encryption to SQL Server to enhance protection of your system. For more information see https://technet.microsoft.com/en-us/library/ms189067(v=sql.105).aspx
Index Path	The physical path of the folder in which indexes are saved.
Log Path	The physical path of the folder in which log files are saved.
UAF	The name of the Opcenter Execution Foundation database.

10.2.1.2 Opcenter Execution Process

The following properties must be configured for the data sources:

- Opcenter Execution Process (Opcenter EX PR) 3.0 to 3.3
- Opcenter Execution Process (Opcenter EX PR) 4.0 or higher

Property	Description
UAF	The name of the Opcenter Execution Foundation database.

10.2.1.3 Opcenter Execution Foundation OEE

The following properties must be configured for the Opcenter Execution Foundation OEE 2207 or higher.

Property	Description
Data Path	The physical path of the folder in which SQL files necessary for the database creation are saved.
Encrypt Connection	This property (whose default value is **False**) can be set to **True** if you want to add a security encryption to SQL Server to enhance protection of your system. For more information see https://technet.microsoft.com/en-us/library/ms189067(v=sql.105).aspx
Index Path	The physical path of the folder in which indexes are saved.
Log Path	The physical path of the folder in which log files are saved.
PPA	The name of the SIMATIC IT LMS database.
PPA Linked Server	Name of the linked server where the SIMATIC IT LMS database is located.
SitMes	The name of the SIMATIC IT Production Suite database.
SitMes Linked Server	Name of the linked server where the SIMATIC IT Production Suite database is located.

10.2.1.4 Opcenter Execution Core SQL Server

The following properties must be configured for the data sources:

- Opcenter Execution Core (Opcenter EX CR) 8.0 to 8.6 SQL Server
- Opcenter Execution Core (Opcenter EX CR) 8.7 or higher SQL Server

Property	Description
Opcenter EX CR Database	The name of the Opcenter EX CR database.
Opcenter EX CR Schema	The name of the Opcenter EX CR schema.
Data Path	The physical path of the folder in which SQL files necessary for the database creation are saved.
Encrypt Connection	This property (whose default value is False) can be set to True if you want to add a security encryption to SQL Server to enhance protection of your system. For more information see https://technet.microsoft.com/en-us/library/ms189067(v=sql.105).aspx
Index Path	The physical path of the folder in which indexes are saved.
Log Path	The physical path of the folder in which log files are saved.

10.2.1.5 Opcenter Execution Core Oracle

The following properties must be configured for the data sources:

- Opcenter Execution Core (Opcenter EX CR) 8.0 to 8.6 Oracle
- Opcenter Execution Core (Opcenter EX CR) 8.7 or higher Oracle

Property	Description
EX CR User	The name of the Opcenter EX CR user.
Port	Port number of the Oracle service.
Service Name	Name of the Oracle service. You can insert either the **Service Name** or the **SID**. If you specify both, the **Service Name** will be used.
SID	The Oracle System ID. You can insert the **SID** instead of the **Service Name**. If you specify both, the **Service Name** will be used.
Username	Insert the name of the Oracle user to enable Oracle Database authentication. For more details, see the *Configuring Oracle Authentication* chapter in *Opcenter Intelligence Installation Manual*.
Password	Insert the password for the Oracle user to enable Oracle Database authentication.

> ⚠ If you leave the **Username** and **Password** fields empty, the Operating System authentication will be enabled. In that case, follow the procedure described in the *Configuring Oracle Authentication* chapter in *Opcenter Intelligence Installation Manual*.

10.2.1.6 Opcenter Execution Electronics SQL Server

The following properties must be configured for the Opcenter Execution Electronics 8.9 or higher SQL Server data source:

Property	Description
Opcenter EX CR Database	The name of the Opcenter EX CR database.
Opcenter EX CR Schema	The name of the Opcenter EX CR schema.
Data Path	The physical path of the folder in which SQL files necessary for the database creation are saved.
Encrypt Connection	This property (whose default value is False) can be set to True if you want to add a security encryption to SQL Server to enhance protection of your system. For more information see https://technet.microsoft.com/en-us/library/ms189067(v=sql.105).aspx
Index Path	The physical path of the folder in which indexes are saved.
Log Path	The physical path of the folder in which log files are saved.

10.2.1.7 Opcenter Execution Pharma Oracle

The following properties must be configured for the data source Opcenter Execution Pharma (Opcenter EX PH) 2211 or higher Oracle:

Property	Description
Port	Port number of the Oracle service.
eBR User	Name of the Opcenter EX PH user.
Service Name	Name of the Oracle service. You can insert either the **Service Name** or the **SID**. If you specify both, the **Service Name** will be used.
SID	The Oracle System ID. You can insert the **SID** instead of the **Service Name**. If you specify both, the **Service Name** will be used.

Property	Description
Username	Insert the name of the Oracle user to enable Oracle Database authentication. For more details, see the *Configuring Oracle Authentication* chapter in *Opcenter Intelligence Installation Manual*.
Password	Insert the password for the Oracle user to enable Oracle Database authentication.

> ⚠ If you leave the **Username** and **Password** fields empty, the Operating System authentication will be enabled. In that case, follow the procedure described in the *Configuring Oracle Authentication* chapter in *Opcenter Intelligence Installation Manual*.

10.2.1.8 Opcenter Quality SQL Server

The following properties should be configured for the data source Opcenter Quality (Opcenter QL) 11.0 to 11.3 - 12.0 SQL Server:

Property	Description
Data Path	The physical path of the folder in which SQL files necessary for the database creation are saved.
Encrypt Connection	This property (whose default value is False) can be set to True if you want to add a security encryption to SQL Server to enhance protection of your system. For more information see https://technet.microsoft.com/en-us/library/ms189067(v=sql.105).aspx
Index Path	The physical path of the folder in which indexes are saved.
Log Path	The physical path of the folder in which log files are saved.
Opcenter Quality	The name of the Opcenter Quality database.

10.2.1.9 Opcenter Quality Oracle

The following properties should be configured for the data source Opcenter Quality (Opcenter QL) 11.0 to 11.3 - 12.0 Oracle:

Property	Description
Port	Port number of the Oracle service.

Property	Description
Opcenter QL User	Name of the Opcenter QL user.
Service Name	Name of the Oracle service. You can insert either the **Service Name** or the **SID**. If you specify both, the **Service Name** will be used.
SID	The Oracle System ID. You can insert the **SID** instead of the **Service Name**. If you specify both, the **Service Name** will be used.
Username	Insert the name of the Oracle user to enable Oracle Database authentication. For more details, see the *Configuring Oracle Authentication* chapter in *Opcenter Intelligence Installation Manual*.
Password	Insert the password for the Oracle user to enable Oracle Database authentication.

> ⚠ If you leave the **Username** and **Password** fields empty, the Operating System authentication will be enabled. In that case, follow the procedure described in the *Configuring Oracle Authentication* chapter in *Opcenter Intelligence Installation Manual*.

10.2.1.10 Opcenter Intra Plant Logistics SQL Server

The following properties must be configured for the Opcenter Intra Plant Logistics (Opcenter IPL) 2210 or higher SQL Server data source:

Property	Description
Opcenter EX CR Database	The name of the Opcenter EX CR database.
Opcenter EX CR Schema	The name of the Opcenter EX CR schema.
Data Path	The physical path of the folder in which SQL files necessary for the database creation are saved.
Encrypt Connection	This property (whose default value is False) can be set to True if you want to add a security encryption to SQL Server to enhance protection of your system. For more information see https://technet.microsoft.com/en-us/library/ms189067(v=sql.105).aspx
Index Path	The physical path of the folder in which indexes are saved.
Log Path	The physical path of the folder in which log files are saved.

10.2.1.11 SIMATIC IT Unified Architecture Discrete Manufacturing

The following properties must be configured for the data source SIMATIC IT Unified Architecture Discrete Manufacturing 1.0 - 1.1 - 1.2 - 1.3 - 2.3 - 2.4 - 2.5:

Property	Description
Data Path	The physical path of the folder in which SQL files necessary for the database creation are saved.
Encrypt Connection	This property (whose default value is False) can be set to True if you want to add a security encryption to SQL Server to enhance protection of your system. For more information see https://technet.microsoft.com/en-us/library/ms189067(v=sql.105).aspx
Index Path	The physical path of the folder in which indexes are saved.
Log Path	The physical path of the folder in which log files are saved.
SitMes	The name of the SIMATIC IT Production Suite database.
UAF	The name of the Unified Architecture Foundation database.

10.2.1.12 SIMATIC IT Unified Architecture Process Industries

The following properties must be configured for the data source SIMATIC IT Unified Architecture Process Industries 1.1 Update 1 - 1.2 - 2.3 - 2.4 - 2.5:

Property	Description
UAF	The name of the Unified Architecture Foundation database.

10.2.1.13 Camstar Enterprise Platform SQL Server

The following properties must be configured for the data source Camstar Enterprise Platform (CEP) V7 SU4-SU5-SU6-SU7-SU8 SQL Server:

Property	Description
CEP Database	The name of the CEP database.
CEP Schema	The name of the CEP schema.

Property	Description
Data Path	The physical path of the folder in which SQL files necessary for the database creation are saved.
Encrypt Connection	This property (whose default value is False) can be set to True if you want to add a security encryption to SQL Server to enhance protection of your system. For more information see https://technet.microsoft.com/en-us/library/ms189067(v=sql.105).aspx
Index Path	The physical path of the folder in which indexes are saved.
Log Path	The physical path of the folder in which log files are saved.

10.2.1.14 Camstar Enterprise Platform Oracle

The following properties must be configured for the data source Camstar Enterprise Platform (CEP) V7 SU4-SU5-SU6-SU7-SU8 Oracle:

Property	Description
CEP User	The name of the CEP user.
Port	Port number of the Oracle service.
Service Name	Name of the Oracle service. You can insert either the **Service Name** or the **SID**. If you specify both, the **Service Name** will be used.
SID	The Oracle System ID. You can insert the **SID** instead of the **Service Name**. If you specify both, the **Service Name** will be used.
Username	Insert the name of the Oracle user to enable Oracle Database authentication. For more details, see the *Configuring Oracle Authentication* chapter in *Opcenter Intelligence Installation Manual*.
Password	Insert the password for the Oracle user to enable Oracle Database authentication.

⚠️ If you leave the **Username** and **Password** fields empty, the Operating System authentication will be enabled. In that case, follow the procedure described in the *Configuring Oracle Authentication* chapter in *Opcenter Intelligence Installation Manual*.

10.2.1.15 QMS Professional SQL Server

The following properties must be configured for the data source QMS Professional 10.03 - 10.04 - 10.05 - 10.06 SQL Server:

Property	Description
Data Path	The physical path of the folder in which SQL files necessary for the database creation are saved.
Encrypt Connection	This property (whose default value is False) can be set to True if you want to add a security encryption to SQL Server to enhance protection of your system. For more information see https://technet.microsoft.com/en-us/library/ms189067(v=sql.105).aspx
Index Path	The physical path of the folder in which indexes are saved.
Log Path	The physical path of the folder in which log files are saved.
QMS	The name of the QMS database.

10.2.1.16 QMS Professional Oracle

The following properties must be configured for the data source QMS Professional 10.03 - 10.04 - 10.05 - 10.06 Oracle:

Property	Description
Port	Port number of the Oracle service.
QMS User	Name of the QMS user.
Service Name	Name of the Oracle service. You can insert either the **Service Name** or the **SID**. If you specify both, the **Service Name** will be used.
SID	The Oracle System ID. You can insert the **SID** instead of the **Service Name**. If you specify both, the **Service Name** will be used.
Username	Insert the name of the Oracle user to enable Oracle Database authentication. For more details, see the *Configuring Oracle Authentication* chapter in *Opcenter Intelligence Installation Manual*.
Password	Insert the password for the Oracle user to enable Oracle Database authentication.

> ⚠ If you leave the **Username** and **Password** fields empty, the Operating System authentication will be enabled. In that case, follow the procedure described in the *Configuring Oracle Authentication* chapter in *Opcenter Intelligence Installation Manual*.

10.2.1.17 SIMATIC IT eBR Oracle

The following properties must be configured for the data source SIMATIC IT eBR 6.1.6 Oracle:

Property	Description
Port	Port number of the Oracle service.
eBR User	Name of the eBR user.
Service Name	Name of the Oracle service. You can insert either the **Service Name** or the **SID**. If you specify both, the **Service Name** will be used.
SID	The Oracle System ID. You can insert the **SID** instead of the **Service Name**. If you specify both, the **Service Name** will be used.
Username	Insert the name of the Oracle user to enable Oracle Database authentication. For more details, see the *Configuring Oracle Authentication* chapter in *Opcenter Intelligence Installation Manual*.
Password	Insert the password for the Oracle user to enable Oracle Database authentication.

> ⚠ If you leave the **Username** and **Password** fields empty, the Operating System authentication will be enabled. In that case, follow the procedure described in the *Configuring Oracle Authentication* chapter in*Opcenter Intelligence Installation Manual*.

10.2.1.18 SIMATIC IT Production Suite

The following properties must be configured for the data source SIMATIC IT Production Suite 7.0 SPx - 7.1 - 7.2 - 8.0:

Property	Description
Data Path	The physical path of the folder in which SQL files necessary for the database creation are saved.
Encrypt Connection	This property (whose default value is **False**) can be set to **True** if you want to add a security encryption to SQL Server to enhance protection of your system. For more information see https://technet.microsoft.com/en-us/library/ms189067(v=sql.105).aspx

Property	Description
Index Path	The physical path of the folder in which indexes are saved.
Log Path	The physical path of the folder in which log files are saved.
SitMes	The name of the SIMATIC IT Production Suite database.
SitMes Linked Server	Name of the linked server where the SIMATIC IT Production Suite database is located.

10.2.1.19 SIMATIC IT Historian

The following properties must be configured for the data source SIMATIC IT Historian 7.2:

Property	Description
Data Path	The physical path of the folder in which SQL files necessary for the database creation are saved.
Encrypt Connection	This property (whose default value is **False**) can be set to **True** if you want to add a security encryption to SQL Server to enhance protection of your system. For more information see https://technet.microsoft.com/en-us/library/ms189067(v=sql.105).aspx
Index Path	The physical path of the folder in which indexes are saved.
PPA	The name of the SIMATIC IT PPA database.
PPA Linked Server	Name of the linked server where the SIMATIC IT PPA database is located.
SitMes	The name of the SIMATIC IT Production Suite database.
SitMes Linked Server	Name of the linked server where the SIMATIC IT Production Suite database is located.

10.2.1.20 SIMATIC IT Line Monitoring System

The following properties must be configured for the SIMATIC IT Line Monitoring System 2.2 SP1 HF1 - 2.3 - 2.4 - 2.5 - 2.6 - 2.7 data source.

Property	Description
Data Path	The physical path of the folder in which SQL files necessary for the database creation are saved.
Encrypt Connection	This property (whose default value is **False**) can be set to **True** if you want to add a security encryption to SQL Server to enhance protection of your system. For more information see https://technet.microsoft.com/en-us/library/ms189067(v=sql.105).aspx
Index Path	The physical path of the folder in which indexes are saved.
Log Path	The physical path of the folder in which log files are saved.
PPA	The name of the SIMATIC IT LMS database.
PPA Linked Server	Name of the linked server where the SIMATIC IT LMS database is located.
SitMes	The name of the SIMATIC IT Production Suite database.
SitMes Linked Server	Name of the linked server where the SIMATIC IT Production Suite database is located.

10.2.1.21 SIMATIC IT Manufacturing Data Warehouse

The following properties must be configured for the data source SIMATIC IT Manufacturing Data Warehouse 1.0 - 2.0:

Property	Description
Encrypt Connection	This property (whose default value is **False**) can be set to **True** if you want to add a security encryption to SQL Server to enhance protection of your system. For more information see https://technet.microsoft.com/en-us/library/ms189067(v=sql.105).aspx
Data Path	The physical path of the folder in which SQL files necessary for the database creation are saved.
Index Path	The physical path of the folder in which indexes are saved.
Log Path	The physical path of the folder in which log files are saved.

10.2.1.22 Third-Party Systems SQL Server

The following properties must be configured for the data source Third-Party Systems SQL Server:

Property	Description
Encrypt Connection	This property (whose default value is **False**) can be set to **True** if you want to add a security encryption to SQL Server to enhance protection of your system. For more information see https://technet.microsoft.com/en-us/library/ms189067(v=sql.105).aspx

10.2.1.23 Third-Party Systems Oracle

The following properties must be configured for the data source Third-Party Systems Oracle:

Property	Description
Port	Port number of the Oracle service.
Service Name	Name of the Oracle service. You can insert either the **Service Name** or the **SID**. If you specify both, the **Service Name** will be used.
SID	The Oracle System ID. You can insert the **SID** instead of the **Service Name**. If you specify both, the **Service Name** will be used.
Username	Insert the name of the Oracle user to enable Oracle Database authentication. For more details, see the *Configuring Oracle Authentication* chapter in *Opcenter Intelligence Installation Manual*.
Password	Insert the password for the Oracle user to enable Oracle Database authentication.

> ⚠️ If you leave the **Username** and **Password** fields empty, the Operating System authentication will be enabled. In that case, follow the procedure described in the *Configuring Oracle Authentication* chapter in *Opcenter Intelligence Installation Manual*.

10.3 Deploying an Environment

Follow this procedure to deploy an environment. You can also undo the deploy operation, for example before deleting a solution. The progress of this operation can be tracked on the **Monitoring Messages** page.

> ⚠️ • Before you start a deploy operation, you must check that no other operation, such as a purge database or an initial or incremental flow, is running at the same time. If that is the case, wait for this operation to end before launching the deploy.

> • The deploy of an environment does not affect the data you may have configured for smart views. A specific deploy of smart views can be executed in the corresponding page.

Procedure

1. In the **Environments** page, select the environment.
2. Click ⬆ **Deploy Environment**.

10.4 Undeploying an Environment

This operation allows you to undo the deploy, for example before deleting a solution. The progress of this operation can be tracked on the **Monitoring Messages** page.

> ⚠ Before you start an undeploy operation, you must check that no other operation, such as a purge database or an initial or incremental flow, is running at the same time. If that is the case, wait for this operation to end before launching the undeploy.

Procedure

1. In the **Environments** page, select an environment.
2. Click ◩ **Undeploy Environment**. All the items and associations created during the previous deploy operation are removed.

10.5 Purging the Manufacturing Data Warehouse

This operation allows you to delete all or part of the data in the MDW. The progress of this operation can be tracked on the **Monitoring Messages** page.

Target Users

The command is enabled only if the current user has the **Solution Engineer** role.

Prerequisites

You have executed a deploy of the environment.

Important Recommendations

- When you launch a purge operation, you must check that no other operation, such as a deploy or an initial or incremental flow, is running at the same time. If that is the case, wait for this operation to end before starting the purge.
- If you have scheduled any incremental flows, it it strongly recommended that you disable them before launching the purge, because their execution might overlap.

Procedure

1. In the **Environments** page, select an environment.
2. Click ✎ **Purge Database**.
3. In the **Purge Database** panel, select:
    - the site for which you want to clean data
      or

- **All Sites**
4. Click **Start**.

11 How to Configure Smart Views

A Smart View is the representation of manufacturing entities, ideas and events, along with their properties and relations, according to a system of categories. By configuring a smart view, you can choose how to visualize the information contained in the data warehouse. To this end, you can create more than one smart view.

The size of each smart view depends on the selected measures and attributes as well as on the size of the selected entities in terms of disk space and computational effort.

In the **Smart Views** page, the Smart Views are grouped according to the projects associated during their creation.

> ✅ For more details on:
> - concepts related to smart views, see *Opcenter Intelligence Product Overview*
> - how data is distributed and used in smart views, see Opcenter Intelligence Smart View Data
> - how time is managed in smart views, see Time Management in Smart Views

Target Users

> ⚠ The **SmartView Engineer** role, which can grant you access to the **Smart Views** pages, is only available if you have purchased an Opcenter Intelligence - Site or an Opcenter Intelligence - Enterprise license.
> A new licensing model has been introduced starting from version 3.2. These roles are maintained to support the previous licensing model and are available only if you are not using the new licensing model. For more details, see *How to Manage Licenses, Users and Roles* in *Opcenter Intelligence Installation Manual*.

Accessing the Page

To access the **Smart Views** page:

1. Select a solution in the **Solutions** page.
2. Click ↗ **Open Solution**.
3. Click the **Smart Views** card.

Workflow

1. Perform preliminary operations
2. Create a Smart View
3. Select Measures
4. Select Attributes
5. Deploy a Smart View
6. (Optional) Undeploy a Smart View
7. Run a Smart View
8. Perform additional operations

11.1 Opcenter Intelligence Smart View Data

When you select measures and attributes in the cards of a smart view, you are choosing the information on the basis of which you want to aggregate, filter or group data for analysis in dashboards.

When the Smart View is deployed, one or more data marts are created, which are made up of related fact tables (measures) and dimensions/contexts (attributes). A fact table is created for each card where measures have been selected and dimensions are created for each selected attribute card.

The available fact tables and dimensions depend on functionalities, on available sources and on the selected measures/attributes. Some of the displayed measures and attributes are provided out of the box, while other depend on the data warehouse content and are loaded during a project synchronization.

Measures and Attributes Distribution in Cards

While measures are distributed in cards according to data warehouse entities, attributes are further subdivided depending on the data warehouse table they belong to. The following attribute types can be present in the corresponding cards:

Type	Description
Standard	Basic information about the entity. They are always present in the attribute cards.
Class	Classification created for the entity in the data source. Classes that are mutually exclusive can be merged into a single attribute by means of the **Merge Attributes** operation.
Property	Property configured for the entity in the data source.
Hierarchy	Hierarchy of the entity distributed in levels as defined in the data source. Since we do not have a prior knowledge of the different hierarchy levels, they are shown as **Level0**, **Level1**, etc. However, like all other measures and attributes, they can be renamed.
Lookup	Additional information on the entity.

11.2 Preliminary Operations

Before creating a smart view, the following preliminary operations are available:

- Synchronize the project or Clean the project
- (Optional) Merge measures and attributes

11.2.1 Synchronizing the Project

The synchronization updates the metadata necessary to include in the smart view the information provided by functionalities and the data sources that you have selected during the project configuration. In short, the project synchronization will transform the data of the manufacturing data warehouse into measures and attributes.

Prerequisites

You have created and configured:

- a project
- a scenario
- an environment

You have performed:

- a deploy of the environment
- an initial flow to load data

Limitations

When you synchronize the project, for the entities with a hierarchy (like for example Equipment, OperationExecution, OperationResponse etc.) the hierarchy might generate a loop (for example, Equipment1 → Equipment2 → Equipment1). In that case, in the **Attributes** cards of the smart view the levels cannot be selected for that entity.

Procedure

1. In the **Smart Views** page, click ↻ **Synchronize Project**.
2. In the **Projects** drop-down, select a project.
3. In the **Environment** drop-down, select an environment.
4. Click **Synchronize**.

11.2.2 Cleaning the Project

The cleaning operation is the opposite of synchronization, which generates measures and attributes on the basis of MDW data (bm20 schema). The cleaning operation must be executed when the MDW content has been totally modified, for example after a purge or an undeploy operation.

Important Recommendation

If you have already created one or more smart views (of any type), the cleaning operation cannot be executed, because it might delete the measures and attributes selected for the smart view(s).

Prerequisites

You have created a project.

Procedure

1. In the **Smart Views** page, click ↻ **Clean Project**.
2. Select the project.
3. Click **Clean Project**.

11.2.3 Merging Measures and Attributes

Measures and attributes can be aggregated by means of the merge operation. This operation is a sort of "cleaning" action, and is useful when, for example, the same information has been expressed with different names or when similar items need to be clustered, for example classes. You can merge more than one item.

The system performs a check on the validity of the merge and informs the user whether the operation is possible or not: for example when measures are included in tables with different analysis contexts and cannot therefore be stacked.

> ⓘ • The merge functionality is only available for data of the out-of-the-box model or for the extension of entities of the out-of-the-box model.

> • The merge operation is not related to any specific smart view, as the merged measures and/or attributes are related to the project. As a result, the prior selection of a smart view is not required before merging measures or attributes.

Procedure

1. In the **Smart View** page, click the ⋀ **Merge** button: from the drop-down menu, select either **Merge Attributes** or **Merge Measures**.
2. Select a functionality from the list on the left pane.
3. In the cards that are displayed, select two or more measures or attributes you want to merge.
4. Click ⋀ **Merge**.
5. In the **Merge Attributes** or **Merge Measures** pane, insert a name for the new merged item and click **Merge**. A new clustered item is shown under the **Custom** section for measures and **Standard** section for attributes.
6. To view the list of measures contained in the merged item, hover the mouse on the ☰ button near the item name and click the check mark that appears on the left, then click the ⓘ **Info** button on the toolbar.
7. To split the item into the original measures, click ⋁ **Split**.

11.3 Creating a Smart View

Prerequisites

- You have created and configured:
    - a project
    - a scenario including a flow
    - an environment
- You have performed (strongly recommended):
    - an initial flow to load data
    - a project synchronization

Procedure

1. In the **Smart View** page, click ⊕ **Create Smart View**.
2. Insert a meaningful name for the smart view. When you name an item, you must follow these rules:
    - The first letter of the name must be an uppercase, lowercase or numeric character.
    - For the remaining characters of the name, only alphanumeric characters, underscores and spaces should be used.
    - Special characters (such as %, |, §, &, #, +, -, etc.) are not allowed.
    - The maximum length for names must not exceed 255 characters.
3. In the **Projects** drop-down list box, select a project.
4. Select a **Type**, which can be either of the following:
    - **Physical**: data warehouse tables are physically created in columnstore mode and the schema has the same name as the view.
    - **Virtual**: information is managed by creating SQL views on top of the data warehouse.

> ⚠ The virtual mode involves transformations each time the user makes a query, and is therefore demanding in terms of resources and possible system slowdowns. It should therefore be used responsibly, in particular when prototyping scenarios are involved or if the data warehouse does not contain a huge amount of data.

5. If you have selected the **Physical** type, you can select the **Schedule**, which can be **Every 2, 5, 10, 30** or **60 minutes** depending on how frequently you want to update the database tables created by the smart view. A flow schedule associated with the smart view is automatically created when you save the smart view.
6. Click **Save**. The **Deploy Info** on the smart view tile after it has been created is **NotDeployed**.

11.4 Selecting Measures

Prerequisites

You have created a smart view.

Limitations

If different measures have names that differ from each other only by a space, the deploy of the smart view fails because their names must be unique within a query batch or stored procedure.
Example:
Actual Quantity EquipmentPropertyStaticValue
ActualQuantity EquipmentPropertyStaticValue
As a workaround, you can rename the measures by editing them in the smart view page.

Procedure

1. In the **Smart View** page, select a smart view and click ⬀ **Open Smart View**.
2. In the **Measures** tab a set of predefined cards is displayed according to the functionalities and the data sources you have selected during the project configuration. Measures are also acquired (and the cards are therefore populated) during the project synchronization.

   > ⓘ   In the **Measures** tab, **Generic Entity** type extensions are shown in the **<*extension name*>Fact** format.

3. Select the measures you want to analyze. Depending on this choice, the attributes cards you can select will vary accordingly. You can select a maximum number of 200 measures. A block will be issued if their number exceeds this limit.

   > ⓘ   If you select the **Downtime Management**, **Equipment Performance** and **Equipment Capacity** measures, the **Asset Performance View** is generated automatically when you deploy the smart view. You cannot therefore assign this name to any other entity.

4. Click 🖫 **Save Measures**: the **Save operation in progress** status is shown on the smart view tile.
5. Wait until the **Available** status appears on the smart view tile to proceed with any other operation on the smart view.

> ⚠   The measures related to the **Equipment Capacity** entity are calculated only if an equipment state (**EquipmentTimeModel** on MDW) exists in the same time range as the capacity sample (**EquipmentCapacityValue** on MDW).

11.5 Selecting Attributes

Prerequisites

- You have created a smart view.
- You have selected and saved at least one measure.

- You have checked that the measures you selected have been saved correctly, that is when the **Smart view available** message is displayed on the smart view tile.

Limitations

If different attributes have names that differ from each other only by a space, the deploy of the smart view fails because their names must be unique within a query batch or stored procedure.
Example:
Actual Quantity EquipmentPropertyStaticValue
ActualQuantity EquipmentPropertyStaticValue
As a workaround, you can rename the attributes by editing them in the smart view page.

Procedure

1. In the **Smart View** page, select a smart view and click ⤴ **Open Smart View**.
2. Click the **Attributes** tab. A set of predefined cards is displayed according to the measures you have selected in the **Measures** page. Attribute cards are updated when a data load is performed. Depending on the data warehouse table they belong to, attributes can be of the following types:

Type	Description
Standard	Basic information about the entity.
Class	Classification created for the entity in the data sources.
Property	Property configured for the entity in the data sources.
Hierarchy	Hierarchy of the entity distributed in levels as defined in the data sources.
Lookup	Additional information on the entity.

> ⓘ **Generic Entity** type extensions are shown in the *<extension name>* format.

3. Select the attributes you want to analyze. You can select a maximum number of 200 attributes. A block will be issued if their number exceeds this limit.
4. Click 💾 **Save Attributes**: the **Save operation in progress** status is shown on the smart view tile.
5. Wait until the **Available** status is displayed to proceed with any other operation on the smart view.

11.6 Deploying a Smart View

A deploy is required after you have performed one of the following operations on measures / attributes and, in some cases, contexts:

- Select
- Clear
- Rename
- Merge
- Split

The progress of this operation is tracked on the **Monitoring Messages** page.

Smart View Deploy Status

The deploy status of a smart view is shown on each smart view tile, followed by the name of the environment selected when the deploy operation has been started. The possible statuses can be **NotDeployed**, **Deploying**, **Undeploying**, **Deployed**, **Deployed with errors**, **Undeployed with errors**. To view the updated status, refresh the page.

> ⚠ The deploy operation is not allowed if the smart view status is **Deploying** or **Undeploying**.

Important Recommendations

- The smart view deploy is based on the difference between existing and new data, so existing data is maintained. Any new measures/attributes selected before the current deploy are filled as soon as the deploy is completed. However, if you deliberately want to destroy and recreate the smart view with the consequent new data load, you have to undeploy the smart view and deploy it again.
- In the latter case, please be aware that the deploy operation takes a long time, as it deletes and recreates all data currently stored in the Smart View.
- The successful completion of neither the deploy nor the undeploy of a smart view is automatically visible. Therefore, before starting the deploy or undeploy of a smart view you need to check on the **Monitoring Messages** page that the previous deploy or undeploy of that smart view has been completed successfully. This is particularly recommended when you want to execute one operation immediately after the other.
- If you create an extension for a project for which you have already executed a deploy of the associated environment, you must execute the deploy again before running the smart view.
- If the selected source is SIMATIC IT UAPI or Opcenter Execution Process, only the following format is supported for datetime fields: yyyy-mm-dd hh:mm:ss. Any other format will be discarded from the system. Non-standard formats can, however, be loaded by overriding the contract layer.
- The deploy of a smart view will not affect the data you have configured for environments. A specific deploy of an environment can be executed in the corresponding page.

Procedure

1. In the **Smart View** page, select a smart view.
2. Click ⬆ **Deploy Smart View**.
3. Select an environment and click **Deploy**. During the deploy operation, the **Deploy Info** on the smart view tile shows the **Deploying on <*environment name*>** message.
4. In the **Monitoring Messages** page, monitor the progress and completion of the deploy operation. When the deploy has been completed successfully, the **Deploy Info** on the smart view tile shows the **Deployed on <*environment name*>** message. If any errors occurred during the deploy, the **Deployed with errors** message is displayed.

> ⚠ After the deploy has been completed, smart views are not immediately populated. The data load on smart views may last many hours depending on the data warehouse size.

11.7 Undeploying a Smart View

You can undo the deploy of a smart view. The undeploy operation is required before deleting a smart view to free allocated resources in the data warehouse and avoid performance issues. The progress of this operation is tracked on the **Monitoring Messages** page.

Smart View Undeploy Status

The undeploy status of a smart view is shown on each smart view tile, followed by the name of the environment selected when the undeploy operation has been started. The possible statuses can be **NotDeployed**, **Deploying**, **Undeploying**, **Deployed**, **Deployed with errors**, **Undeployed with errors**.. To view the updated status, refresh the page.

> ⚠️ The undeploy operation is not allowed if the smart view status is **Deploying** or **Undeploying**.

Important Recommendations

- The successful completion of neither the deploy nor the undeploy of a smart view is automatically visible. Therefore, before starting the deploy or undeploy of a smart view you need to check on the **Monitoring Messages** page that the previous deploy or undeploy of that smart view has been completed successfully. This is particularly recommended when you want to execute one operation immediately after the other.
- If by mistake you launch an undeploy operation before you have deployed the smart view, no error is returned and the smart view remains unchanged.

Procedure

1. In the **Smart View** page, select the smart view for which you want to undo the deploy operation. The smart view must be in **Deployed** status.
2. Click ◺ **Undeploy Smart View**. This button is not visible if the smart view has not been deployed before.
3. Select the environment and click **Undeploy**. All the structures and objects created during the previous deploy operation are removed. During the undeploy operation, the **Deploy Info** on the smart view tile shows the **Undeploying on <*environment name*>** message.
4. In the **Monitoring Messages** page, monitor the progress and completion of the operation. When the undeploy has been completed, the **Deploy Info** on the smart view tile shows the **NotDeployed on <*environment name*>** message. If any errors occurred during the deploy, the **Undeployed with errors** message is displayed.

11.8 Running a Smart View

In this step you can configure and run either an initial or an incremental load for the selected smart view.

> ⚠️ This operation can be executed only if the smart view type is **Physical**. If the smart view is of **Virtual** type, data is made available automatically.

Prerequisites

- You must have deployed the environment at least once.
- Check that no other operation, such as a deploy or another flow, is running at the same time. If that is the case, wait for this operation to end before starting any other action.
- To ensure an adequate performance, it is strongly recommended that you disable any flow schedule you have planned for data sources before running an initial load for smart views.

Procedure

1. In the **Smart View** page, select a smart view. The smart view must be in **Deployed** status.
2. Click ⏩ **Run Smart View**. This button is not visible if the smart view has not been deployed before.
3. In the **Run Smart View** page, select an environment.
4. Specify a **Start Date** and an **End Date** to define the time interval for the data you want to load.

> ⚠ If the selected source is SIMATIC IT UAPI or Opcenter Execution Process, only the following format is supported for datetime fields: yyyy-mm-dd hh:mm:ss. Any other format will be discarded from the system. Non-standard formats can, however, be loaded by overriding the contract layer.

5. Click **Start** to run the smart view.

11.9 Additional Operations

The following additional operations can be performed on a smart view:

- Manage contexts
- Edit a smart view
- Purge a smart view
- Delete a smart view
- Rename measures or attributes

11.9.1 Managing Contexts

In this step you can manually add a relationship between a fact table and a context that have not been directly linked. After you have performed this operation, you must retrieve the context values by editing the SQL scripts for the entities generated by smart views.

If the contexts added automatically by the system are correct and you do not want to add any additional contexts, you can proceed to select attributes. If on the contrary you want to manage additional contexts, go to the **Contexts** page.

Sometimes a context is associated with a fact table and therefore shown as a standard context but the system is not able to retrieve its value. To do so, you will need to customize the SQL scripts by using a specific function.

Procedure

1. In the **Smart View** page, click the **Contexts** tab. The list of all the existing contexts is shown, depending on the entities you have selected in the **Measures** page.
2. The **Standard** section of each card will contain the contexts that have already been associated with a fact table, which cannot be deselected. The **Custom** section will show all the contexts that have not been linked to that entity.
3. Add the contexts you want to link by selecting the corresponding check box(es).
4. Click 🖫 **Save Contexts**. The database columns in the related table/view are created for the newly-added contexts. To retrieve the value of these contexts, you must edit the SQL scripts for the entities generated by smart views.

> ⚠ If you delete a custom context whose attributes are used in the smart view, these attributes will be deleted from the smart view as well.

11.9.2 Editing a Smart View

You can modify some of the options selected when you created the smart view.

> ⚠ You cannot change the smart view configuration if the smart view is in deploying status.

Procedure

1. In the **Smart View** page, click the smart view that you want to edit and click ✏ **Edit Smart View**.
2. If you want to change the smart view **Type**, the following options are available:
   - from **Physical** to **Virtual**: the associated smart view flows and flow schedule are deleted;
   - from **Virtual** to **Physical**: flows and flow schedules are automatically created.
3. You can edit the flow schedule by changing the options in the **Schedule** drop-down menu, which can be **Every 2, 5, 10, 30 or 60 minutes** depending on how frequently you want to update the database tables created by the smart view. This option is enabled only when the selected smart view **Type** is **Physical**.

> ⚠ You cannot delete the flow schedule automatically created with the smart view. You can only edit the flow schedule by changing the options in the **Schedule** drop-down menu of the **Edit Smart View** panel.

4. Click **Save**.

11.9.3 Editing Measures, Attributes, or Contexts

You can edit existing smart views by modifying the options you selected when you created them.

Saving measures and/or attributes does not modify the physical structure of the manufacturing data warehouse. As a result, a deploy of the smart view is always required after the edit operation.

> ⚠ You cannot change the smart view configuration if the smart view is in deploying status.

Procedure

1. In the **Smart View** page, click ↗ **Open Smart View**.
2. Click the **Measures**, **Attributes**, or **Contexts** tab.
3. Select or deselect measures, attributes or contexts depending on the option selected in the previous step.
4. Click 💾 **Save Measures** or 💾 **Save Attributes** or 💾 **Save Contexts**.
5. In the **Smart View** page, select the edited smart view and click ⬆ **Deploy Smart View**.

11.9.4 Purging a Smart View

The purge operation deletes all data for the selected smart view. Smart Views are usually loaded, updated and deleted automatically depending on the changes to the bm20 tables of the data warehouse. However, you may want to delete all data from a smart view in order to reload them.

After the purge of a smart view, all data contained in the smart view entities is deleted. bm20 data is maintained and when the purge has been completed, the smart view is reloaded and populated on the basis of bm20 data, including data in the past. Depending on the amount of data contained in the smart view, the loading operation may take some time.

Prerequisites

Before you start a purge view operation, check that no other operation, such as a deploy or a flow, is running at the same time. If that is the case, wait for this operation to end before starting any other action.

Procedure

1. In the **Smart View** page, select a smart view.

2. Click ✎ **Purge Smart View**. This button is not visible if the smart view has not been deployed before.
3. In the **Purge View** page, select an environment.
4. Click **Start**.

11.9.5 Deleting a Smart View

Important Recommendation

When you delete a smart view, you only delete the configuration, but the corresponding entities are not deleted from the manufacturing data warehouse, including entities that have been deployed, or running flows (if they have been scheduled). The manual deletion of such entities is therefore required.

Procedure

1. In the **Smart View** page, select a smart view.
2. Click 🗑 **Delete Smart View**.
3. Click **Delete**.

> ⚠ You cannot delete a smart view if it has been deployed in at least one environment.

11.9.6 Renaming Measures or Attributes

You may need to rename measures or attributes. You can change the name assigned by the product to measures and attributes or to any type of card.

> ⚠ You cannot change the smart view configuration if the smart view is in deploying status.

Renaming Convention

If you want to rename the cards displayed for measures and attributes, you must apply the following rules, which do not allow:

- All the names used for out-of-the-box functionalities.
- All the names of out-of-the-box entities (which include all possible contexts).
- All (context or functionality) aliases already created for that smart view.

For measures, you must apply the following rules, which do not allow:

- The use of out-of-the-box (standard) measures.
- The aliases of measures you have already created.

For attributes, you must apply the following rules, which do not allow:

- The use of out-of-the-box (standard) attributes.
- The aliases of attributes you have already created.

Procedure

1. In the **Smart View** page, select a smart view and click ↗ **Open Smart View**.
2. Click either the **Measures** or **Attributes** tab.
3. Click the ✎ **Edit Measures** / **Edit Attributes** button depending on the option selected in the previous step.
4. Rename card names, measure names or attribute names.

5. Click ✓ **Confirm Edit**.
6. Click 🖫 **Save Measure** or 🖫 **Save Attribute**.
7. In the **Smart View** page, select the edited smart view and click ⬆ **Deploy Smart View**.

12 How to Perform Runtime Operations

In version 3.2 a new licensing model was introduced, which enables you to install Opcenter Intelligence Analytics (Tableau® OEM) during Opcenter Intelligence setup and create dashboards in this embedded version.

> ⓘ The integration with Legacy Tableau®, Microsoft Power BI and Microsoft SQL Server Reporting Services is no longer supported.

Accessing the page

To access the runtime page, click the **Analytical Tools** card in the **Home** page.

Available Operations

Manage Dashboards using Opcenter Intelligence Analytics (Tableau® OEM)

12.1 How to Manage Dashboards using Opcenter Intelligence Analytics

Target Users

- Users with the **Desktop Explorer** role can perform all operations, including creating dashboards and publishing data sources.
- Users with the **Analytics Explorer** role can create dashboards.
- Users with the **Analytics Viewer** can only view dashboards.

> ⓘ All these roles can access Tableau® Server.

For more details on licenses, users and roles, see *Opcenter Intelligence Quick Start Installation Manual*.

Workflow

1. Publish Data Sources using Opcenter Intelligence Analytics Desktop
2. Manage Dashboards in Opcenter Intelligence Analytics
3. (Optional) Embed Opcenter Intelligence Analytics Dashboards

12.1.1 Publishing Data Sources using Opcenter Analytics Desktop

To create dashboards based on MDW data, you must publish data sources on Opcenter Intelligence Analytics Server using Opcenter Intelligence Analytics Desktop.

> ⚠ Opcenter Intelligence Analytics can only be connected to the MDW data source created and populated in Opcenter Intelligence starting from version 3.2.

Authentication

Depending on the **Run as Server** configuration in Opcenter Intelligence Analytics Configurator, authentication can be handled as follows:

- if you have selected **NT AUTHORITY\Network Service** and the scenario is all-in-one, create a login for the Network Service Windows user in Microsoft SQL Server.

> ⓘ   This configuration is not recommended.

- if you have selected **User Account**, you need to create the appropriate logins in SQL Server and assign the correct permissions to grant access to the data warehouse.

Prerequisites

- You have installed Opcenter Intelligence Analytics during Opcenter Intelligence setup.
- You have configured Opcenter Intelligence Analytics using Opcenter Intelligence Configurator. For more details, see *Opcenter Intelligence Installation Manual*.
- You have reset the password for the Desktop Explorer role.
- You have signed in to Tableau® Server from Tableau® Desktop. For more details, see https://help.tableau.com/v2021.4/pro/desktop/en-us/sign_in_server.htm

> ⓘ   Either of the following cases can occur regarding log-in options:
> - You sign in to Tableau® first, you are prompted to provide your credentials and must enter your user name without the domain and your password.
> - You log in to Opcenter Intelligence first. In this case, the user with the Desktop Explorer role has access to Tableau® from the Analytical Dashboards page and can publish data sources without being prompted to provide credentials.

Important Recommendations

- If the operating system on your machine is **Windows Server 2019**, you have to grant full control on the **Siemens\Tableau\Tableau Server** folder in the **Properties\Security** tab to the user configured in Opcenter Intelligence Analytics Configurator in the **Run As Service Account** section.

Run As Service Account	○ NT AUTHORITY\NetworkService	⦿ User Account		
User Account *	domain\user2	Password *		Show ☐ Same As Installation User

- This user can be the **Network Service** user as in the example below, or a custom **User Account**. Based on this selection, you need to make sure that folder permissions are provided with full control by adding the Network Service user or the custom User Account.
- The NT Authority\NetworkService user or the custom user needs to have proper access to Data Warehouse databases and tables in SQL Server.
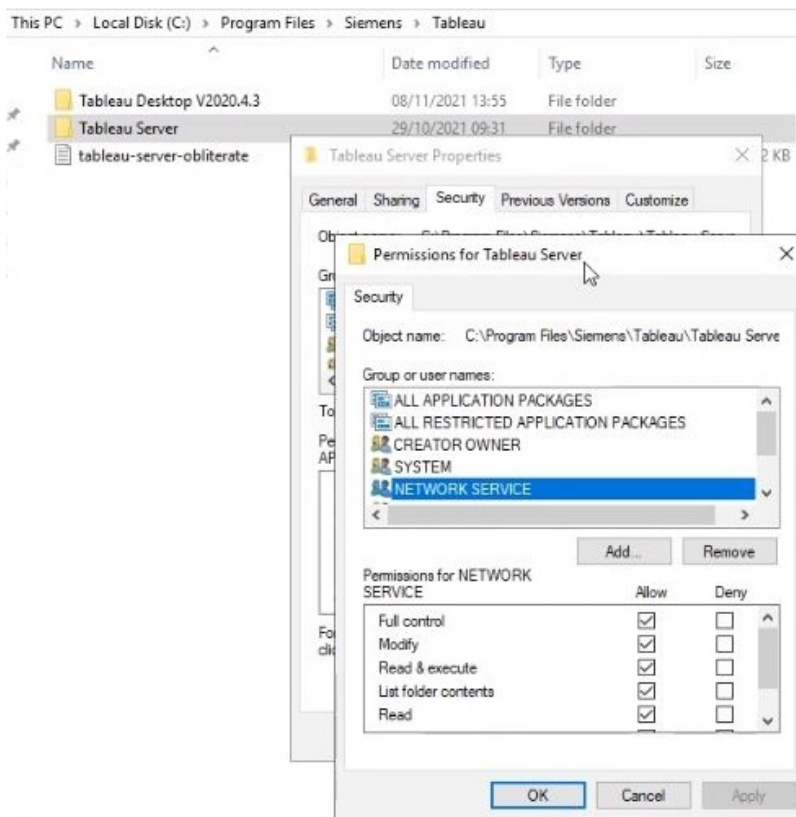
> ⚠️ If this configuration is not applied, an error is returned when you publish a data source in Opcenter Intelligence Analytics Desktop.

Procedure

1. Publish Data Sources. For more details on this operation, see https://help.tableau.com/v2021.4/pro/desktop/en-us/publish_datasources.htm
2. Starting from version 3.5 of Opcenter Intelligence, when you publish data sources from Opcenter Intelligence Analytics Desktop, you can select either **Default** project or **Opcenter Intelligence** project.

> ⓘ If you change permissions for published data sources, you must restart Tableau® Server.

12.1.2 Managing Dashboards using Opcenter Intelligence Analytics

In this page you can create, manage and view dashboards using the embedded Opcenter Intelligence Analytics (Tableau® OEM).

Prerequisites

You must have published data sources on Opcenter Intelligence Analytics Server using Opcenter Intelligence Analytics Desktop.

Procedure

1. Click the **Analytical Dashboards** card.

2. Click ⬚⬚ **Open Tableau Server**. For detailed instructions on how to operate in Tableau® OEM, go to https://www.tableau.com/support/help and select version **2021.4**.

> ⓘ
> - In Opcenter Intelligence Analytics you cannot set data-driven email alerts on dashboards and views.
> - Starting from version 3.5 of Opcenter Intelligence, when you publish data sources from Opcenter Intelligence Analytics Desktop, you can select either **Default** project or **Opcenter Intelligence** project.
> - The dashboards saved in the **Personal Space** or **Collections** sections in Tableau® are not visible in Opcenter Intelligence.

Important Note

In case the error: "An error occurred while connecting Tableau server" is returned when you click the **Open Tableau Server** command, follow these steps:

1. Launch Opcenter Intelligence Configurator > **Manage Configuration** option again.
2. In the **Opcenter Intelligence Analytics Configuration** area, in the **Analytics Server URL** field, insert the IP address of the machine where Tableau® server is installed.
3. Click **Apply** and then **Close**.

12.1.3 How to Embed Opcenter IN Analytics Dashboards in a Custom Application

You can embed the Opcenter Intelligence Analytics (Tableau® OEM) dashboards directly into your custom application using the Siemens Web Application Collaboration (SWAC) library.

For more information on the SWAC Library, see *SWAC Documentation*, available at https://code.siemens.com/swac/sdk/development/-/tree/master/documentation

Prerequisites

- The SWAC Library has been imported. For more information on how to import and integrate a SWAC component in a Siemens Web Framework (SWF) project, see *SWAC Documentation*.
- You have used User Management Component (UMC) authentication to log in to Opcenter Intelligence. If UMC was installed with another product that uses UMC as Identity Provider (for example Opcenter Execution Discrete), the same user that authenticated in Opcenter EX DS must be a user in Opcenter Intelligence too with Desktop Explorer, Analytics Explorer or Analytics Viewer role.
- You have [created and published a dashboard in Opcenter Analytics (Tableau® OEM)](#).

For information on SWAC prerequisites, see *SWAC Documentation*.

Available Operations

- [Integration Methods](#)
- [Embed Dashboards](#)

12.1.3.1 SWAC Integration Methods

The SWAC Component provides the following methods to retrieve and show the dashboard list.

getAllDashboards

Retrieves the list of published dashboards according to the same hierarchical structure as the UI: **Site** > **Projects** > **Workbooks** > **Views**.

The return type is an array, for example:

```
[
{
"Id": "ee75408d-a7ef-4d24-8abc-1ffa6eef2e0c",
"Name": "Default",
"State": "Active",
"Projects": [ {
"Id": "3b243d71-9763-4e78-ba9d-e454d83cc24e",
"Name": "Tableau Samples",
"Description": "",
"Workbooks": [ {
"Id": "823dad3c-7901-4df2-aae6-d1cae5c4ff00",
"Name": "Regional",
"Description": null,
"ContentUrl": "Regional",
"Views": [ {
"Id": "33f65fae-adee-4c3f-9479-26343122f614",
"Name": "Obesity",
"ContentUrl": "Regional/sheets/Obesity",
"previewImage": ""
} ]
} ]
} ]
}
]
```

showDashboard

Shows the dashboard list.

The **ContentUrl** property present on the **View** object as in the above example needs to be passed to this function in order to display the required View (Dashboard).

12.1.3.2 Embedding Opcenter IN Analytics Dashboards

Procedure

1. Create an HTML file and refer to the SWAC libraries. You can use script tags in HTML to add references.

    > ⓘ SWAC-Base.js: <script src="../assets/lib/@swac/swac-base.min.js"></script>
    > SWAC-Container.js: <script src="../assets/lib/@swac/swac-container.min.js"></script>

2. Configure the necessary SWAC library properties. Example: SWAC.Config.LevelLog = 1; SWAC.Config.TimeOuts.Enabled = false.
3. (Optional) Specify the path of the SWAC base library, which permits the execution of SWAC code and communication between SWAC container and SWAC component. Example: SWAC.Config.Container.URLs.BaseLibrary = *<URL>*
4. Initialize the SWAC component object by configuring the necessary properties.
5. Create the SWAC component by calling the **beginCreate** method in the SWAC library.

6. Subscribe to the **onReady** event to call exposed SWAC component methods. Only after the onReady event has been fired, it is possible to call all the SWAC component methods.
7. Fetch the SWAC component object by component name and call the necessary method exposed by the SWAC component.
8. In the callback function, use the **beginShow** (**true**) method to display the SWAC component.

> ⓘ You can download the SWAC kit at this link: https://code.siemens.com/swac. The SWAC kit must be downloaded and referenced locally.

13 Monitoring Operation Execution

In the **Monitoring Messages** page you can view details of command execution and history, check deploy progress, verify schedule history and check flow progress and history. You can monitor various operations through the tabs which provide filters to procure data on the basis of different filter criteria. The operations within each tab are described in the sections below:

- Main Command
- Deploy Details
- Schedule History
- Flow Details

Target Users

Only users with the following roles can access this page and see its content:

- **Administrator**
- **Solution engineer**
- **SmartView engineer**

Main Command

You can monitor the progress of a number of operations such as the deploy of an environment, an initial or incremental load or the purge of a database. You can view the main commands filtered by **Solutions**, **Scenarios**, **Environments**, and **Commands**. You can view the logs of commands and their status in the last 24 hours in **Command History**. The following table lists the icons and the corresponding descriptions of the possible command history statuses.

Icon	Description
🔴	Represents failed operation.
🔺	Represents deployment in progress.
🟩	Represents successful deployment.
⊘	Represents unexpected results.

Deploy Details

You can monitor the progress of the deploy operation filtered by deploy history.

Field	Description
Deploy History	Filters on the basis of already deployed environments.

Field	Description

Deploy Progress	Displays the deploy progress with the following parameters:
	
	• **DEPLOYMENT STAGE:** When you expand the entries in this column, you are able to see the substeps of the deployment stage.
	• **DESCRIPTION:** Provides the description for steps and substeps. If a certain stage fails, the reason for failure of deployment is shown.
	• **EXECUTION:** Provides the status of execution. Possible values are:
	    • **In Progress**
	    • **Completed**
	    • **Failed**
	    • **Not Initiated**
	
	ⓘ When you select a row of the grid, a panel showing information on the corresponding deploy step is displayed.

Schedule History

You can view the planned schedules filtered by solution, scenario, environment and date and time. The **Schedules** area displays the schedule history on the basis of options selected in the filter criteria.

Field	Description
SCHEDULE NAME	Name of the flow schedule.
START DATE	Date when the schedule run starts.
END DATE	Date when the schedule run ends.
STATUS	Provides the status of the task as one of the following: • **Failed** • **Completed** • **Canceled** • **In Progress** • **Scheduled**

Flow Details

You can view the progress of the execution of the selected flow.

Field	Description
Flow Execution	Filters on the basis of the flow environment.

Field	Description
Flow Progress	Displays the file name, status and time of the flow. • **PACKAGE:** Displays the file name. The error message on failure is displayed below the file name. • **STATUS:** Provides the status of the task as one of the following: • **In Progress** • **Completed** • **Failed** • **Not Initiated** • **DURATION:** Provides the duration of the task. ⓘ When you select a row of the grid, a panel showing information on the flow is displayed. In case of error, the full error message is displayed on the panel.

✅ To properly monitor the progress of the execution of all the ETL packages listed in the page, it is recommended that you set the **Server-wide Default Logging level** in the SSIS Catalog to **Basic**.

13.1 Setting the Server-wide Default Logging level in the SSIS Catalog

The SSIS catalog is a central repository for storing, configuring and executing packages. One of the catalog features is the built-in logging, which stores information about various events and statistics in the SSISDB database. There is a default logging level you can configure for the entire SSIS catalog that will enable you to correctly display and monitor the progress of the flows in the **Monitoring Messages** page.

Procedure

1. Connect to the SQL Server instance using SQL Server Management Studio.
2. Expand the **Integration Services Catalogs** node.
3. Right click on the **SSISDB** node and select **Properties**.
4. Set the **Server-wide Default Logging Level** (under the **Operations Log** category) to **Basic**.

14 How to Upgrade a Reporting Framework 7.0 Solution to Opcenter Intelligence 2401

Perform the following procedure if you want to migrate a solution created in SIMATIC IT Reporting Framework 7.0 to Opcenter Intelligence 2401. The old solution items will be migrated as well as the data contained in the database.

> ⓘ   The reports included in the SIMATIC IT RF 7.0 solution will not be migrated.

Prerequisites

You have exported the SIMATIC IT RF 7.0 solution file in .xml format.

Workflow

1. Import the Solution File
2. Check the Migration Results
3. Manage Overloaded Custom Entities Scripts

14.1 Importing the Solution File

Follow this procedure to import a solution created and exported using SIMATIC IT Reporting Framework 7.0 into Opcenter Intelligence.

Procedure

1. In the **Solutions** page, click ⤢ **Import Solution**. The **Import Solution** page is displayed.
2. Click **Choose File** to browse for the .xml file.
3. Select the file and click **Open**.
4. Insert a name for the solution in the **Solution Name** edit box.
5. Click ⤢ **Import**.
6. Click **Ok** to save the solution.
7. If the source database of the solution you are importing is of type LMS, the **Edit Database Source** page is displayed. The name of the LMS database of the RF 7.0 solution is shown under **Database Name**. Select the **Database Type**, which can be either **Line Monitoring System 2.2 SP1** or **Line Monitoring System 2.3-2.4-2.5-2.6-2.7** and click **Save**.
8. Click **Yes** if you want to manage the flows to migrate the content of the MDW 1.0 database together with the solution data.
9. If you are warned that the solution you are importing contains custom entities, you should verify that after the import they have been exposed correctly. In particular, you should check the data types to make sure that the semantics has been properly formulated according to your requirements.

Result

The imported solution is available in the **Solutions** page. Now you must perform a check and possibly modify the flows created during the import operation and the solution environment.

14.2 Post-Migration Check

After the migration has been performed, you should check that a number of items of the new solution correspond to what you configured in the old project version.

Procedure

1. The source version is migrated. The old source types that are not compatible with Opcenter Intelligence are migrated to new types. In particular:
   - all the SIMATIC IT Production Suite versions that are not compatible with Opcenter Intelligence will be included in the Production Suite 7.0 SPx - 7.1 - 7.2 - 8.0 source.
   - all the SIMATIC IT Line Monitoring System versions that are not compatible with Opcenter Intelligence will be included in the SIMATIC IT LMS 2.3 - 2.4 - 2.5 - 2.6 - 2.7 source.
2. Two flows are created:
   - a standard flow that loads current data and must be scheduled;
   - a one-shot flow that loads the old MDW 1.0 data if you have answered **Yes** to the question made during the import operation.
3. (Optional) If the source is SIMATIC IT LMS or SIMATIC IT Production Suite and you have configured a linked server, change the values of environment properties as follows:
   - replace **PPA: [*linkedserver name*].[*PPAdbname*]** with **PPA: *PPAdbname*** and **PPA Linked Server: *linkedserver name*** (without square brackets);
   - replace **SitMes: [*linkedserver name*].[*SitMesdbname*]** with **SitMes: *SitMesdbname*** and **SitMes Linked Server: *linkedserver name*** (without square brackets).
4. Custom entities, if present, must be checked. You must verify that after the migration they have been exposed correctly. In particular, you must check the data type to make sure that the semantics has been properly formulated according to your requirements. The entity type, which can be either **Analytical Context** or **Analytical Type**, must be specified after the migration.
5. If the migration project contains at least a MDW 1.0 source, when all the project functionalities have been enabled, the views that are provided after the deploy of the new solution will entirely emulate the OOTB structures of the old MDW database. As a result, the OOTB reports you have created in SIMATIC IT Reporting Framework 7.0 will not require any modification. Custom reports created in SIMATIC IT RF 7.0 should be checked, as a minimum number of modifications may be required.

14.3 Managing Overloaded Scripts

When you import a solution from SIMATIC IT Reporting Framework 7.0, some custom entities scripts, due to their complexity, may not be imported automatically.
The following table contains the list of these entities. The first column lists the names of the SIMATIC IT RF 7.0 entities for which the overloaded scripts cannot be imported by the system. You must therefore modify these scripts on the basis of the new entity form shown in the second column of the table.
Some of the entities listed in the first column may not have a corresponding item in the second column, because they have not been deemed useful for version 2.0 of the data warehouse. As a result, these entities should be considered as custom entities and treated accordingly.

SIMATIC IT RF 7.0 Entities (not imported)	Corresponding MDW 2.0 Entities
DowntimeValue	EquipmentTimeValue
EquipmentLevel	EquipmentClass
EquipmentPropertyValue	EquipmentPropertyStaticValue
MaterialLotProperty	MaterialProperty

SIMATIC IT RF 7.0 Entities (not imported)	Corresponding MDW 2.0 Entities
MaterialLotPropertyValue	MaterialLotPropertyStaticVaue
MaterialPropertyValue	MaterialDefinitionPropertyStaticValue
Person	Labor
PersonnelClass	LaborClass
PersonProperty	LaborProperty
PersonPropertyValue	LaborPropertyStaticValue
ProductionOrder	OperationExecution
ProductionOrderClass	OperationExecutionClass
ProductionOrderProperty	OperationExecutionProperty
ProductionOrderPropertyValue	OperationExecutionPropertyStaticValue
ProductionOrderStatus	OperationExecutionStatus
ProductionStep	OperationResponse
ProductionStepClass	OperationResponseClass
ProductionStepEquipmentRequirement	N/A
ProductionStepEquipmentRequirementPropertyValue	N/A
ProductionStepMaterialRequirement	N/A
ProductionStepMaterialRequirementPropertyValue	N/A
ProductionStepPersonRequirement	N/A
ProductionStepPersonRequirementPropertyValue	N/A

SIMATIC IT RF 7.0 Entities (not imported)	Corresponding MDW 2.0 Entities
ProductionStepProperty	OperationResponseProperty
ProductionStepPropertyValue	OperationResponsePropertyStaticValue
ProductionStepStatus	OperationResponseStatus
QualityOrder	QualityExecution
QualityOrderClass	QualityExecutionClass
QualityOrderProperty	QualityExecutionProperty
QualityOrderPropertyValue	QualityExecutionPropertyStaticValue
QualityOrderStatus	QualityExecutionStatus
QualityParameterValueStatus	N/A
QualitySample	N/A
QualitySampleStatus	N/A
QualityTask	QualityTaskDefinition
QualityTaskProperty	QualityTaskDefinitionProperty
QualityTaskPropertyValue	QualityTaskDefinitionPropertyStaticValue
QualityTaskSample	N/A
QualityTaskStatus	QualityTaskDefinitionStatus
Tag	N/A
TagClass	N/A
TagValue	N/A

SIMATIC IT RF 7.0 Entities (not imported)	Corresponding MDW 2.0 Entities
TimeCategory	EquipmentTimeCategory

15 How to Perform Advanced Operations

The following advanced operations can be performed on Opcenter Intelligence data warehouse:

- Manage the Update of a Data Source Product Version
- Manage the interaction between EX FN Cleaning Rules and OpcenterINCloud Flow Schedules
- Set up a Maintenance Plan for the Data Warehouse
- Enable Change Data Capture and Change Tracking
- Manage the size of the SQL Server Integration Services Database SSISDB

15.1 How to Manage the Update of a Data Source Product Version

> ⚠ The following workflow is not valid if the data source system is updated from SIMATIC IT Unified Architecture Discrete Manufacturing 2.x to Opcenter Execution Discrete 3.x or Opcenter Execution Discrete 4.0 or higher. In that case, it is strongly recommended that you perform a purge operation and run an initial load on the MDW.

> ⚠ If you are upgrading from Opcenter Execution Discrete 3.x or 4.0 to Opcenter Execution Discrete 4.1 or higher, you have to execute the procedure to Migrate the EquipmentKey in Opcenter Execution Discrete.

Prerequisites

- The source system has been updated.
- You have installed the latest version of Opcenter Intelligence.

When is the execution of this workflow required?

You must execute this workflow when a new slice with a new version number is added to the pie chart.

Important Recommendation

Starting from Opcenter Intelligence 3.2, due to a refactoring of the data model, it is strongly recommended that you perform a purge operation and run an initial load on the MDW if your data source is Opcenter Execution Process or Opcenter Execution Discrete and you are upgrading from version 3.0 or higher.

However, this recommendation does not apply if you have removed obsolete data from these databases, for example to perform long-term data archiving or if you are using Opcenter Execution Foundation Maintenance Configuration. For more details on the latter, see the *How to Configure Maintenance* chapter in *Opcenter Execution Foundation Development and Configuration Guide*.

Workflow

1. Update the migrated Solution Items
2. Retrieve the Start Time for the New Flow
3. Start the Data Flow

15.1.1 Migrating the EquipmentKey in Opcenter Execution Discrete

This migration procedure must be executed only when a customer using Opcenter EX DS 3.x or 4.0 upgrades to Opcenter EX DS 4.1 or higher and Opcenter Intelligence 2401.0001.

Procedure

1. After checking on the **Monitoring Messages** page that any running flows have been completed successfully, stop the flow schedule that loads data from Opcenter Execution Discrete 3.x or 4.0 to the MDW.
2. In the Solution, create the **EquipmentMigration** custom entity of type **Analytical Context** and **Standard** granularity type. Then add a column called **NId** of type **Name**. For more details, see How to Configure Model Extensions.
3. Associate the new custom entity with the Opcenter EX DS 3.x or 4.0 source. See Selecting the Model Extension Source
4. In the Scenario, in the Server configured for the Opcenter EX DS 3.x or 4.0 source, open the database and create a script. In the **Models** drop-down list, select **Custom Model**. In the drop-down list select the **EquipmentMigration** entity. Replace the template script with the following script:

```
SELECT
            cast(0 as smallint )                as [EquipmentMigrationSiteId],
            cast(Id as nvarchar(255))           as [EquipmentMigrationKey],
            cast(NId as nvarchar(255))          as [NId],
            cast(null as datetime)              as [RowInserted],
            cast(LastUpdatedOn as datetime)     as [RowUpdated]
FROM [#UAFDB#].[dbo].[vEquipment_Siemens__2037264456]
```

5. Click 💾 **Save**. For more details, see Loading a Script.
6. Deploy the environment.
7. Run the Single Entity by specifying the **EquipmentMigration** entity and selecting 2010-01-01 as **Start Date**.
8. In **Microsoft SQL Server Management Studio**, select the connection where the MDW is present and create a new query.
9. Copy the following script to the new query and execute it.

```
declare @Eqpt int
declare @EqptMigration int

select @Eqpt = COUNT(*) from [bm20].[Equipment]
select @EqptMigration = COUNT(*) from [bm20].[EquipmentMigration]

if (@Eqpt <> @EqptMigration)
      select 'The COUNT variables do not match, so no update is performed. Please
open an IR to evaluate the scenario'
else
      update eqpt
set eqpt.EquipmentKey = m.NId,
      RowUpdated = GETUTCDATE()
from [bm20].[Equipment] eqpt
    inner join [bm20].[EquipmentMigration] m on
        eqpt.EquipmentKey = m.EquipmentMigrationKey
            and eqpt.EquipmentSiteId = m.EquipmentMigrationSiteId
```

> ❗ If a warning message appears after you have performed step 9, stop the procedure and open an IR with Siemens DI SW Support Services.

10. Add the new Opcenter Execution Discrete 4.1 or higher data source, as described in [Updating the migrated Solution Items](#).
11. Before starting the new flow, get the correct time window to be used as start date and time for the flow, as described in [Retrieving the Start Time for the New Flow](#).
12. [Start the Flow](#).
13. If you have configured and deployed any smart view, deploy it again.

> ⓘ Depending on the amount of data contained in the data warehouse, this operation may take several minutes or hours.

15.1.2 Updating the migrated Solution Items

The following procedures must be executed to upgrade the items of the solution that has been migrated from the previous version of Opcenter Intelligence.

Update the Project

1. Open the migrated Solution.
2. Open the Project and add a new Source.
3. Select the existing Physical Site that has been migrated with the solution.

Update the Scenario

1. Open the Scenario and do either of the following:
      - If the new source is hosted in the same server as the old source, add a new Database to the server.
      - If the new source is not hosted in the same server as the old source, create a new server with the new source as project source.
2. In the **Flows** page, select the existing flow schedule and click ⬭ **Disable Flow Schedule** to disable the corresponding SQL Server job.
3. In the existing **Destination Server**, in the **Flows** tab, create a new Flow and select the new version of the source.
4. Open the newly-created flow and create a new Flow Schedule.

Update and Deploy the Environment

1. Edit the Environment.
      - If the new source is hosted in the same server as the old source, copy and paste the existing parameters (IP address, Database, Properties).
      - If the new source is hosted in a different server, you must specify the new IP address and the new database instance. However, do not change the MDW name so that data can be written on the same database.
2. Deploy the Environment. This operation will create new scripts and a new flow, which will be disabled by default.

15.1.3 Retrieving the Start Time for the New Flow

Before enabling and running the new flow, you must perform the following manual operations, otherwise the flow would start loading the data previously loaded from the old version of the source, resulting in poor performance (e.g. discarded data).

Procedure

1. In **SQL Server Management Studio**, connect to the SQL instance that contains the **MIStudio** database.
2. Use the SELECT statement to retrieve the **flowId** of the old source and jot it down.

```
-- retrieve your @flowId based on name obtained from:
select FlowId from [MIStudio].[scenario].[Flow]
where Name = '<Flow Name>'
where isDeleted = 0
```

3. Use the SELECT statement to retrieve the **environmentId** and jot it down.

```
-- retrieve your @environmentId based on name obtained from:
select EnvironmentId from [MIStudio].[environment].[Environment]
where Name = '<Environment Name>'
where isDeleted = 0
```

4. In the following query, replace @**flowId** and @**environmentId** with the values you have previously jotted down.

```
SELECT TOP 1 *
FROM [MIStudio].[monitoring].[FlowHistory]
where EndTime is not null
and FlowId = @flowId
and EnvironmentId = @environmentId
order by TimeWindowTo desc
```

5. Execute the query, whose purpose is to retrieve the most recent **TimeWindowTo** field to be used as **Start Date and Time** for the new flow.

15.1.4 Starting the Flow

Follow this procedure to start the data flow from the new source to the manufacturing data warehouse.

Procedure

1. Go back to the **Scenario** and in the **Flows** tab select the flow created after the deploy operation.
2. Run the flow.
3. Select the **Initial load** mode.
4. Select the **Manual** start mode.
5. Set the **Start Date and Time** you have retrieved using the query. The date of the retrieved field is in UTC format, you must convert it to local time.
6. Leave the default **End Date and Time**.
7. Start the flow.
8. In the **Monitoring Messages** page, verify that the run flow operation has been completed successfully.
9. In the **Flows** page, select the flow schedule and click 🔘 **Enable Flow Schedule** to enable the corresponding SQL Server job again.

15.2 How to manage interaction between EX FN Cleaning Rules and Opcenter IN Flow Schedules

When you configure maintenance in Opcenter EX FN database for Opcenter EX DS or Opcenter EX PR, you can configure:

- **Cleaning Rules**, to clean the live (runtime) database from the entities that are not needed for production anymore.
- The **Archiving Rule**, which is used to schedule the archiving of production data from the live (runtime) database to an Archiving database.

> ⓘ For detailed information on these operations, see:
> - *Creating Maintenance Configuration* in *Opcenter Execution Foundation Development and Configuration Guide*
> - *How to Configure Maintenance Cleaning Rules* in *Opcenter Execution Foundation User Manual*

If Opcenter Intelligence is extracting data from the Opcenter EX DS or Opcenter EX PR database, you have to schedule Cleaning Rules appropriately to avoid that their execution overlaps with the execution of Opcenter Intelligence Flow Schedules, which would result in an incomplete or failed update of the Manufacturing Data Warehouse.

You can schedule cleaning rules for these databases:

- [Opcenter EX FN Online database](#)
- [Opcenter EX FN Archiving database](#)

15.2.1 Scheduling Rules for Opcenter EX FN Online Database

When Opcenter Intelligence is extracting data from the Opcenter EX DS or Opcenter EX PR online database, you have to make sure that cleaning rules configured on the source online database do not overlap with the data flow schedules configured in Opcenter Intelligence, otherwise you might risk that data is cleaned from the source database before the latest modifications are extracted by Opcenter Intelligence, causing an incomplete update of the same data in the Manufacturing Data Warehouse.

This is the reason why, when an Opcenter Intelligence data flow is extracting data from the online database, the cleaning rules should always be configured by adding a condition on the **Unchanged For** field and inserting a value that must be higher than the period of the Opcenter Intelligence data flow schedule. This condition must be applied in **AND** to the other existing conditions on the **To Be Cleaned** and/or **Is Logically Deleted** fields.

In this way, you make sure that the Opcenter Intelligence data flow is always executed at least once between the **LastUpdateOn** time of the entity and the actual entity cleaning.

Example

If the ETL flow schedule has been configured to run every hour, the cleaning rule should be configured to be applied only to those entities whose **Unchanged For** field is higher than one hour, i.e. only to those entities whose **LastUpdateOn** property is more than one hour earlier than the execution time of the cleaning rule (for example, if the **Unchanged For** condition is set to two hours, only the entities last updated more than two hours before the execution of the cleaning rule are affected by the cleaning rule).

> ⚠ The Opcenter IN data flow manages the **IsDeleted** and **ToBeCleaned** attributes differently.
> - Entities whose **IsDeleted** attribute is *true* are also deleted from the Opcenter IN Manufacturing Data Warehouse.

- Entities whose **ToBeCleaned** attribute is **true** are not deleted from the Opcenter IN Manufacturing Data Warehouse (the data flow execution is not affected by the value of the **ToBeCleaned** attribute).

15.2.2 Scheduling Rules for Opcenter EX FN Archiving Database

When Opcenter Intelligence is extracting data from the Opcenter EX DS or Opcenter EX PR archiving database, you have to make sure that SQL Jobs for removing logically deleted data from the archive do not overlap with the data flow schedules configured in Opcenter Intelligence, otherwise you might risk that data is deleted from the archiving database before it is also deleted from Opcenter Intelligence.

This is the reason why, when an Opcenter Intelligence data flow is extracting data from the archiving database, the data deletion SQL Jobs should always be configured so that the condition clauses include at least a condition on the **LastUpdatedOn** field of the entity (whose value must be older than the SQL job execution time minus the data flow schedule period). The SQL Job scheduling must also be configured taking the data flow schedule into account.

Important Recommendation

It is recommended that you customize the stored procedure provided by Opcenter Execution Foundation (**PurgeLogicallyDeletedItems**) as follows:

1. Make a copy of the stored procedure.
2. Configure the SQL Job so that the copy is executed.

Example

If the ETL flow schedule has been configured to run every day, the customized data deletion stored procedure (SQL Job) should be configured to be applied only to those entities whose **LastUpdatedOn** field in the condition expression is more than one day earlier than the execution time of the stored procedure (e.g. seven days earlier, so that only the entities deleted more than seven days before are affected).

15.3 Setting Up a Maintenance Plan for the Data Warehouse

A maintenance plan is made up of a sequence of tasks required to make sure that a data warehouse is optimized and free of inconsistencies. You should define a maintenance plan to manage the log file growth and fine-tune the data warehouse configuration to provide the best performance.

The following tasks are recommended:

Task	Frequency
Backup Database (Full)	Weekly
Backup Database (Differential)	Every day except **Full Backup** day
Backup Database (Transaction Log)	Hourly
Rebuild / Reorganize Indexes and Update Statistics	Weekly (Daily is even better)

Backup Database (Full)

The Backup Database (Full) task executes the **BACKUP DATABASE** statement and creates a full backup of the database. You will probably want to run this task daily against your system and production databases. In most cases, the databases you will be backing up with this task use the Full Recovery model, and you will also want to run the **Backup Database (Transaction Log)** task as part of your Maintenance Plan.

Backup Database (Differential)

The Backup Database (Differential) task executes the **BACKUP DATABASE** statement using the **DIFFERENTIAL** option. This task should only be used if you need to create differential backups.

Backup Database (Transaction Log)

The Backup Database (Transaction Log) task executes the **BACKUP LOG** statement, and, in most cases, should be part of any Maintenance Plan that uses the **Backup Database (Full)** task. It is a common practice to run this task every hour or so, depending upon your needs.

Rebuild/Reorganize Indexes and Update Statistics

To maintain index and statistics performance, it is recommended that you create a job schedule in SQL Server Agent that executes the system commands required to rebuild/reorganize indexes and update statistics. This procedure should be launched with at least daily frequency. For Enterprise systems the index rebuild operation can be executed anytime, while for Standard systems you should identify a period of low or no workload of the system, as indexes are rebuilt offline. This procedure too should be launched with daily frequency.

To simplify this process, the data warehouse contains the following native stored procedure that executes the basic procedure to rebuild or reorganize indexes and update statistics:

```
[control].[USP_OptimizeIndexesAndUpdateStats
```

This stored procedure accepts as a parameter the name of the data warehouse you have created and for which you want to perform the maintenance of indexes and statistics.

Example

```
exec [control].[USP_OptimizeIndexesAndUpdateStats] 'MDW_Database'
```

For more information on SQL Server Agent job definition and scheduling, see *Microsoft SQL Server documentation*.

15.4 Enabling Change Data Capture and Change Tracking

Microsoft SQL Server provides the Change Data Capture (CDC) and Change Tracking (CT) features, which allow applications to determine the DML (Data Manipulation Language) changes (insert, update and delete operations) made to user tables in a database.

> (i) For more details on these features, see https://docs.microsoft.com/en-us/sql/relational-databases/track-changes/track-data-changes-sql-server.

Two examples are provided which describe how to map a specific table to the **IndicatorValue** table (default table). In the examples, the following tables have been created with this format:

Table name: **Counter**

Table Columns	Description
[CounterCode]	Unique code that represents this row.

Table Columns	Description
[Time]	Date field that specifies when the data has been collected.
[Scrap Unit]	Numeric field that shows the number of scraps.
[Good Unit]	Numeric field that shows the number of good pieces.
[ProductLitres LTR]	Numeric field that shows the production expressed in litres.

Table name: **Machine**

Table Columns	Description
[MachineId]	Id of the equipment.
[MachineSiteId]	Id of the site where the equipment is located.
[MachineKey]	Key of the equipment.
[Name]	Name of the equipment.
[Description]	Description of the equipment.

The examples show how to solve the following issues:

- How to unpivot an entity: enable the Change Data Capture functionality.
- How to retrieve insertion dates and record modification when they are not present natively: enable the Change Tracking functionality.

15.4.1 Change Data Capture Examples

The following scripts can be used to obtain data on Change Data Capture.

To load the scripts, follow the procedure described in the Loading a Script section.

Example 1 - Counter Table

```
select (CounterCode+'#'+v.IndicatorKey) as CounterKey, CounterTime, CounterValue,
v.IndicatorValueSiteId,v.IndicatorValueKey, v.EquipmentSiteId,
v.EquipmentKey,v.IndicatorSiteId,v.IndicatorKey, v.StartDateTime, v.EndDateTime,
v.Duration, v.Value, tran_end_time as RowUpdated
 from (SELECT CounterId, Counter_CT.[CounterCode], [Time] as CounterTime, [Scrap
Unit], [Good Unit], [ProductLitres LTR], L.tran_end_time
 FROM cdc.dbo_Counter_CT as Counter_CT join cdc.lsn_time_mapping as L on
Counter_CT.__$start_lsn = L.start_lsn
 inner join
```

```
(select A.CounterCode, max(L2.tran_end_time) as tran_end_time
FROM cdc.dbo_Counter_CT as A
join cdc.lsn_time_mapping as L2 on A.__$start_lsn = L2.start_lsn
group by CounterCode) L3
on L3.CounterCode = Counter_CT.CounterCode
and L3.tran_end_time = L.tran_end_time
where __$operation=2 or __$operation=4) C
UNPIVOT
(CounterValue FOR Indicator IN
([Scrap Unit], [Good Unit], [ProductLitres LTR])
)AS unpvt
inner join dbo.IndicatorValue_view as v on unpvt.CounterCode = v.IndicatorValueKey
and unpvt.Indicator = v.IndicatorName
order by CounterKey
```

Example 2 - Machine Table

```
select CT.MachineId, CT.MachineSiteId, CT.MachineKey, CT.Name, CT.Description,
L.tran_end_time as RowUpdated from cdc.dbo_Machine_CT as CT
join cdc.lsn_time_mapping as L on CT.__$start_lsn = L.start_lsn
inner join
(select M.MachineId, max(L2.tran_end_time) as tran_end_time
FROM cdc.dbo_Machine_CT as M
join cdc.lsn_time_mapping as L2 on M.__$start_lsn = L2.start_lsn
group by MachineId) L3
on L3.MachineId = CT.MachineId
and L3.tran_end_time = L.tran_end_time
where __$operation=2 or __$operation=4
```

Results

	MachineId	MachineSiteId	MachineKey	Name	Description	RowUpdated
1	6	0	1	UNIT-2	UNIT-2	2017-09-04 07:26:08.277
2	9	0	4	AREA-3	AREA-3	2017-09-04 07:23:12.683
3	12	0	6	UNIT-1	UNIT-1	2017-09-04 07:23:02.387

15.4.2 Change Tracking Examples

The following scripts can be used to obtain data on Change Tracking.

To load the scripts, follow the procedure described in the Loading a Script section.

Example 1 - Counter Table

```
DECLARE @last_synchronization_version bigint
 SELECT (CounterCode+'#'+v.IndicatorKey) as CounterKey, CounterTime, CounterValue,
v.IndicatorValueSiteId,v.IndicatorValueKey, v.EquipmentSiteId,
v.EquipmentKey,v.IndicatorSiteId,v.IndicatorKey, v.StartDateTime, v.EndDateTime,
v.Duration, v.Value, tct.commit_time as RowUpdated
FROM
(
(SELECT [CounterId], [CounterCode], [Time] as CounterTime, [Scrap Unit], [Good Unit],
[ProductLitres LTR] FROM dbo.Counter) p
UNPIVOT
    (CounterValue FOR Indicator IN
        ([Scrap Unit], [Good Unit], [ProductLitres LTR])
)AS unpvt
 JOIN
 CHANGETABLE(CHANGES [dbo].[Counter],@last_synchronization_version) AS CT
 ON unpvt.CounterId = CT.CounterId
 left join dbo.IndicatorValue_view as v on CounterCode = v.IndicatorValueKey and
unpvt.Indicator = v.IndicatorName
 left join sys.dm_tran_commit_table as tct on CT.sys_change_version = tct.commit_ts)
```

Example 2 - Machine Table

```
DECLARE @last_synchronization_version bigint
SELECT M.MachineId, M.MachineSiteId, M.MachineKey,M.Name , M.Description,
tct.commit_time as RowUpdated
FROM [dbo].[Machine] as M
 JOIN
 CHANGETABLE(CHANGES [dbo].[Machine], @last_synchronization_version) AS CT ON
M.MachineId = CT.MachineId
 left join sys.dm_tran_commit_table as tct on CT.sys_change_version = tct.commit_ts
```

Results

	MachineId	MachineSiteId	MachineKey	Name	Description	RowUpdated
1	6	0	1	UNIT-2	UNIT-2	2017-09-04 07:26:08.277
2	9	0	4	AREA-3	AREA-3	2017-09-04 07:23:12.683
3	12	0	6	UNIT-1	UNIT-1	2017-09-04 07:23:02.387

15.5 Managing the size of the SQL Server Integration Services Database SSISDB

Keeping SSISDB size to a minimum

1. To check the settings defined when SSISDB was installed, run the following query in SQL Server Management Studio:

```
USE SSISDB
GO
select * from catalog.catalog_properties
```

2. In the resultset, check the values of the following properties:
    *   **OPERATION_CLEANUP_ENABLED** must be TRUE.
    *   **RETENTION_WINDOW** can be adjusted to user requirements (the default is 365 days).
3. Change the setting of **RETENTION_WINDOW** by executing the following stored procedure (where ## is the number of days):

```
exec catalog.configure_catalog RETENTION_WINDOW, ##
```

4. This operation will not reduce the database size immediately. You need to launch an SQL maintenance job called **SSIS Server Maintenance Job**. For example, you may want to start this job every day at midnight (default setting).
5. Set the **Recovery Model** property to **Simple** before scheduling a data flow.

Important Recommendations

*   If you want to obtain the same result immediately, you may decide to execute the operation manually from SQL Server Management Studio. However, the DB space will not be freed yet, particularly if the Full Recovery Model has been set for the database. In that case, the log file size will become too large and will therefore need to be managed by performing the typical operations included in the maintenance plan of any DB, such as backup, truncation and shrink.
*   Changing the value of the **RETENTION_WINDOW** property may result in the deletion of a high number of gigabytes from the database. In addition, if the Full Recovery Model has been set, the log file creation will be carried out as well. As a consequence, the operation may require a lot of effort in both time and server resources.
*   It may be advisable to perform this operation gradually or to plan a specific time window when the server can be exclusively allocated to the execution of this procedure.
*   The SSISDB is a database that works as any other database. Therefore, any settings of the Autogrowth and Max size on the SSISDB files must be configured keeping in mind the number of execution frequency of ETLs and the configured retention window.

> ⓘ For more information see Microsoft official documentation: https://docs.microsoft.com/en-us/sql/integration-services/catalog/ssis-catalog?view=sql-server-ver15

16 Example: Extending a SIMATIC IT LMS Entity

The following example describes how to extend a previously-created Solution which loads data from SIMATIC IT LMS. In detail, the steps listed below will allow you to add the following columns to the **IndicatorValue** entity in order to contextualize the **Equipment Performance** measures for Material Definitions and Operation Executions in addition to standard contexts:

- **MaterialDefinitionId**
- **OperationExecutionId**

Prerequisites

A Solution with the following characteristics has been configured:

- The Project contains the **Equipment Performance** functionality.
- The **Equipment Performance** functionality of SIMATIC IT LMS has been selected as a source.
- A Scenario has been configured for the Project.

Workflow

1. Extend the **IndicatorValue** entity.
2. Align the scenario to the new project configuration loading the custom script corresponding to the extended entity.
3. Deploy the Environment.
4. If necessary, load earlier data relative to the new entity from the source SIMATIC IT LMS database. If this operation is not performed, the new entity will be automatically populated with more recent data as soon as the first incremental load is executed, but earlier data will never be loaded. If you have deployed the Environment for the first time, you can skip this step.
5. If you have configured at least a smart view and you want to use new columns to contextualize data, update the view accordingly, deploy it again and then, only for physical views, reload data. For more information, see the chapter of this manual on how to manage smart views.

Extending the IndicatorValue Entity

1. Open the Solution of interest and then click the **Projects** card.
2. Open the Project you have configured to load SIMATIC IT LMS data.
3. Select the **Entity Extensions** tab.
4. Click the ⊕ **Create Entity Extension** button.
5. From the **Entity** drop-down list, select **IndicatorValue**.
6. Set the available parameters as follows:

Parameter	Value
Column Name	**MaterialDefinitionId**
Column Type	**Relationship**
Relationship	**MaterialDefinition**

7. Click **Add Column**.
8. Repeat steps from 7 to 8, adding a column with the following parameters:

Parameter	Value
Column Name	OperationExecutionId
Column Type	Relationship
Relationship	OperationExecution

9. Click **Save**.
10. Select the **IndicatorValue_Extension** tile and click ↗ **Open**.
11. Click the ⊕ **Create Extension Source** button.
12. Select the SIMATIC IT LMS source that had been selected within the Project.
13. Click **Save**.

Loading the Custom Script

1. In the **Solutions** page, click the **Scenarios** card.
2. Open the Scenario of interest.
3. Open the Server of interest.
4. Open the source LMS database.
5. In the **Custom Scripts** page, click the ⊕ **Create Script** button.
6. Select **Custom Model** from the **Models** drop-down list.
7. Select **IndicatorValue_Extension** from the **Model Entities** drop-down list.
8. Replace the text displayed in the **Entity Scripts** area with the following:

```
SELECT
CAST(NULL AS smallint) AS [IndicatorValue_ExtensionSiteId],
CAST(CAST([$UniqueDbId] AS nvarchar(255)) + '_' + CAST([$IDArchObj] AS nvarchar(25
5)) +'_'+ CAST([$IDArchiveValue] as nvarchar(255)) AS nvarchar(255)) AS
[IndicatorValue_ExtensionKey],
CAST(NULL AS smallint) AS [IndicatorValueSiteId],
CAST(CAST([$UniqueDbId] AS nvarchar(255)) + '_' + CAST([$IDArchObj] AS nvarchar(25
5)) +'_'+ CAST([$IDArchiveValue] as nvarchar(255)) AS nvarchar(255)) AS
[IndicatorValueKey],
CAST(NULL AS smallint) AS [MaterialDefinitionSiteId],
CAST([ProductId] AS nvarchar(255)) AS [MaterialDefinitionKey],
CAST(NULL AS smallint) AS [OperationExecutionSiteId],
CAST([OrderID] AS nvarchar(255)) AS [OperationExecutionKey],
CAST(NULL AS smallint) AS [ShiftSiteId],
CAST([Shift] AS nvarchar(255)) AS [ShiftKey],
CAST(NULL AS datetime) AS [RowInserted],
CAST(RowUpdated AS datetime) AS [RowUpdated]
FROM [#PPADB#].[dbo].[ArchOEERT546C3276-B61D-47fe-9AF5-66BEE7A3BA76/
OEECounterTable]
```

9. Click 🖫 **Save**.
10. Copy the following text in the **Delete Script** area:

```
SELECT
CAST(NULL as smallint) AS [IndicatorValue_ExtensionSiteId],
CAST(CAST([UniqueDbId] AS nvarchar(255)) + '_' + CAST([IDArchObj] AS nvarchar(255)
) +'_'+ CAST([IDArchiveValue] AS nvarchar(255)) AS nvarchar(255)) AS
[IndicatorValue_ExtensionKey],
CAST(date_deleted AS datetime) AS [RowInserted]
FROM [#PPADB#].[dbo].[OEECounterTable_deleted]
```

11. Click **Save**.

Deploying the Environment

1. In the **Environments** page, select the Environment.
2. Click ⬆ **Deploy Environment**.

Loading Earlier Data

1. Open the Solution and select the **Flows** card.
2. Select a flow.
3. Click ▶ **Run Single Entity**.
4. Select the previously deployed environment.
5. Specify a **Start Date** and an **End Date** to define the time interval for the data you want to load.
6. Select the **IndicatorValue_Extension** entity.
7. Click **Start**.