



One Identity Manager 8.1.5

# Target System Synchronization Reference Guide

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**Legend**

 **WARNING:** A WARNING icon highlights a potential risk of bodily injury or property damage, for which industry-standard safety precautions are advised. This icon is often associated with electrical hazards related to hardware.

 **CAUTION:** A CAUTION icon indicates potential damage to hardware or loss of data if instructions are not followed.

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# Target system synchronization with the Synchronization Editor

The main feature of One Identity Manager is to map employees together with the master data and permissions available to them in different target systems. To achieve this, information about user accounts and permissions can be read from the target system into the One Identity Manager database and linked to employees. This provides an overview of the permissions for each employee in all of the connected target systems. One Identity Manager offers the option of managing user accounts and their permissions. You can provision modifications in the target systems. Employees are supplied with the necessary permissions in the connected target systems according to their function in the company. Regular synchronization keeps data consistent between target systems and the One Identity Manager database.

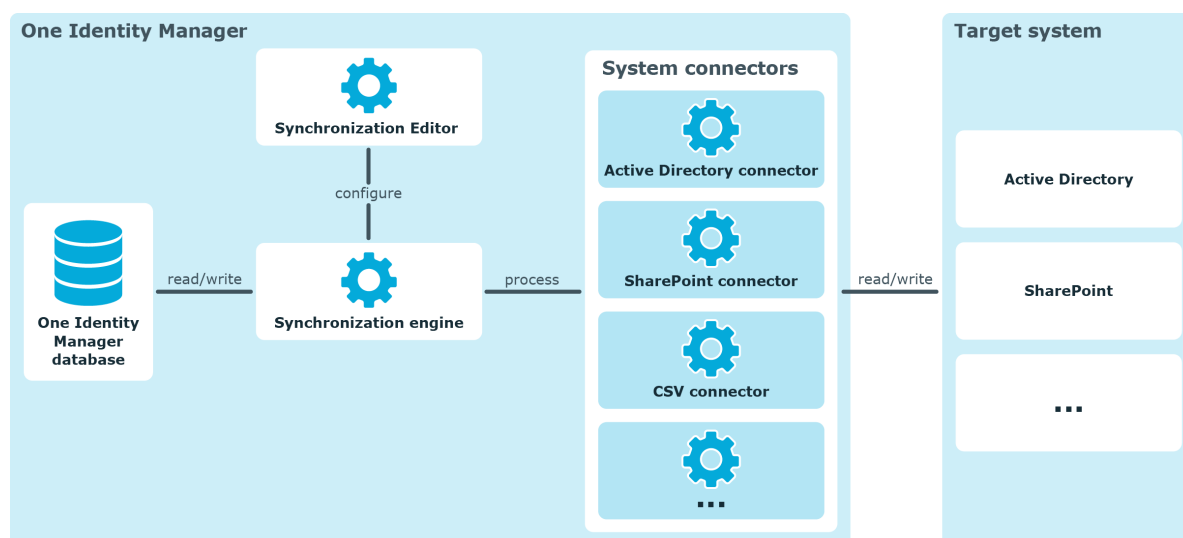
One Identity Manager instantiates connecting the various target systems to the Synchronization Editor. Use this tool to configure data synchronization for any target system and specify which target system data is mapped to the One Identity Manager database. You also define the object properties mapping and the synchronization sequence as a workflow.

One Identity Manager provides default mappings and workflows for synchronizing all target systems which are supported by the installed modules.

## Architecture

Use the Synchronization Editor to configure synchronization between the One Identity Manager database and a target system. A system connector takes over the connection to and communication with the target system. The system connector prepares target system objects, properties, and methods such that they can be read and written by One Identity Manager. The system connector communicates with the target system and carries out all read and write operations.

**Figure 1: One Identity Manager Target system synchronization components**



## Synchronization and provisioning

During target system synchronization with the One Identity Manager database, system objects and their properties are compared with one another. Synchronization results in the target system and One Identity Manager database having an identical data structure. Some target systems are supported by default. For these target systems, One Identity Manager provides default processes and workflows.

### Provisioning

In addition, changes to One Identity Manager database objects can be promptly provisioned in the connected target systems. For standard target systems, One Identity Manager provides default processes and workflows for provisioning.

The same workflows and mappings can be used for provisioning as for synchronization. The processing methods defined in the synchronization step are only executed during provisioning if the condition defined in the processing method is fulfilled and the synchronization and mapping directions for the object to process match.

Object changes are not provisioned in target system connections with read-access only.

### Synchronization of single objects

For standard target systems, Changes made to individual objects in the target system can be immediately applied in the One Identity Manager database without having to start a full synchronization of the target system environment. provides dOne Identity Managerefault processes and workflows for synchronizing single objects.

The same workflows and mappings can be used for single object synchronization as for synchronization. The processing methods defined in the synchronization step are only

executed during single object synchronization if the condition defined in the processing method is fulfilled and the synchronization and mapping directions for the object to process match.

Individual objects can only be synchronized if the object is already present in the One Identity Manager database. The changes are applied to the mapped object properties. If a member list belongs to one of these properties, then the entries in the assignment table will also be updated. If the object is no longer present in the target system, then it is deleted from the One Identity Manager database.

## Related topics

- [Direction of synchronization and mapping](#) on page 44
- [System connection properties](#) on page 104

## Working with the Synchronization Editor

The Synchronization Editor is the One Identity Manager tool you use to configure synchronization of the One Identity Manager database on the one side and any target system on the other. The Synchronization Editor provides a homogeneous interface for all target systems to be controlled.

You can run the following tasks with the Synchronization Editor:

- Set up a connection to any target system
- Load target system schema and mapping with the One Identity Manager database schema (called "One Identity Manager schema" in the following)
- Specify key object properties based on which the other associated objects are identified during synchronization (object matching rules).
- Specify the base object and scope of synchronization
- Define filters to limit the number of objects to synchronize
- Specify the direction of synchronization
- Define the synchronization workflow
  - Select schema classes to be synchronized
  - Specifying processing methods
  - Define the sequence of synchronization steps
- Specify the time and frequency of synchronization

There are different ways to start the Synchronization Editor.

- From the Windows start menu using the entry **One Identity | One Identity Manager | Configuration | Synchronization Editor**.
- From the Launchpad.
- In the Manager

# Synchronization Editor views

The Synchronization Editor has several views for showing the synchronization configuration of the connected systems.







**Table 1: Views in the Synchronization Editor**

View	Description
Navigation view	The navigation view is made up of suggested entry points for the interface navigation.
Document view	The document view shows the form or editor selected through the navigation view respectively. The forms and editors are displayed on different tabs.
Start page	The start page shows an overview of all synchronization projects. You can add new synchronization projects here.
Mapping editor	You can edit maps in the mapping editor. The mapping editor is divided into two schema view and two rule views. Each mapping editor view has its own toolbar.
Schema view	Views in the mapping editor. The One Identity Manager schema and schema property details are displayed in the left-hand area of the mapping editor. The target system schema and schema property details are displayed on the right side.
Rule view	Views in the mapping editor. Property mapping and object matching rules are displayed in the middle of the mapping editor.
Workflow editor	Synchronization steps are organized and displayed as workflows in the workflow editor. The workflow editor is divided in to two views: a general properties view and the workflow view.
Workflow view	View in the workflow editor in which synchronization steps are handled. The workflow view has its own toolbar.
Patch view	The patch view, displays all installation patches for new functions and solved issues in One Identity Manager, which effect target system synchronization. Patches can be applied to existing synchronization projects.
Log view	The log view displays the error log.

## Status bar information

The following information is shown in the status bar.

**Table 2: Status bar icons**

Icon	Meaning
	Current user and system user.
	Connected database in the notation <server>\<database (description)>.
	Synchronization project open.
	A warning has been written to the error log.
	An error message has been written to the error log.
	Database status (database activity such as loading or saving objects).

## Menu items






The Synchronization Editor user interface contains the following menu items and toolbars:

**Table 3: Meaning of items in the menu bar**




Menu	Menu Item	Meaning	Shortcut
Database	New connection	Establishes a database connection.	Ctrl + Shift + N
	Close connection	Closes the current database connection.	
	Settings	For configuring general program settings.	
	Changing a synchronization user's password	The password for the system user <b>Synchronization</b> can be changed.	
	Exit	Exits the program.	Alt + F4
Edit	How to Edit a Synchronization Project	Properties of the loaded synchronization project can be edited.	
	Update synchronization project	System connector updates can be applied to existing synchronization projects.	
	Create template	Creates a template for a new synchronization project.  This menu item is only available in expert mode.	
Help	Community	Opens the One Identity Manager community website.	
	Support portal	Opens the One Identity Manager product support website.	





Menu	Menu Item	Meaning	Shortcut
	Training	Opens the One Identity Manager training portal website.	
	Online documentation	Opens the One Identity Manager documentation website.	
	Search	Opens the search dialog box.	
	Help	Opens the help for this form.	F1
	Info	Shows the version information for program.	
	Generate synchronization analysis report	Generates a synchronization analysis report.	

**Table 4: Meaning of the icons in the toolbar**







Icon	Meaning
 Commit to database	Saves changes permanently. To save changes with change labels, open the submenu and click <b>Commit and assign a change label</b> . For detailed information about working with change labels, see the <i>One Identity Manager Operational Guide</i> .
 Technical view	Shows technical names.
 Additional data	Shows additional properties.
 remote connection	Shows additional properties.
 Enabled variable set	Variable set used in the Synchronization Editor to connect to the target system. This menu item is only enabled if more than one variable set is defined. To select another variable set, open the submenu.

**Table 5: Meaning of icons in the navigation view**









Icon	Meaning
	Create a new workflow with the workflow wizard.
	Creates a new mapping/workflow.
	Edits mapping/workflow.

Icon	Meaning
	Deletes mapping/workflow.
	Reload the data.
	Display synchronization log.
	Display provisioning log.



**Table 6: Meaning of icons in the schema tool bar**

Icon	Meaning
	Add schema property.
	Edit selected schema property.
	Delete selected schema property.
	Filter schema properties.
	Search schema properties.
	Filter schema properties with similar names in other schema respectively.




**Table 7: Meaning of icons in the rule tool bar**

Icon	Meaning
	Add rule.
	Edit selected rule.
	Delete selected rule.
	Filter rules.
	Transform selected property mapping rule into an object matching rule.
	Sorts object matching rule.
	Tests object matching rule.
	Create new rules with help of the mapping wizard.








**Table 8: Meaning of icons in the workflow view**

Icon	Meaning
	Adds new step.
	Shows execution plan.






Icon	Meaning
	Opens detail view of all synchronization steps.
	Closes detail view of all synchronization steps.
	Enable or disable synchronization steps.






**Table 9: Meaning of icons in the variable set tool bar**














Icon	Meaning
	Add a variable/variable set.
	Delete variable/variable set.
	Rename variable set.
	Convert variable to script.
	Convert script variable to a plain variable.
	Display variable usage.
	Default value for restoring the selected variable.

**Table 10: Meaning of icons in the rule tool bar**

Icon	Meaning
 Fixes	Shows patches with fixes.
 Optional features	Shows all patches for optional features.
	Shows all patches that are cannot be applied to the synchronization project.
	Shows all patches that are already applied to the synchronization project.

**Table 11: Meaning of icons in the error log**

Icon	Meaning
	Logs all critical error messages. (Severity level = Fatal)
	Logs all information. (Severity level = Info)
	Logs all warnings. (Severity level = Warning)
	Logs all error messages. (Severity level = error)
	Logs debugger output. This setting should only be used for testing. (Severity level = Debug)

Icon	Meaning
	Logs highly detailed information. This setting should only be used for analysis purposes. The log file quickly becomes large and cumbersome. (Severity level = Trace)
	Adds a custom filter condition.
	Deletes filter condition.
	Searches for term.
	Searches next term.
	Marks all messages with a specific term.
Buffer size	Sets the message buffer size. The buffer's level is displayed next to the field.
	Deletes the buffer contents.
	Stops logging.
	Starts logging.
	Saves log to file.
	Specifies which column are displayed in the error log.
	Copies selected messages to the clipboard.
	Opens the error log with a text editor.

## Customizing the program settings

### To change the program settings

- Select the **Database | Settings...** menu item.

Set the following options on the **General** tab.

**Table 12: General program settings**

Setting	Meaning
Language	<p>Language for the user interface. The initial program login uses the system language for the user interface. Changes to the language settings take effect after the program has been restarted.</p> <p>The language is set globally for all One Identity Manager programs, which means the language setting does not have to be configured for each program individually.</p>

Setting	Meaning
Enable expert mode	Specifies whether expert mode is used. If you set this option, functions become available that should only be used by experienced Synchronization Editor users. For more information, see <a href="#">Additional information for experts</a> on page 157.
Enable the technical view after program start	Specifies whether technical captions are used in the Synchronization Editor views. Disable this option to use display names.
Show additional data	Specifies whether additional properties are displayed.
Show hints	Specified whether additional hint, like explanations, warnings, or examples are displayed.



Set the following options on the **Security** tab.

**Table 13: Security settings**

Setting	Meaning
Saved passwords	List of all saved passwords that are saved locally-
Delete	Deletes the selected value.
Delete all the synchronization project's sensitive data	Deletes all locally saved sensitive data in the current synchronization project.
Delete all saved passwords	Deletes all the Synchronization Editor's locally saved sensitive data.

## Wizard for entering filters


At certain points you can define custom filter conditions. The filter conditions are formulated like a condition (WHERE clause) for a database query.

You can enter database queries directly or put them together with a wizard. Use the  and  button to switch to the relevant view.

- The comparison operators =, <>, <, >, <=, >=, and like are supported for defining conditions.
- To link condition you can use the logical operators AND, OR, and NOT.
- You can use variables in your condition definitions. Variable must be masked.  
Syntax: '\$<variable>\$'

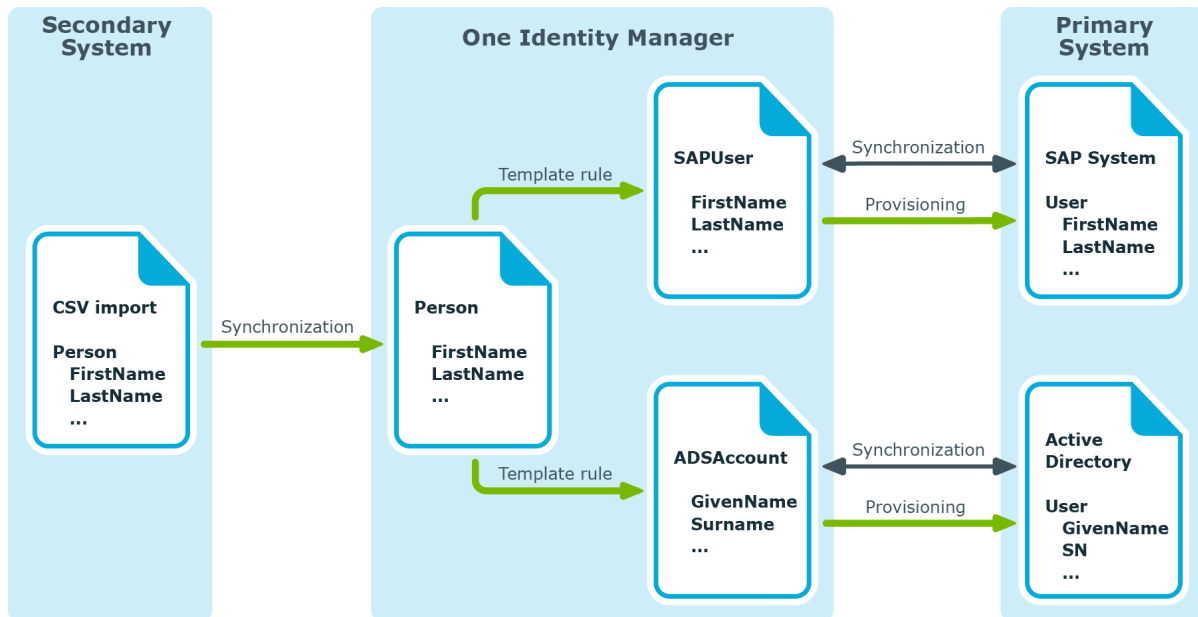
**NOTE:** If the condition contains a dollar sign, which is not labeling a variable, it must be masked with \$.

Example: '300 \$\$' compared to the value '300 \$'

**TIP:** If you enter a condition directly, you can access predefined variables with the  button.

Each condition is displayed in a special control in the wizard. The controls contain connection points to logically join single conditions or delete single conditions. The connection points are set if you mouse over the edge of the respective control.

**Figure 2: Wizard for entering filters**



### **To create a filter with a wizard**

1. Click **Create condition**.

This inserts a control for the first condition.

2. Enter the condition.

- a. Click the left-hand part of the condition and select the property to filter by.

The properties for filtering are listed. You can also define other properties and use variables.

- b. Specify the comparison operator. Click the comparison operator to change it.

The comparison operators =, <>, <, >, <=, >=, and like for defining conditions are supported.

- c. Specify the comparison value on the right-hand side of the condition.

You can enter a string for a comparison value or select a property from the list. You can also use variables.

**NOTE:** To switch back to the input field again, select **Input field** from the menu.

3. To link condition you can use the logical operators AND, OR, and NOT.
  - a. Mouse over the edge of the control to which you wish to create a link.  
The connection points appear.
  - b. Mouse over a connection point and select the connection.  
This adds a new control for the next condition.

**NOTE:** To remove a control, select the **Delete** connection point.

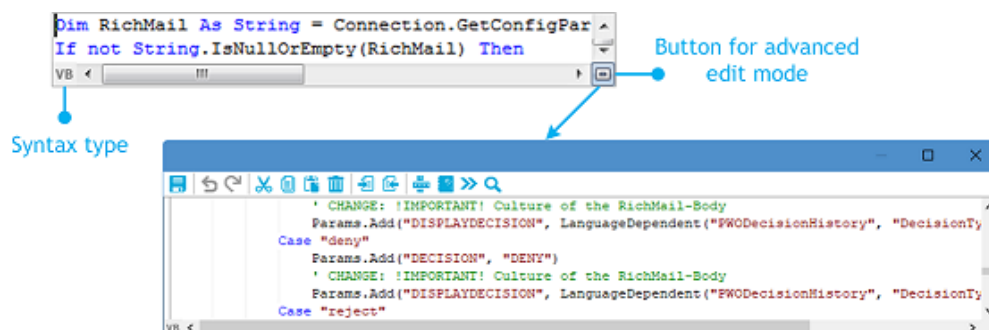
## Support for scripting

You can apply scripts at various points in the synchronization project; for example, when defining the schema properties, in the object filter, or when you define data operations for system connections through the native database connector. You can enter scripts in C# or Visual Basic .NET depending on script's language, which was specified for the synchronization project. You write scripts in a special editing dialog. It has an advanced edit mode which provides additional actions.




### To switch to advanced mode











- Press **Ctrl + Alt + Enter** or click the button at the bottom right.

**Figure 3: Directly entering a database query**



**Table 14: Meaning of icon in advanced edit mode**

Icon	Meaning
	Quits advanced edit mode.
	Undoes last change.
	Redoes last change.
	Cuts selected code.

Icon	Meaning
	Copies selected code into clipboard.
	Inserts code from clipboard.
	Deletes selected code.
	Decreases insert.
	Increases insert.
	Automatic text formatting.
	Shows/hides line numbers.
	Inserts code snippet.
	Word wraps automatically.
	Searches within code.

Additional input aids are provided for creating script code.

## Syntax highlighting



The input fields support syntax highlighting depending on the syntax type.


## Auto-completion

Auto-completion can be used when creating script code. The amount of scripted code to enter is reduced by displaying the names of properties or functions that can be used. To use auto-completion, use the shortcut **Ctrl + SPACE** in the relevant positions within the input fields. The contents of the list is determined by the key words in the code. This way, you can use scripts from the script library.

## Entering code snippets

One Identity Manager provides code snippets for you to use as templates. You can insert code snippets using the following options:

1. Using the icon 
  - Select the  icon.
2. Using a shortcut
  - Press **F2**.

**NOTE:** If you select a code snippet directly using a shortcut or the  icon, a short description and the shortcut name are displayed in a tooltip.

**TIP:** You can use custom code snippets. To do this, create a CustomSnippets directory in the One Identity Manager installation directory to store the code snippets. Use Visual Studio documentation to develop your own code snippets.

If the script tests a fixed value that contains at least two dollar characters, the dollar characters must be masked.

## Related topics

- [Script library for synchronization projects](#) on page 151

# Save changes permanently

Different wizards are run to add new objects like synchronization projects, mappings, or workflows with the Synchronization Editor. The data you enter is temporarily saved. Changes to these objects are also saved only temporarily.

## ***To save changes to the synchronization project permanently***

- In the Synchronization Editor toolbar, click **Commit to database**.  
- OR -
- To save the synchronization project with change labels, open the **Commit to database** menu item and click **Commit and assign a change label**. For detailed information about working with change labels, see the *One Identity Manager Operational Guide*.

One Identity Manager compresses the schemas when the synchronization project is saved for the first time. This removes schema data from the synchronization projects that is not required in the synchronization configuration. This can speed up loading the synchronization project.

## Related topics

- [How to remove unnecessary project data](#) on page 53

# Establish remote connection

To configure synchronization with a target system, One Identity Manager must load the data from the target system. One Identity Manager communicates directly with the target system to do this. Sometimes direct access from the workstation, on which the Synchronization Editor is installed, is not possible. For example, because of the firewall configuration or the workstation does not fulfill the necessary hardware and software requirements. If direct access is not possible from the workstation, you can set up a remote connection.

## Prerequisite

The remote connection server and the workstation must be in the same Active Directory domain.

### To permit remote access to a target system

1. Provide a server installed with the following software.
  - One Identity Manager Service with the **RemoteConnectPlugin**

**Table 15: RemoteConnectPlugin parameters**

Parameters	Value	Description
Authentication method	ADSGroup	Method with which incoming queries can be authenticated.  Permitted values: <b>ADGroup</b>
Permitted AD group		Distinguished name or object SID of the Active Directory group whose members are permitted to use a remote connection. This parameter is only required for the <b>ADGroup</b> authentication method.
Port	2880	Port for reaching the server.

**NOTE:** Authentication of a remote connection can only be done through an Active Directory group.

For more information, see the One Identity Manager Configuration Guide.

- Target system connector
- Target specific client components as they must be installed on the synchronization server.

For more information, see the administration guides for connecting target systems.

2. Declare the remote connection server as Job server in One Identity Manager.
3. Start the One Identity Manager Service.

**TIP:** The remote connection server requires the same configuration as the synchronization server (with regard to the installed software and entitlements). Use the synchronization as remote connection server at the same time, by simply installing the **RemoteConnectPlugin** as well.

### To edit a Job server

1. In the Designer, select the **Base Data | Installation | Job server** category.
2. Enter a new Job server using the **Job servers | New** menu item.
3. Edit the Job server's master data.
4. Select the **View | Server functions** menu item and specify the server functionality.



Select a minimum of the following server functions:

- <target system connector>
  - One Identity Manager Service installed
5. Select the **View | Machine roles** menu item and assign roles to the server.  
Select at least the following roles:
    - Server/Jobserver/<target system>
  6. Enter the queue name of the Job server in the configuration file of the One Identity Manager Service.

For more information, see the One Identity Manager Configuration Guide and the administration guides for connecting target systems.

Remote access may be necessary, if:

- a. A synchronization project must be set up.
- b. An existing synchronization project must be configured but there is generally no direct access to the target system.
- c. A existing synchronization project must be configured but there is temporarily no direct access to the target system.

One Identity Manager requires a connection to the target system, for example, to update the target system schema, to define the scope, or to test the object matching rules. A message appears if you cannot connect to the target system when editing the synchronization configuration. Then you can decide whether you want to connect through a remote connection server, temporarily. In this case, a remote connection dialog opens.

- d. An existing synchronization project needs to be configured but some connection data is encrypted and the encryption values are not known to the Synchronization Editor user.

#### ***To set up a remote connection for a new synchronization project.***

- Set the **Connect using remote connection server** option in the project wizard on the **System access** page and select the server to use for the connection under **Job server**.

The remote connection stays connected as long as the project wizard is open.

#### ***To set up a remote connection for an existing synchronization project.***

1. Open the synchronization project.
2. In the Synchronization Editor toolbar, click **Remote connection....**  
This opens the remote connection dialog.
3. Enter the remote connection properties.
4. Click **Connect**.

This sets up the remote connection. The connection remains in place for as long as the synchronization project is open in the Synchronization Editor.

**Table 16: Remote connection properties**

Property	Description
Select remote connection server automatically	Select this option if you want the remote connection server to be selected automatically.
Job server	In the menu, select the Job server you want for One Identity Manager communicating with the target system.  All Job servers are displayed for which the server function <b>One Identity Manager Service installed</b> is selected.
Select remote connection server manually	Select this option if you do not want the remote connection server to be selected automatically because, for example, the server name cannot be resolved.
Server	Enter the full server name or the server's IP address.
Port	RemoteConnectPlugin uses the port 2880.

**To close a remote connection**

- In the Synchronization Editor toolbar, click **Remote connection....**

**Related topics**

- [Creating a synchronization project](#) on page 61
- [Configuring synchronization](#) on page 66
- [Menu items](#) on page 14
- [Working with an encrypted database](#) on page 26

## Working with an encrypted database

When you set up a synchronization project in an encrypted One Identity Manager database, sensitive data is encrypted. This affects passwords for connection data as well as variables that are labeled as secret. The Synchronization Editor requires all connection data in decrypted form in order to access connected systems. You can nevertheless open the synchronization project and edit it partially.

If the Synchronization Editor now accesses the connection system, it cannot establish a system connection because certain connection parameters are encrypted. The values can be decrypted through an appropriately configured remote connection. Set up a remote connection server to do this. For more information, see [Establish remote connection](#) on page 23. Note here the relevant restrictions for setting up a remote connection server.

### ***To enable the system connection despite encrypted connection data***

1. Edit the system connection.

For more information, see [How to edit system connection properties](#) on page 103.

An extra dialog box is displayed.

2. Set the first option and click **OK**.

- a. Enter the remote connection properties.

For more information, see [Remote connection properties](#) on page 26.

- b. Click **Connect**.

This sets up the remote connection. The connection remains in place for as long as the synchronization project is open in the Synchronization Editor.

**NOTE:** If a remote connection is not possible, you have the option, at this point, to enter values for establishing the system connection.

- Set the second option for this and enter the missing values. Click **OK**.

### ***To decrypt encrypted values by default when you open a synchronization project***

- In the Designer, set the "DPR | UI | EncryptedValueHandling" configuration parameter and select the value "ByUser" on the **Options** tab.

The user can decide whether encrypted values should be ignored or not.

**Table 17: Decryption dialog**

Property	Description
Encrypted value	Value required by the connector to establish a system connection.
Ignore this value	Specifies whether to ignore the value. The synchronization project can be selectively edited. However, all actions which required accessing the connected system, cannot be executed.
Show values	Specifies whether the values entered are shown. If this option is not set, input is masked.
Remember the values and save locally	<p>Specifies whether the data entered is saved locally. The next time the synchronization project is opened, the stored values are applied and can be confirmed or altered.</p> <p><b>IMPORTANT:</b> If an encrypted value has been changed in the One Identity Manager database, the changed value must also be changed on the workstation as soon as the synchronization project is next opened.</p> <p>Otherwise, the value is overwritten by the locally stored data when the synchronization project is saved. Modifications (of passwords, for example) go missing this way!</p>

Property	Description
	<p><b>To avoid overwriting</b></p> <ul style="list-style-type: none"> <li>Update the pre-set values and enable the <b>Remember the values and save locally</b> option.</li> </ul> <p><b>To delete locally saved data</b></p> <ol style="list-style-type: none"> <li>Select the <b>Database   Settings...</b> menu item.</li> <li>Select the <b>Security</b> tab.</li> <li>Select a value and click <b>Delete</b>.</li> </ol>
Ignore all	Ignores encrypted values and open the synchronization project.

## Changing a synchronization user's password

One Identity Manager provides a system user with all the permissions necessary to set up target system synchronization through an application server and to run it. When you set up the One Identity Manager database, you entered a password for the **Synchronization** system user. You can change this password in the Synchronization Editor. The password must then be changed in all synchronization projects that connect to the database through an application server. One Identity Manager can try to update these passwords automatically. If this is not possible, modify the synchronization projects manually.

**IMPORTANT:** The password may not be changed while synchronization is starting up or running. Only change the password outside working hours!

Only passwords that are managed in One Identity Manager can be changed. There is no menu item shown for externally managed passwords. For detailed information about managing system user passwords, see the *One Identity Manager Authorization and Authentication Guide*.

### To change the system user's Password

- Select **Database | Change synchronization user password**.
- Enter the required data:
- Click **OK**.

**Table 18: Password data**

Property	Description
Old password	Password valid until now.
New password	New password for the system user to log on o the database.

Property	Description
and password confirmation	
Show passwords	Passwords are not masked.
Try to update existing synchronization projects	One Identity Manager checks all the synchronization projects and tries to update the password. The password is only changed in synchronization projects that are connected with the database through an application server.

### ***To manually update the database connection password***

1. Open the synchronization project which needs to have its password updated.
2. Select **Configuration | One Identity Manager Connection**.
3. Confirm the prompt with **OK**.  
Do **not** establish a remote connection.
4. Click **Edit connection**.
5. Select the **Connection parameter** page in the system connection wizard.
6. Enter the new password in **Synchronization user's password**.
7. Click **Test**.
8. If the connection is successfully established, click **Next**.
9. Close the system connection wizard.
10. Save the changes.

## Basics of target system synchronization

To configure target system synchronization you must have knowledge of the One Identity Manager's basic procedure for synchronizing and provisioning data. These basics are explained in the following sections.

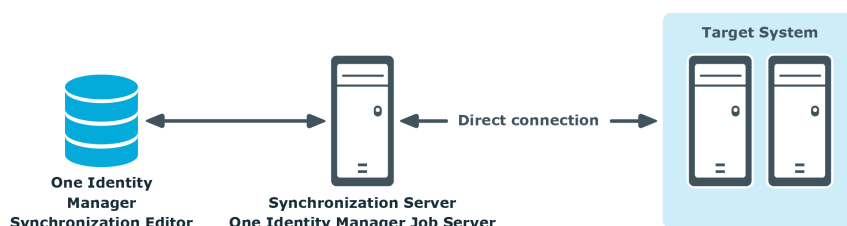
**Table 19: Basic synchronization terminology**

Term	Described in
Dependency resolution	<a href="#">How does dependency resolution work?</a> on page 40
Outstanding objects	<a href="#">Deleting objects in One Identity Manager</a> on page 51
Synchronization of single objects	<a href="#">Synchronization and provisioning</a> on page 10
Filter	<a href="#">What are filters?</a> on page 34
Mapping direction	<a href="#">Direction of synchronization and mapping</a> on page 44 <a href="#">Mapping against the direction of synchronization</a> on page 45
Primary and secondary systems	<a href="#">Synchronizing user data with different systems</a> on page 50
Provisioning	<a href="#">Synchronization and provisioning</a> on page 10
Revision filter	<a href="#">How does revision filtering work?</a> on page 38
Schema	<a href="#">How are schemas mapped</a> on page 31
Scope	<a href="#">What is a scope?</a> on page 37
Direction of synchronization	<a href="#">Direction of synchronization and mapping</a> on page 44
Rogue modification	<a href="#">Detecting rogue modifications</a> on page 47

# Synchronization Editor communications

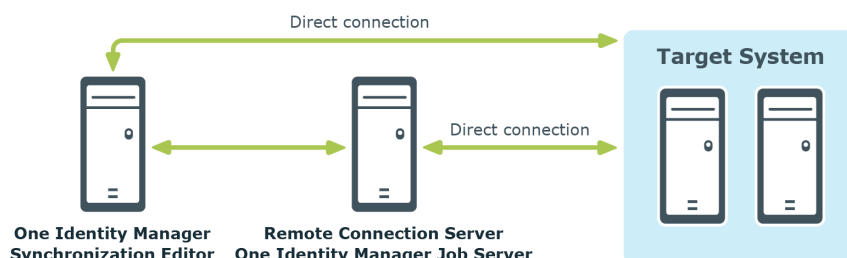
A server installed with the One Identity Manager Service and, if necessary, other target system specific software, is required for synchronization. This server (named the synchronization server in the following) requires direct access to the target system. The synchronization server communicates directly with the One Identity Manager database by default. You can also set up a connection over an application server for this.

**Figure 4: Communication paths for synchronization**



To configure synchronization with a target system, One Identity Manager must load the data from the target system. One Identity Manager communicates directly with the target system to do this. Sometimes direct access from the workstation, on which the Synchronization Editor is installed, is not possible. For example, because of the firewall configuration or the workstation does not fulfill the necessary hardware and software requirements. If direct access is not possible from the workstation, you can set up a remote connection.

**Figure 5: Communication paths for synchronization project configuration**



## Related topics

- [Establish remote connection](#) on page 23

# How are schemas mapped

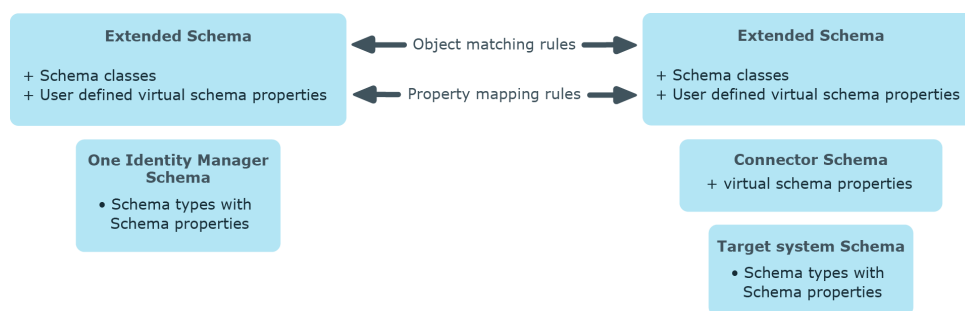
To synchronize a target system with the One Identity Manager database, you must first map the data models of both systems to each other. The data models (schema) are

different for each system. They must be extended in such a way that they can be uniquely mapped.

The One Identity Manager distinguishes between four sorts of schema: One Identity Manager schema, target system schema, connector schema, extended schema. Each schema is characterized through schema types and schema properties. You can extend schema with schema classes and schema properties such that they can be mapped uniquely.

Just how the schema are mapped to each other is defined in mappings. Mappings group together the rules used to map the schema properties of two connected systems. Object matching rules assign schema properties through which system objects can be uniquely identified. Property mapping rules describe how the target system schema properties are mapped in the One Identity Manager schema.

**Figure 6: Schema mapping**



**Table 20: Terms for schema mapping**

Term	Explanation
Schema	<p>Data model of a connected system. The schema describes all the master data from the connected system.</p> <p>The One Identity Manager distinguishes between four sorts of schema: One Identity Manager schema, target system schema, connector schema, extended schema.</p>
One Identity Manager schema	The One Identity Manager data model.
Target system schema	Data model of a specific target system.
Connector schema	<p>The system connector extends the target system schema with additional information which is required for mapping in the Synchronization Editor. This includes:</p> <ul style="list-style-type: none"> <li>• Information about which schema properties map memberships</li> </ul>



Term	Explanation
	<ul style="list-style-type: none"> <li>Information about which schema properties represent references to other objects</li> <li>Virtual properties that the system connector creates</li> </ul> <p>If a target system does not deliver its own schema, the system connector generates the connector schema based on the imported data structure, for example, the import of CSV files by the CSV connector.</p>
Extended schema	<p>A schema can be customized in the Synchronization Editor, for example, to allow or simplify mapping of complex schema properties. The following options are available:</p> <ul style="list-style-type: none"> <li>Add new schema classes</li> <li>Define user-specific virtual schema properties</li> <li>Derive schema properties</li> </ul> <p>Label the modified schema as "extended schema".</p>
Schema type	<p>Defines an object type within a schema. A schema type refers to exactly one table or view of the database based schema or exactly one object type of the non-database based schema.</p>
Schema class	<p>Subset of a schema type. The result list of a schema type is filtered by defined criteria. The number of objects found is limited thus.</p> <p>Example: Active Directory contacts (schema class) are Active Directory user accounts (schema type) with their own object class = 'CONTACT' (filter criteria).</p>
Schema property	<p>Property of a schema type. A schema property refers to exactly one column of a table or view of the database based schema or exactly one object type property of the non-database based schema. There are two different sorts of schema property:</p> <ul style="list-style-type: none"> <li>Schema properties of schema types from the target system and One Identity Manager schema.</li> <li>Virtual schema properties, <ul style="list-style-type: none"> <li>added by the user to extend the target system schema or the One Identity Manager schema</li> <li>added by the user to extend the connector schema or the One Identity Manager schema</li> </ul> </li> </ul>
Virtual schema properties	<p>Schema class property added by the system connector or the user.</p> <p>Virtual schema properties extend the basic schema with additional data required for the mapping. You can use virtual schema properties to represent combinations of schema properties as well as processing step results as schema properties.</p>

Term	Explanation
Object matching rule	Specifies how a concrete object of a target system schema class can be set in relation to a concrete object of a One Identity Manager schema class. An object matching rule encompasses the target system schema property based on which the target system objects can be uniquely identified.
Property mapping rule	Describes how a target system schema property is mapped in the One Identity Manager schema.

## Related topics

- [Setting up mappings](#) on page 67

# What are filters?

You can define different filters in the Synchronization Editor. You can use filters to define the scope of a synchronization project, define schema classes or to create virtual schema properties. There are three sorts of filter that differ in their effect and way they are defined. The number of objects to be synchronized can also be limited by a revision filter.

**Table 21: Sorts of filter**

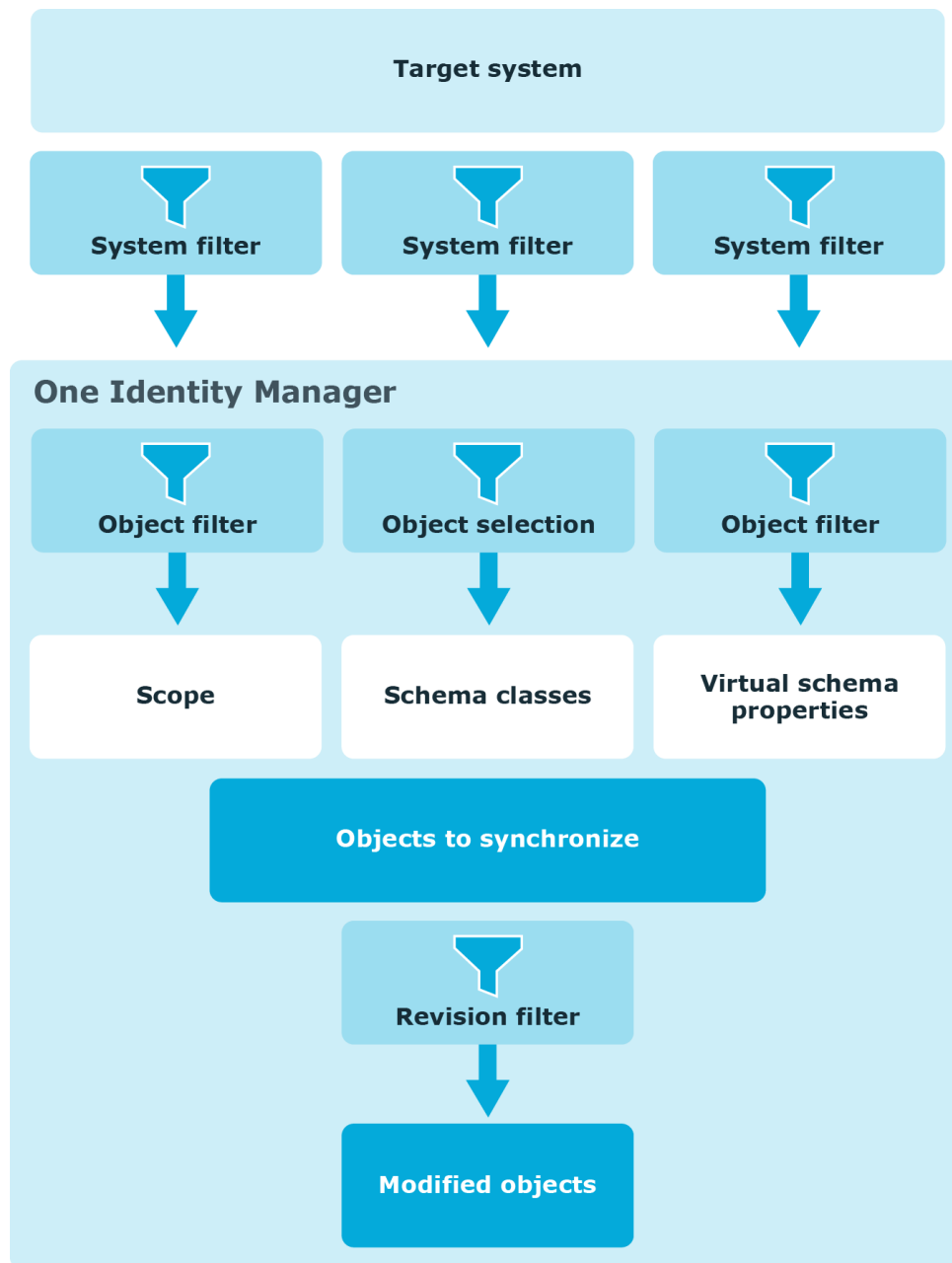
Filter	Description
System filter	<p>This filter limits the number of objects to load in the connected system. It is more effective than the object filter and object matcher because the system connector only load the objects that are really required. You cannot link more than one filter criteria with logical operators.</p> <p>The filter is given in system specific notation, for example, as LDAP filter for an LDAP system.</p> <p>The following connected systems support the system filters: Active Directory, LDAP, One Identity Manager, and databases.</p> <p>A special form of the system filter is the hierarchy filter. The hierarchy filter is built based on the target system's real objects. All the objects to be filtered are selected from the object hierarchy.</p> <p>The hierarchy filter can be used in the definition of the scope of certain target systems.</p>
Object filter	<p>The filter affects objects already loaded. All schema properties of the schema can be used as filter criteria and linked with logical operators.</p> <p>The filter is formulated as a query applied to loaded objects. It can be used when the scope is defined and by virtual schema properties.</p>

Filter	Description
Object selection	<p>The filter affects objects already loaded. All schema properties of the schema can be used as filter criteria and linked with logical operators. In order to ensure that the filter returns the desired results when provisioning single objects, you must add additional system filter criteria to the filter condition.</p> <p>The filter is formulated as a query applied to loaded objects. It can be implemented in the schema class definition.</p>
Revision filter	<p>This filter determines all object that have changed since the last synchronization run. The deciding factor being the revision property modification.</p> <p>The filter can be applied to workflows and start up configurations.</p>

It is recommended you combine system filter and object filter/schema class filter to utilize the advantages of the various filters.

If scope, schema class, and virtual schema property filters are defined in the synchronization configuration and revision filtering is permitted, the number of objects to be synchronized results from the combination of all filters.

**Figure 7: Effects of the filter**



Variables can be used in the filter conditions. This enables the same synchronization project to be used for synchronizing different target systems or different objects within the same target system.

### Related topics

- [What is a scope?](#) on page 37
- [Schema class properties](#) on page 73
- [How does revision filtering work?](#) on page 38

- [Using variables and variable sets](#) on page 110
- [Wizard for entering filters](#) on page 19

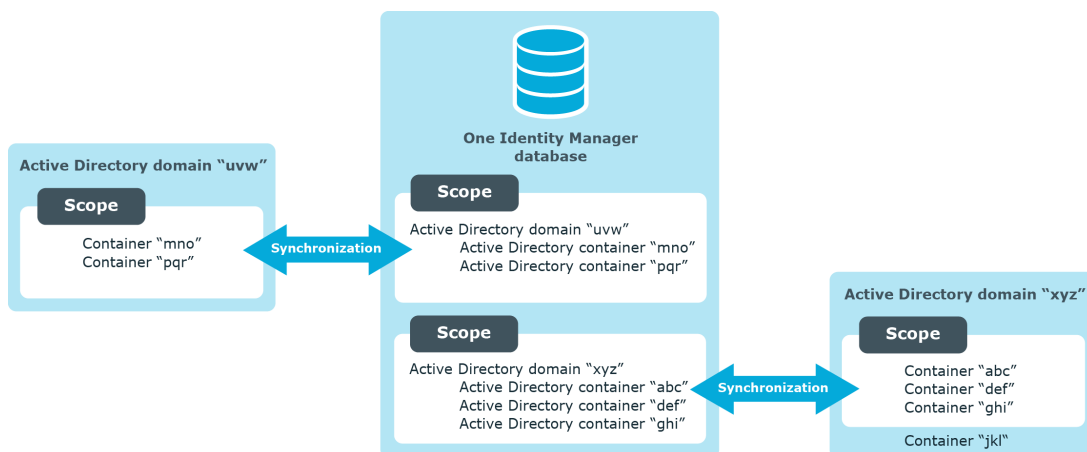
## What is a scope?

The scope specifies which parts of the connected system should be synchronized. The scope is set for the target system to be synchronized as well as for the One Identity Manager schema. If no scope is defined, all objects in the connected system are synchronized.

Example:

Active Directory domains "xyz" and "uvw" are managed through One Identity Manager. The containers "abc", "def", and "ghi" from the Active Directory domain "xyz" should be synchronized. A scope is defined for the target system connection and the One Identity Manager database connection which filters only these objects. The Active Directory domain "uvw" should initially not be synchronized.

**Figure 8: Example for scope definition**



To specify a scope, define a system filter and object filter.

### Hierarchy filter

Some target systems offer an additional option to specify the scope: the hierarchy filter. This filter limits the number of objects to load in the connected system. It is therefore effectively the same as a system filter. The hierarchy filter is built based on the target system's real objects. The objects are displayed in their hierarchical structure. All objects included in the scope are marked in the hierarchy. All objects that are not marked remain outside the scope and are not included in the synchronization. The hierarchy filter can only be applied to objects and not to their schema properties. Create an additional object filter to include schema properties as criteria in the scope definition.

A fully defined hierarchy filter can be transformed into a variable. Thus the filter can be redefined in a specialized variable set and used for other synchronization configurations.

## Reference scope

References to objects in different target systems can be mapped in the One Identity Manager database. In order to solve these references, the target system scope must be extended to include the referenced target systems. For this, you can additionally define a reference scope for each system connection. You can enter the reference scope for the database in the same way. This means that references to parts of the One Identity Manager database can be resolved which are not included in the general scope.

If no reference scope is defined, the general scope is also used for the reference resolution.

Example:

Active Directory domains "xyz" and "uvw" are trusted domains. User accounts from both domains are members in Active Directory groups in the Active Directory domain "xyz". Define a reference scope to assign referenced user accounts of the domain "uvw" during group membership synchronization. In the reference scope, specify that referenced objects should also be searched for in the Active Directory domain "uvw".

If you have not defined a reference scope, Active Directory SIDs are determined for Active Directory domain "uvw" user accounts during Active Directory domain "uvw" group membership synchronization and entered in the One Identity Manager data store.

## Related topics

- [Editing the scope](#) on page 107
- [What are filters?](#) on page 34
- [Using variables and variable sets](#) on page 110

# How does revision filtering work?

When you start synchronization, all synchronization objects are loaded. Some of these objects have not be modified since the last synchronization and, therefore, must not be processed. Synchronization is accelerated by only loading those object pairs that have changed since the last synchronization. One Identity Manager uses revision filtering to accelerate synchronization.

## Prerequisites

- The target system supports revision filtering.  
This data is supplied by the system connector.
- Schema types own a schema property which is labeled as a revision counter.  
This schema property stores the information about the last object modifications.

Example of an Active Directory group:

- In the target system schema: UNS Changed
- In the One Identity Manager schema: Revision Date
- Revision filtering permitted for this synchronization workflow.

Revision filtering can be applied to workflows and start up configuration. The workflow setting is valid for all synchronizations with this workflow. In order to synchronize with the same workflow at different times, with, and without revision filtering, create different start up configurations and specify revision filtering for them.

### ***To permit revision filtering on a workflow***

- Open the synchronization project in the Synchronization Editor.
- Edit the workflow properties. Select the **Use revision filter** item from **Revision filtering** menu.

For more information, see [How to edit a workflow](#) on page 88.

### ***To permit revision filtering for a start up configuration***

- Open the synchronization project in the Synchronization Editor.
- Edit the start up configuration properties. Select the **Use revision filter** item from the **Revision filtering** menu.

For more information, see [How to edit start up configurations](#) on page 116.

Normally, each object keeps information about the last changes made. The highest change data value of all synchronized objects of a schema type is taken as the revision in the One Identity Manager database (DPRRevisionStore table, DPRRevisionStore column). This value is used as a comparison for revision filtering when the same workflow is synchronized the next time. This means that when this workflow is next synchronized, the object change data is compared with the revision saved in the One Identity Manager database. This involves finding object pairs where one has newer change data than the last time it was synchronized. Thus, only objects that have changed since the last synchronization are updated.

The reference parameter for revision filtering is also the last schema type synchronization with the same workflow. The table DPRRevisionStore contains one entry per workflow and schema type.

**NOTE:** One Identity Manager supplies a scheduled process plan, which regularly cleans up the contents of the DPRAttachedDataStore table. Entries for schema types that are no longer used in the synchronization configuration are deleted in the process. The process plan is executed during daily maintenance.

## **Related topics**

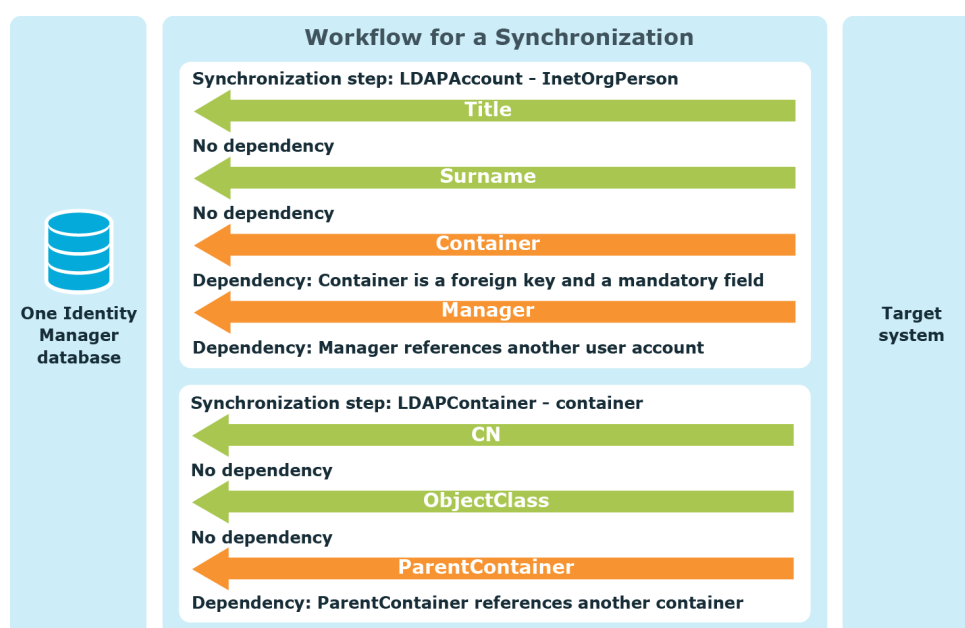
- [Properties of a workflow](#) on page 90
- [Setting up start up configurations](#) on page 115

- [What are filters?](#) on page 34
- [Resetting revisions](#) on page 138

## How does dependency resolution work?

Dependencies can arise between schema classes that require synchronization steps to be repeated. For example, object references can not be set until the reference object has been added. Dependencies can also arise between schema properties within a schema class.

**Figure 9: Example of a workflow with dependent schema classes and schema properties**

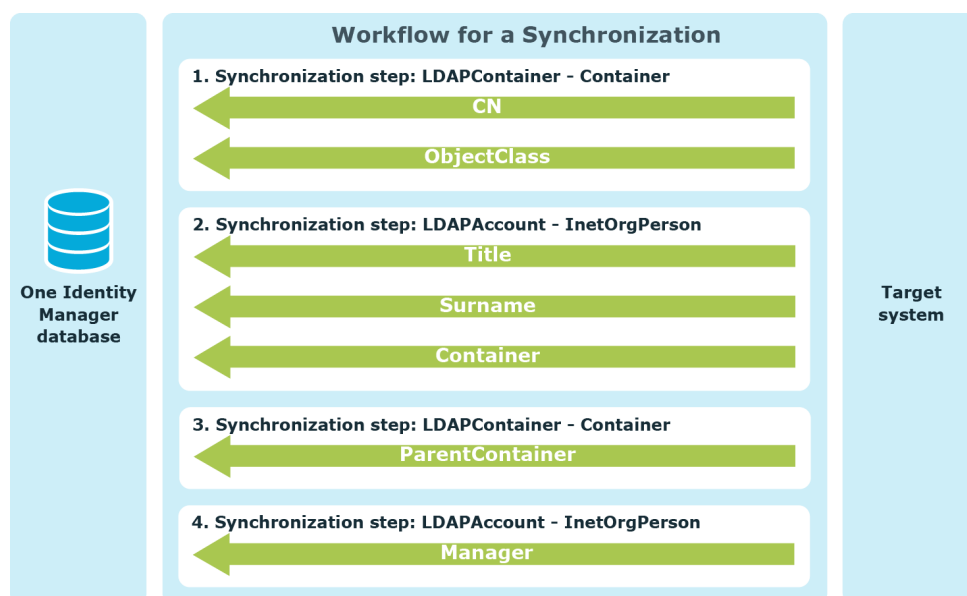


One Identity Manager can automatically resolve such dependencies. In this case, the synchronization steps are group together such that the referenced objects are synchronized first and then the dependent objects next. If dependencies exist within a schema class, additional synchronization steps are inserted to synchronize the dependent schema properties. The final sequence of synchronization steps can be viewed in the report "Execution Plan".

**NOTE:** If dependencies exist between schema classes, the schema classes must be synchronized by the same workflow so that dependencies can be automatically resolved.



**Figure 10: Example of a workflow with automatic dependency resolution**



### To set up automatic resolution of dependencies

- Edit the workflow properties. Select the following option:

Dependency resolution: Automatic

For more information, see [How to edit a workflow](#) on page 88.

Use automatic dependency resolution by default. Only select manual dependency resolution if individual dependencies cannot be resolved automatically. This might be necessary, for example, if two objects reference each other as mandatory properties.

**NOTE:** If dependency resolution is set to "Manual", One Identity Manager does not check whether dependencies exist between schema classes and schema properties during synchronization. The synchronization steps are processed sequentially in the order displayed in the workflow view.

Synchronization exits with an error if dependencies exist that cannot be resolved!

### To resolve dependencies manually

- Find the schema properties between which dependencies exist.
- Create a workflow with synchronization steps which take the following criteria into account:
  - Synchronization steps which synchronize independent and references objects. Property mapping rules for dependent schema properties must be excluded for this.

- b. Synchronization steps which reference dependent objects.  
Property mapping rules for dependent schema properties must be included for this.
3. Specify the synchronization step sequence such that all synchronization steps for a) are executed first and then the synchronization steps for b).
4. Edit the workflow properties. Select the following option:

Dependency resolution: Manual

For more information, see [How to edit a workflow](#) on page 88.

## Related topics

- [Show execution plan](#) on page 103
- [Properties of a workflow](#) on page 90
- [Rule filters](#) on page 101
- [Editing synchronization steps](#) on page 92

# Unresolvable references

If a reference object does not exist in the One Identity Manager database, the object reference cannot be resolved by synchronizing. Unresolvable object references are written in a buffer called the data store (table DPRAttachedDataStore). This ensures that these references remain intact and are not deleted in the target system by provisioning.

Example:

An Active Directory group has an account manager, which owns a domain not in the current synchronization run. The account manager is not in the One Identity Manager database either.

Synchronization cannot assign an account manager. In order to retain the assignment, the object reference is saved with the account manager's distinguished name in the data store.

During each synchronization One Identity Manager tries to clean up the data store. If referenced objects in the One Identity Manager database exist, the references can be resolved and the entries are deleted from the data store. The data store is cleaned up depending on the synchronization type (with or without revision filter) and the maintenance mode.

**Table 22: Maintenance for unresolved object references**

<b>Maintenance mode</b>	<b>Synchronization without revision filer</b>	<b>Synchronization with revision filer</b>
The following applies depending on the maintenance mode:	Object references of all synchronization objects are cleaned up if they exist in the One Identity Manager database.	Only object references for modified objects are cleaned up.
No maintenance	There is no additional task of clearing up the data store.	
Always synchronize affected objects	No effect.	The filter is removed on objects with unresolved references. Therefore, references are also cleaned if the objects have not been changed since the last synchronization.
Full maintenance after every synchronization	One Identity Manager tries to resolve object references following synchronization. As a result, unresolved references are processed that arose during this synchronization run.	One Identity Manager tries to resolve object references following synchronization. As a result, unresolved references are processed that arose during this synchronization run. Object references that were not modified are also cleaned up.

You can enter the number of retries for resolving object references. It may be necessary to try several times to resolve an object if it maps a hierarchy with several levels. One hierarchy level at a time can be resolved with each attempt to resolve an object.

### **To set up maintenance mode**

- Edit the start up configuration properties. Select the **Maintenance** tab.

For more information, see [How to edit start up configurations](#) on page 116.

**NOTE:** One Identity Manager supplies a scheduled process plan, which regularly cleans up the contents of the table DPRAttachedDataStore. Object entries, which no longer exist in the One Identity Manager database are deleted. The process plan is executed during daily maintenance.

### **Related topics**

- [Maintenance modes](#) on page 119
- [Maintaining the data store](#) on page 188

# Direction of synchronization and mapping

To synchronize a target system with One Identity Manager, you must specify which of the connected systems is the data master. Specify the master system in the synchronization configuration with the direction of synchronization. The direction in which schema properties are mapped may differ from this. Therefore, the permitted mapping direction must be given in the schema properties mapping.

**Table 23: Direction of synchronization**

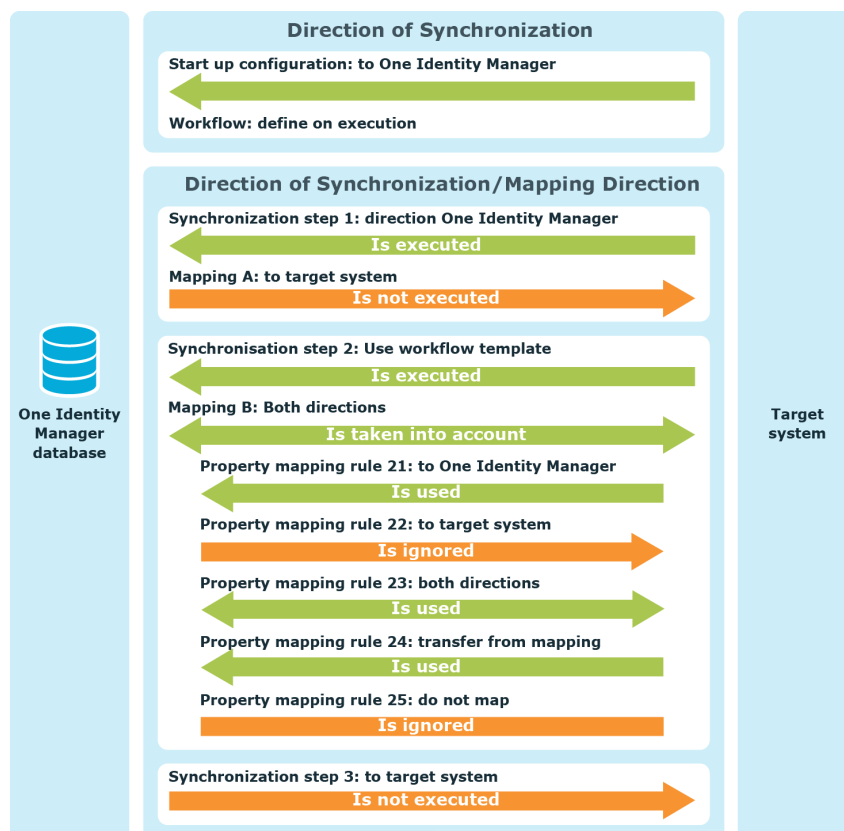
Defined on	Direction of synchronization specifies
Start configuration	In which direction a specific synchronization is executed
Workflow	In which direction synchronizations are executed
synchronization step	By which synchronization direction the step is executed

**Table 24: Permitted mapping direction**

Defined on	Specifies the mapping direction
Mapping	By which synchronization direction property mapping rules are used
Property mapping rule	By which synchronization direction this property mapping rule is used

One Identity Manager synchronizes two connection systems in the direction given in the start up configuration or in the workflow. A synchronization step is only executed in this case, if the direction of synchronization stored with the step matches with the direction of the current synchronization. If the mapping direction stored with the mapping corresponds to the current direction of synchronization, the system object from this schema class are synchronized. Thus, One Identity Manager checks which property mapping rule can be used in the current synchronization direction. This property mapping rule is ignored if the mapping direction of the property mapping rule differs from the current direction of synchronization.

**Figure 11: Example showing effect of specified synchronization direction and permitted mapping direction**



## Related topics

- [Setting up start up configurations](#) on page 115
- [Properties of a workflow](#) on page 90
- [General properties of a synchronization step](#) on page 94
- [Properties of a mapping](#) on page 71
- [Editing property mapping rules](#) on page 78

# Mapping against the direction of synchronization

For certain schema properties, it may be necessary to copy the schema property value immediately from the connected system into the master synchronization system each time synchronization is run. There is a property mapping rule for these schema properties whose direction of mapping is opposite to the direction of synchronization. These rules are not executed by default. To transfer these schema property values during synchronization,

you must force execution of these rules. This behavior is configured in the property mapping rules.

## Prerequisites

- The **Detecting rogue modifications** option is disabled on the property mapping rule.

### *To force mapping a schema property against the direction of synchronization*

- Edit the property mapping rule.

Set **Force mapping against direction of synchronization**.

For more information, see [How to edit property mapping rules](#) on page 79.

Property mapping rules with this option set are executed after the synchronization step is completed. This copies changes from the connected system against the direction of synchronization into the master system.

## Synchronization Sequence

1. All property mapping rules whose mapping direction is the opposite to the direction of synchronization are ignored whilst a synchronization step is being executed. Property mapping rules whose mapping direction corresponds to the direction of synchronization are run.
2. All changes to the connection system are saved when the synchronization step is complete.
3. All property mapping rules with the option **Force mapping against direction of synchronization** set are executed again. For those schema properties involved, the changes are copied from the connected system into the master system.

**NOTE:** The property mapping rules are also rerun after completion of the synchronization step if there are no processing methods given in the synchronization step.

Use the **Force mapping against direction of synchronization** option for schema properties that cannot be edited in the master system due to technical limitations.

**NOTE:** This option is also taken into account when object changes are provisioned.

### Example

An Active Directory environment should be administrated through One Identity Manager. One Identity Manager is the master system for synchronizing both systems. The user account object GUIDs are, however, not mapped in One Identity Manager but in the Active Directory environment. This means the mapping direction is different for a user account object GUID. To copy the object GUID from the target

system to One Identity Manager during synchronization, the mapping must be forced in the opposite direction of synchronization for this schema property.

**Table 25: Synchronization configuration**

Configuration Setting	Value
Direction of Synchronization:	To the target system
Property mapping rule for schema properties:	ADSAccount.ObjectGUID - User.ObjectGUID
Mapping direction:	To the One Identity Manager
Force mapping against direction of synchronization	Enabled

### ***Synchronization Sequence***

Scenario: A new Active Directory user account was added in One Identity Manager.

1. The user account is added in the target system through synchronization.
2. The property mapping rule for the object GUID is ignored because of the opposing the mapping direction.
3. Once all property mapping rules of the synchronization step have been processed, the user account is saved in the target system. A value is calculated in the target system for User.ObjectGUID.
4. Once the synchronization step is complete the property mapping rule for the object GUID is run again. The object GUID is copied from Active Directory to One Identity Manager.

### **Related topics**

- [Editing property mapping rules](#) on page 78

## **Detecting rogue modifications**

To map single schema properties, it could be necessary to declare one of the connected systems as the data master. Property mapping rules for these schema properties all have the same direction of mapping. If editing these schema properties is not technically restricted in any of the connected systems, you can also change their values in a system that is not the data master.

If the direction of synchronization matches the direction of mapping these changes are overwritten by the next synchronization.

If the direction of synchronization is opposite to the direction of mapping, data that cannot be corrected by synchronization becomes inconsistent because the property mapping rules are not executed. Change like this are consider to be "rogue modifications". In this case, a modification is considered to be any difference between the object properties of the connected systems, irrespective of the system the object was actually modified.

Synchronization can identify (rogue detection), log, and correct (rogue correction) rogue modifications. You can configure the respective behavior in the property mapping rules.

## Prerequisites

- The direction of mapping **target system** or **One Identity Manager** is set in the property mapping rule.
- The **Force mapping against direction of synchronization** option is not set in the property mapping rule.

### To detect and log rogue modifications

- Edit the property mapping rule.

Set the **Detect rogue modifications** option.

For more information, see [How to edit property mapping rules](#) on page 79.

### To correct rogue modifications

- In addition, set the **Correct rogue modifications** option in the property mapping rule.

**NOTE:** Rogue modifications can only be corrected if there is write access for schema property to be corrected.

### Synchronization Sequence with Modification Detection

1. A property mapping rule is detected whose mapping direct is opposite to the actual direction of synchronization.
2. If **Detect rogue modifications** is set, One Identity Manager checks the object of the connected system for rogue modifications. Rogue modification are logged.  
The log can be evaluated after synchronization. For more information, see [Synchronization analysis](#) on page 140.
3. If the **Correct rogue modifications** option is set, One Identity Manager executes the property mapping rule. The object property in the connected system is overwritten with the value from the data master.

**NOTE:** Rogue modifications are also handled when object modifications are provisioned.

Modification detection can be usefully applied if a synchronization workflow and a provisioning workflow are configured, which means, the direction of synchronization is **One Identity Manager** and for certain schema properties the direction of mapping is the **target system**. In this case, only changes made to the schema properties that were made in the target system are detected as rogue modifications.



## Example

The synchronization direction **One Identity Manager** is specified for synchronizing Active Directory groups. The groups and their properties are created, edited, and deleted in Active Directory. Only the group's account manager is going to be assigned and changed in One Identity Manager.

**Table 26: Synchronization Configuration**

Configuration Setting	Value
Direction of Synchronization:	To the One Identity Manager
Property mapping rule for schema properties:	ADSGroup.ObjectKeyManager - Group.name of manager
Mapping direction:	To the target system
Detecting rogue modifications:	Set
Correct rogue modifications:	Set

Synchronization adds new groups in One Identity Manager. An account manager is assigned in One Identity Manager. This modification is provisioned in the target system.

There is no technical restriction to editing the account manager in the target system. If the account manager is changed in Active Directory, there is a discrepancy in the data, meaning a rogue modification. This change is detected, logged, and reverted by the next synchronization. The property matching rule is executed and the value in the target system is overwritten with the value from the One Identity Manager database.

It may make sense to use modification detection together with the **Ignore mapping direction restrictions on adding** option. As in the example, a new group is added in Active Directory. This initially assigned an account manager.

By synchronizing, the group is added in One Identity Manager but the account manager remains empty because the property mapping rule is not executed.

Before the account manager is assigned in One Identity Manager, the Active Directory is synchronized again. This detects a rogue modification (empty value in the database - account manager assigned in the target system). As a result, the value in the target system is corrected, deleting the account manager.

To avoid such situations, set the **Ignore mapping direction restrictions on adding** option. This means, the property mapping rule for the account manager is executed when the group is added and the account manager is assigned in the database. The subsequent synchronization does not detect a rogue modification because the account manager is identical in both systems.

### To execute a property mapping rule on adding

- Edit the property mapping rule.

Set the **Ignore mapping direction restrictions on adding** option.

For more information, see [How to edit property mapping rules](#) on page 79.

### Related topics

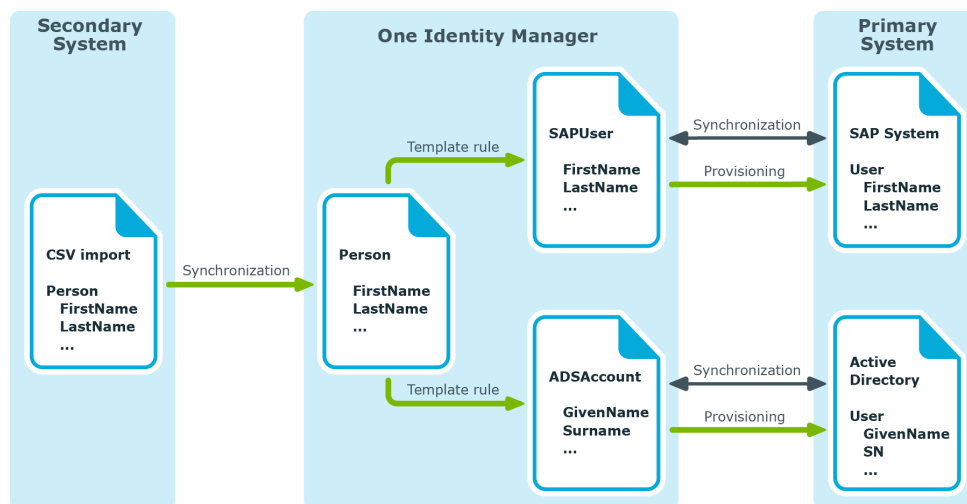
- [Property mapping rule details](#) on page 79

## Synchronizing user data with different systems

The source for the user data and permissions managed by One Identity Manager may be different systems. For example, SAP R/3 user accounts are managed in One Identity Manager. The associated employee data, however, is imported into the database through the CSV connector from another system.

The CSV import may cause the objects coming from another target system through synchronization to be modified. For example, the first and last names of an SAP user account change when the first and last names of an employee change through the CSV import. Changes to the SAP user account should be immediately provisioned in SAP R/3. To illustrate this, the connected systems will be named "primary systems" in the following; the systems whose data is synchronized with the CSV connector as "secondary systems".

**Figure 12: Example of synchronizing user data with different systems**



You can specify whether the data comes from a secondary system in the synchronization steps. In this case, changes are provisioned immediately (actually during synchronization) in the primary system. Conversely, the provisioning process may not start if primary systems are being synchronized.

### ***To configure immediate provisioning when synchronizing a secondary system***

1. Open the synchronization project for the secondary system.  
For more information, see [How to edit a synchronization project](#) on page 62.
2. Edit the synchronization step properties.  
Set the **Import data** option on the **General** tab.  
For more information, see [How to edit synchronization steps](#) on page 93.

**NOTE:** To prevent immediately provisioning of a primary system during synchronization, open the primary system synchronization project and disable the **Import data** option in the synchronization step.

The session variable **FullSync=FALSE** is set if the Data import option is enabled. The session variable is set to **FullSync=TRUE** if the option is disabled. Different processes, scripts, and templates are only executed in the One Identity Manager database if **FullSync=FALSE**. In this context it means they are only synchronized with a secondary system. Synchronizing with a primary system ignores processes, scripts, and templates.

### **Related topics**

- [General properties of a synchronization step](#) on page 94

## **Deleting objects in One Identity Manager**

You have two options for deleting objects in the One Identity Manager, which do not exist in the target system, by using synchronization.

1. The objects are deleted immediately on synchronization.  
You can view the synchronization log to see which objects have been deleted.

**NOTE:** Memberships that exist based on an inheritance cannot be deleted immediately. They are always marked as outstanding.

2. The objects are marked as outstanding by synchronization.

Outstanding objects must be post-processed separately in One Identity Manager. They can either be deleted or published in the target system in the process. This prevents objects being deleted because of an incorrect data situation or an incorrect synchronization configuration.

Outstanding objects:

- Cannot be edited in One Identity Manager.
- Are ignored by subsequent synchronizations.
- Are ignored by inheritance calculations.

This means, all memberships and assignments remain intact until the outstanding objects have been processed.

### ***To delete objects immediately in One Identity Manager***

1. Edit the synchronization step properties.  
For more information, see [How to edit synchronization steps](#) on page 93.
2. Select the **Processing** tab.
3. Specify the processing method. Select the following options as appropriate:

<b>For synchronization from the target systems to One Identity Manager</b>	<b>Processing method (technical name)</b>
Objects that are only found in One Identity Manager:	Delete


### ***To mark object as outstanding in One Identity Manager***

1. Edit the synchronization step properties.  
For more information, see [How to edit synchronization steps](#) on page 93.
2. Select the **Processing** tab.
3. Specify the processing method. Select the following options as appropriate:

<b>For synchronization from the target systems to One Identity Manager</b>	<b>Processing Method (technical name)</b>
Objects that are only found in One Identity Manager:	MarkAsOutstanding

Outstanding objects cannot be editing in One Identity Manager until they have been verified. They are ignored by every other synchronization.

### ***To delete outstanding objects in the One Identity Manager***

1. Start the Manager.
2. Select the **<target system type> | Target system synchronization: <target system type> | <table>** category.
3. Select the objects you want to delete. Multi-select is possible.
4. Click .
5. Confirm the security prompt with **Yes**.

The selected objects are immediately deleted in the One Identity Manager database. Deferred deletion is not taken into account. The "outstanding" label is removed from the objects.

## Related topics

- [Specifying processing methods](#) on page 95
- [Target system synchronization](#) on page 141
- [Include custom tables in the synchronization](#) on page 166
- [Synchronizing user data with different systems](#) on page 50
- [General properties of a synchronization step](#) on page 94
- [Deleting memberships](#) on page 143

# How to remove unnecessary project data

All the schema data (schema types and schema properties) of the target system schema and the One Identity Manager schema are available when you are editing a synchronization project. Only a part of this data is really needed for configuring synchronization. If a synchronization project is finished, the schema is compressed to remove unnecessary data from the synchronization project. This can speed up the loading of the synchronization project.

- **Activating the Synchronization Project**  
Unnecessary schema data is automatically removed from the synchronization project on activation.
- **Shrink schema**
  - a. Schemas are shrunk when the synchronization project is saved for the first time.
  - b. Each time the system is connected, you have the option to shrink the schema.  
All the schema types that are not currently in use are displayed in a dialog. You may remove these from the synchronization project. Here you can select the schema types that should remain available for you to use later.

### ***To shrink the system connection schema***

1. Select **Configuration | Target system**.  
- OR -  
Select **Configuration | One Identity Manager connection**.
2. Click **Shrink schema...** in the **General** view.
3. Mark all the schema types that should not be removed.  
These schema types remain there and can still be used in the synchronization configuration.
4. Click **OK**.

You can add the deleted schema data back into the synchronization project again later. To do this you must update the respective schema.

## Related topics

- [How to edit system connection properties](#) on page 103
- [Activating the synchronization project](#) on page 128
- [Save changes permanently](#) on page 23
- [Updating schemas](#) on page 54

# Updating schemas

To include schema data that have been deleted through compression and schema modifications in the synchronization project, update each schema in the synchronization project. This may be necessary if:

- A schema was changed by:
  - Changes to a target system schema
  - Customizations to the One Identity Manager schema
  - A One Identity Manager update migration
- A schema in the synchronization project was shrunk by:
  - Enabling the synchronization project
  - Saving the synchronization project for the first time
  - Compressing a schema

## *To update a system connection schema*

1. Select the **Configuration | Target system** category.  
- OR -  
Select the **Configuration | One Identity Manager connection** category.
2. Select the **General** view and click **Update schema**.
3. Confirm the security prompt with **Yes**.  
This reloads the schema data.

Then you can add the changes to the schema property mapping.

**NOTE:** The synchronization is deactivated if the schema of an activated synchronization project is updated. Reactivate the synchronization project to synchronize.

## Related topics

- [System connection properties](#) on page 104
- [How to remove unnecessary project data](#) on page 53
- [Setting up mappings](#) on page 67
- [Activating the synchronization project](#) on page 128

# Synchronizing and provisioning memberships

Memberships, such as user accounts in groups, are saved in assignment tables in the One Identity Manager database. Membership lists are commonly maintained as an object property in the target system. If a membership is modified in One Identity Manager, the object must be updated.

## Changing a membership label

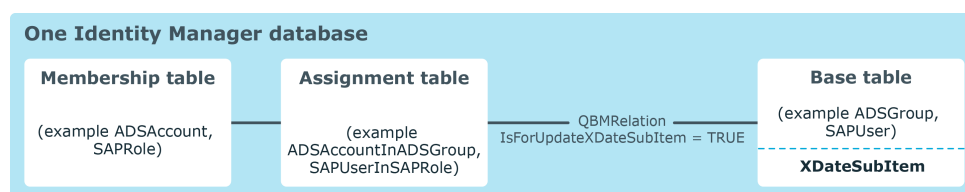
To label whether a membership was changed, a base table assignment is maintained, which maintains information about the last change of membership in the **Dependencies modification date** column (XDateSubItem). During provisioning of modified memberships, One Identity Manager decided which objects must be updated based on this date. In the case of synchronization with revision filtering, the highest value from XDateSubItem and XDateUpdated is used as a revision counter for the database objects.

If a membership is changed in One Identity Manager, the change date for dependencies must updated so that the modification can be provisioned.

### Prerequisites

- The base table has the XDateSubItem column.
- The **Update dependencies modification date** property is true in the table relation between assignment and base table (QBMRRelation.IsForUpdateXDateSubItem = TRUE).

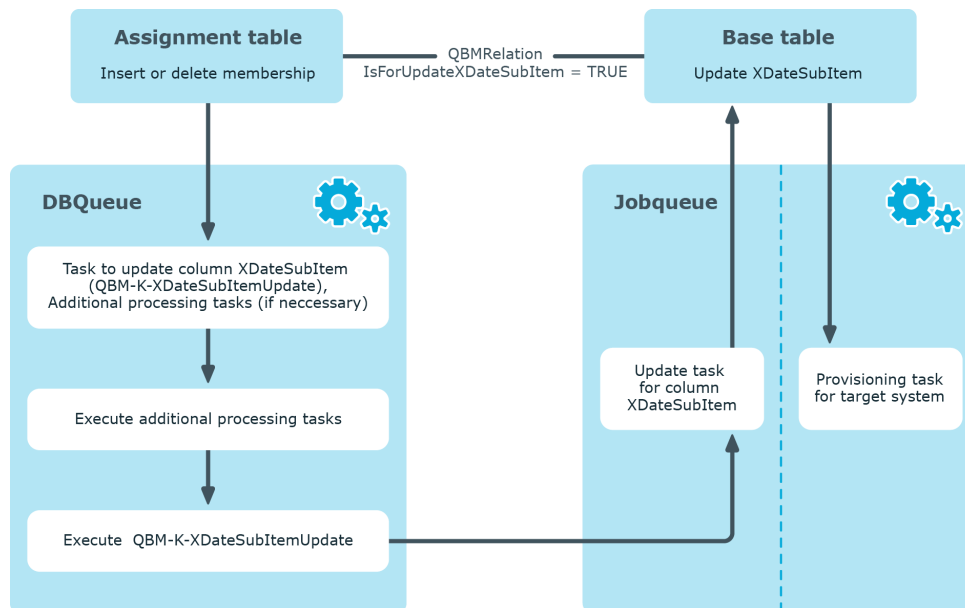
**Figure 13: Memberships in the One Identity Manager database**



If a membership changes (through insertion, deletion, or resetting of status "Outstanding") a task for updating the XDateSubItem column of the base table is queued in the DBQueue

(QBM-K-XDateSubItemUpdate). If necessary, more processing tasks, for example, calculating inheritance, are queued in the DBQueue. These tasks are handled first. The QBM-K-XDateSubItemUpdate task is deferred until all the processing tasks for the modified object and the module to which it belongs, have been handled. If other memberships in this module are changed in the meantime, these changes are collected by the existing task for updating the XDateSubItem column and subsequently handled together. Once the QBM-K-XDateSubItemUpdate task is run, an update task for the XDateSubItem column is queued in the Job queue. The column value is updated. The task for provisioning changed memberships is then placed in the Job queue.

**Figure 14: Processing a membership change in One Identity Manager**



## Example

Active Directory user account membership in an Active Directory group is deleted in One Identity Manager (ADSAccountInADSGroup table). The change date for dependencies is updated on the Active Directory group (ADSGroup.XDateSubItem). The change to the membership for this Active Directory group is provisioned in the target system. The next time synchronization with revision filtering is run, XDateSubItem is taken as the highest change date for the revision counter and is compared to the schema type's revision.

## Related topics

- [How does revision filtering work?](#) on page 38



# Single membership provisioning

During the membership provisioning, changes made in the target system will probably be overwritten. This behavior can occur under the following conditions:

- Memberships are saved in the target system as an object property in list form (Example: List of user accounts in the Members property of an Active Directory group).
- Memberships can be modified in either of the connected systems.
- A provisioning workflow and provisioning processes are set up.

If one membership in One Identity Manager changes, by default, the complete list of members is transferred to the target system. Therefore, memberships that were previously added to the target system are removed in the process and previously deleted memberships are added again.

To prevent this, provisioning can be configured such that only the modified membership is provisioned in the target system. To do this, you must set the **Merge mode** option on the assignment table (DPRNameSpaceHasDialogTable.IsAdHocSingleMemberShip = TRUE). For more detailed information about setting this option, see the administration guides for connecting each target systems.

Additional processing steps are executed for tables with this option enabled.

1. A task is set up in the DBQueue Processor to update the DPRMemberShipAction table. This table contains the modified objects and operations to be run.
2. The membership list of modified objects is compared to the DPRMemberShipAction table. Therefore, if only one membership changes, not the entire members list in the target system has to be updated. Only each modified membership is transferred to the members list. Changes to memberships of the modified object, which were made in the target system in the meantime, are therefore not overwritten.
3. Once the change has been successfully provisioned in the target system, the entry is deleted from the DPRMemberShipAction table. If an error occurs during provisioning, the entry remains in the table.

**Table 27: Handling entries in the DPRMemberShipAction table**

Provisioning Process	Entry in DPRMemberShipAction	Comment
Success	Deleted	
Fail	Remains intact	A new modification to the object is reprocessed by provisioning and deleted on success.
Re-enabled	Reprocessed	
Failed and deleted	Remains intact	Deleted during daily maintenance. All entries without a provisioning task in the Job queue are deleted in the process of these maintenance jobs.

**NOTE:** The complete members list is updated by synchronization. During this process, objects with changes but incomplete provisioning are not handled. These objects are logged in the synchronization log.

## Performance and memory optimization

During synchronization, data packets are loaded in to memory to process synchronization objects in parallel. The size of these data packets can be increased to speed up synchronization but this required more memory. By default, the size of the data packet is selected such that the ratio of memory to performance is balanced out. However, memory issues can still occur during synchronization. This often depends on the configuration of the system environment, the amount of data to synchronize and the exact synchronization configuration. You can control memory usage to avoid such problems. The degree of change is determined with the performance/memory factor.

The performance/memory factor can be set for each synchronization step separately because the amount of data varies from object to object. The first thing to do if a memory problem occurs during synchronization, is to find the affected synchronization step. Reduce the performance/memory factor for this synchronization step until you find the optimal balance between memory requirements and performance.

### *To adjust the performance/memory factor for a synchronization step*

1. Edit the synchronization step properties.  
For more information, see [How to edit synchronization steps](#) on page 93.
2. Select the **Extended** tab.
3. Use the slider to set the performance/memory factor.
  - Move the slider to the left to reduce memory usage. This reduces performance.
  - OR -
  - To increase performance, move the slider to the right. This requires more memory.
4. Click **OK**.

**TIP:** You can adjust the memory requirements for all the data to be processed in the start-up configuration. You can set the reload threshold, partition size, and bulk level here. These setting are only possible in expert mode. For more information, see [Extended properties for start up configuration](#) on page 158.

The performance/memory factor specifies the percentage with which the reload threshold, partition size, and bulk level are applied to an object type.

### Related topics

- [Extended synchronization step properties](#) on page 101

# Improving loading performance

To improve performance when loading a synchronization project, you can save the synchronization project's configuration data as a shadow copy in the One Identity Manager database. After that, the synchronization project is only loaded from the shadow copy. The project loads noticeably faster. The shadow copy is saved in the **Configuration data** column (DPRShell.ShadowCopy).

If you want to use this option, take note of the following:

- The shadow copy does not contain any changes that were made directly in the database and not in the Synchronization Editor.
- If the One Identity Manager database is encrypted or decrypted with the Crypto Configuration program, the shadow copy is deleted.
- If changes to the synchronization project in another database are exported, the shadow copy is deleted in the other database. This ensures that the shadow copy does not contain outdated configuration data.

Prerequisite: The transport package was created with the **Transport of synchronization projects** export criteria.

- If the **Enable shadow copy** option is set, the daily maintenance tasks check whether a shadow copy is saved or not. If the shadow copy is missing, it is created.

## *To enable the shadow copy*

1. Edit the synchronization project's properties.
  - a. Select **General** on the start page.
  - b. Click **Edit**.
2. On the **General** tab, set the **Enable shadow copy** option.
3. (Optional) If the shadow copy on needs to create if the synchronization project is active, set the **Only if the synchronization project is active** option.
4. Click **OK**.

## Related topics

- [General properties of a synchronization project](#) on page 63
- [Exporting a synchronization configuration](#) on page 172

## Setting up synchronization

Use the Synchronization Editor to configure connections for different target system in One Identity Manager. The components of a synchronization configuration are used for both synchronization and for provisioning and synchronizing single objects. Synchronization can be configured so it can be used for connecting different target systems of the same target system type.

**Table 28: Synchronization configuration components**

Term	Described in
base object	<a href="#">Setting up base objects</a> on page 122
Mapping	<a href="#">Setting up mappings</a> on page 67
Start configuration	<a href="#">Setting up start up configurations</a> on page 115
Synchronization project	<a href="#">Creating a synchronization project</a> on page 61
Variable set	<a href="#">Using variables and variable sets</a> on page 110
Workflow	<a href="#">Setting up synchronization workflows</a> on page 87

## Starting the Synchronization Editor

There are different ways to start the Synchronization Editor.

- From the Windows start menu using the entry **One Identity | One Identity Manager | Configuration | Synchronization Editor**.
- From the Launchpad.
- In the Manager

# Creating a synchronization project

A synchronization project collects all the information required for synchronizing the One Identity Manager database with a target system. Connection data for target systems, schema types and properties, mapping, and synchronization workflows all belong to this.

## **Prerequisites**

- A synchronization server is set up and declared in the One Identity Manager database.

There is a wizard to assist you with setting up a synchronization project. This wizard takes you through all the steps you need to set up initial synchronization with a target system. The project wizard takes over the following tasks:

- Connecting to the Target System
- Connecting to the One Identity Manager database
- Defining synchronization behavior

The synchronization behavior can be configured based on target system-specific project templates. Project templates are supplied by One Identity Manager for certain target systems. The project wizard copies the project template data. This can be modified with the project wizard to suit the new synchronization project. Just one synchronization project can be created per target system and default project template used.

After saving the synchronization project, you can alter the synchronization configuration.

## **To complete synchronization configuration**

1. Check the mappings, workflows, start up configuration, and system connection that the wizard has added.
2. Assign a schedule to the start up configuration.
3. If you want to use the synchronization project to synchronize different target systems, specify variables, and variable sets.
4. Activate the synchronization project. The synchronization cannot be started until these are resolved.

**NOTE:** The current synchronization project is closed when you open another synchronization project.

## **Detailed information about this topic**

- [How to create a synchronization project](#) on page 62
- [How to edit a synchronization project](#) on page 62
- [Templates for creating synchronization projects](#) on page 65
- [Specifying a schedule](#) on page 119

- [Using variables and variable sets](#) on page 110
- [Activating the synchronization project](#) on page 128

## How to create a synchronization project

**NOTE:** The current synchronization project is closed when you open another synchronization project.

### *To create a new synchronization project*

- a. Select the synchronization project view on the start page.
- b. Click **Start a new synchronization project**.  
This starts the project wizard.
- c. Follow the project wizard instructions.
- d. Click **Commit to database** to save the new project.

## How to edit a synchronization project

**NOTE:** The current synchronization project is closed when you open another synchronization project.

### *To open a synchronization project*

1. Select the synchronization project view on the start page.
2. Select the synchronization project you want to load by double-clicking on it.  
**TIP:** To limit the list of synchronization projects displayed, select the target system connection you want on the left-hand side of the project selection view.
3. If the connection data is encrypted, enter the values required to establish the system connection and click **OK**.
4. Edit the mappings, workflows, and other components of the synchronization configuration.

### *To edit synchronization project properties*

1. Select the synchronization project view on the start page.
2. Select the synchronization project you want to load by double-clicking on it.
3. If the connection data is encrypted, enter the values required to establish the system connection and click **OK**.
4. Click **Edit....**
5. Edit the display name and the synchronization project description.
6. Click **OK**.


## Detailed information about this topic

- [Working with an encrypted database](#) on page 26

# How to delete a synchronization project

**NOTE:** The current synchronization project is closed when you open another synchronization project.

### To delete a synchronization project

1. Select the synchronization project view on the start page.
2. Select the synchronization project to delete.  
**TIP:** To limit the list of synchronization projects displayed, select the target system connection you want on the left-hand side of the project selection view.
3. Click  in the project selection view toolbar.
4. Confirm the security prompt with **Yes**.

The schedule assigned to this synchronization project is also deleted if it is not used by any other database object.

## General properties of a synchronization project

You can edit the synchronization project's display names and description on the **General** tab.

**Table 29: General properties of a synchronization project**

Property	Description
Display name	Display name for the synchronization project.
Script language	Language in which the scripts for this synchronization project are written.
Enable shadow copy	The synchronization project can be additionally saved in the database as an XML definition. Afterward, the synchronization project is only loaded from this XML definition. The project loads noticeably faster. <b>NOTE:</b> The shadow copy does not contain any changes that were made directly in the database and not in the Synchronization Editor.
Only if the synchronization project is	The shadow copy is only created if the synchronization project is active.

Property	Description
active	
Description	Text field for additional explanation.

On the **Migration** tab, you can see the migration versions of the One Identity Manager module required for the synchronization project. All the patches already installed are also listed. Migration data is only available for synchronization projects that were created with One Identity Manager version 7.1.

**Table 30: Synchronization project migration data**

Property	Description
Origin	Information about the project template used to create the synchronization project.
Context	Module or connected system for which the synchronization project is valid.
Current version	The currently installed version of the program.
Patches added later	Patches that have been applied to the synchronization project since the One Identity Manager was installed or updated.

### Related topics

- [Applying patches](#) on page 148
- [Improving loading performance](#) on page 59
- [Specifying the script language in synchronization projects](#) on page 64

## Specifying the script language in synchronization projects

You can apply scripts at various points in the synchronization project; for example, when defining the schema properties, in the object filter, or when you define data operations for system connections through the native database connector.

When you define a synchronization project with the project wizard, you specify a script language in which to create the script. You can select either **C#** or **Visual Basic .NET**. You can only use project templates in the synchronization wizard that support the selected script language.

**NOTE:** If you want to create a synchronization project using a template, check whether the project template supports the selected script language.

**NOTE:** You cannot change the script language once the project wizard is finished!

Create a new synchronization project to change the script language later.



## Related topics

- [Edit schema properties](#) on page 76
- [Scope properties](#) on page 108
- [Schema class properties](#) on page 73

# Templates for creating synchronization projects

Some system connectors provide template which you can use to configure a complete synchronization project with the project wizard, The project templates add the following components to the synchronization configuration in the synchronization project, depending on the target system type.

- The scope
- A start up configuration (without schedule)
- The default variable set
- A base object

The synchronization base object, e.g. the actual Active Directory domain that you want to synchronize, is added as an object in the One Identity Manager database.

- A synchronization workflow for the initial import of the target system into the One Identity Manager database

The workflow has the following characteristics:

- Direction of synchronization is "One Identity Manager".
  - Processing methods in the synchronization steps are only defined in synchronization direction "One Identity Manager".
- A provisioning workflow

This workflow is only created if the **Read/write access to target system. Provisioning available.** option is selected on the **Restrict target system** access page of the project wizard.

The workflow has the following characteristics:

- Synchronization in the direction of the "Target system".
  - Processing methods are only defined in the synchronization steps in synchronization direction "Target system".
  - Synchronization steps are only created for such schema classes whose schema types have write access.
- The schema classes required
  - Mappings for all schema classes required

These include:

- Required virtual schema properties
- Property mapping rules
- Object matching rules

Also created is:

- Operations for provisioning and single object synchronization

Once a synchronization project has been created from a project template, you can check the settings assign a schedule and start synchronization.

## Restricting system access

When you set up a synchronization project with the project wizard, you decide whether the target system is only read in or whether One Identity Manager can also make changes. If you select the **Target system has read-only access** option, only modifications in the target system are transferred to the One Identity Manager database. Changes in the One Identity Manager database are not written to the target system. This means:

- Direction of synchronization is "One Identity Manager".
- The project wizard only creates one synchronization workflow. A provisioning workflow is not added.
- Processing methods in the synchronization steps are only defined in synchronization direction "One Identity Manager".

### Related topics

- [Templates for creating synchronization projects](#) on page 65
- [Specifying processing methods](#) on page 95
- [Direction of synchronization and mapping](#) on page 44

## Configuring synchronization

Not all system connectors provide a project template for creating a full configured synchronization project. Therefore, you can also create a synchronization project manually. In this case, the project wizard sets up the system connection. All other synchronization configuration components must be configured after you have saved the synchronization project.

### ***To manually set up synchronization of the One Identity Manager database with a target system***

1. Install and configure a synchronization server and declare the server as a Job server in One Identity Manager.
2. Create a new synchronization project.
  - The project wizard sets up the system connection.
  - On the **Select project template** page, select **Create blank project**.
3. Add mappings. Define property mapping rules and object matching rules.
4. Create synchronization workflows.
5. Create a start up configuration.
6. Define the synchronization scope.
7. Specify the base object of the synchronization.
8. Specify the extent of the synchronization log.
9. Run a consistency check.
10. Activate the synchronization project.
11. Save the new synchronization project in the database.

### **Detailed information about this topic**

- [How to create a synchronization project](#) on page 62
- [Setting up mappings](#) on page 67
- [Setting up synchronization workflows](#) on page 87
- [Setting up start up configurations](#) on page 115
- [Editing the scope](#) on page 107
- [Setting up base objects](#) on page 122
- [Configuring the synchronization log](#) on page 106
- [Activating the synchronization project](#) on page 128

## **Setting up mappings**

Mappings group together the rules used to map the schema properties of two connected systems. For this, a schema class is created for every schema type which requires mapping. A schema class limits the result list of a schema type through defined filter criteria. A mapping maps schema properties from exactly one target system schema class to the schema properties of exactly one schema class in the One Identity Manager schema. A schema class without a filter condition represents the schema type.

Property mapping rules describe how the target system schema properties are mapped in the One Identity Manager schema. Object matching rules assign schema properties through

which system objects can be uniquely identified. For example, Active Directory groups can be uniquely identified by the schema properties `DistinguishedName` and `ObjectGUID`.

You specify in the mapping, which mapping direction is permitted for the connected schema classes. Furthermore, you can also specify the permitted mapping direction for individual property mapping rules.

Default mappings for target system synchronization are added if the synchronization project was created with a default project template. You can edit or delete these mappings or create new mappings. If the synchronization project was created without a project template, no mappings are set up.

The schema property mapping is edited with the mapping editor.

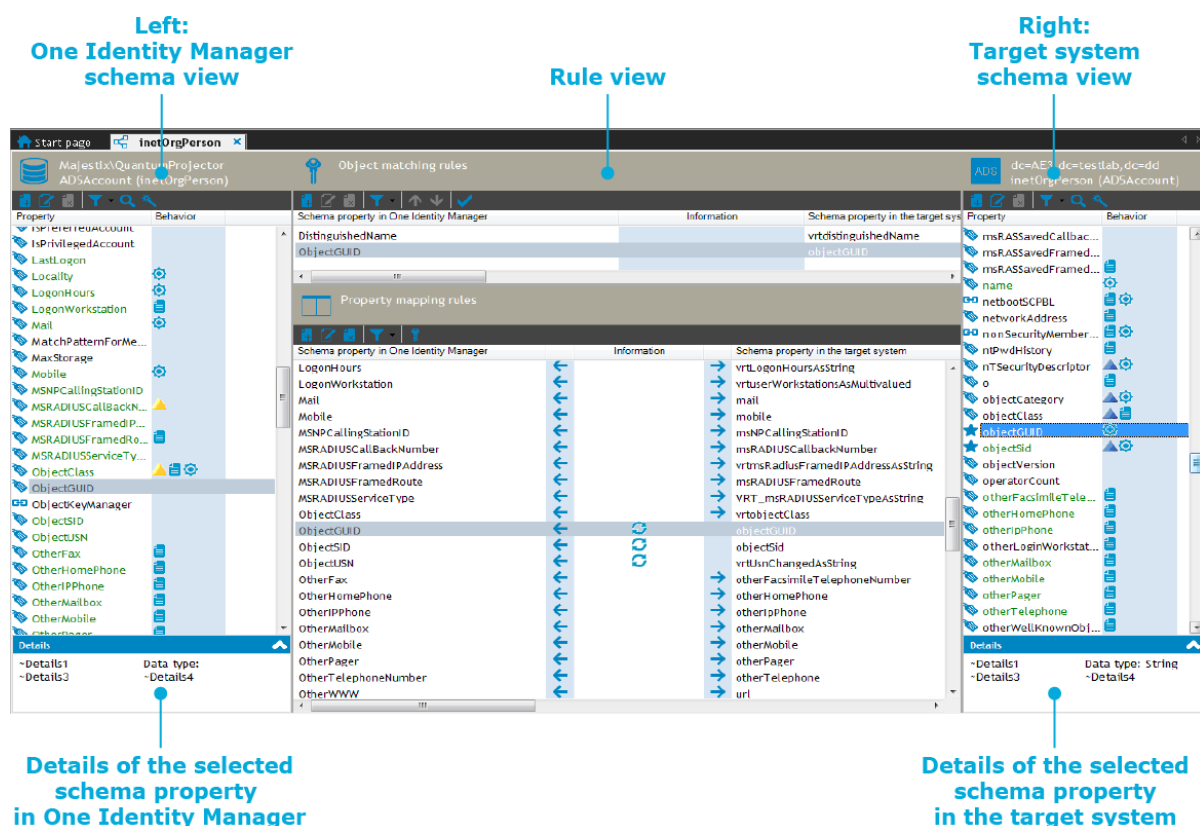
## Detailed information about this topic

- [How are schemas mapped on page 31](#)

## Mapping editor

The schema property mapping is edited with the mapping editor. The mapping editor is divided into two schema view and two rule views. Each mapping editor view has its own toolbar.

**Figure 15: Views in the mapping editor**






**TIP:**







**To display mapped schema properties of a shelf**

- Select a property mapping rule or an object mapping rule in the shelf view.  
All the schema properties mapped by this shelf are displayed.
- OR -
- Select the schema property in the schema view.  
All the property mapping and object mapping rules mapped by this schema property are marked.






**Table 31: Meaning of icons in the navigation view**





Icon	Meaning
	Create a new mapping.
	Edit mapping.
	Delete mapping.

**Table 32: Meaning of icons in the schema tool bar**











Icon	Meaning
	Add schema property.
	Edit selected schema property.
	Delete selected schema property.
	Filter schema properties.
	Search schema properties.
	Filter schema properties with similar names in other schema respectively.

**Table 33: Meaning of icons in the rule tool bar**






Icon	Meaning
	Add rule.
	Edit selected rule.
	Delete selected rule.
	Filter rules.
	Transform selected property mapping rule into an object matching rule.

Icon	Meaning
	Sorts object matching rule.
	
	Tests object matching rule.
	Create new rules with help of the mapping wizard.

**Table 34: Meaning of icons in the schema view**


Icon	Meaning
	The schema property is a unique key.
	The schema property references another schema property.
	Schema property with a special feature.
	User-defined virtual schema property.
	The schema property contains several values.
	Mandatory property.
	Rule based mandatory property.
	The schema property is read-only.
	The schema property is write-only.
	The value of the schema property is calculated automatically.

**Table 35: Meaning of icons in the rule view**

Icon	Meaning
	Direction of synchronization: One Identity Manager.
	Direction of synchronization: target system.
	A condition limited use of the rule.
	Mapping in the opposite direction of synchronization is permitted.
	Indicates configuration errors. Mouse over the icon to display the error description.

## How to create a mapping


### *To create a mapping*

1. Select the **Mappings** category.
2. Click  in the navigation view.

3. Enter the general properties of a mapping and create the required schema classes.
4. Click **OK**.


## How to edit a mapping

### *To edit the general properties of a mapping*

1. Select the **Mappings**.
2. Select a mapping in the navigation view.
3. Click  in the navigation view toolbar.
4. Click **Edit** category to enable the properties available for editing.
5. Edit the mapping's properties.
6. Click **OK**.

## How to delete a mapping

### *To delete a mapping*



1. Select the **Mappings** category.
2. Select a mapping in the navigation view.
3. Click  in the navigation view.
4. Confirm the security prompt with **Yes**.
5. Save the changes.

## Properties of a mapping



Enter the following properties for a mapping.

**Table 36: Properties of a mapping**

Properties	Meaning
Mapping name	Display name for the mapping. The name must be unique within a synchronization project. Mapping name is used as key. It cannot be changed after saving.
Mapping direction	Mapping direction permitted for all property mapping rules.

Properties	Meaning
	<p>Both directions</p> <p>Property mapping rules are applied to synchronization in both the direction of the target system and One Identity Manager.</p> <p>Target system</p> <p>Property mapping rules are only used for synchronizing in the direction of the target system.</p> <p>One Identity Manager</p> <p>Property mapping rules are only used for synchronizing in the direction of One Identity Manager.</p>
Description	Text field for additional explanation.
Hierarchy synchronization	<p>Specifies whether the mapping is part of the hierarchy. This option is important for optimizing synchronization.</p> <p>Example:</p> <p>In Active Directory, all the objects in one container are subordinate. Therefore, the containers map a part of the object hierarchy. Set the <b>Hierarchy synchronization</b> option in the container mapping.</p>
Only suitable for updates	<p>Specifies whether schema class objects are never added during synchronization but only updated or deleted.</p> <p>This option can be used, for example, if not all target system type mandatory properties in One Identity Manager are editable. Example: Active Directory domains.</p>
Can map through multiply referenced objects	<p>Specifies whether mapping by multi-reference rule should be used to mapped referenced objects.</p> <p>This option must be set, if more than one mapping is set up for a schema type and the schema type is used as a member in a multiple reference rule. You must decide which of these mappings is going to used to map schema properties and to identify the system objects, Normally, the schema type's default mapping is used.</p> <p>The option can only be set on one mapping of each schema type.</p> <p>If more than one mapping is defined for a schema type and the option is not set on any mapping, a message appears on all property mapping rules that the schema type uses.</p>
Schema class in One Identity Manager	<p>One Identity Manager schema class valid for this mapping. Displays all schema classes with a configured mapping, in the menu.</p> <ul style="list-style-type: none"> <li>Click  to edit schema class properties.</li> </ul> <p>Create a new schema class to set up a mapping for another schema type.</p> <ul style="list-style-type: none"> <li>Click  to create a new schema class.</li> </ul>



Properties	Meaning
Schema class in the target system	<p>Target system schema class valid for this mapping. Displays all schema classes with a configured mapping, in the menu.</p> <ul style="list-style-type: none"> <li>Click  to edit schema class properties.</li> </ul> <p>Create a new schema class to set up a mapping for another schema type.</p> <ul style="list-style-type: none"> <li>Click  to create a new schema class.</li> </ul>

## Detailed information about this topic

- [Direction of synchronization and mapping](#) on page 44
- [Schema class properties](#) on page 73

# Schema class properties

Enter the following properties for a schema class:

**Table 37: Schema class properties**

Property	Meaning
Class types	<p>Types of schema classes. The class type can only be specified when a new schema class is added.</p> <p>Generic schema class    Schema classes without a native filter function.</p> <p>Unique objects    Schema classes, which filter objects based on unique values from different properties. Only distinct objects are filtered. This prevents the system connector from trying to add objects that already exist.</p>
Schema type	Select the schema type for which you want to create a schema class.
Display name	Schema class display name.
Class name	Unique schema class identifier By default, the class name is based on the schema type. The class name must be unique within a schema type.
Description	Text field for additional explanation.
Distinction	Schema properties, which form a unique value when combined.

Property	Meaning
	<p>This only applies to schema classes with the class type "Unique objects"</p> <p><b>⚠ CAUTION:</b> The schema class filters objects in an undefined order. Therefore, the result may not be the same each time the filter is used.</p> <p><b>Only use this class type for mapping in the direct of One Identity Manager. Otherwise, you cannot guarantee that the same object is updated every time the CSV file is written.</b></p>
Filter	
System filter	<p>Filter that immediately affects the connection system.</p> <p>Enter the filter in system specific notation, for example, as Where clause for a database system or as LDAP filter for an LDAP system.</p> <p>If tested against a fixed value that contains at least two dollar characters, the dollar characters must be masked.</p> <p><b>NOTE:</b> The system filter does not work, if changes are being provisioned. Therefore, it may not filter more objects than the object selection.</p>
Object selection	<p>Filter that affects loaded objects.</p> <p>Condition    Formulate a query for loaded objects. Use the wizard for entering filter.</p> <p>Script        You can also store a script which determines system objects. The script must be written in the script language specified in the synchronization project.</p> <p><b>NOTE:</b> Object selection must include the filter criteria of the system filter so that One Identity Manager can also assign schema class object when provisioning.</p>

## Related topics

- [Support for scripting](#) on page 21
- [Use cases for class types](#) on page 74

## Use cases for class types

You want to import employee and organization data from an external personnel management system into One Identity Manager. All the data is provided in a CSV file and transferred to the database through the CSV connector in the One Identity Manager database.

**Table 38: Example of a CSV file**

	<b>Lastname</b>	<b>FirstName</b>	<b>Department</b>	<b>Location</b>
1	Harris	Clara	Marketing	London
2	Bloggs	Jan	Marketing	Berlin
3	King	Jenny	Marketing	London
4	Basset	Jenny	Sales	Berlin
5	King	Ben	Sales	London
6	Harris	Ben	Sales	Berlin

Employee objects, departments, and location will be added to the One Identity Manager database from this data. The CSV synchronization exits with an error when a second object with the same name is added because the names of the departments and location are not unique. This can be prevented.

### **Which objects should be created?**

1. Employees with the **LastName** and **FirstName** properties. Object can be uniquely identified through these two properties. The file contain six different objects.
2. Departments with the **Department** and **Location** properties. The file contains four different objects.
3. Location with the **Location** property. The file contains two different objects.

For 2. and 3. distinct objects must be supplied Therefore, schema classes with the class type "Unique objects" are created in the mapping.

### **To set up the mappings**

1. Create a mapping for employees.
  - Create a new schema class in the target system.  
Select the **Generic schema class** class type and enter the mandatory data.
2. Create a mapping for the department.
  - Create a new schema class in the target system.
    - a. Select the **Unique objects** class type and enter the mandatory data.
    - b. Enable **Department** and **Location** on the **Distinction** tab.  
The schema class filters exactly those objects from the CSV file that are unique identifiable by the combination of **Department** and **Location**.
3. Create a mapping for the location.
  - Create a new schema class in the target system.
    - a. Select the **Unique objects** class type and enter the mandatory data.
    - b. Enable **Location** on the **Distinction** tab.

The schema class filters exactly those objects from the CSV file that are unique identifiable by the Location property.

4. Check the filter results in the target system browser.

**Table 39: Schema class definition results**

Schema class	Filtered Objects
Employees	Harris; Clara
	Bloggs; Jan
	King; Jenny
	Basset; Jenny
	King; Ben
	Harris; Ben
Departments	Marketing; London
	Marketing; Berlin
	Sales; London
	Sales; Berlin
Locations	London
	Berlin

## Edit schema properties

**IMPORTANT:** Schema properties should only be added, modified, or deleted by experienced Synchronization Editor users and system administrators.

All schema properties of a schema class are displayed in the mapping editor's schema view. There are two different sorts of schema property:

- Schema properties of schema types from the target system and One Identity Manager schema.
- Virtual schema properties,
  - added by the user to extend the target system schema or the One Identity Manager schema
  - added by the user to extend the connector schema or the One Identity Manager schema

You can use virtual schema properties to represent combinations of schema properties as well as processing step results as schema properties. They are used amongst other things to map lists of members to One Identity Manager database auxiliary tables. Some virtual schema properties are added by the system connector when you set up the synchronization project. You can create user specific schema properties. You can use these, for example, to include custom One Identity Manager database schema extensions in the mapping.

**NOTE:** Virtual schema properties are only saved in the synchronization project. They do not modify basic One Identity Manager schema or target system schema.

**NOTE** You can use variables with fixed values in schema properties. In this case, variable names with dollar signed are included. If the schema property value contains a dollar sign, which is not used to label a variable, it must be masked with \$.

Example: Enter the value '300 \$\$' for a variable with the value '300 \$'.


## Related topics

- [Schema editor](#) on page 160

## How to add virtual schema properties

**IMPORTANT:** Schema properties should only be added, modified, or deleted by experienced Synchronization Editor users and system administrators.

### *To add a virtual schema property*

1. Select the **Mappings** category.
2. Select a mapping in the navigation view.
3. Click  in the schema view menu bar.
4. Enter details for the virtual schema property.
5. Click **OK**.

The icon  marks custom virtual schema properties in the schema view.

## How to display and edit schema properties

**IMPORTANT:** Schema properties should only be added, modified, or deleted by experienced Synchronization Editor users and system administrators.

### *To edit a virtual schema property*

**NOTE:** Only user specific virtual schema properties can be edited.


1. Select the **Mappings** category.
2. Select a mapping in the navigation view.
3. Double-click on the schema property in the schema view.
4. Edit the schema property details.
5. Click **OK**.

## How to delete virtual schema properties

**IMPORTANT:** Schema properties should only be added, modified, or deleted by experienced Synchronization Editor users and system administrators.

### ***To delete a virtual schema property***

**| NOTE:** Only user specific virtual schema properties can be deleted.



1. Select the **Mappings** category.
2. Select a mapping in the navigation view.
3. Select the virtual schema property in the schema view.
4. Click  in the schema view menu bar.
5. Confirm the security prompt with **Yes**.

## **Editing property mapping rules**

Property mapping rules describe how the target system schema properties are mapped in the One Identity Manager schema. You can specify whether the permitted mapping direction is taken over from the mapping for each property mapping rule. You can also specify a different mapping direction than the one in the mapping.

## **How to create property mapping rules**

### ***To create a property mapping rule***

1. Select the **Mappings** category.
2. Select a mapping in the navigation view.
3. Click  in the rule view menu bar for property mapping rules.
4. Select a rule type and enter the rule details.
5. To create a rule from a template, click .
6. Click **OK**.


### ***To create a property mapping rule by "drag and drop".***

1. Select the **Mappings** category.
2. Select a mapping in the navigation view.
3. Select the schema property to map in the schema view.
4. Drag the schema property with the mouse from one schema view onto the schema property in the other schema view.
5. If the schema property data types match, a property mapping rule is added for the selected schema property. You can edit the rule details later.

If the schema property data types do not match, the conflict wizard is started which helps you create the property mapping rules.

One Identity Manager helps you to set up new property mapping rules based on existing rules. Use the mapping wizard for this.

### ***To create a property mapping rule with the mapping wizard***

1. Select the **Mappings** category.
2. In the navigation view, select a mapping.
3. Click  in the rule view menu bar for property mapping rules.
4. Follow the mapping wizard's instructions.
5. Test the new rule.


## **How to edit property mapping rules**

### ***To edit a property mapping rule***

1. Select the **Mappings** category.
2. Select a mapping in the navigation view.
3. Double-click on the property mapping rule you want to edit in the rule view.
4. Edit the rule details.
5. Click **OK**.

## **How to delete property mapping rules**

### ***To delete a property mapping rule***

1. Select the **Mappings** category.
2. Select a mapping in the navigation view.
3. Click  in the rule view menu bar for property mapping rules.
4. Confirm the security prompt with **Yes**.


## **Property mapping rule details**

Enter the following details for a property mapping rule.

**TIP:** To create a rule from a template, click .

**Table 40: Property mapping rule details**

Detail	Description
Rule Types	Select the rule type for a new rule.
Value compare	Compares the schema property value of the One Identity Manager schema with the value of a target system schema.

Detail	Description
	<p>rule</p> <p>Multiple reference rule</p> <p>Compares multi-value schema properties. The value list are compared element by element. Missing values are added; superfluous value are deleted.</p>
Rule name	<p>Name for the rule. The rule name must be unique within a mapping.</p> <p>Click  to change rule names. The rule name is used as key. Changes to the rule name may cause errors.</p>
Display name	Rule display name.
Mapping direction	<p>Specify the permitted mapping direction for mapping selected schema properties.</p> <p>Both directions</p> <p>Property mapping rule is applied for both synchronization in the direction of the target system and synchronization direction One Identity Manager.</p> <p>To the target system</p> <p>Property mapping rule is only used for synchronizing in the direction of the target system.</p> <p>To the One Identity Manager</p> <p>Property mapping rule is only used for synchronizing in the direction of the One Identity Manager.</p> <p>Do not assign</p> <p>The property mapping rule is ignored.</p> <p>You can set this value to disable a property mapping rule.</p> <p>Taken from mapping</p> <p>The mapping direction applies which is fixed in the mapping.</p>
Ignore mapping direction restrictions on adding	<p>Specifies whether the given direction of mapping is ignored when new objects are added.</p> <p>If this option is set, the property mapping rule can also be run if the synchronization mapping is in the opposite direction. Property mapping rules not assigned a mapping direction are also ignore when new objects are added.</p> <p>If this option is not set, the specify mapping direction is valid when new objects are added.</p> <div> <p>Example:</p> </div>



Detail	Description
	<p>A telephone system is managed with One Identity Manager. The telephone system is the data master when the telephone numbers are synchronized. The direction of mapping is set to <b>One Identity Manager</b>. The telephone number is a mandatory value in the target system.</p> <p>In One Identity Manager, a new employee is added. Each employee is given an initial telephone number. These employees should be added to the target system by synchronizing them. So that the telephone numbers are written to the target system during synchronization, the <b>Ignore mapping direction restrictions on adding</b> option must be set on the property mapping rule.</p>
	For more information, see <a href="#">Detecting rogue modifications</a> on page 47.
Description	Text field for additional explanation.
Schema property	Select the schema properties to be mapped.
Do not overwrite	The schema property value is only changed by synchronization if the schema property does not contain a value.
Mapping condition	<p>Condition under which the property mapping rule is used.</p> <p>Click <b>Create condition</b> to create the condition with the wizard. For more information, see <a href="#">Wizard for entering filters</a> on page 19.</p> <p>Example: Left.CanonicalName = 'Managed Service Accounts'</p> <p>The property mapping rule is applied to all objects assigned to the container "Managed Service Accounts" in One Identity Manager.</p>

**Table 41: Additional detail of a value compare rule**

Detail	Description
Force mapping against direction of synchronization	<p>If this option is set, the property mapping rule can also be applied if the synchronization mapping is in the opposite direction. For more information, see <a href="#">Mapping against the direction of synchronization</a> on page 45.</p> <p>The option can only be set if:</p> <ul style="list-style-type: none"> <li>• <b>Detecting rogue modifications</b> is disabled.</li> <li>• The direction of mapping is <b>Target system</b> or <b>One Identity Manager</b>.</li> </ul> <p>The property mapping rule may not be executed in both directions.</p>
Detecting	Specifies whether rogue modifications are identified and logged if the

Detail	Description
rogue modifications	<p>direction of synchronization is opposite to the mapping direction.</p> <p>The option can only be set if:</p> <ul style="list-style-type: none"> <li>• The direction of mapping is <b>Target system</b> or <b>One Identity Manager</b>.</li> <li>• <b>Force mapping against direction of synchronization</b> is disabled.</li> </ul> <p>If this option is set, rogue modifications are detected and logged. The log can be evaluated after synchronization. For more information, see <a href="#">Synchronization analysis</a> on page 140.</p> <p>If the option is not set, the property mapping rule is ignored by synchronization.</p> <p>For more information, see <a href="#">Detecting rogue modifications</a> on page 47.</p>
Correct rogue modifications	<p>Specifies whether rogue modifications are corrected if the direction of synchronization is opposite to the mapping direction.</p> <p>The option can only be set if:</p> <ul style="list-style-type: none"> <li>• <b>Detecting rogue modifications</b> is enabled.</li> <li>• The direction of mapping is <b>Target system</b> or <b>One Identity Manager</b>.</li> <li>• <b>Force mapping against direction of synchronization</b> is disabled.</li> </ul> <p>If the option is set, the property mapping rule is executed by synchronization. The object property in the connected system is overwritten with the value from the data master. Thus rogue changes are ignored.</p> <p>If the option is not set, rogue changes are only logged.</p> <p>For more information, see <a href="#">Detecting rogue modifications</a> on page 47.</p>
Ignore case	<p>Specifies whether changes that only differ through case are ignored by the mapping. This option affects only schema properties with the <b>String</b> data type.</p>
Deal with the first value of the property as a single value	<p>If a multi-value schema property is mapped using a value compare rule, the first value from the value list is taken into account by synchronization.</p>
Disable merge mode support	<p>Specifies whether to disable merge mode for single provisioning of memberships in this property mapping rule. If the option is set, when memberships are provisioned and merge mode is enabled on the assignment table, the entire membership list is also transferred.</p>

Detail	Description
	Weitere Informationen finden Sie unter <a href="#">Einzelprovisionierung von Mitgliedschaften</a> .

**Table 42: Additional detail of a multi-reference mapping rule**

Member filter	Description
Only include these	Select all members in the value list to be mapped to the schema property of the connected system.
Exclude these	Select all members in the value list <b>not</b> to be mapped to the schema property of the connected system.

## Editing object matching rules

Object matching rules assign schema properties through which system objects can be uniquely identified. For example, Active Directory groups can be uniquely identified by the DistinguishedName and ObjectGUID schema properties.

Object matching rules can be added or created from property mapping rules. If system objects can only be identified through several schema properties, different property matching rules can be linked with logical operators to form an object matching rule.

**NOTE:** Using object matching rules of this type can slow down synchronization. Instead, use a virtual schema property to link the schema properties required for matching and create an object matching rule with it.

If several object matching rules are set up, they are executed in the order in which they are listed in the rule view. The rule at the top is the primary rule, all other are marked as alternatives. If a system object can be identified uniquely by the primary rule, the alternative rule are not executed. If a system object cannot be identified by the primary rule, One Identity Manager uses the next alternative rule to determine a suitable system object. If non of the rules can identify a suitable system object, the object does not have a partner can is handled as new or deleted.

### Example

The following object matching rules are defined for mapping Active Directory groups:

- Object GUID <-> Object GUID (primary rule)
- Distinguished name <-> Obj-Dist-Name (alternative rule)
- Object SID <-> Object-Sid (alternative rule no. 2)

Properties of an Active Directory group are modified in One Identity Manager. During provisioning, the Active Directory connector tries to identify the group in the target system by using the object GUID. It does not find an object with this object GUID so the alternative object matching rule is applied. The connector identifies an object with the same distinguished name and updates this object in the target system.


**NOTE:**

- Object matching rules must use schema properties with read-access. Write-only schema properties are not suitable for identification of system objects.
- Schema property that are only used for identifying system objects are not mapped by default.
- Schema properties used to identify system objects must contain a value. If a schema property contains is empty, the object mapping rule is ignored and the next alternative rule is applied.
- If several system objects that fulfill the matching criteria are found, a message appears in the synchronization log. These objects are ignored as processing continues.

If several system objects are found, either there is corrupt data in connected systems or the matching criteria is not unique. Clean up the data in the connected systems and adjust the object matching rules.

## How to create object matching rules

### *To create an object matching rule from a property mapping rule*

1. Select the **Mappings** category.
2. Select a mapping in the navigation view.
3. Select the property mapping rule in the rule view.
4. Click  in the rule view toolbar.


A message appears.

5. To convert the property mapping rule to an object matching rule, click **No** in the message dialog.

- OR -

To convert the property mapping rule into an object matching rule and create a copy of the property mapping rule, click **Yes** in the message dialog.


### *To create a new object matching rule*

1. Select the **Mappings** category.
2. Select a mapping in the navigation view.
3. Click  in the rule view toolbar for object matching rules.

4. Select a rule type and enter the rule details.
5. Click **OK**.

One Identity Manager helps you to set up new object matching rules based on existing rules. Use the mapping wizard for this.

#### ***To create an object matching rules with the mapping wizard***

1. Select the **Mappings** category.
2. Select a mapping in the navigation view.
3. Click  in the menu bar for the object matching rule view.
4. Follow the mapping wizard's instructions.
5. Test the new rule.


## **How to edit object matching rules**

#### ***To edit an object matching rule***

1. Select the **Mappings** category.
2. Select a mapping in the navigation view.
3. Double-click on the object matching rule you want to edit.
4. Edit the rule details.
5. Click **OK**.

## **How to delete object matching rules**

#### ***To delete an object matching rule***

1. Select the **Mappings** category.
2. Select a mapping in the navigation view.
3. Click  in the rule view menu bar for object matching rules.
4. Confirm the security prompt with **Yes**.

## **Object matching rule details**

Enter the following details for an object mapping rule.

**Table 43: Object matching rule details**


<b>Detail</b>	<b>Description</b>
Rule Types	Select the rule type for a new rule.

Detail	Description
Value compare rule	Compares the schema property value of the One Identity Manager schema with the value of a target system schema.
Logical Expression Rule	Evaluates the logical connective of several rules. Use this rule type to identify if you can only identify system objects using several schema properties.
Rule name	Name for the rule. The rule name must be unique within a mapping.
Display name	Rule display name.
Case sensitive	Specifies whether upper and lowercase are taken into account when system objects are being identified.
Description	Text field for additional explanation.

**Table 44: Additional detail of a value compare rule**

Detail	Description
Schema property	Select the schema properties which uniquely identify the system objects.

**Table 45: Additional details of a logical expression rule**


Detail	Description
Expression	Links the existing rules to each other using logical operators. Permitted operators are AND, OR, and NOT as well as brackets. Syntax: <rule name> {AND   OR   NOT   ()} <rule name> ... Click  to select an existing rule.

## Testing object matching rules

You can test which results the object matching rules return in the rule editor. This displays all object pairs found by one of the rules. In addition, objects are shown that are only found in one of the connected systems.

The test uses the variable set that is selected in the Synchronization Editor's toolbar.

### **To test object matching rules**

1. Select the **Mappings** category.
2. Select a mapping in the navigation view.
3. Click  in the rule view toolbar for object matching rules.

# Setting up synchronization workflows

The synchronization sequence is controlled by a workflow. Use workflows to combine the synchronization steps to be executed. The number of synchronization projects can be limited by using revision filters and quotas. You can set up different workflows within a synchronization project which map different purposes of the synchronization.

Define workflows:






- Direction of synchronization
- Number and order of synchronization steps
- Objects to compare (revision filter)

Default workflows for target system synchronization are added if the synchronization project was created with a default project template. You can edit these workflows with the workflow editor and set up new workflows. If the synchronization project was created without a project template, no workflows are set up.






## Toolbars in the workflow editor

Both workflow and navigation views have their own toolbars.

**Table 46: Meaning of icons in the navigation view**


Icon	Meaning
	Create a new workflow with the workflow wizard.
	Create a new workflow.
	Edit a workflow.
	Delete a workflow.
	Copy selected workflow.

**Table 47: Meaning of icons in the workflow view**

Icon	Meaning
	Adds new step.
	Shows execution plan.
	Opens detail view of all synchronization steps.
	Closes detail view of all synchronization steps.
	Enable or disable synchronization steps.


# How to create a workflow

## *To create a workflow*

1. Select the **Workflows** category.
2. Click  in the navigation view.
3. Enter a name and description for the workflow.
4. Click **OK**.

Default values are saved for the other workflow properties. To modify these values, edit the workflow properties.

## *To create a workflow with the workflow wizard*

1. Select the **Workflows** category.
2. Click  in the navigation view.
3. Follow the workflow wizard instructions.


# How to edit a workflow

## *To edit workflow properties*

1. Select the **Workflows**.
2. Select a workflow in the navigation view.
3. Select the **General** view in the Workflow Editor and click **Edit** category.
4. Edit the workflow properties.
5. Click **OK**.

# How to copy a workflow


## *To copy a workflow*

1. Select the **Workflows** category.
2. Select the workflow in the navigation view.
3. Click  in the navigation view.
4. Edit the workflow properties.
5. Click **OK**.



# How to delete a workflow


## To delete a workflow

1. Select the **Workflows** category.
2. Select the workflow in the navigation view.
3. Click  in the navigation view.
4. Confirm the security prompt with **Yes**.

# Creating workflows with the workflow wizard

The project wizard creates a synchronization workflow for initially loading the target system objects into the One Identity Manager database. You can use the workflow wizard to set up more workflows. The workflow wizard specifies workflows for the direction of synchronization "target system".

## To create a workflow with the workflow wizard

1. Select the **Workflows** category.
2. Click  in the navigation view.  
This starts the workflow wizard.  
Click **Next**.
3. Enter the following workflow properties

**Table 48: General workflow properties**

Property	Description
Display name	Enter a display name for the workflow.
Description	Text field for additional explanation.

Click **Next**.

4. Select the mapping to be handled by the workflow.

All mappings are enabled by default.

To disable a mapping, double-click .

To enable a mapping, double-click .

**NOTE:** The **Part of hierarchy** displays which mappings form part of the object hierarchy. To prevent errors, all mappings, which map the object hierarchy, must be entirely selected or entirely de-selected.

5. Specify the mappings for which revision filtering is permitted.

Revision filtering is permitted for all mappings, by default.

Click **Next**.

6. Specify synchronization behavior for the object pair whose properties have changed.
  - a. In the **Database method** column, select the processing method to be executed in the One Identity Manager database.  
- OR -
  - b. In the **Target system method** column, select the processing method to be executed in the target system.

Click **Next**.

7. Specify synchronization behavior for the objects that only exist in the One Identity Manager database.
  - a. In the **Database method** column, select the processing method to be executed in the One Identity Manager database.  
- OR -
  - b. In the **Target system method** column, select the processing method to be executed in the target system.

Click **Next**.

8. Specify synchronization behavior for objects that only exist in the target system.
  - a. In the **Database method** column, select the processing method to be executed in the One Identity Manager database.  
- OR -
  - b. In the **Target system method** column, select the processing method to be executed in the target system.

Click **Next**.

9. Click **Close** to end the workflow wizard.

This creates the workflow. You can check the properties of the Workflow and the synchronization steps with the workflow editor and rework them.

**NOTE:** A disabled synchronization step is added if no processing methods have been specified for a mapping.

## Detailed information about this topic

- [Properties of a mapping](#) on page 71
- [Specifying processing methods](#) on page 95

## Properties of a workflow

Enter the following properties for a workflow.

**Table 49: General workflow properties**

Properties	Meaning
Workflow	Workflow display name.
Direction of synchronization	<p>Select the direction in which synchronization should take place.</p> <ul style="list-style-type: none"> <li>• <b>Defined by execution:</b> The synchronization direction is defined in the start up configuration. For more information, see <a href="#">Start up configuration properties</a> on page 116.</li> <li>• <b>Target system:</b> One Identity Manager is the master system for synchronization.</li> <li>• <b>One Identity Manager:</b> The target system is the master system for synchronization.</li> </ul>
Revision filtering	<p>The revision filtering can be used to limit synchronization to just the objects that have been modified since the last synchronization.</p> <p>For more information, see <a href="#">How does revision filtering work?</a> on page 38.</p> <ul style="list-style-type: none"> <li>• <b>Defined by execution:</b> The required behavior is defined in the start up configuration.</li> <li>• <b>Use revision filter:</b> Only modified objects are synchronized.</li> <li>• <b>Do not use revision filter:</b> All objects are synchronized.</li> </ul>
Error Handling	<p>Specify whether synchronization should be continued if an error occurs during processing of synchronization objects (adding, deleting, updating, and reloading objects). Object processing is continued using the next object; the error is logged.</p> <p>To optimize error localization, you can abort synchronization if an error occurs during the processing of synchronization objects. In this case, no further synchronization objects are processed.</p> <p><b>NOTE:</b> This property does not affect configuration, network, or general synchronization errors (for example, if it is not possible to resolve a reference). The effectiveness of this property depends on the actual error, error position, the target system, and the implementation of the target system connectors.</p> <ul style="list-style-type: none"> <li>• <b>Continue on error:</b> Processing continues with the next object. Errors are logged. This option should be used for productive systems.</li> <li>• <b>Break on error:</b> Synchronization is aborted. This option should only be used to find errors, for example in going live processes.</li> </ul>

Properties	Meaning
Dependency resolution	<p>Specify how dependencies between synchronization step are resolved. For more information, see <a href="#">How does dependency resolution work?</a> on page 40.</p> <ul style="list-style-type: none"> <li>• <b>Automatic:</b> Dependencies are resolved automatically. One Identity Manager determines the sequence of the synchronization steps automatically. It takes into account dependencies between schema classes to synchronize and schema properties.</li> <li>• <b>Manual:</b> Dependencies are not resolved. The synchronization steps are processed sequentially in the order listed in the workflow view. Dependencies between the schema classes and the schema properties must be taken into account when compiling the synchronization steps.</li> </ul>
Description	Text field for additional explanation.

## Editing synchronization steps

The synchronization steps in a workflow specify which mappings are processed in which order during synchronization. There may be dependencies between synchronization steps. These must be resolved automatically or manually.

Synchronization steps are displayed in the workflow view. Here, you can edit synchronization step properties and their order.

Defining synchronization steps:


- Mappings to be processed
- Property mapping rules to apply
- Processing methods
- Number of objects to compare
- Objects to compare (revision filter)
- Direction of synchronization

### Detailed information about this topic

- [How does dependency resolution work?](#) on page 40

## How to create synchronization steps

### *To create a synchronization step*




1. Select the **Workflows** category.
2. Select a workflow in the navigation view.
3. In the workflow view, click .
4. Enter the synchronization step properties.
5. Click **OK**.

## How to edit synchronization steps


### *To edit synchronization step properties*

1. Select the **Workflows** category.
2. Select a workflow in the navigation view.
3. Double-click on the synchronization step in the workflow.
4. Edit the synchronization step properties.
5. Click **OK**.

### *To manually specify the order of synchronization steps*



1. Select the **Workflows** category.
2. Select a workflow in the navigation view.
3. Click  in the workflow view toolbar to open all the synchronization steps.
4. To change the order of the synchronization steps, click  and  on the synchronization step.

### *To enable or disable synchronization steps*

1. Select the **Workflows** category.
2. Select a workflow in the navigation view.
3. Click  in the workflow view's toolbar.
4. Check the boxes for all synchronization steps that you want to disable.  
- OR -  
Uncheck the boxes for all synchronization steps that you want to enable.  
Multi-select is possible.
5. Click **OK**.

## How to delete synchronization steps

### To delete a synchronization step

1. Select the **Workflows** category.
2. Select a workflow in the navigation view.
3. Click  in the synchronization step in the workflow view to open the synchronization step dialog box.
4. Click .
5. Confirm the security prompt with **Yes**.

## General properties of a synchronization step

Enter the following general properties for a synchronization step.

**Table 50: General properties of a synchronization step**

Property	Meaning	
Name	An arbitrary name for the synchronization step. The name must be unique within a synchronization workflow.	
Mapping	Select the mapping to be processed by the synchronization step.	
Synchronization in direction	Use workflow template	The direction of synchronization is defined in the workflow.  For more information, see <a href="#">Properties of a workflow</a> on page 90.
	To the target system	One Identity Manager is the master system for synchronization.
	To the One Identity Manager	The target system is the master system for synchronization.
Revision filtering	The revision filtering can be used to limit synchronization to just the objects that have been modified since the last synchronization.  For more information, see <a href="#">How does revision filtering work?</a> on page 38.	
	Use workflow template	The desired behavior is specified with the workflow.
	Use revision filter	Only modified object are synchronized.
	Do not use revision filter	All objects are synchronized.

Property	Meaning
Exception handling	<p>Specify whether synchronization should be continued if an error occurs during processing of synchronization objects (adding, deleting, updating, and reloading objects). Object processing is continued using the next object; the error is logged.</p> <p>To optimize error localization, you can abort synchronization if an error occurs during the processing of synchronization objects. In this case, no further synchronization objects are processed.</p> <p><b>NOTE:</b> This property does not affect configuration, network, or general synchronization errors (for example, if it is not possible to resolve a reference). The effectiveness of this property depends on the actual error, error position, the target system, and the implementation of the target system connectors.</p> <p>Use workflow template      The desired behavior is specified with the workflow.</p> <p>Continue on error      Processing is continued with the next object. Errors are logged.</p> <p>                                 This option should be used for productive systems.</p> <p>Break on error      The entire synchronization is aborted.</p> <p>                                 This option should only be used to find errors, for example in going live processes.</p>
Data import	<p>Set this option if the synchronization step synchronizes a secondary system and changes are immediately provisioned in the primary system.</p> <p>Do not set this option if the synchronization step synchronizes a primary system.</p> <p>For more information, see <a href="#">Synchronizing user data with different systems</a> on page 50.</p>
Description	Text field for additional explanation.
Disabled	If this option is set, the synchronization step is not synchronized.

## Specifying processing methods

Specify how changes to system objects should be handled on the **Processing** tab. You can select the following default methods. Furthermore, the schema types of the various target systems provide additional processing methods if required.

The processing methods are defined for different sets of synchronization objects.

- **Objects only found in the target system** and missing in One Identity Manager.
- **Objects only found in One Identity Manager** and missing in the target system.

- **Objects with modified properties**

This means there are object pairs whose objects differ.






- **Objects without modifications**

This means there are object pairs whose objects are identical.

**Table 51: Default processing methods in a synchronization step**

Processing method (technical name)	Meaning
Insert	Objects that only exist in one of the connected system are added to the other system.
Delete	<p>Objects that only exist in one of the connected system are deleted from the system.</p> <p>The following applies to synchronization in One Identity Manager.</p> <p>The object is immediately deleted if it came from a primary system. Deferred deletion is not taken into account. Deferred deletion is taken into account if the object comes from a secondary system. For more information, see <a href="#">Synchronizing user data with different systems</a> on page 50. For more information about deferred deletion, see the One Identity Manager Configuration Guide.</p>
Update	Objects whose properties have change are updated.
MarkAsOutstanding	Objects that only exist in the One Identity Manager are marked as outstanding during synchronizing in the direction of One Identity Manager. These objects can be reworked after synchronization is complete. Objects marked as outstanding are ignored by subsequent synchronization.
No processing	No processing methods are executed.

**Table 52: Meaning of the icons**

Icon	Meaning
	<p>Adds an extra processing method for the object set.</p> <p>If you allow several processing methods for one object set, add conditions for executing these methods.</p>
	<p>Create a condition for executing the method.</p> <p>All objects are processed the same way if you do not create a condition.</p>
	Moves the processing method forwards in the order of execution.
	Moves the processing method backwards in the order of execution.
	Deletes the processing method.



## Detailed information about this topic

- [Editing subsets](#) on page 97
- [Specifying additional processing methods](#) on page 97
- For more information, see [Specifying custom processing methods](#) on page 99.
- [Deleting objects in One Identity Manager](#) on page 51

## Specifying additional processing methods

Some target systems provide extra processing methods in addition to the default ones. One Identity Manager can execute different processing methods in sequence for the same set of objects.

### *To define different processing methods for a set of objects*

1. Select a processing method from the menu for synchronizing an object set.
2. Click **+** to specify another processing method for this object set. Select a processing method from the menu.
3. Use **↑** and **↓** to specify the order in which to execute the processing methods.

### Example

You can enter external user IDs for One Identity Manager user accounts in SAP. User accounts that only exist in SAP are added if One Identity Manager user accounts from SAP R/3 are synchronized with One Identity Manager. The associated external user ID's are also transferred into the target system.

Object set	Processing methods
Objects only found in One Identity Manager are:	Insert AddExtID



## Related topics

- [Specifying processing methods](#) on page 95

## Editing subsets


Processing methods can be limited to a set of the objects. To do this, specify the condition under which the processing method is to be executed. You can specify different processing methods for different sets of objects. These are executed in the given order.

### To define processing for different sets

1. Select a processing method from the menu for synchronizing an object set.
2. Click  to specify another processing method for this object set. Select a processing method from the menu.
3. Create the condition defining the execution point the processing method. Click  next to the method.

Enter the condition. You can use comparisons, logical operators, and variables. You can write queries with a wizard or enter them directly.

- Use the following expression in the condition to access the schema properties of the system in which you want the processing method to be executed:  
Base.<schema property>
- To access the schema properties of the other system in the condition, use the expression: Other.<schema property>

4. Use  and  to specify the order in which to execute the processing methods.

### Example

All user accounts that only exist in Active Directory are processed as follows when synchronizing Active Directory user accounts from One Identity Manager in the direction of One Identity Manager:

Object set	Processing method	Condition
1 All user accounts, connected to an employee, are marked for deletion.	MarkForDeletion	Base.UID_Person <> ''
All user accounts, not connected with an employee, are deleted.	Delete	Base.UID_Person = ''
2 All user accounts, in container A, are deleted.	Delete	Base.UID_ADSContainer = '4b53ff19-6ae4-4a87-86bd-eca3ddf5ebf2'
All user accounts, not belonging to container A, are marked for deletion.	MarkForDeletion	Base.UID_ADSContainer <> '4b53ff19-6ae4-4a87-86bd-eca3ddf5ebf2'

### Related topics

- [Specifying processing methods](#) on page 95
- [Wizard for entering filters](#) on page 19

## Specifying custom processing methods

Apart from a connector's default and additional processing methods, the Synchronization Editor can also use custom processing methods. This is done using custom scripts.

### To set up and use a custom processing method

1. In the Designer, create a script to make the necessary modifications to the loaded objects.

Script structure:

```
<Tag("Projector")>
<BaseObjectType("Table")>
Public Sub CCC_ScriptName(unit As IUnitOfWork, entity As IEntity())
    'Steps to execute
    ...
End Sub
```

- `<Tag("Projector")>`: Labels the script to use as a processing method. This enables the Synchronization Editor to identify the scripts to use as processing methods.
- `<BaseObjectType("Table")>`: Defines the type of objects the script will be applied to. Enter the table that contains the objects to be handled.  
If the script can be applied to several object types, define a separate object type for each table.
- `CCC_ScriptName`: Script name. In the Synchronization Editor, you can select the script as the processing method under this name. Enter a name that uniquely describes the processing method.

For detailed information about creating scripts with the Script Editor, see the *One Identity Manager Configuration Guide*.

2. Compile the script.
3. Open the synchronization project in the Synchronization Editor.
4. Select the **Configuration | One Identity Manager connection** category and update the One Identity Manager schema.
5. In the **Workflows** category, select the synchronization workflow in which you want to use the new processing method.
6. Find the synchronization step and click **Edit**.  
The synchronization step must handle the object type defined in the script.
7. On the **Processing** tab, you can select processing methods under the script name.

### Example script

The following example script removes the manager from all departments and location that the script will be applied to as a processing method.

```
<Tag("Projector")>
<BaseObjectType("Department")>
<BaseObjectType("Locality")>
Public Sub CCC_Department_RemoveManager(unit As IUnitOfWork, entities As
IEntity())
    For Each currEntity As IEntity In entities
        If Not String.IsNullOrEmpty(currEntity.GetValue("UID_
PersonHead").ToString()) Then
            currEntity.PutValue("UID_PersonHead", "")
            unit.Put(currEntity)
        End If
    Next
End Sub
```

### Related topics

- [Specifying processing methods](#) on page 95

## Specifying quotas

Errors in the synchronization configuration can cause system objects to be processed incorrectly. Errors in the data through incorrect configuration can be reduced. Often, it is known how many system objects have been modified, added, or deleted in a connected system. If this number is exceeded when a processing method is executed, a warning appears and synchronization is aborted. The synchronization step and mapping configurations can be checked and corrected before repeating synchronization.

A quota can be defined for each processing method in each synchronization step to specify the part of the system objects to process. A quota provides the number of object to process relative to the total number of all objects in the schema class to be synchronized. When a synchronization step is executed, One Identity Manager calculates the number of objects to process for each processing method with a quota. If this number exceeds the quota, the synchronization step is aborted.

Quotas can only be defined for processing methods which modify data (for example, Insert, Update, Delete).

**NOTE:** One Identity Manager takes total number objects to be synchronized into account when it calculates the number of objects to process. Conditions defined for processing methods are not taken into account!

Enter an higher quota for processing methods which limit the number of objects to synchronize with a condition.

**Table 53: Quotas for a synchronization step**

Property	Meaning
No quota	If this is set, quotas are not included.
Use these settings	<p>Specify which processing methods include a quota. Enter the quota in percent.</p> <p>One Identity Manager specifies quotas for synchronization in the target system in workflows created with the workflow wizard, by default. These quotas can be changed later.</p>
Processing method	Quota
Update	75 %
Delete	10%

## Rule filters

You can specify which Property mapping rules must be applied to each synchronization step. For example, dependencies between schema class objects can be resolved this way.

Included rules: Select the property mapping rule to be applied during synchronization.

Excluded rules: Select the property mapping rules which should not be applied during synchronization.

**| NOTE:** Unmarked rules are included automatically.

### Detailed information about this topic

- [How does dependency resolution work?](#) on page 40

## Extended synchronization step properties

You can optimize memory usage for processing synchronization step data on the **Extended** tab.

**Table 54: Extended synchronization step properties**

Property	Description
Performance/memory factor	This controls the behavior of memory and performance in the synchronization step. If more memory is available, you can change the performance/memory factor in favor of performance. Reduce the performance/memory factor if there are memory

Property	Description
	<p>problems.</p> <p>The performance/memory factor specifies the percentage with which the reload threshold, partition size, and bulk level are applied to an object type.</p> <p>Use the slider to set the performance/memory factor.</p> <ul style="list-style-type: none"> <li>• Move the slider to the right to increase performance. This requires more memory.</li> <li>• Move the slider to the left to reduce the memory requirement. This also reduces the performance.</li> </ul>
Reload threshold	<p>Specifies the maximum number of properties that can be loaded by synchronization to prevent partitioned reloading. You can increase this value to accelerate synchronization of target systems with small mappings. However, more memory is required.</p> <p>The default value for all data to be processed is fixed in the start up configuration. It can be specified separately for every synchronization step.</p> <p><b>To specify the threshold for a synchronization step</b></p> <ol style="list-style-type: none"> <li>1. Disable <b>Use start up configuration settings</b>.</li> <li>2. Change the preset reload threshold.</li> </ol>
Mode	<p>Specifies whether changes in the in-memory object are committed after the synchronization step has been executed. This affects changes that are made through the property mapping rule's <b>Force mapping against direction of synchronization</b> option.</p> <p>This setting is required only for object-based synchronization, for example, provisioning, when the object must be handled by more than one synchronization step.</p> <ul style="list-style-type: none"> <li>• <b>None</b>: No changes are committed.</li> <li>• <b>Automatic</b>: It is decided automatically, which changes are committed.</li> <li>• <b>UserDefined</b>: Changes to the selected schema properties are committed.</li> </ul> <p>Under <b>Commit changes for</b>, enable the schema properties whose changes are committed in the in-memory object.</p>

**TIP:** You can adjust the memory requirements for all the data to be processed in the start-up configuration. You can set the reload threshold, partition size, and bulk level here. These setting are only possible in expert mode. For more information, see

| [Extended properties for start up configuration](#) on page 158.


### Detailed information about this topic

- [Performance and memory optimization](#) on page 58

## Show execution plan

The execution plan shows all synchronization steps of a workflow in the order in which they will be executed. Dependencies between schema classes are resolved. Thus, additional synchronization steps that are added automatically are also displayed.

### *To display a workflow execution plan*


1. Select the **Workflows** category.
2. Select a workflow in the navigation view.
3. In the workflow view, click .

The execution plan is displayed as a report. You can save the report.

### Detailed information about this topic

- [How does dependency resolution work?](#) on page 40

## Connecting systems

You connect to the One Identity Manager database when you log into the Synchronization Editor. You connect to the target system with the project wizard. The system connection is automatically set up once One Identity Manager accesses the target system. The icon  in the status bar of the Synchronization Editor is displayed if a target system is connected.

Other system connection properties are saved in the synchronization project. You can edit these properties in Synchronization Editor.

## How to edit system connection properties

### *To edit database connection properties*

1. Select the **Configuration | One Identity Manager connection** category.  
The sections **General**, **Scope**, **Connection parameters**, and **Schema classes** are displayed in the document view with the database connection properties.
2. To edit general properties of the database connection, select the **General** view and click **Setup...**

### To edit target system connection properties

1. Select the **Configuration | Target system** category.  
The sections **General**, **Scope**, **Connection parameters**, and **Schema classes** are displayed in the document view with the target system connection properties.
2. To edit general properties of the target system connection, select the **General** view and click **Setup....**




### Detailed information about this topic

- [System connection properties](#) on page 104


## System connection properties

The following information about system connections is mapped.

**Table 55: System connection properties**

Property	Description
System connection	Default display value for the system connection. <b>NOTE:</b> If the connection parameters of the connected system differ from the loaded schema, the schema's display name is also displayed. In this case, the schema must be updated before the synchronization project can be used.
Setup...	Opens a dialog box for editing the system connection's general properties and configuring the contents of the synchronization log.
 Updating schemas	Updates the schema. The synchronization project is saved before the schema is updated. This allows the existing schema to be reloaded if an error occurs during update. <b>NOTE:</b> The synchronization is deactivated if the schema of an activated synchronization project is updated. Reactivate the synchronization project to synchronize.
 Shrink schema...	All schema types of the respective schema, which cannot be used in the synchronization project, are deleted from it. You can select schema type to be retained even though they are not used.
 Browse...	Start the Target System Browser. Use the target system browser to view the target system data/One Identity Manager database. You can add, change, and delete system objects. You can test virtual schema properties. The variable set selected in the Synchronization Editor's toolbar is used to connect to the target system.



Property	Description
 Edit connection...	<p>Starts the system connection wizard.</p> <p>The system connection wizard allows you to edit the connection parameters of the current system connection, for example, if the synchronization server has changed.</p> <p><b>NOTE:</b> Certain connection parameters correspond with the loaded schema. If these connection parameters are changed, the schema must be updated in the synchronization project so that synchronization can be configured and run successfully. This is necessary, for example, if the connection to another One Identity Manager database is established that has a different schema to the connection database.</p> <ul style="list-style-type: none"> <li>Click <b>Update schema</b> before continuing to edit the synchronization project.</li> </ul>
Connection parameter	Lists all connection parameters. You can define connection parameter values as variables in order to use one synchronization configuration for synchronizing different target systems.
Scope	Specifies whether a scope is defined. You can edit the scope.
Schema Classes	All schema classes are listed in groups of schema types.
Schema browser	<p>This displays the target system schema with all its schema types and their properties.</p> <p>The schema browser is only available in expert mode.</p>

**Table 56: General properties of a system connection**

Property	Description
Schema	Name of the schema.
Display name	Schema display name.
Connection is read-only	If this option is set, the system connector only has read access to the target system. Write operations are not executed, only logged. Changes to objects in the One Identity Manager database are not provisioned in the target system.
Retry count	Number of attempts at establishing the connection.
Delay between retries	Time delay between retry attempts.
Create synchronization log	Specifies whether a synchronization log with detailed information about the synchronization object is created.
Data to log	Data to be recorded in the synchronization log.

## Detailed information about this topic

- [Activating the synchronization project](#) on page 128
- [Using variables and variable sets](#) on page 110
- [Editing the scope](#) on page 107
- [Configuring the synchronization log](#) on page 106
- [Overview of schema classes](#) on page 125

## Configuring the synchronization log

All the information, tips, warnings, and errors that occur during synchronization are recorded in the synchronization log. You can configure the type of information to record separately for each system connection.

### *To configure the content of the synchronization log*

1. Edit the system connection properties.
2. To configure the synchronization log for target system connection, select the **Configuration | Target system** category in Synchronization Editor.  
- OR -  
To configure the synchronization log for the database connection, select the **Configuration | Synchronization Editor connection** category in One Identity Manager.
3. Select the **General** view and click **Configure**.
4. Select the **Synchronization log** view and set **Create synchronization log**.
5. Enable the data to be logged.  

**NOTE:** Some content generates a particularly large volume of log data!  
The synchronization log should only contain data required for error analysis and other analyzes.
6. Click **OK**.

Synchronization logs are stored for a fixed length of time.

### *To modify the retention period for synchronization logs*

- In the Designer, enable the **DPR | Journal | LifeTime** configuration parameter and enter the maximum retention period.

## Detailed information about this topic

- [How to edit system connection properties](#) on page 103

# Editing the scope

In the general scope, you can specify system objects to be handled by synchronization. This allows you to limit the number of objects to synchronize. If no general scope is defined, all objects in the connected system are synchronized.

In the reference scope, you define which system objects are loaded for the reference resolution. If no reference scope is defined, the general scope is also used for the reference resolution.

**TIP:** If a general scope is defined, but you want all system objects of a target system type to be available, create an empty reference scope. To do this, simply enter the display name of the reference scope. This means that no scope is calculated in the reference resolution.

If the synchronization project was created using a default project template, a scope is defined. You may edit this scope. A scope is not defined if the synchronization project was created without a project template.

**NOTE:** To avoid data inconsistencies, define the same scope in both of the connected systems.

## Detailed information about this topic

- [What is a scope?](#) on page 37
- [What are filters?](#) on page 34
- [Scope properties](#) on page 108

## How to edit a scope

### *To edit the scope*

1. Edit the system connection properties.  
For more information, see [How to edit system connection properties](#) on page 103.
2. Select the **Scope** view.
3. Click **Edit scope**.

### *To edit the reference scope*

1. Edit the system connection properties.  
For more information, see [How to edit system connection properties](#) on page 103.
2. Select the **Scope** view.
3. Click **Edit reference scope**.

# How to delete a scope




## *To delete the scope or scope reference.*

1. Edit the system connection properties.  
For more information, see [How to edit system connection properties](#) on page 103.
2. Select the **Scope** view.
3. Click **Delete**.

## Scope properties

Enter the following properties for a scope. Set a filter for the target system whose object are referenced from the connection system. For more information, see [What is a scope?](#) on page 37.

**Table 57: Scope properties**

Property	Description
Schema	Display name for the schema to which the scope will be applied.
Name	Scope display name. The name must be unique within a synchronization project.
Scope hierarchy	List of all schema types for the selected schema. To filter the list, click  .
	<div>Show all object types      All object types of the schema are displayed.</div> <div>Only show hierarchically structured object types      Only the object types of the schema that form a hierarchical structure are displayed.</div>
Is filtered?	All schema types with a filter are marked. <div><div> A filter is defined and effective.</div><div> A filter is effective.</div></div>

Property	Description
Condition	Specify the filter condition for the scope. Select an object type in the scope hierarchy for this.
System filter	<p>Filter that immediately affects the connection system.</p> <p>Enter the filter in system specific notation, for example, as Where clause for a database system or as LDAP filter for an LDAP system.</p> <p>If tested against a fixed value that contains at least two dollar characters, the dollar characters must be masked.</p> <p>This filter is only effective when loading the system objects.</p>
Object filter	<p>Filter that affects loaded objects.</p> <p>Condition Formulate a query for loaded objects. Use the wizard for entering filter.</p> <p>Script You can also store a script which determines system objects. The script must be written in the script language specified in the synchronization project.</p>
Hierarchy filter	<p>Filter created on the bases of existing system objects. This filter limits the number of objects to load in the connected system.</p> <p>This filter is only available for individual target systems.</p> <p>For more information, see <a href="#">Creating hierarchy filters</a> on page 109.</p>

## Related topics

- [Support for scripting](#) on page 21

## Creating hierarchy filters

Certain target systems support the definition of a scope based on the hierarchy of existing target system objects. The hierarchy filter limits the number of objects to load in the connected system. The hierarchy filter can only be applied to objects and not to their schema properties.

The objects are displayed in their hierarchical structure on the right-hand side of the scope view. The Synchronization Editor establishes a connection to the target system to do this, using the variable set selected in the Synchronization Editor's toolbar.

### **To create a hierarchy filter**

- Mark all the objects in this hierarchy which are included in the scope.  
All unmarked objects remain outside the scope.

If you enable the hierarchy's root node, new objects within the hierarchy are included by the scope. If the root node is disabled, only the marked objects are within the scope. New objects are not synchronized.

**NOTE:** Create an additional object filter to include schema properties as criteria in the scope definition.

A fully defined hierarchy filter can be transformed into a variable. Thus the filter can be redefined in a specialized variable set and used for other synchronization configurations.

### ***To convert a variable into a hierarchy filter***

1. Click **Convert into a variable**.
2. Confirm the security prompt with **Yes**.

The hierarchy filter is saved as variable. To change the filter, edit the variable.

### **Related topics**

- [What is a scope?](#) on page 37
- [Editing the scope](#) on page 107
- [Using variables and variable sets](#) on page 110

## **Using variables and variable sets**

You can use variables to create generally applicable synchronization configurations that contain the necessary information about the synchronization objects when synchronization starts. For example, you can use variables in the target system connection to synchronize different Active Directory domains with the same synchronization project.

Variables can be used in the following Synchronization Editor definitions.

System connections	in parameters
Scopes	in the filter
Schema classes	in the filter
Schema properties	as defined value
Property mapping rules	in the condition
Processing methods	in the condition
Base objects	in the definition

Variable sets are added for different instances of the variables. Each synchronization project has a default variable set, which has all the variables with a default value. The start up configuration contains a link to the variable set in use. If no variable set is given, the default variable set is used.








**NOTE:** If synchronization projects are updated, connection parameters from the default variable set are always used. Ensure that the variables in the default variable set contain the correct values.

A default variable set is defined if the synchronization project was created using a default project template. You can add variables to this variable set. If the synchronization project was created without a project template, no variable sets are set up.

Create a specialized variable set to use variables with other values. You can change the values of the variables individually. Assign the specialized variable set to a start up configuration in order to use it.


The default variable set contains all variables that are required in the synchronization project. New variables are created in the default variable set. They are automatically added to all specialized variable sets, with their default values. A variable's value can also be found with a script, for example, for reading a system user's password from an external password management system.

**Table 58: Meaning of icons in the variable set toolbar**

Icon	Meaning
	Add a variable/variable set.
	Delete variable/variable set.
	Rename variable set.
	Convert variable to script.
	Convert script variable to a plain variable.
	Display variable usage.
	Default value for restoring the selected variable.

## How to create variables

### *To create a variable in the default variable set*

1. Select the **Configuration | Variables**.  
The default variable set is displayed with all available variables in the upper part of the document view.
2. Click  in the upper view's toolbar.
3. Edit the variable's properties.
4. Save the changes.

### ***To create variables from connection parameters***

1. Edit the system connection properties.  
For more information, see [How to edit system connection properties](#) on page 103.
2. Open the **Connection parameters** view.
3. Select the parameter whose value should be converted and click **Convert** category.  
This button is not available if the parameter has already been converted into a variable. The variable name is displayed instead.
4. Save the changes.

### **Related topics**

- [Using scripts in variables](#) on page 114

## **How to edit variables**

**| NOTE:** Variable labeled as system variables cannot be modified.

### ***To edit a variable in the default variable set***

1. Select the **Configuration | Variables** category.  
The default variable set is displayed with all available variables in the upper part of the document view.
2. Select a variable in the default variable set.
3. Edit the variable's properties.
4. Save the changes.


### ***To edit a variable in the specialized variable set***

1. Select the **Configuration | Variables** category.  
All specialized variable sets are shown in the lower part of the document view.
2. Open a specialized variable set in the variable set view.
3. Select a variable and enter a new value.
4. Save the changes.





## How to delete variables

### *To delete a variable in the default variable set*

1. Select the **Configuration | Variables** category.  
The default variable set is displayed with all available variables in the upper part of the document view.
2. Click  in the upper view's toolbar.


## How to create specialized variable sets

### *To create a specialized variable set*

1. Select the **Configuration | Variables** category.  
All specialized variable sets are shown in the lower part of the document view.
2. Click  in the variable set view toolbar.
3. Click  in the variable set toolbar to rename the variable set and enter the new name.
4. Select a variable and enter a new value.  
Edit all the variable values which take on another characteristic.
5. Save the changes.

## How to delete specialized variable sets

### *To delete a specialized variable set*

1. Select the **Configuration | Variables** category.  
All specialized variable sets are shown in the lower part of the document view.
2. Select a specialized variable set in the variable set view.
3. Click  in the variable set view toolbar.

## Variable properties


**| NOTE:** Variable labeled as system variables cannot be modified.

Enter the following properties for a variable in the default variable set.


**Table 59: Variable properties**

Property	Description
Name	Variable name. The name must be unique within a variable set.
Display name	Display name of the variable.
Value	Default value of the variable. <ul style="list-style-type: none"><li>• To display and edit the value of a hierarchy filter, click <b>Edit....</b></li><li>• To display and edit the script of a script variable, click <b>Edit....</b></li></ul>
Secret value	Specifies whether the variable in the Synchronization Editor may be displayed.  If this option is set, the value is not displayed.
In use	Specifies whether the variable is used in a Synchronization Editor function.
Description	Text field for additional explanation.

**To show all definition used in a variable set**

1. Select a variable in the default variable set.
2. Click  in the toolbar.

**To restore a variable's default value in a specialized variable set**

1. Select a variable in the specialized variable set.
2. Click  in the toolbar.

**Related topics**


- [Using scripts in variables](#) on page 114
- [Creating hierarchy filters](#) on page 109

## Using scripts in variables

You can write scripts for finding variable values. You can use scripts, for example, for reading a system user's password from an external password management system.


**NOTE:** The **External password management** option must be set for a system user in order to use their password from an external password management system. For detailed information about editing system users, see the *One Identity Manager Authorization and Authentication Guide*.

### ***To create a script variable.***

1. Create the variable in the default variable set.
2. Select the variable and click  in the toolbar.
3. In the **Value** input field, click **Edit**.
4. Enter the script and click **OK**.
5. Save the changes.

In this way, you can convert existing variables into script variables.

### ***To convert script variables into simple variables.***

1. Select the script variable in the default variable set.
2. Click  in the toolbar.
3. Confirm the security prompt with **Yes**.

### **Related topics**

- [Validating scripts](#) on page 168


## **Setting up start up configurations**

A start up configuration contains all the required properties and options for a tangible synchronization. This specifies which synchronization configuration components (workflows, mappings, variable sets) should be used for synchronization. Synchronization is started with a schedule. Different start up configurations can be set up for different synchronization targets.

If the synchronization project was creating using a default project template, a start up configuration is added. You can edit this start up configuration and create new start up configurations. If the synchronization project was created without a project template, start up configuration is set up.

## **How to create start up configurations**

### ***To create a start up configuration***

1. In the Synchronization Editor, select the **Configuration | Start up configurations** category.
2. Click  in the document view toolbar.
3. Edit the start up configuration's master data.
4. Click **OK**.

# How to edit start up configurations

## *To edit a start up configuration*

1. In the Synchronization Editor, select the **Configuration | Start up configurations** category.
2. Select a start up configuration in the document view and click **Edit...**
3. Edit the start up configuration's master data.
4. Click **OK**.

# How to delete start up configurations

## *To delete a start up configuration*

1. In the Synchronization Editor, select the **Configuration | Start up configurations** category.
2. Select a start up configuration in the document view.
3. Click **Delete**.
4. Confirm the security prompt with **Yes**.

# Start up configuration properties

Enter the following general properties for a start up configuration.

**Table 60: General properties of a start up configuration**

Property	Description
Display name	Name of the start up configuration.
Workflow	Workflow processed by this start up configuration.
Direction of synchronization	Direction in which synchronization will be executed. Select a synchronization direction from the list if "Defined by execution" and at least one synchronization step "Use workflow default" is saved with the workflow. Otherwise the direction of the synchronization workflow or synchronization step is used for synchronization.
	To the target system One Identity Manager is the master system for synchronization.
	To One Identity Manager The target system is the master system for synchronization.

Property	Description				
Revision filtering	<p>The revision filtering can be used to limit synchronization to just the objects that have been modified since the last synchronization.</p> <p>Select a value from the list if "Defined by execution" and at least one synchronization step "Use workflow default" is saved with the workflow. Otherwise the value of the workflow or synchronization step is used for synchronization.</p> <table> <tr> <td>Use revision filter</td><td>Only modified object are synchronized.</td></tr> <tr> <td>Do not use revision filter</td><td>All objects are synchronized.</td></tr> </table>	Use revision filter	Only modified object are synchronized.	Do not use revision filter	All objects are synchronized.
Use revision filter	Only modified object are synchronized.				
Do not use revision filter	All objects are synchronized.				
Schedule	Schedule for starting synchronization.				
Variable set	<p>Assign the variable set with which to run synchronization.</p> <p>If no variable set is given, the default variable is used. If a specialized variable set is assigned, a list of all variables with their values is displayed.</p> <p>If changes are provisioned from One Identity Manager to the target system, each start up configuration must have a corresponding base object that uses the same variable set.</p>				
Description	Text field for additional explanation.				

## Detailed information about this topic

- [Direction of synchronization and mapping](#) on page 44
- [How does revision filtering work?](#) on page 38
- [Using variables and variable sets](#) on page 110
- [Setting up synchronization workflows](#) on page 87
- [Specifying a schedule](#) on page 119

## Grouping

**Table 61: Configuration parameters for the delayed start of further synchronizations**

Configuration parameter	Meaning
Common   Jobservice   RedoDelayMinutes	This configuration parameter specifies the wait time (latency) in minutes before the Job server attempts to execute a process step again.

You can group start up configurations logically on the **Grouping** tab. If you have several start up configurations, you can group them together into a start up group. Specify the start up behavior for each start up group. The same start up behavior applies to all start up configurations belonging to the same start up group.

**Table 62: Grouping start up configurations**

Property	Description
Name	<p>Name of the start up group.</p> <ul style="list-style-type: none"> <li>To create a new start up group, enter a name.</li> <li>- OR -</li> <li>Select an existing start up group from the menu.</li> </ul>
Concurrency behavior	<p>One Identity Manager behavior if multiple start up configurations are executed simultaneously.</p> <p>Ignore      Multiple synchronization can be executed simultaneously.</p> <p><b>NOTE:</b> This behavior can cause synchronization errors or loss of data.</p> <p>Plan your start times carefully. If possible, specify your start times so that synchronization does not overlap.</p> <p>Stop on error      If synchronization is already running, each new synchronization attempt breaks off with an error. Check the One Identity Manager Service log file for this.</p> <p>Postpone and wait      If synchronization is already running, the each new synchronization is postponed until the first one has finished. You can adjust the wait time using the <b>Common   Jobservice   RedoDelayMinutes</b> configuration parameter.</p> <p>This configuration parameter specifies the wait time in minutes before the Job server attempts to start synchronization again. If the first synchronization is still running, the start of a further synchronization is delayed for the specified length of time. This configuration parameter is only effective on grouped start up configurations whose concurrence behavior is configured with the <b>Postpone and wait</b> option. The default value is two minutes.</p>

## Related topics

- [Running synchronization](#) on page 134

# Maintenance modes

You set the maintenance mode for start up configuration on the **Maintenance** tab. Here, you can specify how data can be maintained that could not be saved during synchronization. Object references, which have not (yet) been loaded are included in this (for example, cross-domain references). Complex hierarchies loaded through a CSV import might also have to be reworked because reference objects could not be assigned to them. Unresolvable object references are written to a data store. The synchronization buffer is cleaned up by maintenance.

**Table 63: Start up configuration maintenance mode**

Property	Description	
Mode	Maintenance mode for cleaning up the synchronization buffer.	
	No maintenance	There is no additional task of clearing up the synchronization buffer.
	Always synchronize affected objects	The filter is removed on objects with unresolved references.
	Full maintenance after every synchronization	One Identity Manager tries to resolve object references following synchronization.
Retries	Number of retries resolving an object reference. It may be necessary to try several times to resolve an object if it maps a hierarchy with several levels.	

## Detailed information about this topic

- [Unresolvable references](#) on page 42

## Specifying a schedule

Synchronization is started using scheduled process plans. A scheduled process plan is added once a start up configuration is assigned to a schedule. Use schedules to define executing times for synchronization.

**NOTE:** Synchronization can only be started if the synchronization project is enabled.

**IMPORTANT:** As long as synchronization is running, you must not start another synchronization for the same target system. This applies especially, if the same synchronization objects would be processed.

If another synchronization is started with another start up configuration, that addresses same target system, it may lead to synchronization error or loss of data. Plan your start times carefully. If possible, specify your start times so that synchronization does not overlap.

### ***To assign an existing schedule to a start up configuration***

1. Select the **Configuration | Start up configurations** category.
2. Select a start up configuration in the document view and click **Edit**.
3. Select a schedule from the **Schedule** menu.

All active schedules assigned to the table JobAutoStart are available for selection.

4. Click **OK**.

One Identity Manager specifies a process plan when changes are committed to the One Identity Manager database. This process plan starts the synchronizing process.

**NOTE:** You can manage existing schedules with Designer. For more detailed information, see the *One Identity Manager Operational Guide*.

## **How to set up schedules**

### ***To create a schedule***

1. Select the **Configuration | Start up configurations** category.
2. Select a start up configuration in the document view and click **Create schedule**.
3. Edit the schedule properties.
4. Click **OK**.

One Identity Manager specifies a process plan when changes are committed to the One Identity Manager database. This process plan starts the synchronizing process.

### ***To edit a schedule***

1. Open the synchronization project in the Synchronization Editor.
2. Select the **Configuration | Start up configurations** category.
3. Select a start up configuration in the document view and click **Edit schedule**.
4. Edit the schedule properties.
5. To enable the schedule, click **Activate**.
6. Click **OK**.

### **Related topics**



- [Properties of a schedule](#) on page 120

## **Properties of a schedule**

Enter the following properties for a schedule.



**Table 64: Schedule properties**

Property	Meaning
Name	Schedule ID. Translate the given text using the  button.
Description	Detailed description of the schedule. Translate the given text using the  button.
Enabled	Specifies whether the schedule is enabled or not. <b>  NOTE:</b> Only active schedules are run.
Time zones	Unique identifier for the time zone that is used for running the schedule. Choose between <b>Universal Time Code</b> or one of the time zones in the menu. <b>  NOTE:</b> When you add a new schedule, the time zone is preset to that of the client from which you started the Synchronization Editor.
Start (date)	The day on which the schedule should be run for the first time. If this day conflicts with the defined interval type, the first run is on the next available day based on the start date.
Validity period	Period within which the schedule is run. <ul style="list-style-type: none"> <li>• If the schedule will be run for an unlimited period, select the <b>Unlimited duration</b> option.</li> <li>• To set a validity period, select the <b>Limited duration</b> option and enter the day the schedule will be run for the last time in <b>End (date)</b>.</li> </ul>
Occurs	Interval in which the task is run. Permitted interval types are <b>Hourly</b> , <b>Daily</b> , <b>Weekly</b> , <b>Monthly</b> , and <b>Yearly</b> . For the <b>Weekly</b> interval type, specify the precise weekday. For the <b>Monthly</b> interval type, specify the day of the month (1st to 31st day of the month). For the <b>Yearly</b> interval type, specify the day of the year (1st to 366th day of the year). <b>  NOTE:</b> If the schedule is not going to be run until next month because the interval type is <b>Monthly</b> with sub-interval <b>29</b> , <b>30</b> , or <b>31</b> , the last day of the current month is used. Example: A schedule that is run on the 31st day of each month is run on 30th April. In February, the schedule is run on the 28th (or 29th in leap year). Schedules with the interval type <b>Yearly</b> with sub interval <b>366</b> are only run in leap year.
Start time	Fixed start type for the <b>Daily</b> , <b>Weekly</b> , <b>Monthly</b> , and <b>Yearly</b> interval types. Enter the time in local format for the chosen time zone. For the interval type <b>Hourly</b> , the start time is calculated from the rate of

Property	Meaning
	occurrence and the interval type.
Repeat every	Rate of occurrence for running the schedule within the selected time interval. For the <b>Weekly</b> interval type, select at least one weekday.

## Setting up base objects

Base objects contain data about the target system to be synchronized, its system connection, and the synchronization server. Base objects form the basis for provisioning changes in the target system and synchronizing single objects. A base object is, for example, a specific Active Directory domain from the One Identity Manager database. The connection parameters for logging into a target system are assigned through a variable set. In addition, the synchronization server is declared in the base object.

Base objects are required for provisioning processes and single object synchronization of all the target systems that are connected by default to the One Identity Manager. You cannot normally specify a specific base object for provisioning and single object synchronization with database connectors or the CSV connector. In this case, assignment of one base table and the synchronization server is sufficient. You can only set up one synchronization project in the One Identity Manager database per base object.


The base object is used to determine which provisioning workflow is suited to an object in the One Identity Manager database. In order to find the correct workflow for provisioning object modifications or for single object synchronization, you can only set up one synchronization project per base object.

If the synchronization project was created using a default project template, a base object is added. You can edit this base object and create more base objects. If the synchronization project was created without a project template, no base object is set up.

**NOTE:** You cannot add base objects until the synchronization project has been permanently saved in the database.

## How to create base objects


### *To add a base object using an existing database object*

1. Select the **Configuration | Base objects** category.
2. Click  in the document view toolbar.
3. Edit the base objects's master data.
4. Click **OK**.

If the base object does not yet exist in the One Identity Manager database, use the wizard to create a base object.

**NOTE:** The wizard is only available to target systems that are contained in One Identity Manager as default modules. The wizard cannot be used in synchronization projects with the CSV connector or the native database connector.

### ***To add a base object using a wizard***

1. Select the **Configuration | Base objects** category.
2. Click  in the document view toolbar.
3. On the welcome page, click **Next**.
4. On the **System access** page, specify how One Identity Manager can access the target system.

- If access is possible from the workstation on which you started the Synchronization Editor, do not change any settings.
- If access is not possible from the workstation on which you started the Synchronization Editor, you can set up a remote connection.


Enable the **Connect using remote connection server** option and select the server to be used for the connection under **Job server**.

5. Select the system connection for the new base object on the **Create system connection** page.

Follow the system connection wizard instructions. For detailed information about which connection parameter you required, see the administration guide for the respective system.

6. On the **Synchronization server** page, select the synchronization server to execute synchronization.

If the synchronization server is not declared as a Job server in the One Identity Manager database yet, you can add a new Job server.

- Click  to add a new Job server.
- Enter a name for the Job server and the full server name conforming to DNS syntax.
- Click **OK**.

The synchronization server is declared as Job server for the target system in the One Identity Manager database.


**NOTE:** After you save the synchronization project, ensure that this server is set up as a synchronization server.

7. Click **Finish** to complete the wizard.

The wizard creates a variable set with the given connection parameters. It creates the synchronization base object, for example, the actual Active Directory domain you want to synchronize, as an object in the One Identity Manager database.


# How to edit base objects

## To edit a base object

1. Select the **Configuration | Base objects** category.
2. Select a base object in the document view and click .
3. Edit the base objects's master data.
4. Click **OK**.

# How to delete base objects

## To delete a base object

1. Select the **Configuration | Base objects** category.
2. Select a base object in the document view and click .
3. Confirm the security prompt with **Yes**.

# Properties of base objects

Enter the following properties for a base object.

**Table 65: Properties of base objects**

Property	Description
Synchronization has no base object	Defines whether a specific base object is required for synchronization. If this option is set, a specific object cannot be selected from the base table.
Base table	Select the table from which to select the base object, for example, <code>ADSDomain</code> .
Base object	Select the object from the base table formed by the base object for synchronization and provisioning processes.
Synchronization server	Select the synchronization server.
Server function	The server's server function that synchronizes <b>Single object synchronization</b> and <b>provisioning</b> types. This allows parallel editing. If no server function is given, the synchronization server handles these processes.  Assign a custom server function.
Variable set	Select the variable set that contains the connection parameter which

Property	Description
	corresponds with the base object. Variables from selected variable sets are displayed.
	For each base objects there must be a start up configuration, which uses the same variable set.

## Related topics

- [Load balancing during provisioning and single object synchronization](#) on page 174
- [Using variables and variable sets](#) on page 110

# Overview of schema classes


Synchronization Editor displays a schema overview for each system connection. The schema overview contains all schema types and the derived schema classes used in the synchronization project. You can edit schema classes here.

## *To display the schema overview*


1. Edit the system connection properties.  
For more information, see [How to edit system connection properties](#) on page 103.
2. Open the **Schema classes** view.  
This displays the schema type and schema class structures.

# How to add schema classes

## *To create a schema class*

1. Edit the system connection properties.  
For more information, see [How to edit system connection properties](#) on page 103.
2. Open the **Schema classes** view.
3. Click  in the schema overview menu bar.
4. Edit the schema class properties.  
For more information, see [Schema class properties](#) on page 73.
5. Save the changes.

### ***To create a new mapping for a schema class***

1. Create a new mapping.  
For more information, see [How to create a mapping](#) on page 70.
2. Select **One Identity Manager schema class** or **Target system schema class**.
3. Click .
4. Edit the schema class properties.  
For more information, see [Schema class properties](#) on page 73.
5. Save the changes.

## **How to edit schema classes**

### **NOTE:**

- You can only edit customized schema classes.
- Modifications to schema classes in use can cause errors!

### ***To edit a schema class***

1. Edit the system connection properties.  
For more information, see [How to edit system connection properties](#) on page 103.
2. Open the **Schema classes** view.
3. Double-click on a schema class in the schema overview.
4. Edit the schema class properties.  
For more information, see [Schema class properties](#) on page 73.
5. Save the changes.

## **How to delete schema classes**

**NOTE:** Custom schema classes, which are not in use, can be deleted.

### ***To delete a schema class***

1. Remove the schema class from all mappings in which they are used.  
For more information, see [How to edit a mapping](#) on page 71.
2. Edit the system connection properties.  
For more information, see [How to edit system connection properties](#) on page 103.
3. Open the **Schema classes** view.

4. Select the schema class in the schema overview and click  in the toolbar.

If the schema class is still in use, the location is displayed.

5. Confirm the security prompt with **Yes**.

**TIP:** Compress the schema to remove unnecessary schema classes from the target schema or the One Identity Manager schema from the synchronization project. For more information, see [How to remove unnecessary project data](#) on page 53.

## Customizing the synchronization configuration

Having used the project wizard to set up a synchronization project for initial synchronization of a target system, you can use the synchronization project to load target system objects into the One Identity Manager database. These objects can be edited with One Identity Manager tools. You must customize synchronization configuration in order to compare the database with the target system regularly and to synchronize changes. You can configure a synchronization project such that the necessary information about the direction of synchronization, objects to synchronize, and the property mapping rules to be applied, is made available when synchronization starts.

Edit the target system connection scope and the One Identity Manager database connection to specify which target system and database object are handled by synchronization. To prevent data inconsistencies, define the same scope in both systems. If no scope is defined, all objects will be synchronized.

You can use variables to create generally applicable synchronization configurations that contain the necessary information about the synchronization objects when synchronization starts. Variables can be implemented in base objects, schema classes, or processing methods, for example.

Use variables to set up a synchronization project for synchronizing different target systems. For this, connection parameters for logging onto target systems are stored as variables.

## Checking the consistency of the synchronization configuration

Before activating a synchronization project, check the consistency of the synchronization configuration. The consistency check detects configuration errors which would lead to errors during synchronization. The synchronization project cannot be activated until the configuration error are corrected.

The consistency check amongst others whether:

- All mandatory properties are mapped through property mapping rules.
- Dependencies can be automatically resolved in workflows.
- Different schema classes of a schema type are differentiated from one another by filters.



### ***To check consistency the loaded synchronization project***

1. Select the **General** view on the start page.
2. Click on **Verify project**.

## **Activating the synchronization project**

Once you have collected all the data in the synchronization project you require for synchronizing from the One Identity Manager database to a target system, you must activate the project. This optimizes the size of the synchronization project. Data is removed which is not required, for example, unused schema types. Synchronization can be run after activating.

**Table 66: Meaning of icons on the start page**

Icon	Meaning
	The synchronization project is activated.
	The synchronization project is deactivated.

### ***To activate the loaded synchronization project***

1. Select **General** on the start page.
2. Click **Activate project**.

**NOTE:** This runs a consistency check. If consistency errors occurs, a message appears. You can decide whether the project is activated or not.

Check the errors before you use the synchronization project. In the **General** view, click **Verify project**.

An activated synchronization project can only be edited to a limited extend. The schema in the synchronization project must be updated if schema modifications are required. The synchronization project is deactivated in this case and can be edited again.

Furthermore, the synchronization project must be deactivated if synchronization should not be started by any means (not even manually).

### ***To deactivate the synchronization project***

1. Open the synchronization project in the Synchronization Editor.
2. Select the **General** view on the start page.
3. Click **Deactivate project**.



## Related topics

- [Checking the consistency of the synchronization configuration](#) on page 127
- [System connection properties](#) on page 104
- [How to remove unnecessary project data](#) on page 53
- [Updating schemas](#) on page 54

# Defining start up sequences

In the Synchronization Editor, you can define start up sequences across synchronization projects for full synchronization. Start up sequences order start up configurations for different target systems into a sequence. The synchronization projects are executed automatically in the given order.

### Example

Shortly after synchronizing personnel planning data from an SAP HCM system, always synchronize the SAP R/3, Active Directory, Privileged Account Management, and G Suite systems. Personnel planning data should be synchronized daily.

To do this, the start up configuration for the SAP HCM system and the start up configuration for all other target system are group together in a start up sequence. The start up configuration for SAP HCM is positioned at the top. A schedule is assigned that starts the start up sequence daily.





Specify whether each start up configuration is allowed to start after the previous synchronization has completed or at the same time as the previous start up configuration.

## Detailed information about this topic

- [Creating start up sequences](#) on page 130
- [Editing start up sequences](#) on page 130
- [Deleting start up sequences](#) on page 131
- [Start up sequence properties](#) on page 131
- [Executing start up sequences](#) on page 136
- [Monitoring start up sequences](#) on page 136

# Creating start up sequences

## *To create a start up sequence*







1. In the Synchronization Editor, select the **Database | Manage start up sequences** menu item.
2. In the **Sequences** pane, click .
3. Enter the start up sequence's master data.
4. Select the start up configuration to run by clicking .
5. To edit the start up configuration's properties, click .
6. To save the start up sequence, click .

## Detailed information about this topic

- [Start up sequence properties](#) on page 131

# Editing start up sequences

## *To edit a start up sequence*


1. In the Synchronization Editor, select the **Database | Manage start up sequences**.
2. In the **Sequences** pane, double-click the start up sequence.
3. Edit the start up sequence's master data.
4. To add a start up configuration to the start up sequence, select the start up configuration and click .
5. To remove a start up configuration from the start up sequence, select the start up configuration and click .
6. To edit the start up configuration's properties, click .
7. To change the order of the start up configurations, select a start up configuration and click  or .
8. To save the changes, click .

## Detailed information about this topic

- [Start up sequence properties](#) on page 131

# Deleting start up sequences

## To delete a start up sequence

1. In the Synchronization Editor, select the **Database | Manage start up sequences**.
2. In the **Sequences** pane, double-click the start up sequence.
3. In the **Included start up information**, click .
4. Confirm the security prompt with **Yes**.

This deletes all instances of the start up sequence.

## Related topics

- [Monitoring start up sequences](#) on page 136

# Start up sequence properties

Enter the following properties for a start up sequence.

**Table 67: General start up sequence properties**

Property	Description
Name	Name of the start up sequence.
Schedule	Schedule for starting synchronization. Ensure that start up configurations that are used in start up sequences are not started individually at the same time. Assign the start up sequence to a schedule that is not used in any of the start up configurations.
Allow multiple starts	Specifies whether this start up sequence can be started more than once. Ensure that no other synchronization is started for the same target system as long as synchronization is running. Example: A start up sequence is triggered daily. Even if the start up sequence has not ended after 24 hours, it should be started again. If each start up configuration synchronizes another target system, you can set the <b>Allow multiple starts</b> option. If the option is not set, the start up sequence is not restarted until the current instance is finished.
Description	Text field for additional explanation.

You can set the properties of each the selected start up configurations.

**Table 68: Start up configuration properties in a start up sequence**

Property	Description
Runs simultaneously	<p>Specifies whether this start up configuration can be started at the same time as the previous start up configuration. Use this option to synchronize projects in parallel that are started from different synchronization servers.</p> <p>Do not set this option if the start up configurations handle the same target system objects.</p>
Sequence quits on error	<p>Specifies whether the start up sequence is canceled if an error occurs running this start up configuration.</p> <p>If the option is set, instances of the start up sequence are still displayed in the Synchronization Editor after synchronization has quit.</p>

### Example

Shortly after synchronizing personnel planning data from an SAP HCM system, always synchronize the SAP R/3, Active Directory, Privileged Account Management, and G Suite systems. Personnel planning data should be synchronized daily.

Even if the start up sequence has not ended after 24 hours, it should be started again.

The target systems SAP R/3, Active Directory, Privileged Account Management, and G Suite can be synchronized in parallel. They cannot, however, be started before SAP HCM has finished synchronizing.

The start up sequence contains the following configuration:

- **Schedule:** daily
- **Allow multiple starts:** set
- Order of start up configurations:
  1. SAP HCM System  
**Runs simultaneously:** not set
  2. SAP R/3 client  
**Runs simultaneously:** not set
  3. Active Directory domain  
**Runs simultaneously:** set
  4. One Identity Safeguard Appliance  
**Runs simultaneously:** set

## 5. G Suite Domain

**Runs simultaneously:** set

### Detailed information about this topic

- [Specifying a schedule](#) on page 119
- [Monitoring start up sequences](#) on page 136
- [Running synchronization](#) on page 134

## Running synchronization

Synchronization is started using scheduled process plans. It is possible to start synchronization manually in the Synchronization Editor. You can simulate synchronization beforehand to estimate synchronization results and discover errors in the synchronization configuration. If synchronization was terminated unexpectedly, you must reset the start information to be able to restart synchronization.

**IMPORTANT:** As long as a synchronization process is running, you must not start another synchronization process for the same target system. This especially applies, if the same synchronization objects would be processed.

- If another synchronization process is started with the same start up configuration, the process is stopped and is assigned **Frozen** status. An error message is written to the One Identity Manager Service log file.
  - Ensure that start up configurations that are used in start up sequences are not started individually at the same time. Assign start up sequences and start up configurations different schedules.
- Starting another synchronization process with different start up configuration that addresses same target system may lead to synchronization errors or loss of data. Specify One Identity Manager behavior in this case, in the start up configuration.
  - Use the schedule to ensure that the start up configurations are run in sequence.
  - Group start up configurations with the same start up behavior.

If you want to specify the order in which target systems are synchronized, use the start up sequence to run synchronization. In a start up sequence, you can combine start up configurations from different synchronization projects and specify the order of execution.

### Detailed information about this topic

- [Simulating synchronization](#) on page 135
- [Starting synchronization manually](#) on page 135
- [Executing start up sequences](#) on page 136
- [Handling unexpected termination of synchronization](#) on page 137
- [Grouping](#) on page 117

# Simulating synchronization

You can simulate synchronization before using a start up configuration to execute it. Simulation allows you to estimate the result of synchronization. This means you can recognize potential errors in the synchronization configuration, for example. Reactions from the connected system and its consequences cannot be incorporated because simulation cannot modify data.

Simulation executes the following actions:

- Creates execution plan
- Connects to the target system and One Identity Manager database
- Loads system objects
- Logs write operations for objects and their properties but does not execute

Dependent objects and schema properties cannot be resolved if the objects already exist in the connected system. Unresolvable dependencies are logged.

**IMPORTANT:** Simulation changes data in neither One Identity Manager nor the target system. However, large amounts of data are read from both systems. This can affect system performance and processing.

All the data to be processed remains in the memory of the workstation running the simulation until the simulation is complete. Demands on memory may be heavy depending on the amount of data.

## ***To start simulation***

1. Select the **Configuration | Start up configurations** category.
2. Select a start up configuration in the document view and click **Simulate....**
3. Click **Start simulation**.
4. Confirm the security prompt with **Yes**.

A report is displayed after simulation has completed. You can save the report.

# Starting synchronization manually

## ***To start synchronization manually***

1. Open the synchronization project in the Synchronization Editor.
2. Select the **Configuration | Start up configurations** category.
3. Select a start up configuration in the document view and click **Execute**.
4. Confirm the security prompt with **Yes**.

## Related topics

- [Executing start up sequences](#) on page 136

# Executing start up sequences

By default, start up sequences are started using scheduled process plans. In the Synchronization Editor, it is also possible to start a start up sequence manually.

### *To start a start up sequence manually*

1. In the Synchronization Editor, select the **Database | Manage start up sequences**.
2. In the **Sequences** pane, double-click the start up sequence.
3. In the **Included start up information**, click ►.

## Related topics

- [Defining start up sequences](#) on page 129
- [Monitoring start up sequences](#) on page 136
- [Starting synchronization manually](#) on page 135

# Monitoring start up sequences

Once a start up sequence is running, an instance of the start up sequence is added in the DPRStartSequence table. This instance contains information about the runtime status and errors of the entire start up sequence. A DPRStartSequenceHasProjection table is also saved for every start up configuration that is run. This instance contains information about the runtime status and errors of the current synchronization.

Instances can be shown and monitored in the Synchronization Editor. The following instances are shown:

- Start up sequences that are still running.
- Start up sequences that quit on error assuming at least one start up configuration has the **Sequence quits on error** option set.

### *To display a start sequence instance*

1. In the Synchronization Editor, select the **Database | Manage start up sequences** menu item.
2. In the **Sequences** pane, click ▼.
3. Double-click on the start up sequence instance.



In the **Included startup information** view, you can see the runtime status of all the associated start up configurations.

4. To update the view, in the **Sequences** toolbar, click .

**Table 69: Runtime status of an instance**

Color	Description	Progress state
White	The instance is created.	Created
Green	The start up configuration is waiting to run.	Pending
Yellow	Synchronization is running.	Running
Gray	Synchronization has successfully completed	Processed
Red	Synchronization ended with an error.	Error

Instances of completed start up sequences are deleted after a specified time period. The `DPRStartSequence` and `DPRStartSequenceHasProjection` tables are cleaned up in the process. By default, completed instances are kept for seven days.

#### ***To change the retention period for completed instances***

- In the Designer, set the **DPR | StartSequence | LifeTime** configuration parameter and enter the maximum retention period.

#### **Related topics**

- [Deleting start up sequences](#) on page 131
- [Start up sequence properties](#) on page 131

## Handling unexpected termination of synchronization

If synchronization is executed with a start up configuration, some One Identity Manager processes are stopped. It is not possible to start this start up configuration again. The One Identity Manager saves start information of the current synchronization in the database. This start information is reset once synchronization is completely normally.

If synchronization was terminated unexpectedly, for example, a server was no available, you must manually reset the start information. You can only restart synchronization after this.

**IMPORTANT:** Start information may not be reset if synchronization is running normally.

Before you reset the start information, ensure that synchronization has really been aborted.

### ***To reset synchronization start information***

1. Select the **Configuration | Start up configurations** category.
2. Select a start up configuration in the document view and click **Reset**.
3. Confirm the security prompt with **Yes**.

The status "Broken" is entered in the synchronization log.

**NOTE:** If necessary, start information can be reset automatically. To do this, customize the process `DPR_DPRProjectionStartInfo_Run_Synchronization`. Changes made to the process are applied to all target systems connected to the One Identity Manager database when synchronization takes place.

## **Resetting revisions**

Synchronization with revision filtering involves finding object pairs where one has newer change information than the last time it was synchronized. It may also be necessary to process those objects during synchronization, whose change information has not be updated since the last synchronization. This might be required if changes to data were made without the change information for the object being updated, for example. It is possible that data in one of the connected systems was restored from a backup. This means the change information for the objects is now older than before the last synchronization. Such objects are not processed by synchronization with revision filtering.

One Identity Manager provides an option to reset revision numbers in a start up configuration. The revision can be reset for one schema type or for all of a schema's types. The next time synchronization is run with this start up configuration, all affected objects are seen as changed.

### ***To reset the revision number***

1. Select the category **Configuration | Start up configurations**.
2. Select a start up-configuration in the document view and click **Revisions...**  
This opens the **Manage revisions...** dialog window, which displays all the schema types with their respective revision numbers. Schema types without a revision number, are not displayed.
3. Select the schema for which you want to reset the revision number.  
- OR -  
From the target system schema or the One Identity Manager schema, select the schema type for which you want to reset the revision.
4. Click **Reset**.
5. Select another schema type if required.
6. Click **Apply**.
7. Confirm the security prompt with **Yes**.

The revisions of the selected schema types are deleted from the start up configuration.

## Related topics

- [How does revision filtering work?](#) on page 38







## Synchronization analysis

Synchronization results are summarized in the synchronization log. You can specify the extent of the synchronization log for each system connection individually. One Identity Manager provides several reports in which the synchronization results are organized under different criteria.

### Toolbars in the log view

The navigation view in the **Logs** category has its own toolbar.


**Table 70: Meaning of icons in the navigation view**

Icon	Meaning
	Reload the data.
	Display synchronization log.
	Display provisioning log.
	Only display most recent logs. This display logs from within the past 24 hours.
	Sort by execution time.
	Sort by execution status.


## How to display synchronization logs

### *To display a synchronization log*

1. Open the synchronization project in the Synchronization Editor.
2. Select the **Logs** category.

3. Click  in the navigation view toolbar.  
Logs for all completed synchronization runs are displayed in the navigation view.
4. Select a log by double-clicking it.  
An analysis of the synchronization is shown as a report. You can save the report.

### ***To display a provisioning log***

1. Open the synchronization project in the Synchronization Editor.
2. Select the **Logs** category.
3. Click  in the navigation view toolbar.  
Logs for all completed provisioning processes are displayed in the navigation view.
4. Select a log by double-clicking it.  
An analysis of the provisioning is shown as a report. You can save the report.

The log is marked in color in the navigation view. This mark shows you the status of the synchronization/provisioning.

**TIP:** The logs are also displayed in the Manager under the **<target system> | synchronization log** category.

## **Target system synchronization**

Objects, which do not exist in the target system, can be marked as outstanding in One Identity Manager by synchronizing. This prevents objects being deleted because of an incorrect data situation or an incorrect synchronization configuration.

Outstanding objects:

- Cannot be edited in One Identity Manager.
- Are ignored by subsequent synchronizations.
- Are ignored by inheritance calculations.

This means, all memberships and assignments remain intact until the outstanding objects have been processed.

Start target system synchronization to do this.

### ***To post-process outstanding objects***




1. Start the Manager.
2. Select the **<target system type> | Target system synchronization: <target system type> | <table>** category.

**TIP:**

### **To display object properties of an outstanding object**

- a. Select the object on the target system synchronization form.
  - b. Open the context menu and click **Show object**.
3. Select the objects you want to rework. Multi-select is possible.
  4. Click on one of the following icons in the form toolbar to execute the respective method.

**Table 71: Methods for handling outstanding objects**

Icon	Method	Description
	Delete	The object is immediately deleted from the One Identity Manager database. Deferred deletion is not taken into account. The <b>Outstanding</b> label is removed from the object. Indirect memberships cannot be deleted.
	Publish	The object is added to the target system. The <b>Outstanding</b> label is removed from the object.  The method triggers the HandleOutstanding event. This runs a target system specific process that triggers the provisioning process for the object.  Prerequisites: <ul style="list-style-type: none"><li>• The table containing the object can be published.</li><li>• The target system connector has write access to the target system.</li><li>• A custom process is set up for provisioning the object.</li></ul>
	Reset	The <b>Outstanding</b> label is removed for the object.

5. Confirm the security prompt with **Yes**.

**NOTE:** By default, the selected objects are processed in parallel, which speeds up execution of the selected method. If an error occurs during processing, the action is stopped and all changes are discarded.

Bulk processing of objects must be disabled if errors are to be localized, which means the objects are processed sequentially. Failed objects are named in the error message. All changes that were made up until the error occurred are saved.

### **To disable bulk processing**

- In the form's toolbar, click  to disable bulk processing.

For more detailed information about post-processing outstanding objects from connected target systems, see the target system connection guides.

# Deleting memberships

Membership of user accounts in groups, for example, can result from direct assignment or through inheritance in One Identity Manager. The membership's origin is stored in the `XOrigin` assignment table. Inherited memberships cannot be deleted as long as the inheritance source still exists. If inherited memberships are deleted in the target system, they are marked as outstanding by synchronization, depending on which processing method was selected.

You can differentiate between the following cases of deleting membership through synchronization:

**Table 72: Deleting memberships**

Membership origin	Delete method	MarkAsOutstanding method
Only direct	The membership is deleted immediately by synchronization.	The membership is marked as outstanding by synchronization.
Only inherited	The membership is marked as outstanding by synchronization.	The membership is marked as outstanding by synchronization.
Direct and inherited	The membership is marked as outstanding by synchronization. The reference to direct assignment is removed (value in the <code>XOrigin</code> column is updated).	The membership is marked as outstanding by synchronization.

Outstanding memberships must be post-processed separately. You can publish these memberships if the inheritance source still exists or you set the status back and remove the inheritance source.

## Example

Ben King has an Active Directory user account that is a member of the Active Directory group "Backup operators". This membership is loaded into the One Identity Manager database by initial synchronization and saved as direct membership in the `ADSAccountInADSGroup` table (`XOrigin` = '1'). Ben King is member of the business role "Project A". This business role is assigned to the Active Directory group "Backup operators". Therefore, Ben King becomes an indirect member of this Active Directory group (`ADSAccountInADSGroup.XOrigin` = '3'). The group membership is deleted in the target system. The deleted membership is immediately deleted in the One Identity Manager database the next time synchronization is run (`ADSAccountInADSGroup.XOrigin` = '2'). The membership is marked as outstanding because it remains in the One Identity Manager database due to inheritance. The outstanding membership must be post-processed in target system synchronization. There are two possible ways to do this:

- a. Assignments to the business role "Project A" are correct.  
The method "Publish" is applied. Membership is re-added to the target system.
- b. Mapping in the target system is correct.
  - The method "Reset status" is applied.
  - The assignment of the Active Directory group to the business role "Project A", or Ben King's membership of this business role must be deleted. The group membership must also be deleted from ADSAccountInADSGroup table.

The method "Delete" cannot be applied.

### Related topics

- [Deleting objects in One Identity Manager](#) on page 51
- [Target system synchronization](#) on page 141

## Help for the analysis of synchronization issues

You can generate a report for analyzing problems that arise during synchronization, inadequate performance for example. The report contains information such as:

- Consistency check results
- Revision filter settings
- Scope applied
- Analysis of the data store
- Object access times in the One Identity Manager database and in the target system

### ***To generate a synchronization analysis report***

1. Select the **Help | Generate synchronization analysis report** menu item and click **Yes** in the security prompt.  
The report may take a few minutes to generate. It is displayed in a separate window.
2. Print the report or save it in one of the available output formats.



## Setting up synchronization with default connectors

One Identity Manager provides connectors for synchronizing with the following target systems:

- Native supported target systems

Separate modules are provided for mapping and processing target system objects. Each target system has its own connector. This includes, for example, the following target systems:

- Active Directory
- SharePoint
- SAP R/3

Connectors for natively supported target systems are described in the administration guides for the relevant modules.

- Cloud applications

Using the SCIM connector, Cloud applications can be connected to the Universal Cloud Interface Module of the One Identity Manager. Cloud objects are transferred to the Universal Cloud Interface over the Cloud Systems Management Module and can be linked there to employees.

For detailed information, see the following guides:

- One Identity Manager Administration Guide for Connecting to Cloud Applications
- One Identity Manager Administration Guide for Connecting to the Universal Cloud Interface

- CSV files

The CSV connector can transfer data between CSV files and the One Identity Manager database. In this context, the CSV files map the target system.

For more detailed information, see the One Identity Manager CSV Connector User Guide.

- One Identity Manager databases

Use the One Identity Manager connector to synchronize One Identity Manager databases with the same product version.

For more detailed information, see the One Identity Manager User Guide for the One Identity Manager Connector.

- Target systems that are not natively supported

You can use the Windows PowerShell connector to connect target systems to One Identity Manager that do not have native support in One Identity Manager. Windows PowerShell cmdlets are used to execute read/write operations in the target system.

For more detailed information, see the One Identity Manager Windows PowerShell Connector User Guide.

- Native database systems

With this native database connector, you can synchronize external databases with the One Identity Manager database.

For detailed information, see the following guides:

- One Identity Manager Native Database Connector User Guide for Connecting DB2 (LUW) Databases
- One Identity Manager Native Database Connector User Guide for Connecting MySQL Databases
- One Identity Manager Native Database Connector User Guide for Connecting Oracle Databases
- One Identity Manager Native Database Connector User Guide for Connecting SQLite Databases
- One Identity Manager Native Database Connector User Guide for Connecting SQL Server Databases
- One Identity Manager Native Database Connector User Guide for the CData ADO.NET Provider
- One Identity Manager Native Database Connector User Guide for the generic ADO.NET Provider
- One Identity Manager Native Database Connector User Guide for Connecting SAP HANA Databases

## Updating existing synchronization projects

Any required changes to system connectors or the synchronization engine are made available when you update One Identity Manager. These changes must be applied to existing synchronization projects to prevent target system synchronizations that are already set up, from failing. There are two ways to do this:

- Apply the required patches to the existing synchronization projects.

Patches for new functions and resolved issues in One Identity Manager are installed by hotfix packages and migration packages. You must apply these patches manually for the changes to take effect in existing synchronization projects. The default configuration of these synchronization projects is updated in the process. Custom modifications are not effected by the patches.

This method is recommended if the synchronization projects conform to the default configuration and contain no, or only very little, customization.

- Delete existing synchronization projects and create them again.

This method is recommended if your synchronization projects contain extensive customizations that might conflict with the modifications in the patches.

### Detailed information about this topic

- [Applying patches](#) on page 148
- [How to delete a synchronization project](#) on page 63

For more detailed information about setting up synchronization projects, see the administration guides for connecting target systems.

# Applying patches

**CAUTION:** Patches do not change customizations in synchronization projects. This means that conflicts may occur if patches are applied to synchronization projects, which have been customized. This may cause loss of data.

## *Before you apply a patch*

1. Read the patch description to decide whether it provides necessary improvements for the synchronization project.
2. Check whether conflict with customizations could occur.
3. Create a backup of the database so that you can restore the original state if necessary.
4. Deactivate the synchronization project.

**NOTE:** If synchronization projects are updated, connection parameters from the default variable set are always used. Ensure that the variables in the default variable set contain the correct values.

One Identity Manager has three patch types. All patches that are applied are displayed in the synchronization project's migration details. Once a milestone has been applied, the associated patches are not listed separately in the migration details anymore.

**Table 73: Patch types**

Patch type	Description
Optional features	Patch for optional functionality
Fix	Patch for solved problems.
Milestone	Milestones are provided with every new One Identity Manager version. A milestone is provided for each context, which includes all the solved issues of the previous version. It does not contain the optional features of the previous version.

Patches can be dependent on each other. These dependencies determine the order in which the patches are applied. When a patch is applied, the patches that are dependent on it are also applied. If a new version of One Identity Manager is installed, all patches for the version are consolidated into one milestone. If patches are available for different version of the program, the older patches must always be applied first. Therefore, One Identity Manager automatically applies all previous milestone once a patch for a later version is selected.

Patches and their dependencies are displayed in the patch view. The left side shows the patches that are available. The newest patches are at the top. Dependent patches are displayed below. In this area, select the patches that you want to apply to the current

synchronization project. Then the patches are displayed on the right-hand side, with all their predecessor in the order in which they will be applied.

Each patch contains a script which checks if the patch can be applied to the synchronization project. Whether or not a patch can be applied depends on the concrete synchronization configuration.

**Table 74: Meaning of icons in the rule tool bar**

Icon	Meaning
 Fixes	Shows patches with fixes.
 Optional features	Shows all patches for optional features.
	Shows all patches that cannot be applied to the synchronization project.
	Shows all patches that are already applied to the synchronization project.

Some patches required user input during installation, for example, to confirm that you really want a particular change to be executed.

### ***To apply patches***

1. Open the synchronization project in the Synchronization Editor.
2. Select **Edit | Update synchronization project...** from the menu.
3. Optional: Select the patches to be applied under **Available patches**. Multi-select is possible.  
In the patch detail view, patches are listed in the order in which they will be applied.
4. Click **Apply selected patches**.
5. Enter any user input as prompted.
6. If necessary, use the patch log to check whether customization need to be reworked.
7. If required, rework customizations in the synchronization configuration.
8. Run a consistency check.
9. Simulate the synchronization.
10. Activate the synchronization project.
11. Save the changes.

**NOTE:** A patch does not take effect until the changes associated with it are saved in the database. If consistency check or simulation errors occur that cannot be corrected, you can dismiss the patch changes by reloading the synchronization project without saving the changes.

## Related topics

- [General properties of a synchronization project](#) on page 63
- [Automatic patches](#) on page 150

# Automatic patches

Patches can be labeled as automatic patches. All existing synchronization projects are migrated after One Identity Manager is updated, for example, with a service pack. This updates the One Identity Manager schema and applies automatic patches. A process is queued in the Job queue to do this. After the One Identity Manager update, you should check whether the process `DPR_Migrate_Shell` was run successfully. If a patch could not be applied, for example because the target system was not available, you can apply the patch manually later.

A Job server is found to migrate existing synchronization projects. To do this, the synchronization server is determined from base object that is assigned to the synchronization project's default variable set. If a synchronization server cannot be found, the Job server carries out the migration using the **Update server** server function. In order to execute the migration process, the One Identity Manager Service must be started on all Job servers found in this way.

## Related topics

- [Applying patches](#) on page 148

## Script library for synchronization projects

You can apply scripts at various points in the synchronization project; for example, when defining the schema properties, in the object filter, or when you define data operations for system connections through the native database connector. For each synchronization project, you can build a separate script library. The scripts in these script libraries can be used everywhere where scripts are implemented in the synchronization configuration. You can create and maintain scripts centrally that are required for defining different synchronization configuration components.

You can import scripts into other synchronization projects. Scripts that you use in different synchronization projects you can label as script templates. The script templates are only maintained in one synchronization project. You can transfer any modification to other synchronization projects as required.

**NOTE:** Scripts from the One Identity Manager script library are not available in the Synchronization Editor's script library. For detailed information about the One Identity Manager script library, see *One Identity Manager Configuration Guide*.

### To display a synchronization project's script library

1. In the Synchronization Editor, open the synchronization project.
2. Select the **Configuration | Script library** category.

### Detailed information about this topic

- [Adding scripts to script libraries](#) on page 153
- [Editing scripts in the script library](#) on page 154
- [Using scripts across projects](#) on page 155






## Views in the script library

The Synchronization Editor's script library has two views. The **Scripts** view provides an overview of all general properties of the scripts. The scripts are edited in the **Editor** view.

## Script views

This lists all the scripts in the script library with all their general properties. You can update scripts that were created from script templates.

**Table 75: Icons in the script view**

Icon	Meaning
 Add	Create a new script.
 Edit	Edit the selected script's general properties.
 Delete	Deletes the selected script.
 Import ▼	Imports scripts from other synchronization projects.
	Updates scripts with changes from script templates.



**Table 76: General properties of scripts**

Property	Description
Script	Name of script.
Description	Text field for additional explanation.
Schema type	Schema type that the script is used on.
Is template	Script can be used as a template for other synchronization projects.
Uses template	Script was imported from another script template.
Updates available	Script template used as basis for the script has changed.
Updates differences	Shows the changes to the script template.
Updates apply	Updates the script with the changes from the script template.

## Editor view

Show the code of the selected script. It can be edited and compiled. For more information, see [Support for scripting](#) on page 21.

**Table 77: Icons in the editor view**

Icon	Meaning
	Saves changes to the script.
 Compile	Compiles all the scripts in the script library.
	✓ Script was compiled without errors.
	✗ Script contains syntax errors.



## Detailed information about this topic

- [Adding scripts to script libraries](#) on page 153
- [Editing scripts in the script library](#) on page 154
- [Using scripts across projects](#) on page 155

# Adding scripts to script libraries

To add scripts to the Synchronization Editor's script library, create the scripts directly in the script library or take them from script properties. You can import all scripts into other synchronization projects.

### *To add a script to the script library*

1. Open the script library.
2. In the **Scripts** view, click **Add**.
3. Enter the script's general master data.
  - **Name:** Unique script name.
  - **Schema type:** Schema type that the script is applied to.
  - **Description:** Text field for additional explanation.
  - **Is template:** Specifies whether the script can be used as a template for other synchronization projects.
4. In the **Editor** view, edit the script.  
For more information, see [Support for scripting](#) on page 21.
5. Click **OK**.

### *To import a script*

1. Open the script library.
2. In the **Scripts** view, click **Import**.
3. Select the script to import.  
This saves a copy of the script that you can customize to fit the project.

### *To copy script properties from other scripts*

1. Select the **Mappings** category.
2. Select a mapping in the navigation view.
3. Double-click on the schema property in the schema view.
4. In the **Edit property** dialog, click **Move to script library**.
5. Confirm the security prompt with **Yes**.

6. Click **OK**.

This saves a new script in the script library. The name of the script is taken from the technical name of the schema type and the name of the schema property. This script contains a read-only schema property script as well as a write-only schema property script.

## Related topics

- [Script library for synchronization projects](#) on page 151
- [Editing scripts in the script library](#) on page 154

# Editing scripts in the script library

## *To edit a script's master data*

1. Open the script library.
2. Select the script in the **Script** view.
3. Click **Edit**.
4. Edit the script's general master data.
  - **Name**: Unique script name.
  - **Schema type**: Schema type that the script is applied to.
  - **Description**: Text field for additional explanation.
  - **Is template**: Specifies whether the script can be used as a template for other synchronization projects.
5. Click **OK**.

## *To edit the script*

1. Open the script library.
2. Select the script in the **Script** view.
3. Edit the script in the **Editor** view.

For more information, see [Support for scripting](#) on page 21.
4. Click .

## *To compile the script.*

1. Open the script library.
2. Click **Compile**.

This compiles all the scripts in the scrip library.

### ***To remove a script from the scrip library.***

1. Open the script library.
2. Select the script in the **Script** view.
3. Click **Delete**.
4. Confirm the security prompt with **Yes**.

### **Related topics**

- [Script library for synchronization projects](#) on page 151

## **Using scripts across projects**

You can import scripts can be imported into other synchronization projects and customize them there. Sometimes you can use scripts for the same synchronization projects without having to change them. Scripts like this are maintained centrally and changes are transferred to the other synchronization projects as required. Mark scripts to use in across projects as script templates.

### ***To mark a script as a script template***

1. Open the script library.
2. Select the script in the **Script** view.
3. Click **Edit**.
4. Edit the script's general master data.
  - Enable the **Is template** option.
5. Click **OK**.

### ***To import a script template into another synchronization project***

1. Open the synchronization project you want import the script template into.
2. Open the script library.
3. In the **Scripts** view, click **Import**.
4. Select the script template you want to import.

This saves a copy of the script.

You can see if the script template was changed in the script. You can decided if changes to these copies are accepted.

### ***To view the script template changes***


1. Open the script library.
2. Select the imported script in the **Scripts** view.

3. In the **Updates | Differences** column, click **Show**.

***To apply script template changes to the copy***

1. Open the script library.
2. Select the imported script in the **Scripts** view.
3. In the **Updates | Apply** column, click **Apply**.

***To apply the all script templates changes***

1. Open the script library.
2. In the **Scripts** view, click .
3. Confirm the security prompt with **OK**.

**Related topics**

- [Script library for synchronization projects](#) on page 151

## Additional information for experts

**NOTE:** The following functions should only be carried out by experienced Synchronization Editor users and system administrators.

The properties and processes described here are only available in expert mode.

**IMPORTANT:** Changes to properties described here may affect system performance.

Check the effects on system performance of you environment before you change properties in expert mode.

### To enable expert mode

1. Select the **Database | Settings...** menu item.
2. Enable **Enable expert mode**.
3. Click **OK**.

## Additional properties of a mapping

Enter the following additional property for a mapping when you are in expert mode.

**Table 78: Properties of a mapping**

Properties	Meaning
Base mapping	Property mapping rules can be inherited from a existing mapping. Select a mapping from the menu for this. Inherited property mapping rules can only be editing in the base mapping. Other property mapping rules can be added.  This is only visible in expert mode.

### Related topics

- [Properties of a mapping](#) on page 71

# Extended properties for start up configuration

In expert mode, the tab **Advanced** is displayed in the start up configuration dialog.

**Table 79: Extended properties for start up configuration**

Property	Description
Failure handling mode	<p>Specifies how failed objects are handled during synchronization.</p> <ul style="list-style-type: none"><li>• Repeat (default) Synchronization is repeated until the failed objects do not yield any changes. Advantage: This results in a full synchronization. Certain, highly complex hierarchical structures cannot only be synchronized in this mode. Disadvantage: Synchronization in this mode takes considerably longer if a failed object arises.</li><li>• Ignore The synchronization ignores failed objects. Advantage: Synchronization does not take longer because of failed objects that cannot be corrected by repeating (data error). Disadvantage: Errors, which can occur through complex data dependencies, are no longer corrected. The synchronization results may therefore not be complete.</li></ul> <p><b>NOTE:</b> Repetitions of failed objects means a reduced synchronization. It makes sense to ignore failed objects if synchronization with this start up configuration is run frequently because the failed objects are processed again by the next synchronization. This also achieves full synchronization results and at the same time reduces the runtime of each synchronization.</p>
Reload threshold	<p>Specifies the maximum number of properties that can be loaded by synchronization to prevent partitioned reloading. You can increase this value to accelerate synchronization of target systems with small mappings. However, more memory is required.</p> <p>The reload threshold can be specified separately for each synchronization step.</p>
Partition size	<p>Specifies the number of objects and object pairs the can be processed at the same time. To prevent frequent reloading and to speed up synchronization, you can increase the size of the partition. However, more memory is required.</p>

Property	Description
Bulk level	Controls internal bulk processing of data. For example, this is used to calculate how much object data is buffered in main memory. Depending on the operations to be run, a multiple of the value may be applied.  Higher values speed up processing but require more memory. Smaller values reduce memory usage. This value should only be reduced if synchronizing causes memory problems.
Debug mode	Sets debug mode. Processing steps are handled sequentially in debug mode. This makes it much easier to find errors. Only set this option for finding errors!

**TIP:** If memory problems occur, you should examine the reload threshold, partition size, and bulk level together and adjust them.

The reload threshold, partition size, and the bulk level also depend on how the performance/memory factor is configured in the synchronization steps. The performance/memory factor specifies the percentage with which the reload threshold, partition size, and bulk level are applied to an object type.

### Detailed information about this topic

- [Processing synchronization steps](#) on page 171
- [Performance and memory optimization](#) on page 58

### Related topics

- [Setting up start up configurations](#) on page 115
- [Extended synchronization step properties](#) on page 101

## Using the local cache

Some connectors support the use of local cache. If you enable this cache, the connector loads all the necessary data into a local database after the connection has been established with the target system. The data is loaded for each schema type. The data required for synchronization are then supplied by the local database.

The aim is, to replace numerous small single read accesses to the target system by one large one. This can significantly increase the performance of target system synchronization where individual accesses need a lot of time but list access can be relatively quickly handled. This is generally the case for cloud-based target systems. Apart from that, the cache reduces the number of queries to the target system. The cache should, therefore, be used for target systems where the number of queries is limited through quotas.

It does not always make sense to use the cache. When synchronizing with revision filtering, which is executed at short intervals, you can expect few accesses to the target

system. Filling the cache in this case, might cost more time than the sum of all system accesses without caching.

**TIP:** Use the cache for initial and the next synchronization after that as well as synchronization without revision filtering.

Cache is only used for synchronization.


The cache database is added in the user's 'temp' directory and deleted after the system is disconnected. Schema type contents with sensitive data (if known) are encrypted with the "Data Protection API" with the current user's key.

You specify whether the local is used in the target system connection settings. For more information, see the One Identity Manager administration guides for connecting to target systems that support local caching.

## Schema browser

In addition to the schema overview, the Synchronization Editor provides a schema browser in expert mode. The details of the connected target system's entire schema and the details of the entire One Identity Manager schema are shown in the schema browser. Schema types, schema properties, and the processing methods available are displayed in a hierarchical structure. The schema can be saved as XML for error analysis.

### **To save a schema**


1. Select **Configuration | One Identity Manager connection**.  
- OR -  
Select **Configuration | Target system**.
2. Open the **Schema browser** view.  
This display the entire schema of the connected system in a hierarchical structure.
3. In the schema browser menu bar, click .
4. Enter a file name and repository.
5. Click **Save**.

## Schema editor


A schema editor is integrated into the schema browser. It is only available in expert mode and allows you to edit custom virtual schema properties.



### ***To open the schema editor***

1. Select the **Configuration | One Identity Manager connection** category.  
- OR -  
Select the **Configuration | Target system** category.
2. Open the **Schema browser** view.
3. In the schema browser menu bar, click .


### ***To add a custom schema property***

1. Select the schema in the **Schema** view to which you want to add a new virtual schema property.
2. Click **Add schema property**  in the **Action** pane.
3. Select the schema property type and edit its details.
4. Click **Create**.
5. Click **Commit to database** to save the changes.

### ***To edit a custom schema property***

1. Select the schema property in the **Schema** view.
2. Edit the schema property details.
3. Click **Apply changes**.
4. Click **Commit to database** to save the changes.

### ***To delete a custom schema property***

1. Select the schema property in the **Schema** view.
2. Click **Delete schema property**  in the **Action** bar.
3. Confirm the security prompt with **Yes**.
4. Click **Commit to database** to save the changes.

### **Detailed information about this topic**

- [Edit schema properties](#) on page 76

## **Using custom project templates**

You can make your own project templates based on existing synchronization projects. This is particularly useful if you want to use customized mappings or synchronization workflows in synchronization projects for other target systems. If you base a synchronization project on a custom project template, it includes all settings of the underlying synchronization project. To use the new project, you merely change the target system specific settings.

## Script language and supported scripts

A script language and the script languages, which are supported, are specified for the project template. These properties have different functions and can therefore, have different values.

Script language	Language that is used to write the project template's script. Only change a project template's script language if the script needs to be modified manually and a specific script language should be used to do this.
Supported script languages	Script languages to be used for scripts in synchronization projects created with this project template. <ul style="list-style-type: none"><li>• If a project template supports more than one script language, select the script language to use when you set up the synchronization project (only in expert mode).</li><li>• If you create a project template from an existing synchronization project, it only supports the script language of the underlying synchronization project.</li></ul>

## Related topics

- [Creating project templates](#) on page 162
- [Creating synchronization projects from a custom project template](#) on page 163
- [Specifying the script language in synchronization projects](#) on page 64

# Creating project templates

Project templates can be created in expert mode from existing synchronization projects. You can use these to create new synchronization projects with the project wizard.

**TIP:** Before you create a project template from an existing synchronization project, apply all available patches to the synchronization project and save the changes. For more information, see [Applying patches](#) on page 148.

### ***To create a project template***

1. Select **Edit | Create template....**
2. Enter the template properties.  
The values are preset with the properties of the open synchronization project.
3. Click **OK**.

**Table 80: Project template properties**

Property	Description
Display name	Name of the project template to display in the project wizard.
Script language	Language that is used to write the project template's script. Only change this setting if you want to manually change the script in the project template at a later date.
Description	Text field for additional explanation.

## Related topics

- [Creating synchronization projects from a custom project template](#) on page 163

# Creating synchronization projects from a custom project template

Take note of the following advice before creating a synchronization project:

**NOTE:** It is possible that project templates created with an older version of One Identity Manager are not compatible with the currently installed version. Errors may occur if these project templates are used. Recreate the project templates with the currently installed version of One Identity Manager.

**NOTE:** The script language of the synchronization project you want to set up, supports the project template script language.

Custom project templates can also be used if expert mode is not enabled.

## ***To create a synchronization project from a custom project template***


1. Create a new synchronization project with the project wizard.
  - a. Select the custom project template on the **Select project template** page.
  - b. On the **Synchronization base object** page, select the base object that is required for the synchronization and provisioning processes.
    - **Base object table:** Table to select the base object from, for example ADSDomain.
    - **Show more:** Shows tables for other target system types in the base table menu.
    - **Base object:** Object from the base table that forms the base object for synchronization and provisioning processes.

- **Proceed without a base object:** Synchronization does not require a specific base object.

Set this option, if the base object is not in the One Identity Manager database yet.

- c. On the **Synchronization server** page, select a synchronization server to execute synchronization.

If the synchronization server is not declared as a Job server in the One Identity Manager database yet, you can add a new Job server.

- i. Click  to add a new Job server.
- ii. Enter a name for the Job server and the full server name conforming to DNS syntax.
- iii. Click **OK**.

The synchronization server is declared as a Job server for the target system in the One Identity Manager database.

**NOTE:** After you save the synchronization project, ensure that this server is set up as a synchronization server.

- d. Enter the general setting for the synchronization project under **General**.

- **Display name:** Display name for the synchronization project.
- **Description:** Text field for additional explanation.

- e. Disable the **Activate and save the new synchronization project automatically** option on the last page of the project wizard.

The synchronization project should not be activated yet because it is not completely configured.

2. Changed the display names and description of the synchronization project if required.
3. Save the synchronization project in the database.

### ***To configure synchronization with this synchronization project***

1. Select the variables in the default variable set. Modify at least the value of variables with connection parameters.
2. Define the synchronization scope.
3. (Optional) If the base object does not yet exist in the One Identity Manager database, add the synchronization base object in the Manager. This might be the specific Active Directory domain to be synchronized, for example.
  - Specify the synchronization base object in the Synchronization Editor.  
Select the base table for the base object you just added and the synchronization server.
4. (Optional) In the Designer, check if the operations for provisioning and single objects synchronization have been added. This is the case if the base object was entered when the synchronization project was created from the custom project template. Otherwise, define the required single object operations in the Designer.

5. Specify the extent of the synchronization log.
6. Assign a schedule to the start up configuration.
7. Run a consistency check.
8. Activate the synchronization project.
9. Save the changes.

### Detailed information about this topic

- [How to edit variables](#) on page 112
- [How to create base objects](#) on page 122
- [How to edit a scope](#) on page 107
- [Specifying a schedule](#) on page 119
- [Configuring the synchronization log](#) on page 106
- [Checking the consistency of the synchronization configuration](#) on page 127
- [Activating the synchronization project](#) on page 128
- [Operations for provisioning and single object synchronization](#) on page 173

### Related topics

- [Creating project templates](#) on page 162

## Managing project templates

The Synchronization Editor provides an overview of all available project templates. Here you can edit display names and descriptions of custom project templates and delete project templates you no longer need.

### *To display a list of project templates*


1. Select **Database | Manage templates....**  
This menu item is only displayed in export mode.  
This opens the dialog window **Manage templates....**
2. To hide custom project templates, disable  in the dialog box toolbar.
3. To hide default project templates, disable  in the dialog box toolbar.

**Table 81: Project template properties**



Property	Description
Project template	Name of the project template.

Property	Description
Target system	Type of target system, which applies to the project template.
Supported versions	Version of the target system that are supported by this project template. If no value is displayed, the project template supports every version that can be connected with the target system connector. For detailed information, see the administration manuals for connection to the respective target system.
Description	Description of the project template.
Last change	Date of the last change to the project template.

### ***To edit a custom project template***

1. Enable  in the dialog box toolbar.
2. Select the project template.
3. Edit the display name or description in the **Properties** pane.
4. Click **Save and close**.
5. Confirm the security prompt with **Yes**.

### ***To delete a custom project template***

1. Enable  in the dialog box toolbar.
2. Select the project template.
3. Click  in the dialog box toolbar.
4. Confirm the security prompt with **Yes**.
5. Click **Save and close**.
6. Confirm the security prompt with **Yes**.

## **Include custom tables in the synchronization**

Custom schema extensions can be included in the synchronization configuration. Custom columns are automatically assigned to additional schema properties which can be included in the mapping. The following settings must be made in order to include custom tables that were created using the default project templates in synchronization projects.

### ***To prepare a custom table for synchronization***

1. In the Manager, assign a target system type to the custom table.
  - Specify whether outstanding objects can be published in post-processing.
2. In the Synchronization Editor, select a synchronization project and create a schema class for the custom table in the One Identity Manager schema.
3. In the Synchronization Editor, define the mapping and synchronization steps for the schema class.

For detailed information about target system types and post-processing outstanding object, see the target system connection guides.

### ***Integrate a custom table into provisioning processes***

- In the Designer, define the provisioning operations.  
Use the settings from other operations for the same target system and modify the following properties:
  - **Synchronization workflow:** Select the provisioning workflow.
  - **Table:** Select the custom table.

### ***Configuring single object synchronization for a custom table***

1. In the Designer, define the operations for single object synchronization.  
Use the settings from other operations for the same target system and modify the following properties:
  - **Name:** Read
  - **Synchronization workflow:** Select the synchronization workflow.
  - **Table:** Select the custom table.
2. In the Designer, assign the custom table to customizer `DPR.Customizer.ProjectorReadEntityLogic`.
3. Create a process in the Designer for the custom table.  
Use the settings from another read process for the same target system and modify the following properties.
  - Replace all references to the original table with a reference to the custom table.  
Process properties:
  - **Table:** Select the custom table.
  - **Event:** Read
  - **Pre-script for generating:** Pass the defined single object operation as a parameter to script `DPR_GetAdHocData`.

Process step properties:

- **Process task:** ProjectorComponent - UpdateProjection
- **Process information term:** Replace the display name of the object with the display name of the custom table.

For detailed information about setting up processes, see the *One Identity Manager Configuration Guide*.

4. Record the path to the base object of synchronization for the custom table in the Manager.

For detailed information about this, please consult the manuals for connecting target systems.

## Detailed information about this topic

- [How to add schema classes](#) on page 125
- [Operations for provisioning and single object synchronization](#) on page 173

## Related topics




- [Deleting objects in One Identity Manager](#) on page 51

# Validating scripts

You can apply scripts at various points in the synchronization project; for example, when defining the schema properties, in the object filter, or when you define data operations for system connections through the native database connector. You can enter scripts in C# or Visual Basic .NET depending on script's language, which was specified for the synchronization project.

You can use the available compiling and debugging functions to troubleshoot script.

**Table 82: Edit box buttons**

Button	Description
	Opens advanced edit mode.
	Checks the script's syntax.
Compile	✓ Script was compiled without errors.
	✗ Script contains syntax errors.
	Export the current script to a Visual Studio project.
Debug	This button is only available in "Edit schema properties" dialog window and in the system connection wizard for the native database connector.



## Compile

### *To verify the script's syntax*

1. Open the script in the Synchronization Editor.
2. Click **Compile**.

Compiler errors are shown immediately and written to in the Synchronization Editor's error log.

## Debug

The script is exported to a Visual Studio project for debugging. Once the project is run, the Synchronization Editor starts in debug mode and the script is tested.

## Prerequisites

- Visual Studio is installed on the workstation on which the Synchronization Editor is running.
- All changes to the synchronization project are saved.
- The debugger can be used in scripts that are used in:
  - Schema properties
  - Script variables
  - Data operations for system connections using the native database connector

### *To debug a script*

1. Open the script in the Synchronization Editor.
2. Click **Debug**.
3. Confirm the prompt with **OK**.
4. Start debugging in the Visual Studio project.
5. If necessary, correct the script in the Synchronization Editor's default mode.
6. Save the changes.

## Related topics

- [Support for scripting](#) on page 21
- [Error log](#) on page 189

# Starting synchronization

You can also start synchronization manually by either running it on your workstation or from the synchronization server. If you run synchronization from your workstation, you

cannot work with the Synchronization Editor until synchronization is complete. To be able to continue working with the Synchronization Editor during synchronization, run synchronization from the synchronization server.

### ***To start synchronization manually***

1. Open the synchronization project in the Synchronization Editor.
2. Select the **Configuration | Start up configurations** category.
3. Select a start up configuration in the document view and click **Execute**.
4. Confirm the security prompt with **Yes**.

## **Defining downstream processes**

Certain actions must be executed in the One Identity Manager database after synchronization has finished. For this, you can define additional processes in the tables, which return base objects. These additional processes are executed through the "PostSync" event, which is triggered in the process DPR\_DPRProjectionStartInfo\_Run\_Synchronization.

### ***To create a downstream process for synchronization***

1. In the Designer, select the **Process Orchestration** category.
2. Start Process Editor using the **Create a new process** task.  
This makes a new element for the process and opens it in the Process Editor.
3. Edit at least the following process properties.

Table: Table that returns the base object for the synchronization, for example ADSDomain.

Event: PostSync

4. Create the required process steps.  
For more information, see the One Identity Manager Configuration Guide.
5. Save the changes.

### **Examples**

- To automatically assign employees to Active Directory user accounts, the table ADSDomain contains the process ADS\_ADSDomain\_SearchAndCreate\_FullSync. The process is triggered by the event "PostSync".
- If group memberships cannot be resolved when an Active Directory domain is synchronized, the One Identity Manager finds the Active Directory SIDs of the user accounts. For this, there is the process ADS\_ADSDomain\_PostSync set on the table ADSDomain. The process is triggered by the event "PostSync".

# Processing synchronization steps

When a synchronization step is processed in a process plan, synchronization objects are determined and processed as follows:

1. Load slim list of objects to be synchronized

Objects to be synchronized are loaded according to the object matching rules from the target system and the One Identity Manager database. Only key properties, the revision property (if exists) and individually specified schema properties in the system connector are loaded in this case.

**TIP:** For systems whose schema type only have a few schema properties, this list can already be loaded with all schema properties. This can speed up synchronization.

You can configure the appropriate behavior in the start up configuration when in expert mode. Modify the reload threshold to do this. For more information, see [Extended properties for start up configuration](#) on page 158.

2. Use revision filter

Modified object pairs are filtered, if revision filtering is permitted and the target system supports revision filtering. The revision filter is applied to the slim list, which means objects that are already loaded. Therefore, objects that only exist in one of the connected systems are also processed.

3. Load lists of object pairs with all schema properties

One Identity Manager loads list of object and object pairs to be synchronized with all mapped schema properties. The lists are loaded in partitions with a fixed size. Once a partition (for example 1000 object pairs) has been loaded, they are processed asynchronously and at the same time the next partition is being loaded. Therefore, a maximum of two partitions are located in main memory at any time.

**TIP:** In expert mode, you can define the partition size in the start configuration. For more information, see [Extended properties for start up configuration](#) on page 158.

4. Use mapping

The moment a partition (for example, 1000 list pairs) have been loaded, the mapping is used for all objects and object pairs. Processing methods are subsequently executed according to the given condition.

## Detailed information about this topic

- [How does revision filtering work?](#) on page 38
- [Start up configuration properties](#) on page 116
- [Editing property mapping rules](#) on page 78
- [Specifying processing methods](#) on page 95

# Exporting a synchronization configuration

Synchronization projects created for a test database, for example, can be transported to a live database. You use the Database Transporter to do this. To use the synchronization project in the target database, check the connection credentials and change the synchronization configuration to match the target database's requirements.

## Prerequisite

- The schema of both One Identity Manager databases are identical. Customized schema extensions used in the mapping exist in both databases.

## To transport a synchronization project to another One Identity Manager database

1. Create a transport package for the synchronization project using the Database Transporter.
  - a. Set the **Transport synchronization projects** option.
  - b. To select the synchronization project, click **Select**.
    - Enable the synchronization project in the tree view and click **OK**. Multi-select is possible.
  - c. Click **Next**.

This exports the data.

**NOTE:** The transport package does not contain a root object, scheduled process plans, or assignments of schedules to start up configurations.

2. Import the transport package into the target database with the Database Transporter.

On the **Import configuration** page, configure the import.

- a. If there is a synchronization project in the target database already, configure here, which changes are imported into the target database.
  - **Do not change the start up configuration settings:** Specifies whether start up configurations, variables, and variable sets are imported.  
Set this option so that changes to these objects are not overwritten in the target database. If this option is not set, changes made to these objects in the target database are overwritten by the transport package.
  - **Details:** Shows an overview of all the objects with their change status. Click **Details** to show the overview.

To show details of the modification, expand the respective node in the **Objects** column. To exclude certain object changes from the import package, disable the object.

- b. Click **Next**.

Then the transport package data is imported.

After importing is complete, the database is compiled.

3. Modify the synchronization project in the target database.
  - a. Modify the One Identity Manager database connection data and update the schema.
  - b. Check the target system connection data and the variable set.
  - c. Configure the base object.
  - d. Assign a schedule to the start up configuration.
  - e. Configure the synchronization log.
  - f. Make any other necessary changes to the settings.
  - g. Run a consistency check.
  - h. Activate the synchronization project.

For more information about creating and importing transport packages, see the *One Identity Manager Operational Guide*.

### Detailed information about this topic

- [How to edit system connection properties](#) on page 103
- [How to create base objects](#) on page 122
- [Specifying a schedule](#) on page 119
- [Configuring the synchronization log](#) on page 106
- [Checking the consistency of the synchronization configuration](#) on page 127
- [Activating the synchronization project](#) on page 128

## Operations for provisioning and single object synchronization

In order to provision object modifications and perform single object synchronization, you must specify which synchronization workflow should be used for this task. When setting up the synchronization using the default project templates, the required single object operations will be created. If you create your own provisioning processes or would like to include custom tables in the provisioning or single object synchronization, then you need to define your own single object operations.

### ***To define single object operations***

1. Select the **Process Orchestration | Provisioning process operations** category in the Designer.
2. Select the menu item **Object | New**.
3. Edit the operation properties.
4. Save the changes.
5. Use this operation in the pre-script to generate the provisioning process or process for single object synchronization as a parameter for script `DPR_GetAdHocData`.

**Table 83: Single object operations**

Property	Description
Name	Name of the operation.
Synchronization workflow	Workflow that is to be used for provisioning or single object synchronization.
System connection	Target system connection of the target system to be used.
Table	Table for which the operation has been defined. Provisioning or single object synchronization can only be run for the objects in this table.
Display name	Operation display name in the One Identity Manager tools' user interface.
Description	Text field for additional explanation.
Processing status	Only used internally by One Identity Manager.

## **Load balancing during provisioning and single object synchronization**

You can accelerate provisioning and single object synchronization by distributing processes over several Job servers. To do this, you use the base objects to specify, which Job servers will handle the objects in parallel.

Load balancing can be implemented to manage spikes in data traffic, for example, when a college semester begins, numerous accounts must be added and provisioned in the target system.

If a property of a user account is changed after restructuring in the target system, you can use single object synchronization to select all the affected user accounts and load the changed property into the One Identity Manager database.

There are specific Job servers configured for cases like this. For each base object, a server function is defined and assigned to the Job server. All Job servers with this attribute run provisioning and single object synchronization processes in parallel.


**NOTE:** You should not implement load balancing for provisioning or single object synchronization on a permanent basis. Parallel processing of objects might result in dependencies not being resolved because referenced objects from another Job server have not been completely processed.

Once load balancing is no longer required, ensure that the synchronization server executes the provisioning processes and single object synchronization.

### ***To configure load balancing for a target system***

1. Configure the servers and declare them as Job servers in One Identity Manager.
  - Assign the standard server function of the respective target system to these Job servers.

All Job servers must be able to access the same target system as the synchronization server for the respective base object. For detailed information about setting up the synchronization server, see the administration guides for connecting to target systems.

2. Use the Synchronization Editor to create a server function for the target system's base object.
  - a. On the base object's master data form, click  next to the **Service function** field.
  - b. Enter a name for the server function.
  - c. Enable all the Job servers to which the server function will be assigned.

Only enable the Job servers that can access the same target system as the base object's synchronization server.
  - d. Click **OK**.

### ***To use the synchronization server without load balancing.***

- In the Synchronization Editor, remove the server function from the base object.

## **Restrictions**

Load balancing is only used if the number of maximum instances for the executed process task or process component is set to **0** or **>1**.

If the maximum number of instances on the process task or process component is set to **1** or **-1**, load balancing cannot take place. This affects processes, which use the following process tasks:

- AdHocProjectionSingle
- AdHocProjectionSinglex86
- UpdateProjectionSingle
- UpdateProjectionSinglex86

These process tasks are used, for example, by different provisioning processes for the IBM Notes and G Suite target system types.

For more information about these process tasks, see the *One Identity Manager Configuration Guide*.

### Detailed information about this topic

- [How to edit base objects](#) on page 124
- [Properties of base objects](#) on page 124

## Automatically create and update synchronization projects

You can create synchronization projects automatically. This can be particularly useful if you want to set up synchronization projects for different Active Directory domains, which require the same configuration. A new synchronization project is generated from the command line or with a Windows PowerShell CmdLet using the configuration of a reference project. The reference project's configuration is supplied in a configuration file, which you can modify. You can define variable settings, like the target system to connect or password, in parameters, which are used passed values when the command is called.

Existing synchronization projects for which patches are available can be updated in the same way. A configuration file is made available using a reference project that contains a list of all the patches that are to be applied. Only patches that do not require any user input can be applied.

### To set up automatic creation of synchronization projects:

1. Enable expert mode in the Synchronization Editor.
2. Create the reference project using the project wizard.
  - a. Create a new synchronization project.
  - b. Click **Save configuration** on the last page of the project wizard.
  - c. Select a repository for the configuration file and give it a name.

The file is saved as a Synchronization Editor workspace file with the extension `sews`.
  - d. End the project wizard.
3. Customize the synchronization configuration in the configuration file.
  - Check the saved settings and adjust the values.
  - Create the parameters for changeable settings.
4. To create synchronization projects with this configuration



- Open up the Synchronization Editor Command Line Interface.
  - OR -
  - Load the Synchronization Editor Module for Windows PowerShell.
5. To automatically create synchronization projects, use scripts which execute the Synchronization Editor Command Line Interface or the Synchronization Editor Module for Windows PowerShell.

***To set up automatic updating of synchronization projects:***

1. Enable expert mode in the Synchronization Editor.
2. Create the configuration file.
  - a. Open the reference project.
  - b. Select **Edit | Update synchronization project** from the menu.
  - c. Optional: Select the patches to be applied under **Available patches**. Select at least one patch or milestone. Multi-select is possible.
  - d. Click **Save configuration**.
  - e. Select a repository for the configuration file and give it a name.

The file is saved as a Synchronization Editor workspace file with the extension `sews`.
3. Customize the synchronization configuration in the configuration file.
  - Check the saved settings and adjust the values.
  - Create the parameters for changeable settings.
4. To update synchronization projects with this configuration:
  - Open up the Synchronization Editor Command Line Interface.
  - OR -
  - Load the Synchronization Editor Module for Windows PowerShell.
5. To automatically update synchronization projects, use scripts which execute the Synchronization Editor Command Line Interface or the Synchronization Editor Module for Windows PowerShell.

**TIP:** A configuration file created for setting up new synchronization projects can also be used for updating synchronization projects. Add the necessary editor and parameters to the configuration file.

**Detailed information about this topic**

- [How to create a synchronization project](#) on page 62
- [Customizing the configuration file](#) on page 178
- [Synchronization Editor Command Line Interface](#) on page 183
- [Synchronization Editor Module for Windows PowerShell](#) on page 186
- [Configuration file examples](#) on page 194

# Customizing the configuration file

All data required for creating or updating a synchronization project is saved in XML format. The file is divided into three main sections:

- Parameter definitions  
For more information, see [Parameter definitions](#) on page 180.
- Global definitions  
For more information, see [Global definitions](#) on page 181.
- Editor Definitions  
For more information, see [Defining the editor for new synchronization projects](#) on page 182 or [Defining the editor for existing synchronization projects](#) on page 182.

## Structure of the configuration file

```
<?xml version="1.0" encoding="utf-8"?>
<SynchronizationEditorWorkspace Version="1.0">
  <Parameters>
    ...
  </Parameters>
  <Global>
    ...
  </Global>
  <Editors>
    ...
  </Editors>
</SynchronizationEditorWorkspace>
```

Customize the settings to create or update a new synchronization project based on this configuration file. Use parameters for all variable values if different synchronization projects are going to be created or updated with this configuration file.

### ***To Customize the configuration file***

1. Decide on the variable values.
2. Define parameters for each of these values.
3. Replace the values with parameters.

## Example

Synchronization projects should be created for various Active Directory domains in different One Identity Manager databases on one and the same database server. A synchronization project has been created with the project wizard for one of these domains. This reference project's configuration file must be adjusted such that it can be used for all the other domains.

The following settings must be customized:

- Define parameters for the One Identity Manager database, database user, system user and its password.
- Define parameter for the domain name, domain controller Active Directory user and its password.
- Define a parameter for the synchronization project, if more than one synchronization projects is going to added to one database.
- Replace the respective values in the global and editor sections with these parameters.

**IMPORTANT:** The connection data for the One Identity Manager database in the global definitions (`WorkDatabase.ConnectionString`) and in the editor definitions (`MainConnection.ConnectionParameter`) must be identical. If you replace these value with parameters, use the same parameter in each case.

The following table shows the required adjustments in the configuration file based on a reference project from a SQL Server database. For detailed information about the connection data for a SQL Server database, see the *One Identity Manager Installation Guide*. For detailed information about One Identity Manager authentication modules, see the *One Identity Manager Authorization and Authentication Guide*.

Customizations to the configuration file for new synchronization projects:

- `WorkDatabase.ConnectionString`  
`data source=<database server>;initial catalog=<database>;  
user id=<user>;pooling=False;Password=$DBPassword$`  
Replace `<database>` and `<user>` with parameters, such as `$Database$` and `$DBUser$`.
- `WorkDatabase.AuthenticationString`  
`Module=<authentication module>;User[VI.DB_USER]=<system user>;  
(Password)Password[VI.DB_Password]=<password>`  
Replace `<system user>` and `<password>` with parameters, such as `$SystemUser$` and `$SystemPassword$`.
- `MainConnection.ConnectionParameter`

```
Authentication=ProjectorAuthenticator;
data source=<database server>;DBFactory="VI.DB.ViSqlFactory, VI.DB";
initial catalog=<database>;password="<DBPassword>";pooling=False;
user id=<user>
```

Replace <system user> and <password> with parameters, such as \$SystemUser\$ and \$SystemPassword\$.

- ConnectedSystemConnection.ConnectionParameter

```
ADAuthentication=<authentication type>;
ADEnableras=<Remote Access Service>;
ADEnablerecyclebin=<Active Directory recycle bin>;
ADEnableterminal=<terminal service>;
ADPort=<Port>;ADRootdn="<distinguished domain name>";
ADServer=<domain controller>;
ADTypeEnableExtensions=<type classes allowed>;
ADTypeExtensions=<type class definition>;
baseloginaccount=<Active Directory user>;
basepassword="<Active Directory password>"
```

Replace <distinguished domain name>, <domain controller>, <Active Directory user> and <Active Directory password> with parameters.

- ShellDisplay

```
<synchronization project display name>
```

Replace the <synchronization project display name> with a parameter if more than one synchronization projects are added to a database.

For more information, see [Configuration file for creating new synchronization projects](#) on page 194.

## Parameter definitions

First, define all the parameters for variable settings. You can use these parameters in the global and editor definitions.

**Table 84: Parameter definition**

Attribute	Description
Parameter name	Name of the parameter.
Display	Display name of the parameter.
IsQueryParameter	Specifies whether the parameter's value is given by the user. <ul style="list-style-type: none"> <li>• <b>False:</b> The parameter value is passed on the command line.</li> <li>• <b>True:</b> The parameter value is queried after the command is</li> </ul>

Attribute	Description
	run. The user must enter a value. This setting can be used to input a password, for example.
IsSecret	Specifies whether the parameter value is displayed or not. <ul style="list-style-type: none"> <li>• <b>False:</b> The parameter value is displayed when the user enters it.</li> <li>• <b>True:</b> The parameter is masked when the user enters it.</li> </ul>
Example value	Default value used if no value is entered on the command line or by user input. If no default value is defined, a value must be passed on the command line or entered by the user.
ValueFormat	Format of the parameter value. Permitted values are: <ul style="list-style-type: none"> <li>• <b>ConnectionParameterValue:</b> The value is formatted as a connection parameter. Special characters are masked.</li> <li>• <b>Default:</b> The parameter value is handled as given.</li> </ul> <p>If no ValueFormat is defined, the parameter value is handled as given.</p>

## Global definitions

The global definitions contain the information required for logging into the One Identity Manager database where the changes are to be made.

**Table 85: Global definitions**

Elements	Description
WorkDatabase.ConnectionString	Database server connection parameter. Modify these settings or define a parameter if adding new synchronization projects to a different database.
WorkDatabase.AuthenticationString	Login data for the One Identity Manager database. Modify these settings or define a parameter if adding new synchronization projects to a different database.
WorkDatabase.DatabaseFactory	Supported database system. Only SQL Server is supported at present (VI.DB.ViSqlFactory, VI.DB).
LoadedShell.Uid	Unique ID of the synchronization project to be loaded. Only required when making changes to existing synchronization projects.

## Defining the editor for new synchronization projects

To create new synchronization projects, use the ShellWizard editor. The definition part of this editor contains the following information:

**Table 86: ShellWizard editor definitions**

Elements	Description
TemplateUid	Unique project template ID to be used.  This element does not exist if the reference project was created without a project template.
ConnectedSystemIdentity	Schema information, such as type, version, and schema ID of the connected system.
ScriptLanguage	Script language used in the synchronization project.
ShellDisplay	Synchronization project display name.
ShellDescription	Description of the synchronization project.
AutoCompletion	Specifies whether the synchronization project is activated immediately.
MainConnection	The connection data for the One Identity Manager database to be synchronized in this synchronization project.
ConnectedSystemConnection	Connection data for the target system to be synchronized with this synchronization project.
TemplateConfiguration	Additional settings that were made in the project wizard. For example: <ul style="list-style-type: none"><li>• Provisioning data</li><li>• Enabled revision filter</li><li>• Setting for the synchronization log</li><li>• Selected synchronization server</li></ul> This element does not exist if the reference project was created without a project template.

## Defining the editor for existing synchronization projects

To apply patches to existing synchronization projects, use the ShellPatchEditor. The definition part of this editor contains the following information:

**Table 87: ShellPatchEditor editor definitions**

Elements	Description
PatchesToApply	<p>Comma-separated list of patch numbers for all patches that are to be applied.</p> <p>Only patches that do not require any user input can be applied.</p> <p>Keywords can be specified in order to apply all available patches.</p> <ul style="list-style-type: none"><li>• <b>AllFixes</b>: Applies all patches for resolved issues.</li><li>• <b>AllFeatures</b>: Applies all patches for new features.</li></ul> <p>Example: &lt;Data Name="PatchesToApply" Display="Patches to apply" Type="System.String, mscorlib"&gt;AllFixes,AllFeatures&lt;/Data&gt;</p> <p>All dependent milestones will also be applied.</p>

## Synchronization Editor Command Line Interface

Once you have created a configuration file and have customized it accordingly, you can generate new synchronization projects or update existing synchronization projects with the Synchronization Editor Command Line Interface. You can also opt to use the Synchronization Editor Module for Windows PowerShell to do this. For more information, see [Synchronization Editor Module for Windows PowerShell](#) on page 186.

### ***To create synchronization projects with the Synchronization Editor Command Line Interface***

1. Start a command line editor.
2. Switch to the One Identity Manager installation directory.
3. Execute the Synchronization Editor Command Line Interface with the -V option and set the parameter values.

```
SynchronizationEditor.CLI.exe --CreateShell {<Options>} <configuration file> {<Parameter>}
```

**NOTE:** If the value of a parameter contains a space or special character, it must be enclosed in quotes.

Example: SynchronizationEditor.CLI.exe --CreateShell -V /Workspace=D:\ActiveDirectoryProject.sews /SetParam SyncProject="Synchronization project for Active Directory domain XYZ"

4. Enter values for the parameters requiring user input.
  - To enter an empty value, press **ENTER**.
  - To transfer the default value defined in the configuration file, click **Esc**.
5. If no error occur, execute steps 3 and 4 with the -S option.

If the synchronization project was created with a project template, the schemas are shrunk when saved.

### ***To update synchronization projects with the Synchronization Editor Command Line Interface***

1. Start a command line editor.
2. Switch to the One Identity Manager installation directory.
3. Execute the Synchronization Editor Command Line Interface with the -V option and set the parameter values.

```
SynchronizationEditor.CLI.exe --PatchShell {<options>} <configuration file> {<parameter>}
```

**NOTE:** If the value of a parameter contains a space or special character, it must be enclosed in quotes.

Example: SynchronizationEditor.CLI.exe --PatchShell -V /Workspace=D:\ActiveDirectoryProject.sews /SetParam SyncProject="CCC-99D111DD1CF11111BCF1111E1111BE9" /SetParam Patches=AllFixes,Milestone\_OneIM\_8.0.2017.1104,VPR#12345,VPR#23456,VPR#34567

- If the target system is accessed when the patch is applied and the connection parameters in the default variable set contain encrypted values, you will be prompted to enter the decrypted values. The names of the required parameters are displayed.

**TIP:** Use these parameter names to add a parameter in the configuration file for each encrypted connection parameter. This allows values for the encrypted connection parameters to be passed to the Synchronization Editor Command Line Interface when it is called.

The parameter names must conform to the following naming convention: Decryption\_DefaultVariableSet\_<variable name>.

Example of a parameter definition: <Parameter Name="Decryption\_DefaultVariableSet\_Password" Display="Password of target system user" IsQueryParameter="False">

Example of a command line call: SynchronizationEditor.CLI.exe --PatchShell -V /Workspace=D:\ActiveDirectoryProject.sews /SetParam SyncProject="CCC-99D111DD1CF11111BCF1111E1111BE9" /SetParam Patches=AllFixes /SetParam Decryption\_DefaultVariableSet\_Password="A123-z987"

4. Enter values for the parameters requiring user input.
  - To enter an empty value, press **ENTER**.
  - To transfer the default value defined in the configuration file, click **Esc**.
5. If no error occur, execute steps 3 and 4 with the -S option.

If the synchronization project was created with a project template, the schemas are shrunk when saved.



**TIP:** Run the SynchronizationEditor.CLI.exe without additional input to view help for the Synchronization Editor Command Line Interface.

**Table 88: Synchronization Editor Command Line Interface commands**

Command	Description
--CreateShell	Creates a new synchronization project using the data from the defined workspace. Short form: --CS
--PatchShell	Applies patches to an existing synchronization project. Short form: --PS

**Table 89: Synchronization Editor Command Line Interface options**

Option	Description
-? H	Displays help.
-Q	No alert before running irreversible actions.
-V	The Synchronization Editor Command Line Interface is run in verbose mode. Use this option for debugging.
-S	Saves the new synchronization project in the database. If this option is not given, creating the synchronization project is simulated.
-N	Defines whether the Synchronization Editor Command Line Interface opens in non-interactive mode. This may cause requests for parameter input to fail. Missing encrypted values are also queried in non-interactive mode.

**Table 90: Parameter declaration**

Parameters	Description
/Workspace	Full or relative path of the configuration file.
/SetParam	Sets the value of the parameter defined in the configuration file. Overwrites default values. Format: Parameter name=value Pay attention to the upper and lower case characters in the parameter name. If a value contains a space or special character, it must be enclosed in quotes. Multiple parameters are declared individually: /SetParam ParamName1=Value1 /SetParam ParamName2=Value2

# Synchronization Editor Module for Windows PowerShell

Once you have created a configuration file and have customized it accordingly, you can generate new synchronization projects or update existing synchronization projects with the Synchronization Editor Module for Windows PowerShell. You can also opt to use the Synchronization Editor Command Line Interface to do this. For more information, see [Synchronization Editor Command Line Interface](#) on page 183.

## ***To create synchronization projects with the Synchronization Editor Module for Windows PowerShell***

1. Start Windows PowerShell.
2. Switch to the One Identity Manager installation directory.
3. Load the Synchronization Editor Module for Windows PowerShell.

```
Import-Module .\VI.Projector.Editor.PowerShell.dll
```

4. Run the New-ProjectorShell CmdLet and set the value for the parameter.

```
New-ProjectorShell -Workspace <configuration file> {option} {parameter}
```

```
Example: New-ProjectorShell -Workspace D:\ActiveDirectoryProject.sews -  
WorkspaceParameter @{SyncProject="Synchronization Project for Active Directory  
Domain XYZ"}
```

**NOTE:** Mandatory parameter are queried one at a time if you execute the CmdLet without additional input.

5. Enter values for the parameters requiring user input.
  - To enter an empty value, press **ENTER**.
6. If no error occur, execute steps 3 and 4 with the -SaveToDatabase option.  
If the synchronization project was created with a project template, the schemas are shrunk when saved.

## ***To update synchronization projects with the Synchronization Editor Module for Windows PowerShell***

1. Start Windows PowerShell.
2. Switch to the One Identity Manager installation directory.
3. Load the Synchronization Editor Module for Windows PowerShell.

```
Import-Module .\VI.Projector.Editor.PowerShell.dll
```

4. Run the Update-ProjectorShell CmdLet and set the value for the parameter.

```
Update-ProjectorShell -Workspace <configuration_file> {option} {parameters}
```

```
Example: Update-ProjectorShell -Workspace D:\ActiveDirectoryProject.sews -  
WorkspaceParameter @{SyncProject="CCC-
```

```
99D111DD1CF11111BCF11111E1111BE9";Patches="AllFixes,Milestone_OneIM_8.0.2017.1104,VPR#12345,VPR#23456,VPR#34567"}
```

**NOTE:** Mandatory parameter are queried one at a time if you execute the CmdLet without additional input.

- If the target system is accessed when the patch is applied and the connection parameters in the default variable set contain encrypted values, you will be prompted to enter the decrypted values. The names of the required parameters are displayed.

**TIP:** Use these parameter names to add a parameter in the configuration file for each encrypted connection parameter. This allows values for the encrypted connection parameters to be passed to the CmdLet when it is called.

The parameter names must conform to the following naming convention: `Decryption_DefaultVariableSet_<variable name>`.

Example of a parameter definition: `<Parameter Name="Decryption_DefaultVariableSet_Password" Display="Password of target system user" IsQueryParameter="False">`

Example of a command line call: `Update-ProjectorShell -Workspace D:\ActiveDirectoryProject.sews -WorkspaceParameter @{SyncProject="CCC-99D111DD1CF11111BCF11111E1111BE9";Patches="AllFixes";Decryption_DefaultVariableSet_Password="A123-z987"}`

5. Enter values for the parameters requiring user input.
  - To enter an empty value, press **ENTER**.
6. If no error occur, execute steps 3 and 4 with the `-SaveToDatabase` option.

If the synchronization project was created with a project template, the schemas are shrunk when saved.

**Table 91: Synchronization Editor Module for Windows PowerShell CmdLets**

CmdLet	Description
New-ProjectorShell	Creates a new synchronization project using the data from the defined workspace.
Update-ProjectorShell	Applies patches to an existing synchronization project.

**Table 92: Options**

Option	Description
-?	Displays help.
-Workspace	Full or relative path of the configuration file.
-SaveToDatabase	Saves the new synchronization project in the database. If this option is not given, creating the synchronization project is simulated.

Option	Description
-WorkspaceParameter	<p>Sets the value of the parameter defined in the configuration file. Overwrites default values.</p> <p>Format: @{Parameter name="value"}</p> <p>Multiple parameters are separated with semicolons: -</p> <p>WorkspaceParameter @</p> <p>{ParamName1="Value1";ParamName2="Value2"}</p>

## Maintaining the data store

You set the maintenance mode in the start up configuration. Depending on the mode, maintenance of the data store is done after each synchronization whereby One Identity Manager attempts to clean up unresolved references. The contents of the data store can also be displayed in the Synchronization Editor and you can start maintenance manually. In this case, you decide if you want to run maintenance directly on the workstation that the Synchronization Editor was started on, or if it should be run by the One Identity Manager Service.

If the One Identity Manager connection is in expert mode, you also see the **Data store** view.

### *To display the contents of the data store*

1. Select the **Configuration | One Identity Manager connection** category.
2. Open the **Data store** view.

In the overview pane you can see the data store contents.

### *To start maintenance manually*

1. In the **Data store** view, click **Perform maintenance**.
2. To allow maintenance to be run by the One Identity Manager Service, click **Yes**.  
- OR -  
To run maintenance on the current workstation, click **No**.

### Related topics

- [Unresolvable references](#) on page 42
- [Maintenance modes](#) on page 119

# Troubleshooting

One Identity Manager offers different options for logging errors. These logs help you to analyze synchronization errors. These include:

- Synchronization logs  
For more information, see [How to display synchronization logs](#) on page 140.
- One Identity Manager Service log files on the synchronization server
- synchronization analysis report  
For more information, see [Help for the analysis of synchronization issues](#) on page 144.
- Error log  
For more information, see [Error log](#) on page 189.
- Messages logged with NLog  
Configure the required security level in the SynchronizationEditor.exe.config file.

For detailed information and help on troubleshooting in One Identity Manager and configuring log files, see the *One Identity Manager Process Monitoring and Troubleshooting Guide*.

## Error log

In expert mode, you can show the error log. In the error log, you can view all the errors that have occurred since the program started up. The error log is reinitialized when the Synchronization Editor restarts.

### **To display items from error log**

- Enable expert mode.  
By default, the error log is displayed in the lower section of the Synchronization Editor.

For detailed information about functions in the error log, see the *One Identity Manager Process Monitoring and Troubleshooting Guide*.

## Resolving errors when connecting target systems

### Incorrect mapping of object hierarchy after synchronization

If objects, which map a hierarchy, are synchronized the following errors can occur:

- Objects are mapped to the wrong position in the hierarchy.
- Objects are not loaded.

#### Probable reason

The parent objects could not be referenced. If the parent object is a mandatory property, the child objects cannot be saved.

By default, objects are processed in blocks of 1024 each during synchronization. Objects are loaded in random order. Therefore, a child object might be processed before its parent object has been loaded. Thus the parent object cannot be assigned.

#### Example: Importing cost center with the CSV connector

Cost centers make up an object hierarchy. The respective parent object is assigned through the `UID_ParentProfitCenter` column. The complete hierarchy path is kept in the `FullPath` column.

During synchronization, a cost center might be loaded before its parent cost center. Therefore, the parent cost center cannot be referenced. Because the parent cost center is not a mandatory property, the object is loaded but appears at a strange place in the hierarchy. A different full name is formatted in the database as given in the CSV file. If the full name is the only matching criteria for identifying the object the objects cannot be assigned uniquely.

#### Solution

| NOTE:

- The solution approach only applies for resolving references of the same object type.
- Synchronization can get slower if the amount of data is large.
- The solution described is **one** way to prevent the error. There may be other solutions depending on the actual data situation.

### **To prevent the error**

- Label the column containing the hierarchy path as the sort criteria in the target system schema and set the partition size to "1".

The objects are sorted by hierarchy path during synchronization and loaded one by one in the database in this order. This ensures that the parent object is already loaded and can be referenced.

- Ensure manual dependency resolution is set in the synchronization workflow.

This can be necessary in certain situations, for example, when synchronizing cost centers. In this case, the full name is the only matching criteria. In the One Identity Manager database this is put together from the cost center name (AccountNumber column) and the full name of the parent object. In the case of automated dependency resolution, the parent objects are not assigned until the second synchronization step. Therefore, no parent objects are assigned after the first synchronization step. The full name is only formatted from the cost center name. All child objects therefore, have another full name in the database as in the target system. In the second synchronization step, there objects can no longer be identified. Thus parent objects cannot be assigned by it.

In the case of manual dependency resolution, all property mapping rules are executed in one synchronization step. The parent object assigned immediately. This way, the template finds the correct full names.

### **To mark a column as sort criterion**

1. Edit the target system schema in the Synchronization Editor.
  - a. Select the **Configuration | Target system** category.
  - b. Click **Edit connection**.

This starts the system connection wizard.

2. Select the page where you can edit the **Hierarchical sort order** option.

**NOTE:** The system connection wizards of the various target systems display different pages. For example, in the system connection wizard for CSV systems, select the **Display information** page.

3. Select the column containing the hierarchy path.
4. Enable the **Hierarchical sort order** option.
5. Save the changes.

### ***To adjust the partition size***

1. Enable expert mode in the Synchronization Editor.
  - a. Select the **Database | Settings...** menu.
  - b. Enable **Enable expert mode**.
  - c. Click **OK**.
2. Edit the start up configuration properties.
  - a. Select the **Configuration | Start up configurations** category.
  - b. Select the start up configuration in the document view and click **Edit...**

3. Select the **Advanced** tab.

4. Enter the value "1" in **Partition size**.

For detailed information about start up configuration advanced properties, see the One Identity Manager Target System Synchronization Reference Guide.

5. Click **OK**.
6. Disable expert mode

### ***To set manual dependency resolution***

1. Edit the workflow properties.
  - a. Select the **Workflows** category.
  - b. Select the workflow in the navigation view.
  - c. Select the **General** view in the Workflow Editor and click **Edit**.
2. Select the value "Manual" in the **Dependency resolution** field.
3. Click **OK**.
4. Save the changes.
5. Activate the synchronization project.



## Configuration parameters for target system synchronization

The following configuration parameters are additionally available in One Identity Manager after the module has been installed.

**Table 93: Configuration parameters for target system synchronization**

Configuration parameters	Meaning if Set
DPR	General configuration parameter for target system synchronization.
DPR   Journal	General parameter for configuring the synchronization log.
DPR   Journal   LifeTime	This configuration parameter specifies the synchronization log's retention period (in days). Older logs are deleted from the database.
DPR   StartSequence	General parameter for configuring synchronization start up sequences.
DPR   StartSequence   LifeTime	Configuration parameter for specifying the retention period (in days) for completed synchronization start up sequences. Older entries are deleted from the database.
DPR   UI	Synchronization Editor user interface configuration.
DPR   UI   EncryptedValueHandling	The configuration parameter defines the Synchronization Editor behavior when handling encrypted values. <ul style="list-style-type: none"><li>• <b>ByUser</b>: Shows encryption dialog when the synchronization project opens.</li><li>• <b>IgnoreAll</b>: Does not show encryption dialog when the synchronization project opens. All encrypted values are ignored by default. (default)</li></ul>

## Configuration file examples

The following examples demonstrate the modifications required in the configuration files in order to automatically create or update synchronization projects.

### Detailed information about this topic

- [Configuration file for creating new synchronization projects](#) on page 194
- [Configuration file for updating existing synchronization projects](#) on page 196
- [Automatically create and update synchronization projects](#) on page 176

## Configuration file for creating new synchronization projects

The following extract from a configuration file contains the changes required for the example in section [Customizing the configuration file](#) on page 178.

```
<?xml version="1.0" encoding="utf-8"?>
<SynchronizationEditorWorkspace Version="1.0">
  <Parameters>
    <Parameter Name="Database" Display="Connected database"
      IsQueryParameter="false" IsSecret="false"></Parameter>
    <Parameter Name="DBUser" Display="Database server user"
      IsQueryParameter="false" IsSecret="false"></Parameter>
    <Parameter Name="DBPassword" Display="Database server password"
      IsQueryParameter="true" IsSecret="true"></Parameter>
    <Parameter Name="SystemUser" Display="One Identity Manager system user"
      IsQueryParameter="false" IsSecret="false"></Parameter>
    <Parameter Name="SystemPassword" Display="Password of system user"
      IsQueryParameter="true" IsSecret="true"></Parameter>
```

```

<Parameter Name="Domain" Display="Distinguished name of the domain"
IsQueryParameter="false" IsSecret="false"></Parameter>

<Parameter Name="DomainController" Display="Distinguished name of the
domain controller" IsQueryParameter="false" IsSecret="false"></Parameter>

<Parameter Name="ADUser" Display="Active Directory user"
IsQueryParameter="false" IsSecret="false"></Parameter>

<Parameter Name="ADUserPassword" Display="Password of Active Directory
user" IsQueryParameter="true" IsSecret="true"></Parameter>

<Parameter Name="SyncProject" Display="Synchronization Project"
IsQueryParameter="false" IsSecret="false"></Parameter>

</Parameters>

<Global>

<Data Name="WorkDatabase.ConnectionString" Display="Connection string"
Type="System.String, mscorlib">data source=Datenbankserver;initial
catalog=$Database$;user
id=$DBUser$;pooling=false;Password=$DBPassword$</Data>

<Data Name="WorkDatabase.AuthenticationString" Display="Authentication
string" Type="System.String,
mscorlib">Module=Authentifizierungsverfahren;User[VI.DB_USER]=$SystemUser$;
(Password)Password[VI.DB_Password]=$SystemPassword$</Data>

<!-- ... -->

</Global>

<Editors>

<Editor Name="ShellWizard" Type="VI.Projector.Editor.Wizards.ShellWizard,
VI.Projector.Editor">

<!-- ... -->

<Data Name="ShellDisplay" Display="Script display name"
Type="System.String mscorlib">$SyncProject$</Data>

<!-- ... -->

<Data Name="MainConnection.ConnectionParameter" Display="Connection
parameter" Type="System.String,
mscorlib">Authentication=ProjectorAuthenticator;data
source=databaseserver; DBFactory="VI.DB.ViSqlFactory, VI.DB";initial
catalog=$Database$;password=$DBPassword$; pooling=False;user
id=$DBUser$</Data>

<!-- ... -->

<Data Name="ConnectedSystemConnection.ConnectionParameter"
Display="Connection parameter" Type="System.String,
mscorlib">ADAuthentication=1;ADEnableras=False;ADEnablerecyclebin=False;
ADEnableterminal=True;ADPort=389;ADRootdn=$Domain$;ADServer=$DomainCon
troller$;

```

```

        ADTypeEnableExtensions=True;ADTypeExtensions=;baseloginaccount=$ADUser
        $; basepassword=$ADUserPassword$</Data>
    <!-- ... -->
</Editor>
</Editors>
</SynchronizationEditorWorkspace>

```

## Configuration file for updating existing synchronization projects

The following excerpt from a configuration file contains the changes required for applying patches.

```

<?xml version="1.0" encoding="utf-8"?>
<SynchronizationEditorWorkspace Version="1.0">
    <Parameters>
        <Parameter Name="Database" Display="Connected database"
            IsQueryParameter="false" IsSecret="false"></Parameter>
        <Parameter Name="DBUser" Display="Database server user"
            IsQueryParameter="false" IsSecret="false"></Parameter>
        <Parameter Name="DBPassword" Display="Database server password"
            IsQueryParameter="true" IsSecret="true"></Parameter>
        <Parameter Name="SystemUser" Display="One Identity Manager system user"
            IsQueryParameter="false" IsSecret="false"></Parameter>
        <Parameter Name="SystemPassword" Display="Password of system user"
            IsQueryParameter="true" IsSecret="true"></Parameter>
        <Parameter Name="SyncProject" Display="Synchronization Project"
            IsQueryParameter="false" IsSecret="false"></Parameter>
        <Parameter Name="Patches" Display="Comma separated list of patches to
            apply" IsQueryParameter="True"></Parameter>
        <Parameter Name="Decryption_DefaultVariableSet_Password" Display="Password
            of target system user" IsQueryParameter="False"></Parameter>
    </Parameters>
    <Global>
        <Data Name="WorkDatabase.ConnectionString" Display="Connection string"
            Type="System.String, mscorlib">data source=Datenbankserver;initial
            catalog=$Database$;user
            id=$DBUser$;pooling=false;Password=$DBPassword$</Data>
    </Global>

```

```

    <Data Name="WorkDatabase.AuthenticationString" Display="Authentication
string" Type="System.String,
mscorlib">Module=Authentifizierungsverfahren;User[VI.DB_USER]=$SystemUser$;
(Password)Password[VI.DB_Password]=$SystemPassword$</Data>

    <Data Name="WorkDatabase.DatabaseFactory" Display="Database factory"
Type="System.String, mscorlib">VI.DB.ViSqlFactory, VI.DB</Data>

    <Data Name="LoadedShell.Uid" Display="Loaded shell" Type="System.String,
mscorlib">$SyncProject$</Data>
</Global>
<Editors>
    <Editor Name="ShellPatchEditor"
Type="VI.Projector.Editor.AppModel.Editors.ShellPatchEditor,
VI.Projector.Editor">
        <Data Name="PatchesToApply" Display="Patches to apply"
Type="System.String, mscorlib">$Patches$</Data>
    </Editor>
</Editors>
</SynchronizationEditorWorkspace>

```

One Identity solutions eliminate the complexities and time-consuming processes often required to govern identities, manage privileged accounts and control access. Our solutions enhance business agility while addressing your IAM challenges with on-premises, cloud and hybrid environments.

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- View Knowledge Base articles
- Sign up for product notifications
- Download software and technical documentation
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- Engage in community discussions
- Chat with support engineers online
- View services to assist you with your product

## A

### **Active Directory connector**

System connector for connecting to an Active Directory system.

### **Active Roles connector**

System connector for connecting to an Active Directory system through One Identity Active Roles.

### **Azure Active Directory connector**

System connector for connecting to an Azure Active Directory system.

## B

### **Base mapping**

Mapping from which to inherit a mapping.

### **Base object**

Base objects contain data about the target system to be synchronized, its system connection and the synchronization server.

## C

### **cloud application**

Mapping a cloud application in the Universal Cloud Interface Module's One Identity Manager.

### **Connector schema**

The system connector extends the target system schema with additional information which is required for mapping in the Synchronization Editor.

### **CSV connector**

System connector which allow data to be imported from CSV files.

## D

### **Database connection**

System connection to the One Identity Manager database.

**Direction of synchronization**

Direction in which synchronization is run. The master system is defined by the direction of synchronization.

**E****Exchange Online connector**

System connector for connecting to an Exchange Online system.

**Extended schema**

A schema can be customized in the Synchronization Editor, for example, to allow or simplify mapping of complex schema properties. Label the modified schema as "extended schema".

**F****Filter**

see revision filter; see object filter; see system filter; see object selection

**G****G Suite connector**

System connector for connecting to an G Suite.

**H****hierarchy filter**

Used to limit the number of objects to be loaded directly into the target system. It is based on the real objects of the target system. This filter can be used for defining the scope.

**I****IBM Notes connector**

System connector for connecting to an IBM Notes system.

**Intersection**

Objects which occur in both of the connected systems

**J****Job server**

Server with the One Identity Manager Service installed.



## **L**

### **LDAP connector**

System connector for connecting to an LDAP system.

## **M**

### **Maintenance**

Post processing of data that could not be saved during synchronization.

### **mapping**

List of object matching rules and property mapping rules which map the schema properties of two connected systems to one another.

### **Mapping direction**

Direction of synchronization permitted for mapping schema properties.

### **Microsoft Exchange connector**

System connector for connecting to a Microsoft Exchange system.

## **N**

### **Native database connector**

System connector for connecting to an external database.

## **O**

### **Object filter**

Filter for limiting the results of the scope. For example, the system objects of an Active Directory domain are limited to one container.

### **Object matching rule**

Specifies how a concrete object of a target system schema class can be set in relation to a concrete schema class object of a One Identity Manager schema. An object matching rule encompasses the target system schema property based on which the target system objects can be uniquely identified.

### **Object selection**

Filter for limiting the number of objects to synchronize. For example, the system objects of an Active Directory domain are limited to one container. You can also filter single objects.

### **One Identity Manager connector**

System connector for connecting to a One Identity Manager database.

### **One Identity Manager schema**

The One Identity Manager data model.

## **Oracle E-Business Suite connector**

System connector for connecting to an Oracle E-Business Suite.

## **P**

### **Performance/memory factor**

Percentage with which the reload threshold, partition size and bulk level are applied to an object type.

### **Processing Method**

Method used to process objects within a synchronization step. Example: Add object (insert), update object (update), delete object (delete). Processing methods and their mandatory parameters are defined with the schema type.

### **Project template**

Template used by the project wizard to create a preconfigured synchronization project.

### **Project wizard**

Wizard which aids configuration of synchronization projects.

### **Property mapping rule**

Describes how a target system schema property is mapped in the One Identity Manager schema.

### **Provisioning**

Actual changes to an object in the One Identity Manager database (added, modified, deleted) are made immediately written to the target system.

## **Q**

### **quota**

A set of system object that can be processed in a synchronization step with a particular processing method.

## **R**

### **reference scope**

Used to resolve reference between objects of different systems. The reference scope specifies the system in which objects for resolving references may be found.

### **Relative complement**

Objects that only occur in one of the two system systems involved in synchronizing.

### **Remote connection server**

Job server installed with the RemoteConnectPlugin and the target system connector is installed. If direct access to the target system is not possible, a

remote connection can be set up. Communication between the Synchronization Editor and Target System is done through a remote connection server.

**Revision**

Highest value for change data for all system objects to be synchronized when synchronization is run. This value is saved in the table "DPRRevisionStore", column "value".

**Revision filter**

Filters all system objects not changed since the last synchronization. The deciding factor being the revision property modification. Synchronization can be speeded up with revision filtering.

**Revision property**

Schema property containing the revision counter of a system object. Objects that have not changed since the last synchronization are found through the revision property.

**Rogue modification**

A change that was not made in the synchronization master system. Example: the direction of synchronization is define as "target system". This makes One Identity Manager the master system for synchronization. Changes to the target system are identified as invalid.

**S****SAP R/3 connector**

System connector for connecting to an SAP R/3 system.

**Schema**

Data model of a connected system. The schema describes all the master data from the connected system. see target system schema; see One Identity Manager schema; see connector schema; see extended schema

**Schema browser**

The component of Synchronization Editor which shows details of the connected target system's entire schema and the details of the entire One Identity Manager schema.

**Schema class**

Subset of a schema type. The result list of a schema type is filtered by defined criteria. Example: Active Directory contacts are Active Directory user accounts with the property objectclass = "CONTACT".

**Schema editor**

The component of the schema browser which can be used to edit user-specific virtual schema properties.

**Schema property**

Property of a schema type. Refers to exactly one column of a table or view of the database based schema or exactly one object type property of the non-database based schema.

**Schema type**

Defines an object type within a schema. Refers to exactly one table or view of the database based schema or exactly one object type of the non-database based schema.

**SCIM connector**

System connector, which connects a cloud application using the System for Cross-domain Identity Management specification.

**Scope**

Section of a connected system which should be synchronized. The scope is defined with a filter.

**SharePoint connector**

System connector for connecting to a SharePoint farm.

**SharePoint Online connector**

System connector for connecting to a SharePoint Online farm.

**Start configuration**

Specifies which synchronization configuration components are used for a specific synchronization. Specifies the synchronization schedule.

**Synchronization**

The process of comparing data between One Identity Manager and a target system. Objects and their properties are compared by fixed rules. Synchronization results in the identical data situation in the target system and One Identity Manager database.

**Synchronization buffer**

One Identity Manager table with information about referenced objects which could not be assigned by synchronization.

**Synchronization Editor**

One Identity Manager tool for configuring target system synchronization.

**Synchronization Editor Command Line Interface**

Synchronization Editor components with which synchronization projects can be created on the command line.

**Synchronization Editor Module for Windows PowerShell**

Synchronization Editor components with which synchronization projects can be created by Windows PowerShell CmdLet.

**Synchronization engine**

One Identity Manager component which executes synchronization and provisioning tasks.

**Synchronization master**

System which is verified as data master. The master system is specified by the direction of synchronization.

**Synchronization of single objects**

Recent changes to an object in the target system (modified, deleted) are immediately written to the One Identity Manager database.

**Synchronization project**

A collection of all data required for synchronizing and provisioning a target system. Connection data, schema classes and properties, mappings, and synchronization workflows all belongs to this.

**Synchronization server**

Job server installed with the target system connector. All One Identity Manager actions are executed against the target system environment on the synchronization server.

**Synchronization step**

Specific rule for processing exactly two schema classes.

**Synchronization workflow**

see Workflow

**System connector**

Software interface for accessing a connected system.

**System filter**

Used to limit the number of objects to synchronize in the connected system. The connector only loads the object found through this filter.

**System object**

Object from the target system. A system object always belongs to a schema class.

**T****Target system**

An instance of a target system in which the employees managed by One Identity Manager have access to network resources. Example: An Active Directory domain X for target system type "Active Directory", a directory Y for target system type "LDAP", a client Z for target system type "SAP R/3".

**Target system browser**

The component of Synchronization Editor with which objects in the connected system can be viewed and edited.

**Target system schema**

Data model of a specific target system. Describes all the data originating from the target system.

**Target system synchronization**

Post processing of objects that were marked as outstanding by synchronization.

**Target system type**

Grouping similar target systems. Example: Active Directory, LDAP, SharePoint.

**U****Universal Cloud Interface connector**

System connector for connecting to the Universal Cloud Interface.

**V****Variable set**

Used to configure synchronization configuration for different systems. Each variable set contains at least the variables for the system connection parameter. The value of the variables are redefined for different uses.

**Virtual schema properties**

Schema class property added by the system connector or the user.

**W****Windows PowerShell connector**

System connector for connecting non-native supported target systems. Windows PowerShell cmdlets are used to execute read/write operations in the target system.

**Workflow**

Collection of all the synchronization steps to be executed.

**Workflow wizard**

Wizard which aids configuration of synchronization workflows.

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