



One Identity Manager 9.2

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.**

One Identity Manager Target System Synchronization Reference Guide
Updated - 29 September 2023, 04:22

For the most recent documents and product information, see [Online product documentation](#).

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Target system synchronization with the Synchronization Editor

The main feature of One Identity Manager is to map identities together with the main 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 identities. This provides an overview of the permissions for each identity 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. Identities 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.

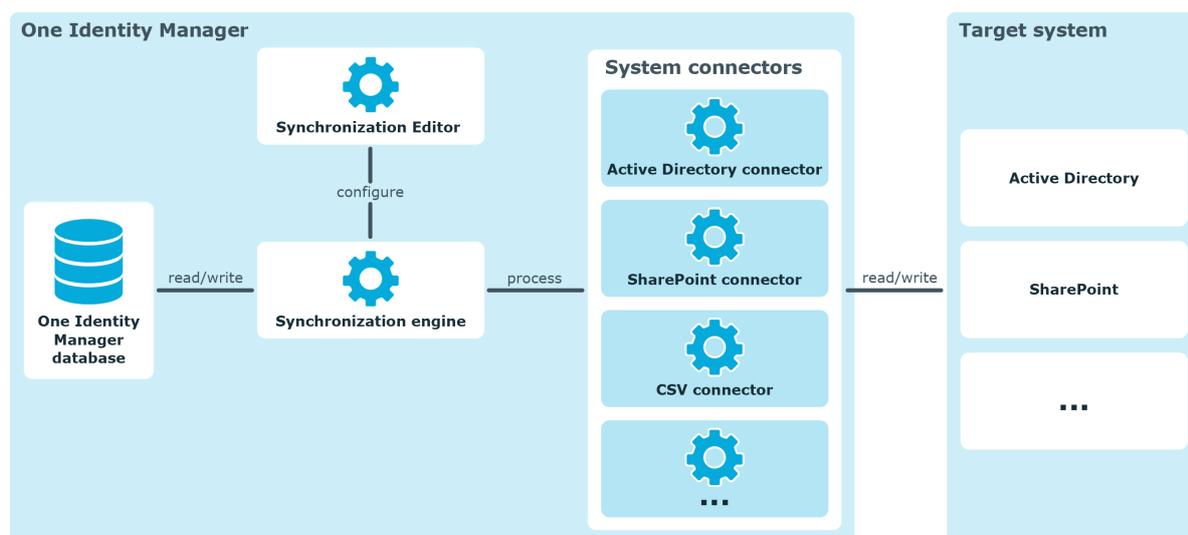
One Identity Manager instantiates connecting the various target systems to the Synchronization Editor. Use this tool to configure data synchronization for any target system and specify which target system data is mapped to the One Identity Manager database. You also define the object properties mapping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

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 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 51
- [System connection properties](#) on page 125

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 **One Identity > One Identity Manager > Configuration > Synchronization Editor** entry.
- From the Launchpad.
- In the Manager
- From the command line.

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. The  icon shows an overview of all managed synchronization projects.
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 pane 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 the installation patches for new features and solved issues in One Identity Manager that 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 password	The password for the system user Synchronization can be changed.	
	Exit	Exits the program.	Alt + F4
Edit	Edit 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.	
	Create copy	This creates a copy of the current synchronization project.	
Help	Community	Opens the One Identity Manager	

Menu	Menu Item	Meaning	Shortcut
		community website.	
	Support portal	Opens the One Identity Manager product support website.	
	Training	Opens the One Identity Manager training portal website.	
	Online documentation	Opens the One Identity Manager documentation website.	
	Search	Opens the search dialog.	
	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

Button	Meaning
 Commit to database	Saves changes permanently. To save changes with change labels, open the submenu and click Commit and assign a change label . For more information about working with change labels, see the <i>One Identity Manager Operational Guide</i> .
 Offline mode	Enable offline mode. This does not establish a connection to the target system or to the One Identity Manager database. The button is only displayed if the Synchronization Editor was started with the -o option.
 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. The button is enabled only if multiple variable sets are 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.
	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. Test virtual schema properties.

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.
	Order object matching rules.
	
	Test rules.
	Create new rules with help of the mapping wizard.

Table 8: Meaning of icons in the workflow view

Icon	Meaning
	Adds new step.
	Shows implementation plan.
	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
	Solved issues Shows patches for solved issues.
	Enhancements Shows all patches for new or changed 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 log

Icon	Meaning
	Logs all critical error messages. (Info level Fatal)
	Logs all information. (Info level Info)
	Logs all warnings. (Info level Warning)

Icon	Meaning
	Logs all error messages. (Info level Error)
	Logs debugger output. This setting should only be used for testing. (Info level Debug)
	Logs highly detailed information. This setting should only be used for analysis purposes. The log file quickly becomes large and cumbersome. (Info 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	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.

Setting	Meaning
	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.
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 Additional information for experts on page 182.
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  buttons 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>\$'

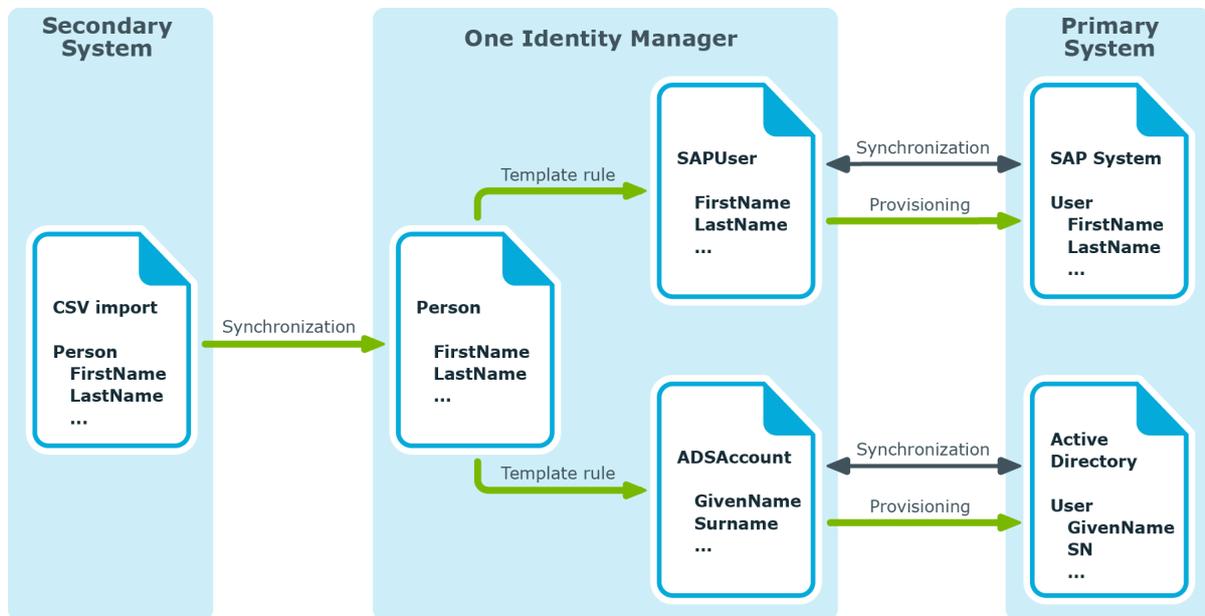
NOTE: If the condition contains a dollar sign, which is not labeling a variable, it must be masked with \$.

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 in the menu. 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 are supported for defining conditions.

- 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 generic 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

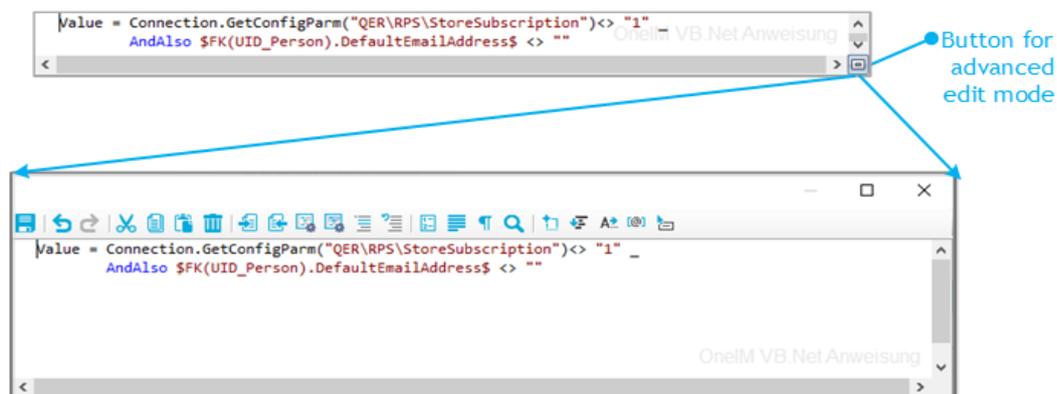


Table 14: Meaning of icon in advanced edit mode

Icon	Meaning
	Quits advanced edit mode.
	Undoes last change.
	Redoes last change.
	Cuts selected code.
	Copies selected code into clipboard.
	Inserts code from clipboard.
	Deletes selected code.
	Decreases insert.
	Increases insert.
	Automatic text formatting.
	Formats text selection automatically.
	Shows/hides line numbers.
	Inserts comments.
	Removes comments.
	Inserts or removes line numbers.
	Inserts or removes automatic line breaks.
	Enable or disable automatic completion of words when they are entered.
	Shows or hides spaces and tabs.
	Searches within code.
	Inserts code snippet.
	Shows list of objects properties.
	Shows auto completion list.
	Shows list with parameter information.
	Shows additional information.

Table 15: Shortcut for editing scripts

Shortcut	Description
Ctrl + C	Copy to clipboard.
Ctl + Ins	Copy to clipboard.

Shortcut	Description
Ctrl + X	Cut and copy to clipboard.
Shift + Del	Cut and copy to clipboard.
Ctrl + L	Cut row and copy to clipboard.
Ctrl + V	Paste from clipboard.
Shift + Ins	Paste from clipboard.
Ctrl + Y	Redo action.
Ctrl + Shift + Z	Redo action.
Ctrl + Z	Undo action.
Backspace	Remove character behind cursor.
Shift + Backspace	Remove character behind cursor.
Ctrl + Backspace	Remove word behind cursor.
Del	Delete character in front of cursor.
Ctrl + Shift + L	Delete row.
Ctrl + Del	Delete to end of next word.
Data	Insert line break.
Shift + Return.	Insert soft line break.
Ctrl + Return	Insert row above.
Ctrl + Shift + Return	Insert row below.
Ctrl + Space	Auto-complete.
Ctrl + Space + Space	Show list with parameter information.
Tab	Insert indent/tab.
Shift + Tab	Remove indent/tab.
Ctrl + U	Change marked characters to lowercase.
Ctrl + Shift + U	Change marked characters to uppercase.
Ins	Toggle insert mode.
Ctrl + T	Swap characters in front and behind cursor.
Ctrl + Shift + T	Swap words in front and behind cursor.
Shift + Alt + T	Swap row with previous row.
Alt + PgUp	Move row up.

Shortcut	Description
Alt + PgDn	Move row down.
PgUp	Move up
PgDn	Move down.
Left arrow	Move left.
Right arrow	Move right.
Ctrl + Left arrow	Move to previous word.
Ctrl + Right arrow	Move to next word.
Home	Move to start of line.
End	Move to end of line.
Ctrl + Home	Move to start of script.
Ctrl + End	Move to end of script.
PgDn	Move up a page.
PgUp	Move down a page.
Ctrl + PgUp	Move to visible start.
Ctrl + PgDn	Move to visible end.
Ctrl +]	Move to next bracket. (not possible on German keyboard)
Ctrl + Down arrow	Scroll down.
Ctrl + Up arrow	Scroll up
Ctrl + F	Open search dialog.
F3	Search next.
Ctrl + F3	Search forward.
Shift + F3	Search backward.
Ctrl + Shift + F3	Find previous.
Ctrl + H	Replace.
Ctrl + I	Search forward incrementally.
Ctrl + Shift + I	Search backward incrementally.
Ctrl + Shift + Num-	Reduce code block selection.
Ctrl + Shift + Num+	Extend code block selection.
Esc	Remove selection.

Shortcut	Description
Shift + Down arrow	Extend selection down.
Shift + Up arrow	Extend selection up.
Shift + Left arrow	Extend selection left.
Shift + Right arrow	Extend selection right.
Ctrl + Shift + Left arrow	Extend selection to previous word.
Ctrl + Shift + Right arrow	Extend selection to next word.
Shift + Home	Extend selection to start of line.
Shift + End	Extend selection to end of line.
Shift + Alt + Home	Extend selection to start of script.
Ctrl + Shift + End	Extend selection to end of script.
Shift + PgUp	Extend selection by one page up.
Shift + PgDn	Extend selection by one page down.
Ctrl + Shift + PgUp	Extend selection to visible start.
Ctrl + Shift + PgDn	Extend selection to visible end.
Ctrl + A	Select all.
Ctrl + Shift + W	Select word.
Ctrl + Shift +]	Select up to the next bracket. (not possible on German keyboard)
Shift + Alt + Down arrow	Extend selected block down.
Shift + Alt + Up arrow	Extend selected block up.
Shift + Alt + Left arrow	Extend selected block left.
Shift + Alt + Right arrow	Extend selected block right.
Ctrl + Shift + Alt + Left arrow	Extend selected block by one word to the left.
Ctrl + Shift + Alt + Right arrow	Extend selected block by one word to the right.
Ctrl + mouse wheel	Adjust text size.

There is additional help provided for creating script code.

Syntax highlighting

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

Auto-completion

You can use auto-completion when you write script code. You can enable automatic completion in the input fields with the  button in advanced edit mode. This suggests a word to automatically complete the keyword as it is entered. If a keyword is expected at a certain position in the source code, auto-completion comes up automatically after a few letters. Although, after specific characters, such as period (.) or parenthesis (()), automatic completion is always offered. Alternatively, you can use the **Ctrl + space** shortcut in the relevant positions within the input fields to call up autocomplete.

The amount of scripted code to enter is reduced by displaying the names of properties or functions that can be used. 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
 - a. Select the  icon.
 - b. Select the code snippet.
2. Using a shortcut
 - a. Press **F2**.
 - b. Select the code snippet.

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.

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 176
- [Validating scripts](#) on page 194

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 more 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.

NOTE: As long as patches are being applied to a synchronization project, no other changes can be permanently saved. Wait until the update is complete before making any changes.

If an update fails, correct the error first and run the update again before saving other changes to the synchronization project.

Related topics

- [How to remove unnecessary project data](#) on page 61
- [Updating existing synchronization projects](#) on page 172

Establishing remote connections

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 16: RemoteConnectPlugin parameters

Parameters	Value	Description
Authentication method	ADGroup	Method with which incoming queries can be authenticated. Permitted values: ADGroup
Authentication type	Ntlm	Authentication type to use. Permitted values: Negotiate, Ntlm, IntegratedWindowsAuthentication
Bind address	+	IP address of the network card to use. + : Use all network cards.
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 ADGroup authentication method.
Port	2880	Port for reaching the server.

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

- 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 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 main 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*.

Permissions for the One Identity Manager Service user account.

The RemoteConnectPlugin uses an internal HTTPS server for remote access. The user account's permissions for the One Identity Manager Service must be extended accordingly.

- Users require permission to open an HTTP server. The administrator must grant URL approval to the user to do this. This can be run with the following command line call:

```
netsh http add urlacl url=https://+:<port number>/Remoting/  
user=<domain>\<user name> listen=yes
```

- If the One Identity Manager Service has to run under the Network Service's user account (**NT Authority\NetworkService**), explicit permissions for the internal web service must be granted. This can be run with the following command line call:

```
netsh http add urlacl url=https://+:<port number>/Remoting/ user="NT  
AUTHORITY\NETWORKSERVICE" listen=yes
```

- You can check the result with the following command line call:

```
netsh http show urlacl
```

The RemoteConnectPlugin port certificate

- The RemoteConnectPlugin port must be assigned a certificate because the RemoteConnectPlugin uses HTTPS for remote access. This can be run with the following command line call:

```
netsh http add sslcert ipport=0.0.0.0:<port number> certhash=<certificate  
thumbprint>appid="{F06D38CA-DF0F-4D72-BC33-D3F6472A8DEE}"
```

- You can check the result with the following command line call:

```
netsh http show sslcert
```

The RemoteConnectPlugin uses System.Net.HttpListener for the web interface.

Related topics

- [Connecting remotely to the target system](#) on page 30
- [Creating a synchronization project](#) on page 72
- [Configuring synchronization](#) on page 78
- [Working with an encrypted database](#) on page 32
- [Run Synchronization Editor without target system connection](#) on page 31

Connecting remotely to the target system

Remote access to a target system might 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 to update the target system schema, to define the scope, or to test the object matching rules, for example. 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.

1. In the project wizard, on the **System access** page, set the **Connect using remote connection server** option.
2. Under **Job server**, select the server to use for the connection.

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. In the Synchronization Editor, 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.

- a. If you want to determine the remote connection server automatically, select **Select remote connection server automatically**.
 - **Job server:** Job server that One Identity Manager uses to communicate with the target system.
All Job servers are displayed for which the server function **One Identity Manager Service installed** is selected.
- b. If the remote connection server cannot be determined automatically because, for example, the server name cannot be resolved, select **Select remote connection server manually**.
 - **Server:** Full server name or the IP address of the server.
 - **Port:** The RemoteConnectPlugin uses port 2880.

4. Click **Connect**.

The remote connection remains established as long as the synchronization project is open in the Synchronization Editor.

To close a remote connection

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

Related topics

- [Establishing remote connections](#) on page 27
- [Creating a synchronization project](#) on page 72
- [Configuring synchronization](#) on page 78
- [Menu items](#) on page 14
- [Working with an encrypted database](#) on page 32

Run Synchronization Editor without target system connection

Sometimes it is not necessary to access the connected system with the Synchronization Editor. In this case the Synchronization Editor can be run with a disconnected target system connection. For example, connection configurations can be viewed and edited without the One Identity Manager attempting to connect to the system in question. However, Synchronization Editor functions, which absolutely require a system connection, cannot be run or cannot be run correctly with it.

To start the Synchronization Editor without target system connection

1. Start a command line program and go to the One Identity Manager installation directory.

2. Run the Synchronization Editor with the `-o` option.

```
SynchronizationEditor.exe -o
```

The target system connection is disconnected by default. The  **Disconnected** button on the toolbar allows you to cancel the disconnect and reconnect.

Related topics

- [Starting the Synchronization Editor](#) on page 71
- [Pausing handling of target system specific processes](#) on page 218

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 [Establishing remote connections](#) on page 27. 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 125.

An extra dialog is displayed.

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

1. Enter the remote connection properties.

For more information, see [Connecting remotely to the target system](#) on page 30.

2. 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 run.
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>IMPORTANT: 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> <p>To avoid overwriting</p> <ul style="list-style-type: none">• Update the pre-set values and enable the Remember the values and save locally option. <p>To delete locally saved data</p> <ol style="list-style-type: none">1. Select the Database > Settings... menu item.2. Select the Security tab.3. Select a value and click Delete.
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 more information about managing system user passwords, see the *One Identity Manager Authorization and Authentication Guide*.

To change the system user's Password

1. Select the **Database > Change synchronization user password** menu item.
2. Enter the required data:
3. Click **OK**.

Table 18: Password data

Property	Description
Old password	Password valid until now.
New password and password confirmation	New password for the system user to log on to the database.
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 the **Configuration > One Identity Manager connection** category.
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.

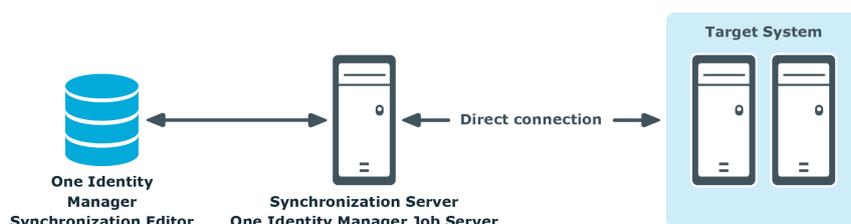
Table 19: Basic synchronization terminology

Term	Described in
Dependency resolution	How does dependency resolution work? on page 46
Outstanding objects	Deleting objects in One Identity Manager on page 60
Synchronization of single objects	Synchronization and provisioning on page 10
Filter	What are filters? on page 40
Mapping direction	Direction of synchronization and mapping on page 51 Mapping against the direction of synchronization on page 53
Primary and secondary systems	Synchronizing user data with different systems on page 58
Provisioning	Synchronization and provisioning on page 10
Revision filter	How does revision filtering work? on page 44
Schema	How are schemas mapped on page 37
Scope	What is a scope? on page 43
Direction of synchronization	Direction of synchronization and mapping on page 51
Rogue modification	Detecting rogue modifications on page 55

Synchronization Editor communications

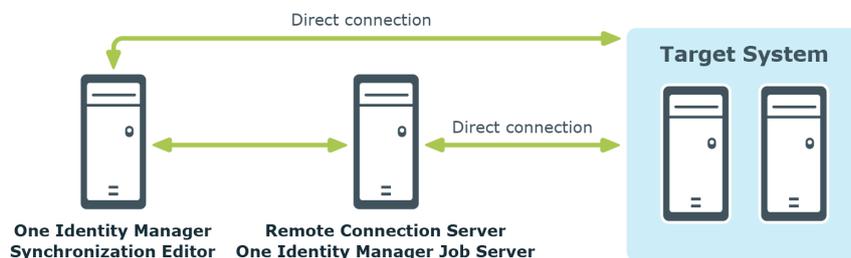
A server installed with the One Identity Manager Service and, if necessary, other target system specific software, is required for synchronization. This server (named the synchronization server in the following) requires direct access to the target system. The synchronization server communicates directly 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

- [Establishing remote connections](#) on page 27

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

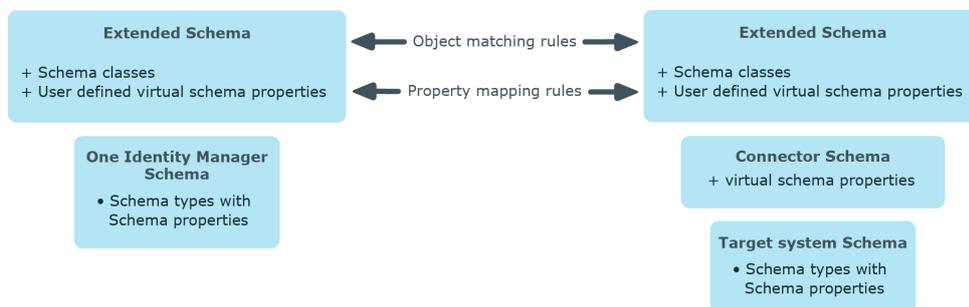


Table 20: Terms for schema mapping

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

Term	Explanation
Extended schema	<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> <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"> • Add new schema classes • Define user-specific virtual schema properties • Derive schema properties <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"> • Schema properties of schema types from the target system and One Identity Manager schema. • Virtual schema properties, <ul style="list-style-type: none"> • Added by the system connector 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
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</p>

Term	Explanation
	properties.
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 79

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

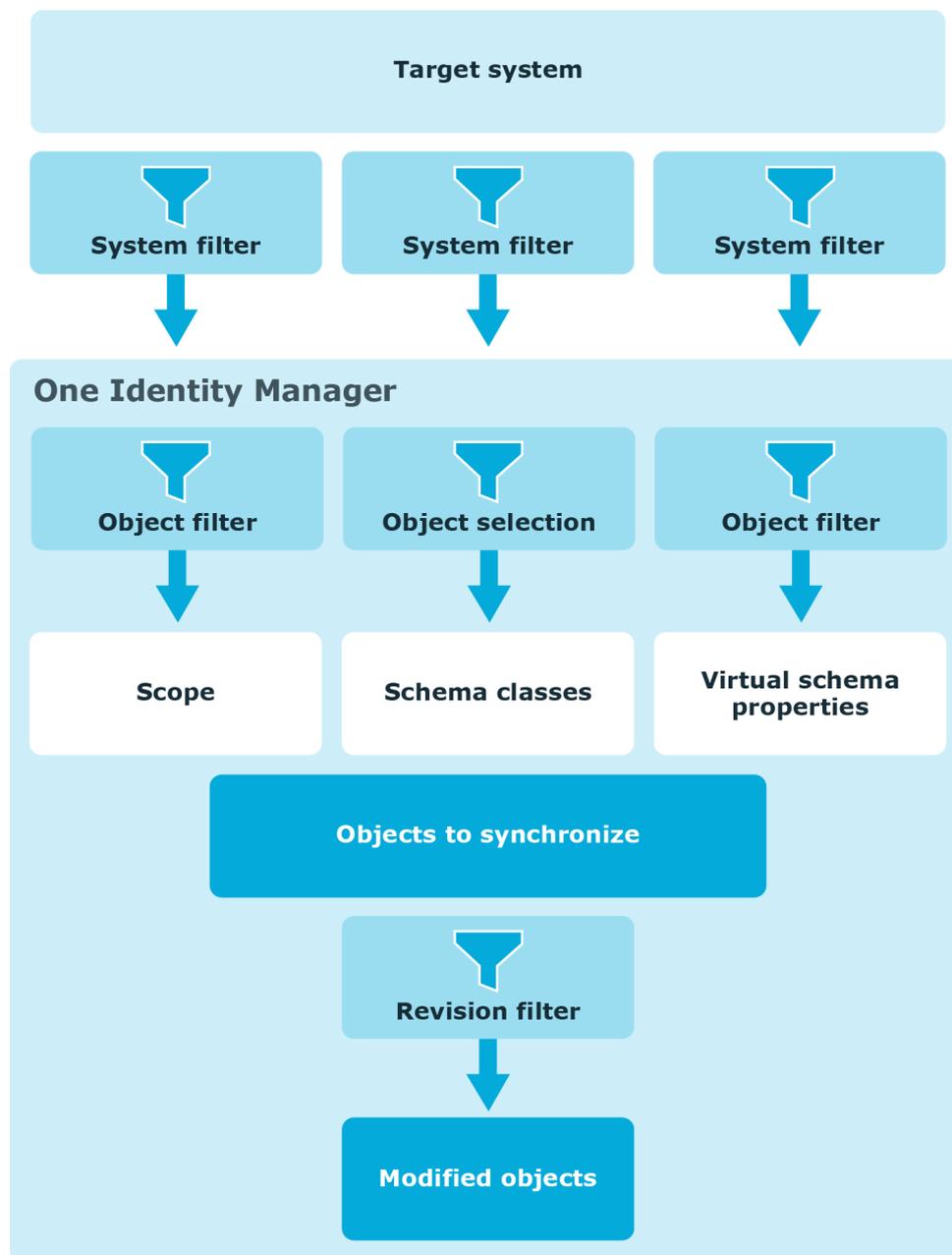
Filter	Description
System filter	<p>This filter limits the number of objects to load in the connected system. It is more effective than the object filter and object matcher because the system connector only load the objects that are really required. You cannot link more than one filter criteria with 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 system filters: Active Directory, LDAP, One Identity Manager databases.</p> <hr/> <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</p>

Filter	Description
	when the scope is defined and by virtual schema properties.
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 43
- [Schema class properties](#) on page 85
- [How does revision filtering work?](#) on page 44

- [Using variables and variable sets](#) on page 132
- [Wizard for entering filters](#) on page 19

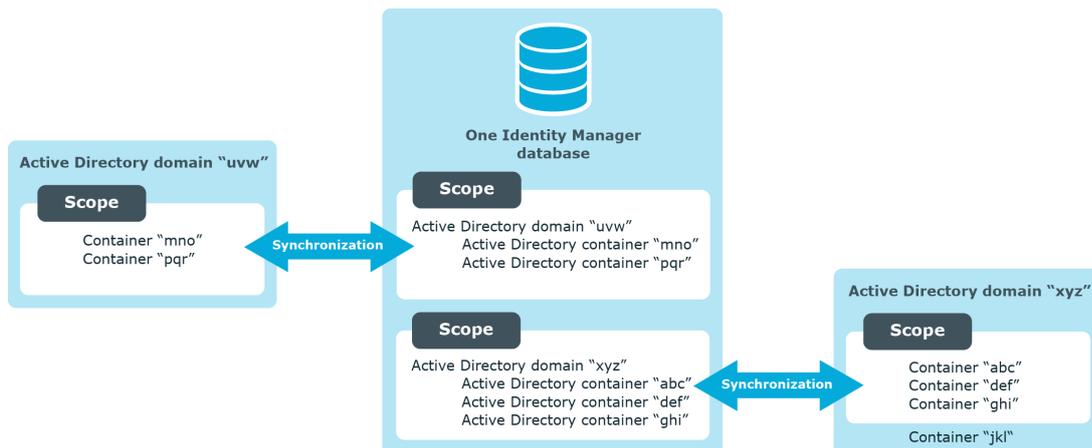
What is a scope?

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 128
- [What are filters?](#) on page 40
- [Using variables and variable sets](#) on page 132

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

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

For more information, see [Editing workflows](#) on page 106.

To permit revision filtering for a start up configuration

- In the Synchronization Editor, open the synchronization project.
- 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 137.

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.

Synchronization is even faster if the change information on the schema type also takes deleted objects into account. If a schema type's objects were neither added, changed nor deleted, the synchronization step can be skipped. Objects must not be loaded for comparison. Use of this optimization depends on whether the target system provides the appropriate change information.

To use optimized revision filtering

- In the Designer, set the **Common | TableRevision** configuration parameter.

Now each time a table changes, the table's revision date updates. This information is stored in the QBMTABLERevision table, RevisionDate column. In this way, One Identity Manager identifies whether a table object has been added, changed, or deleted.

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 run during daily maintenance.

NOTE: If the **Common | TableRevision** is not set, all revision data in the QBMTABLERevision table is deleted.

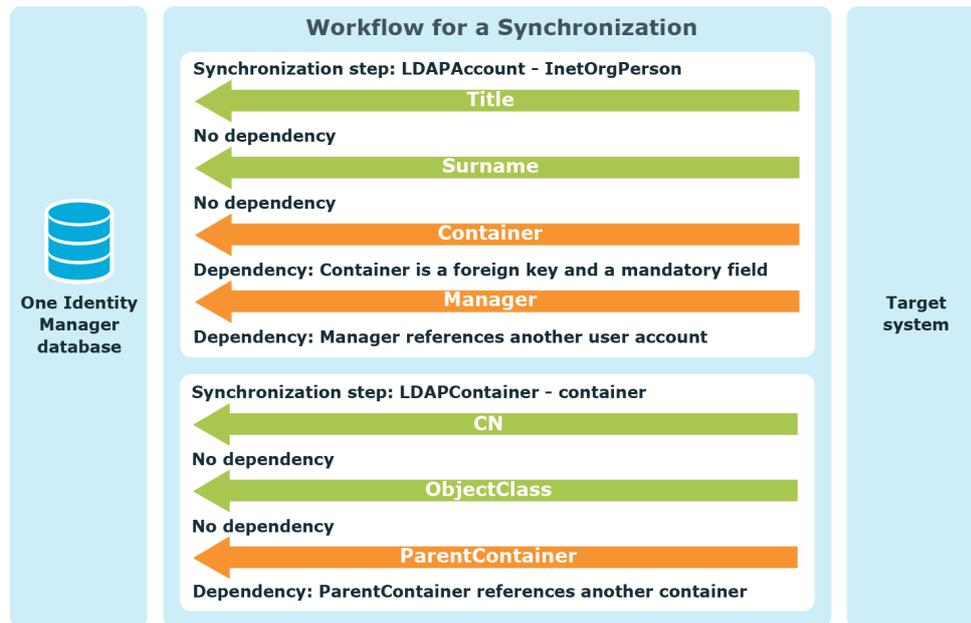
Related topics

- [Properties of a workflow](#) on page 108
- [Setting up start up configurations](#) on page 137
- [What are filters?](#) on page 40
- [Resetting revisions](#) on page 161

How does dependency resolution work?

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

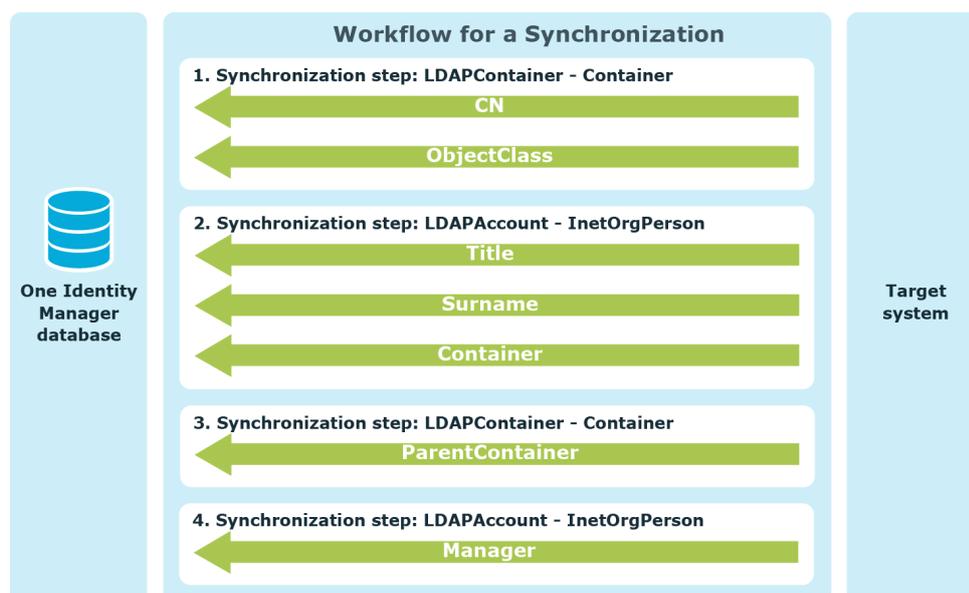
Figure 9: Example of a workflow with dependent schema classes and schema properties



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 **Implementation plan** report.

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:
Dependency resolution: **Automatic**

For more information, see [Editing workflows](#) on page 106.

Use automatic dependency resolution by default. Only select manual dependency resolution if individual dependencies cannot be resolved automatically. For example, this may be necessary 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

1. Find the schema properties between which dependencies exist.
2. Create a workflow with synchronization steps which take the following criteria into account:
 - a. Synchronization steps for schema classes without object dependencies
 - b. Synchronization steps for schema classes with objects referenced in other schema classes
 - Exclude the property mapping rules for dependent schema properties. Use the rule filter to do this.

- c. Synchronization steps for schema classes and schema properties that reference dependent objects
 - Enable the **Step only for dealing with dependency conflicts** option. These synchronization steps are performed only for objects that exist in both of the connected systems.
 - Include the property mapping rules for dependent schema properties. Use the rule filter to do this. All property mapping rules that have already been run in the previous steps can be excluded.
3. Specify the synchronization step sequence such that all synchronization steps for a) are run first, then all the synchronization steps for b), and lastly all the synchronization steps for c).
4. Edit the workflow properties. Select:
Dependency resolution: **Manual**
For more information, see [Editing workflows](#) on page 106.

Example of a workflow with manual dependency resolution

User accounts (Account) reference a primary system entitlement (UID_EntitlementPrimary) and one user account must be assigned as a manager (UID_ManagerAccount) on the system entitlement (Entitlement).

A synchronization workflow is defined by the following synchronization steps:

1. User accounts (Account)
Excluded rule: Primary system entitlement rule(UID_EntitlementPrimary)
Step only for dealing with dependency conflicts: disabled
2. System entitlements (Entitlement)
Step only for dealing with dependency conflicts: disabled
The property mapping rule for the system entitlement manager (UID_ManagerAccount) remains included because the referenced user accounts are already synchronized in step 1.
3. User accounts (Account)
Step only for dealing with dependency conflicts: enabled
Included rule: Primary system entitlement rule(UID_EntitlementPrimary)
All other property mapping rules are excluded.

Related topics

- [Displaying implementation plans](#) on page 124
- [Properties of a workflow](#) on page 108

- [Rule filters](#) on page 122
- [Editing synchronization steps](#) on page 110

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

Maintenance mode	Synchronization without revision filer	Synchronization with revision filer
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.

Maintenance mode	Synchronization without revision filer	Synchronization with revision filer
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 137.

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 run during daily maintenance.

Related topics

- [Maintenance modes](#) on page 140
- [Maintaining the data store](#) on page 216
- [Disabling the synchronization buffer](#) on page 217

Direction of synchronization and mapping

To synchronize a target system with One Identity Manager, you must specify which of the connected systems is the primary system. The primary system is defined in the synchronization configuration by the synchronization direction. 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

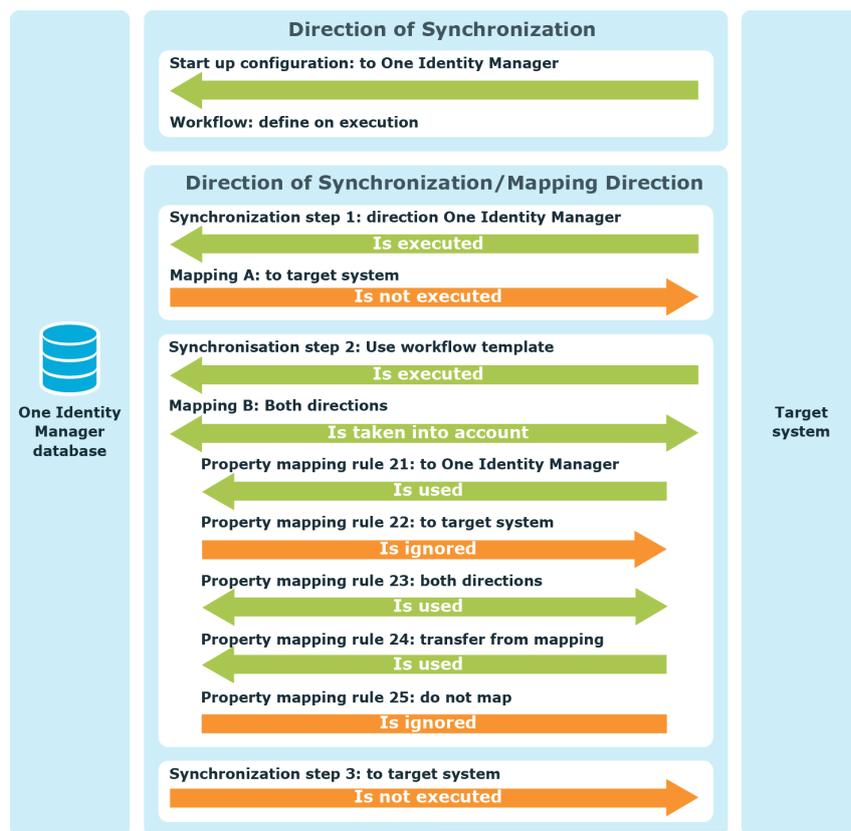
Defined on	Direction of synchronization specifies
Start configuration	In which direction a specific synchronization is run
Workflow	In which direction synchronizations are run
synchronization step	By which synchronization direction the step is run

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 run 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 137
- [Properties of a workflow](#) on page 108
- [General properties of a synchronization step](#) on page 113
- [Properties of a mapping](#) on page 83
- [Editing property mapping rules](#) on page 90

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 to the primary 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 run by default. To transfer these schema property values during synchronization, you must

ensure that these rules are carried out. 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 [Editing property mapping rules](#) on page 92.

Property mapping rules with this option set are run after the synchronization step is completed. This copies changes from the connected system against the direction of synchronization into the primary 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 run. 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 run again. For those schema properties involved, the changes are copied from the connected system into the primary 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 primary 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 primary 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 90

Detecting rogue modifications

To map single schema properties, it could be necessary to declare one of the connected systems as the primary system. 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 primary system.

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 run. 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.

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 163.
3. If the **Correct rogue modifications** option is set, One Identity Manager runs the property mapping rule. The object property in the connected system is overwritten with the value from the primary system.

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 mapping rule is run and the value in the target system is overwritten with the value from the One Identity Manager database.

Ignore mapping direction on adding

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 run.

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 run 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 run a property mapping rule on adding

1. Edit the property mapping rule.
2. Set the **Ignore mapping direction restrictions on adding** option.

Respect sort order of MVP values

It must be specified for multi-valued schema properties whether the order in which the values are sorted in the value list is relevant for detecting rogue modifications.

- **Sort order is relevant**
A rogue modification is also detected if merely the sort order of the values in the value list differs.
- **Sort order is irrelevant**
A rogue modification is detected if at least one of the values in the value list differs. If the value lists differ only by the order in which the values are sorted, a rogue modification is not detected.

Prerequisites:

- Both mapped schema properties are multi-value.
- The schema property written by the mapping has `DPRSchemaProperty.IsMvpOrderSignificant=1`.
- **Rogue detection enabled** is set.
- **Force mapping against direction of synchronization** is disabled.
- **Handle first property value as single value** is disabled for both of the connected systems.

To respect the sort order of MVP values when detecting rogue modifications

1. Edit the property mapping rule.
2. In the **Multi-value sort order** menu, select **Respect sort order**.

Related topics

- [Property mapping rule details](#) on page 92
- [Editing property mapping rules](#) on page 92

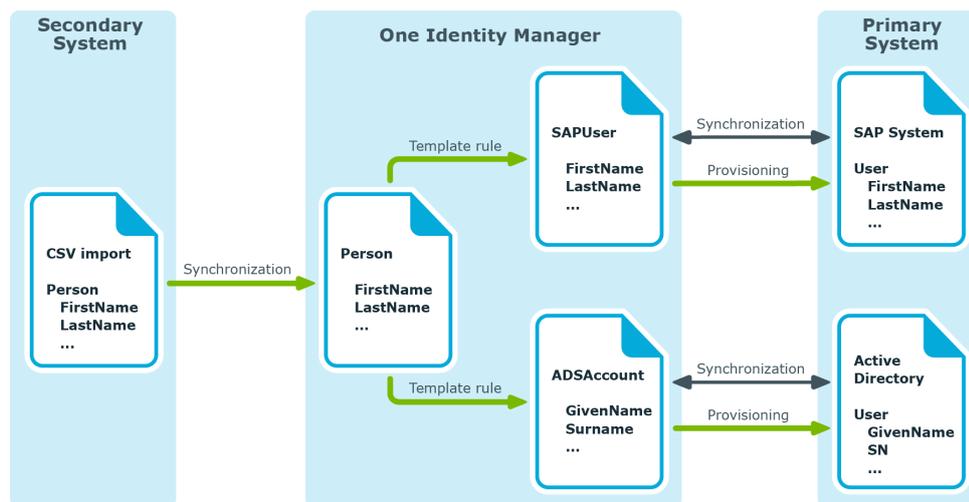
Synchronizing user data with different systems

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 identity 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 identity 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 73.
2. Edit the synchronization step properties.
Set the **Import data** option on the **General** tab.
For more information, see [Editing synchronization steps](#) on page 112.

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 run 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 113

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 [Editing synchronization steps](#) on page 112.
2. Select the **Processing** tab.
3. Specify the processing method. Select the following options as appropriate:

For synchronization from the target systems to One Identity Manager	Processing method (technical name)
----------------------------------------------------------------------------	-------------------------------------------

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 [Editing synchronization steps](#) on page 112.
2. Select the **Processing** tab.
3. Specify the processing method. Select the following options as appropriate:

For synchronization from the target systems to One Identity Manager	Processing Method (technical name)
----------------------------------------------------------------------------	-------------------------------------------

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 115
- [Target system synchronization](#) on page 164
- [Include custom tables in the synchronization](#) on page 192
- [Synchronizing user data with different systems](#) on page 58
- [General properties of a synchronization step](#) on page 113
- [Deleting memberships](#) on page 166

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 125
- [Activating the synchronization project](#) on page 151
- [Save changes permanently](#) on page 26
- [Updating schemas](#) on page 62

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 125
- [How to remove unnecessary project data](#) on page 61
- [Setting up mappings](#) on page 79
- [Activating the synchronization project](#) on page 151

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 be updated so that the modification can be provisioned.

Prerequisites

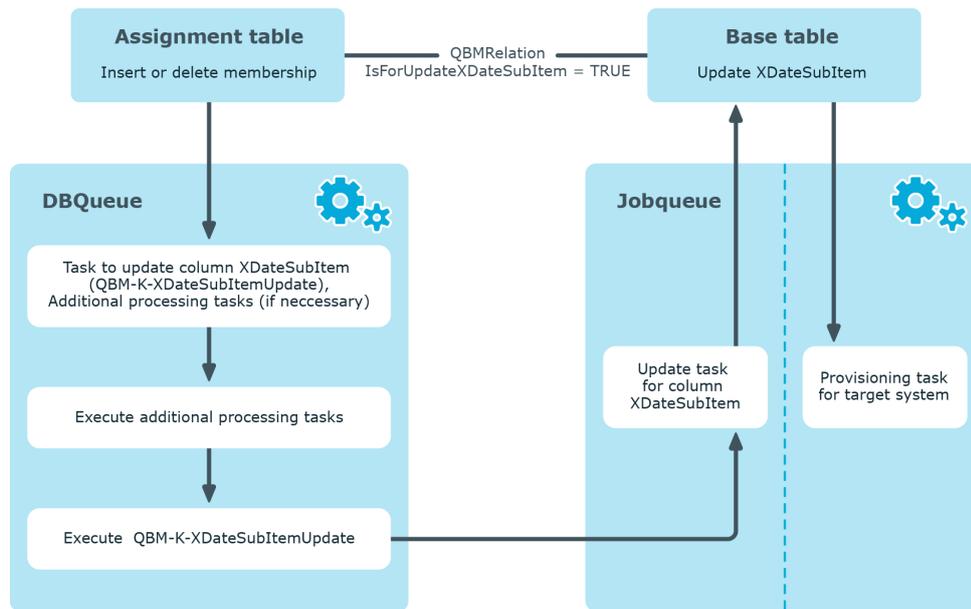
- The base table has the XDateSubItem column.
- The **Update dependencies modification date** property is true in the table relation between assignment and base table (QBMRelation.IsForUpdateXDateSubItem = TRUE).

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 in the target system schema.

Related topics

- [How does revision filtering work?](#) on page 44

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 as an object property in list form in the target system.
Examples: List of user accounts in the Member property of a group - OR - List of profiles in the MemberOf property of a user account
- 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 information about setting this option, see the administration guides for connecting each target systems.

Additional processing steps are run 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 <code>DPRMemberShipAction</code>	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 [Editing synchronization steps](#) on page 112.
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 settings are only possible in expert mode. For more information, see [Extended properties for start up configuration](#) on page 183.

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 122

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 (DPRShe11.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.
 1. Select **General** on the start page.
 2. 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 74
- [Exporting a synchronization configuration](#) on page 198

Concurrency behavior of synchronization objects

It is possible that synchronization objects have been changed at the same time in both connected systems or are being processed automatically that processing is not yet complete. These objects are excluded by default to avoid data conflict. If possible, synchronization of these objects is repeated by the next synchronization run. Excluded objects are recorded in the synchronization log.

By default, synchronization objects are checked for possible concurrency conflicts before processing starts. However, if provisioning processes are created afterward, conflicts may not be detected. Therefore, the start up configurations, it is possible to set when and how often the data should be checked for possible conflicts.

To protect synchronization performance as much as possible, the information about the object processing status is cached. By default, the data remains in the cache for 60 seconds. You can modify the retention time.

To set when to check for concurrency conflicts

1. In the Synchronization Editor, enable expert mode.
 1. In the Synchronization Editor, select the **Database > Settings** menu.
 2. Enable **Enable expert mode**.
 3. Click **OK**.
2. Edit the start up configuration properties.
 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. Select the **Advanced** tab.
4. In the **Collision detection** field, specify when to check for concurrency conflicts.
 - **Before processing** (default): Checks synchronization objects for possible collision conflicts immediate after they are loaded.
Advantage: Detected objects are not processed.
Disadvantage: Conflicts are not detected if synchronization objects are then processed by other system processes during synchronization. Conflicts can still occur due to the time delay before the objects are saved.
 - **Before committing**: Synchronization objects are checked for possible concurrency conflicts before committing.
Advantage: Conflicts are detected immediately before committing. This increases the detection rate.
Disadvantage: Objects are processed unnecessarily if their processing conflicts could already have been detected after loading.
 - **Multiple**: Synchronization objects are checked for possible concurrency conflicts before processing starts and before saving.
Advantage: High detection rate.
Disadvantage: Multiple checks can reduce synchronization performance.
5. In the **Cached data retention time** field, specify how long the data remains in the cache. This is given in seconds.
6. Click **OK**.
7. Disable expert mode

In rare cases, it could still be necessary to synchronize some properties of skipped objects immediately, to transfer safety-critical changes, for example. You can configure the behavior you require in the property mapping rules.

To force synchronization of individual schema properties

1. Edit the property mapping rule for this schema property.
 1. In the Synchronization Editor, 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.
2. In the **Concurrency behavior** field, set the value **Apply rule**.

This applies the property mapping rule, overwriting any data changes in the connected system.

IMPORTANT:

- Only select this option in exceptional cases. Afterward, check the data modifications that might be overwritten by this.
- The setting only takes effect if **Pre-processing** is selected for collision detection in the start up configuration. Only then can collisions can be detected before mapping takes place.

3. Click **OK**.

Related topics

- [Extended properties for start up configuration](#) on page 183
- [Object matching rule details](#) on page 102
- [Editing property mapping rules](#) on page 92

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	Setting up base objects on page 145
Mapping	Setting up mappings on page 79
Start configuration	Setting up start up configurations on page 137
Synchronization project	Creating a synchronization project on page 72
Variable set	Using variables and variable sets on page 132
Workflow	Setting up synchronization workflows on page 104

Starting the Synchronization Editor

There are different ways to start the Synchronization Editor.

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

Related topics

- [Run Synchronization Editor without target system connection](#) on page 31

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. For certain target systems, One Identity Manager supplies a default project template. 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 73
- [How to edit a synchronization project](#) on page 73
- [Templates for creating synchronization projects](#) on page 76
- [Specifying a schedule](#) on page 141
- [Using variables and variable sets](#) on page 132

- [Activating the synchronization project](#) on page 151
- [Copying synchronization projects](#) on page 156

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 home 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 synchronization project was already opened by another user, a message appears.
 - To open the synchronization project anyway, click **OK**.
You cannot save changes to the synchronization project.
4. If the connection data is encrypted, enter the values required to establish the system connection and click **OK**.
5. 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....**
If the synchronization project was already opened by another user, the button is disabled.
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 32

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

Property	Description
	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. NOTE: 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 active	The shadow copy is only created if the synchronization project is active.
Description	Text field for additional explanation.

Related topics

- [Specifying the script language in synchronization projects](#) on page 76
- [Improving loading performance](#) on page 67

Synchronization project migration data

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 174

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 generic 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 88
- [Scope properties](#) on page 130
- [Schema class properties](#) on page 85

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 76
- [Specifying processing methods](#) on page 115
- [Direction of synchronization and mapping](#) on page 51

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 73
- [Setting up mappings](#) on page 79
- [Setting up synchronization workflows](#) on page 104
- [Setting up start up configurations](#) on page 137
- [Editing the scope](#) on page 128

- [Setting up base objects](#) on page 145
- [Configuring the synchronization log](#) on page 127
- [Activating the synchronization project](#) on page 151

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.

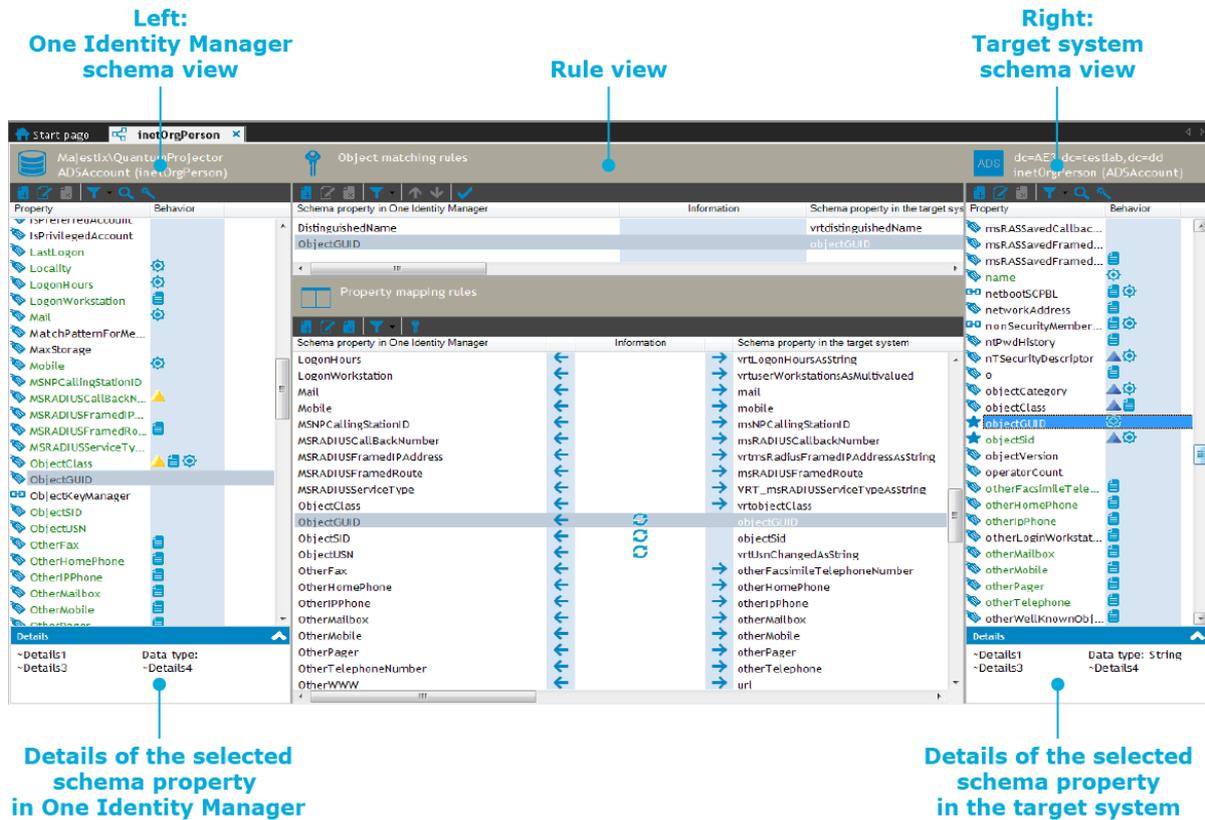
Detailed information about this topic

- [How are schemas mapped](#) on page 37
- [Mapping editor](#) on page 80
- [Creating mappings](#) on page 82
- [Editing mappings](#) on page 83
- [Deleting mappings](#) on page 83
- [Properties of a mapping](#) on page 83
- [Schema class properties](#) on page 85
- [Edit schema properties](#) on page 88
- [Editing property mapping rules](#) on page 90
- [Editing object matching rules](#) on page 99

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 matching 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 matching 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. Test virtual schema properties.

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.
	Order object matching rules.
	
	Test rules.
	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.

Icon	Meaning
	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.
	Schema property that contains the revision counter.

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.

Creating mappings

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**.

Related topics

- [Setting up mappings](#) on page 79

Editing mappings

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 properties of the mapping.
6. Click **OK**.

Related topics

- [Setting up mappings](#) on page 79

Deleting mappings

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.

Related topics

- [Setting up mappings](#) on page 79

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 Hierarchy synchronization 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>

Properties	Meaning
	<ul style="list-style-type: none"> Click  to edit schema class properties. <p>Create a new schema class to set up a mapping for another schema type.</p> <ul style="list-style-type: none"> Click  to create a new schema class.
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"> Click  to edit schema class properties. <p>Create a new schema class to set up a mapping for another schema type.</p> <ul style="list-style-type: none"> Click  to create a new schema class.

Detailed information about this topic

- [Direction of synchronization and mapping](#) on page 51
- [Schema class properties](#) on page 85

Related topics

- [Setting up mappings](#) on page 79

Schema class properties

Enter the following properties for a schema class:

Table 37: Schema class properties

Property	Meaning				
Class types	Types of schema classes. The class type can only be specified when a new schema class is added.				
	<table> <tbody> <tr> <td>Generic schema class</td> <td>Schema class without a filter function.</td> </tr> <tr> <td>Unique objects</td> <td>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.</td> </tr> </tbody> </table>	Generic schema class	Schema class without a filter function.	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.
Generic schema class	Schema class without a filter function.				
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.				
Schema type	Select the schema type for which you want to create a schema class.				

Property	Meaning
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	<p>Schema properties, which form a unique value when combined.</p> <p>This only applies to schema classes with the class type "Unique objects"</p> <p>⚠ CAUTION: 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>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.</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>NOTE: 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>NOTE: 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 87
- [Setting up mappings](#) on page 79

Use cases for class types

You want to import identity 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

	Lastname	FirstName	Department	Location
1	Name1	User1	Marketing	London
2	Name2	User2	Marketing	Berlin
3	Name3	User3	Marketing	London
4	Name4	User4	Sales	Berlin
5	Name5	User5	Sales	London
6	Name6	User6	Sales	Berlin

Identities, 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. Identities 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 identities.
 - 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.
 1. Select the **Unique objects** class type and enter the mandatory data.
 2. 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.
 1. Select the **Unique objects** class type and enter the mandatory data.
 2. 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
Identities	Name1; User1
	Name2; User2
	Name3; User3
	Name4; User4
	Name5; User5
	Name6; User6
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 system connector 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 signs 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 186
- [Adding virtual schema properties](#) on page 89
- [Displaying and editing schema properties](#) on page 89
- [Deleting virtual schema properties](#) on page 90
- [Setting up mappings](#) on page 79

Adding 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.

Related topics

- [Edit schema properties](#) on page 88

Displaying and editing 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**.

Related topics

- [Edit schema properties](#) on page 88

Deleting 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**.

Related topics

- [Edit schema properties](#) on page 88

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.

Detailed information about this topic

- [Testing property mapping rules](#) on page 98
- [Creating property mapping rules](#) on page 91
- [Editing property mapping rules](#) on page 92

- [Deleting property mapping rules](#) on page 92
- [Property mapping rule details](#) on page 92
- [Setting up mappings](#) on page 79

Creating property mapping rules

To create a property mapping rule

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. 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 with 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.

Related topics

- [Editing property mapping rules](#) on page 90

Editing property mapping rules

To edit a property mapping rule

1. In the Synchronization Editor, 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**.

Related topics

- [Editing property mapping rules](#) on page 90

Deleting property mapping rules

To delete a property mapping rule

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

Related topics

- [Editing property mapping rules](#) on page 90

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 comparison rule	Compares the schema property value of the One Identity Manager schema with the value of a target system schema.

Detail	Description	
	Multiple reference rule	Compares multi-value schema properties. The value list are compared element by element. Missing values are added; superfluous value are deleted.
Rule name	Name of the rule. The rule name must be unique within a mapping. Click 🔗 to change rule names. The rule name is used as key. Changes to the rule name may cause errors.	
Display name	Rule display name.	
Mapping direction	Specify the permitted mapping direction for mapping selected schema properties.	
	Both directions	Property mapping rule is applied for both synchronization in the direction of the target system and synchronization direction One Identity Manager.
	To the target system	Property mapping rule is only used for synchronizing in the direction of the target system.
	To the One Identity Manager	Property mapping rule is only used for synchronizing in the direction of the One Identity Manager.
	Do not assign	The property mapping rule is ignored. You can set this value to disable a property mapping rule.
	Taken from mapping	The mapping direction applies which is fixed in the mapping.
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 style="border: 1px solid #00a0e3; padding: 10px;"> <p>Example: A telephone system is managed with One Identity Manager. The</p> </div>	

Detail**Description**

telephone system acts as the primary system when the telephone numbers are synchronized. The direction of mapping is set to **One Identity Manager**. The telephone number is a mandatory value in the target system.

In One Identity Manager, a new identity is added. Each identity is given an initial telephone number. These identities should be added to the target system by synchronizing them. So that the telephone numbers are written to the target system during synchronization, the **Ignore mapping direction restrictions on adding** option must be set on the property mapping rule.

For more information, see [Detecting rogue modifications](#) on page 55.

Description

Text field for additional explanation.

Concurrence behavior

Specifies whether the property mapping rule is always applied. Objects in a connected system (synchronization target) that

- Have been changed but the changes are not yet provisioned
- Are in automatic processes that are not yet complete
- Or are blocked in some other way

are excluded by default to avoid data conflict. If possible, synchronization of these objects is repeated by the next synchronization run.

In rare cases, it may still be necessary to synchronize some properties of these objects immediately, to transfer safety-critical changes to the connected system, for example.

- **Apply rule:** Applies the property mapping rule, overwriting any data changes.

IMPORTANT:

- Only select this option in exceptional cases. Afterward, check the data modifications that might be overwritten by this.
 - The setting only takes effect if **Pre-processing** is selected for collision detection in the start up configuration. Only then can collisions be detected before mapping takes place.
- **Do not apply rule:** The property mapping rule is not run if the object is blocked for changes. If this option is enabled for all property mapping rules in the mapping, the object will be completely omitted and not handled by the synchronization.

Detail	Description
	<p>This corresponds to the default behavior.</p> <p>For more information, see Concurrency behavior of synchronization objects on page 68.</p>
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. The condition can be created with the wizard or stored as a script.</p> <p>Use the Left and Right operators to reference the respective schema.</p> <p>Left: Schema properties in the One Identity Manager's schema extension.</p> <p>Right: Schema properties in the target system's schema extension.</p> <ul style="list-style-type: none"> To create the condition with the wizard, select the Condition and click Create condition. For more information, see Wizard for entering filters on page 19. <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> <ul style="list-style-type: none"> To write the condition as a script, select Script and enter the script code. For more information, see Support for scripting on page 21. <p>Example: If string.IsNullOrEmpty(\$Left::CanonicalName\$) Then ...</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 Mapping against the direction of synchronization on page 53.</p> <p>The option can only be set if:</p> <ul style="list-style-type: none"> Detecting rogue modifications is disabled. The direction of mapping is Target system or One Identity Manager. <p>The property mapping rule may not be run in both directions.</p>
Detecting rogue modifications	Specifies whether rogue modifications are identified and logged if the direction of synchronization is opposite to the mapping direction.

Detail	Description
Correct rogue modifications	<p>The option can only be set if:</p> <ul style="list-style-type: none"> • The direction of mapping is Target system or One Identity Manager. • Force mapping against direction of synchronization is disabled. <p>If this option is set, rogue modifications are detected and logged. The log can be evaluated after synchronization. For more information, see Synchronization analysis on page 163.</p> <p>If the option is not set, the property mapping rule is ignored by synchronization.</p> <p>For more information, see Detecting rogue modifications on page 55.</p>
Multi-value sort order	<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"> • Detecting rogue modifications is enabled. • The direction of mapping is Target system or One Identity Manager. • Force mapping against direction of synchronization is disabled. <p>If the option is set, the property mapping rule is run by synchronization. The object property in the connected system is overwritten with the value from the primary system. Thus rogue changes are ignored.</p> <p>If the option is not set, rogue changes are only logged.</p> <p>For more information, see Detecting rogue modifications on page 55.</p> <p>Specifies whether the order in which the values of multi-valued schema properties are sorted must be respected when detecting rogue modifications.</p> <ul style="list-style-type: none"> • Respect sort order: The order in which values are sorted is relevant. Rogue modification detection checks whether all values in both mapped schema properties are in the identical order. • Ignore sort order: The order in which the values are sorted is irrelevant. Rogue modification detection checks whether all values in both mapped schema properties exist irrespective of their sort order. • Automatic: The connector automatically determines whether

Detail	Description
	<p>the sort order is be respected. This is taken into account when a schema property is set, <code>DPRSchemaProperty.IsMvpOrderSignificant=1</code> that can be overridden by the mapping.</p> <p>This field is only displayed if all the following apply:</p> <ul style="list-style-type: none"> • Both schema properties are multi-value • Force mapping against direction of synchronization is disabled • Detecting rogue modifications is enabled • Handle first property value as single value is disabled <p>For more information, see Detecting rogue modifications on page 55.</p>
Ignore case	Specifies whether changes that only differ through case are ignored by the mapping. This option affects only schema properties with the String data type.
Deal with the first value of the property as a single value	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.
Disable merge mode support	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.
	For more information, see Single membership provisioning on page 65.

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 not to be mapped to the schema property of the connected system.

Related topics

- [Editing property mapping rules](#) on page 90

Testing property mapping rules

The functionality of property mapping rules can be tested on an object pair that meet the object matching criteria. Furthermore, the test can be run on a new object pair that does not contain any values. To run the test, change the properties of one of the objects. The test dialog shows what changes have been made in each system. The changed objects can be copied into the clipboard and used for further analysis.

The **Test object matching rules...** dialog shows all mapped schema properties from the selected mapping. The schema property values that have write access can be edited.

Table 43: Meaning of icons in the test dialog

Icon/Option	Meaning
	Filters the list of object pairs that match the object matching rules.
	Discards all changes made to the objects.
	Copies objects to the clipboard.
Automatic	Specifies whether the mapping is run automatically once a value changes. If a value in the target system object has changed, mapping is carried out in One Identity Manager and vice versa. This applies all the property mapping rules.
	Maps to One Identity Manager. This applies all the property mapping rules.
	Maps to the target system. This applies all the property mapping rules.
Close	Closes the test dialog.

To test property mapping rules with a new object pair

1. In the Synchronization Editor, select the **Mappings** category.
2. Select a mapping in the navigation view.
3. In the property mapping rule view's toolbar, click .

This opens the **Test property mapping rules** dialog and displays empty object properties.

4. Enter values for the target system object.

- Click  or map automatically.

All changes caused by the property mapping rules are displayed on the database side.

5. Enter values for the database object.

- Click → or map automatically.

All changes caused by the property mapping rules are displayed on the target system side.

To test property mapping rules with a fixed object pair

1. In the Synchronization Editor, select the **Mappings** category.
2. Select a mapping in the navigation view.
3. In the object matching rule view's toolbar, click ✓.
4. In the **Test object matching rules** dialog, double-click the object pair you want to test with property mapping rules.

This opens the **Test property mapping rules** dialog and displays the object properties of the selected object pair. The **Test object pairs** section shows all the object pairs that meet the object matching criteria.

5. (Optional) To run the test with a different object pair, double-click an object pair in the **Test object pairs** section.
6. Change the target system object's properties.

- Click ← or map automatically.

All changes caused by the property mapping rules are displayed on the database side.

7. Change the database object's properties.

- Click → or map automatically.

All changes caused by the property mapping rules are displayed on the target system side.

Related topics

- [Editing property mapping rules](#) on page 90
- [Testing object matching rules](#) on page 103

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 mapping 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 run 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 run. 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 properties used to identify system objects must contain a value. If a schema property contains is empty, the object matching 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.

Detailed information about this topic

- [Creating object matching rules](#) on page 101
- [Editing object matching rules](#) on page 102
- [Deleting object matching rules](#) on page 102
- [Object matching rule details](#) on page 102
- [Testing object matching rules](#) on page 103
- [Setting up mappings](#) on page 79

Creating 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 prompt 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 prompt 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.

Related topics

- [Editing object matching rules](#) on page 99

Editing 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**.

Related topics

- [Editing object matching rules](#) on page 99

Deleting 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**.

Related topics

- [Editing object matching rules](#) on page 99

Object matching rule details

Enter the following details for an object matching rule.

Table 44: Object matching rule details

Detail	Description
Rule Types	Select the rule type for a new rule.
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.

Detail	Description
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 45: Additional detail of a value compare rule

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

Table 46: Additional details of a logical expression rule

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

Related topics

- [Editing object matching rules](#) on page 99

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.

Related topics

- [Editing object matching rules](#) on page 99
- [Testing property mapping rules](#) on page 98

Setting up synchronization workflows

The synchronization sequence is controlled by a workflow. Use workflows to combine the synchronization steps to be run. 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.

Detailed information about this topic

- [Properties of a workflow](#) on page 108
- [Toolbars in the workflow editor](#) on page 104
- [Displaying implementation plans](#) on page 124
- [Editing synchronization steps](#) on page 110
- [Copying workflows](#) on page 106
- [Creating workflows](#) on page 105
- [Deleting workflows](#) on page 107
- [Editing workflows](#) on page 106

Toolbars in the workflow editor

Both workflow and navigation views have their own toolbars.

Table 47: 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 48: Meaning of icons in the workflow view

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

Related topics

- [Setting up synchronization workflows](#) on page 104

Creating workflows

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.

Related topics

- [Setting up synchronization workflows](#) on page 104
- [Properties of a workflow](#) on page 108

Editing workflows

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. On the **General** tab, enter the main properties of the workflow.
5. On the **Synchronization log** tab, configure which data should be written to the synchronization log.
6. Click **OK**.

Related topics

- [Setting up synchronization workflows](#) on page 104
- [Properties of a workflow](#) on page 108

Copying workflows

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**.

Related topics

- [Setting up synchronization workflows](#) on page 104
- [Properties of a workflow](#) on page 108

Deleting workflows

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**.

Related topics

- [Setting up synchronization workflows](#) on page 104

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.
3. On the **General** page, enter the main properties of the workflow.
 - **Display name:** Display name of the workflow.
 - **Description:** Text field for additional explanation.
4. On the **Assign mapping** page, select the mappings that the workflow will handle and designate mappings for revision filtering.

By default, all existing mappings are enabled.

- To deselect a mapping, double-click .
- To select a mapping, double-click .

Revision filtering is permitted for all mappings, by default.

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

5. On the **Synchronization behavior for intersections** page, specify the synchronization behavior of the object pair whose properties have changed.

- a. In the **Database method** column, select the processing method to be run in the One Identity Manager database.
- OR -
 - b. In the **Target system method** column, select the processing method to be run in the target system.
6. On the **Relative complement in One Identity Manager** page, specify the synchronization behavior of objects that only exist in the One Identity Manager database.
 - a. In the **Database method** column, select the processing method to be run in the One Identity Manager database.
- OR -
 - b. In the **Target system method** column, select the processing method to be run in the target system.
7. On the **Relative complement in the target system** page, specify synchronization behavior for objects that only exist in the target system.
 - a. In the **Database method** column, select the processing method to be run in the One Identity Manager database.
- OR -
 - b. In the **Target system method** column, select the processing method to be run in the target system.
8. To end the workflow wizard, click **Finish**.

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 83
- [Specifying processing methods](#) on page 115

Related topics

- [Setting up synchronization workflows](#) on page 104
- [Properties of a workflow](#) on page 108

Properties of a workflow

Enter the following general 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">• Defined when run: The synchronization direction is defined in the start up configuration. For more information, see Start up configuration properties on page 138.• Target system: One Identity Manager is the primary system for synchronization.• One Identity Manager The target system is the primary system for synchronization.
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 How does revision filtering work? on page 44.</p> <ul style="list-style-type: none">• Defined when run: The required behavior is defined in the start up configuration.• Use revision filter: Only modified objects are synchronized.• Do not use revision filter: All objects are synchronized.
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 stop synchronization if an error occurs during the processing of synchronization objects. In this case, no further synchronization objects are processed.</p> <p>NOTE: 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">• Continue on error: Processing continues with the next object. Errors are logged. This option should be used for productive systems.• Break on error: Synchronization is stopped. This option should only be used to find errors, for example in going live processes.

Properties	Meaning
Dependency resolution	<p>Specify how dependencies between synchronization step are resolved.</p> <p>For more information, see How does dependency resolution work? on page 46.</p> <ul style="list-style-type: none"> • Automatic: 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. • Manual: 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.
Collision detection strategy	<p>Specifies the strategy for checking conflicts when new objects are added to the target system.</p> <ul style="list-style-type: none"> • Optimistic: Drops additional verification. For example, select this value if conflicts are unlikely because data in the target system is changed only by One Identity Manager. • Pessimistic: Additional verification is carried out to identify conflicts. For example, select this value if conflicts are likely because data in the target system is changed at the same time by other systems.
Description	Text field for additional explanation.

On the **Synchronization log** tab, configure which data should be written to the synchronization log.

Related topics

- [Setting up synchronization workflows](#) on page 104
- [Configuring the synchronization log](#) on page 127
- [How does dependency resolution work?](#) on page 46

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 46
- [General properties of a synchronization step](#) on page 113
- [Specifying processing methods](#) on page 115
- [Specifying quotas](#) on page 120
- [Rule filters](#) on page 122
- [Extended synchronization step properties](#) on page 122
- [Creating synchronization steps](#) on page 111
- [Deleting synchronization steps](#) on page 113
- [Editing synchronization steps](#) on page 112

Creating 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**.

Related topics

- [Editing synchronization steps](#) on page 110

Editing synchronization steps

To edit synchronization step properties

1. In the Synchronization Editor, open the synchronization project.
2. Select the **Workflows** category.
3. Select a workflow in the navigation view.
4. Double-click on the synchronization step in the workflow.
5. Edit the synchronization step properties.
6. Click **OK**.

To manually specify the order of synchronization steps

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

To enable or disable synchronization steps

1. In the Synchronization Editor, open the synchronization project.
2. Select the **Workflows** category.
3. Select a workflow in the navigation view.
4. Click  in the workflow view's toolbar.
5. Set the **Disable** option for all synchronization steps that you do not want to be carried out.
- OR -
Clear the **Disable** check boxes on all synchronization steps that you want to enable.
Multi-select is possible.
6. Click **OK**.

Related topics

- [Editing synchronization steps](#) on page 110

Deleting 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.
4. Click .
5. Confirm the security prompt with **Yes**.

Related topics

- [Editing synchronization steps](#) on page 110

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	Select the direction in which synchronization should take place. <ul style="list-style-type: none">• Use workflow template: The direction of synchronization is defined in the workflow. For more information, see Properties of a workflow on page 108.• Target system: One Identity Manager is the primary system for synchronization.• One Identity Manager The target system is the primary 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 How does revision filtering work? on page 44. <ul style="list-style-type: none">• Use workflow template: The desired behavior is specified with the workflow.• Use revision filter: Only modified objects 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 stop synchronization if an error occurs during the processing of synchronization objects. In this case, no further synchronization objects are processed.</p> <p>NOTE: 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"> • Use workflow template: The desired behavior is specified with the workflow. • Continue on error: Processing continues with the next object. Errors are logged. This option should be used for productive systems. • Break on error: Synchronization is stopped completely. This option should only be used to find errors, for example in going live processes.
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 Synchronizing user data with different systems on page 58.</p>
Description	Text field for additional explanation.
Step only for dealing with dependency conflicts	<p>Specifies whether the synchronization step is used for post-processing conflicts if dependencies are resolved manually. This synchronization step, should only apply those property mapping rules that resolve references. Use the rule filter to exclude rules that should not be applied.</p> <p>The synchronization step is performed only for objects that exist in both connected systems.</p> <p>The option is visible only if Manual is set in the workflow for dependency resolution. For more information, see Properties of a workflow on page 108.</p>
Disabled	If this option is set, the synchronization step is not synchronized.

Related topics

- [Editing synchronization steps](#) on page 110
- [How does dependency resolution work?](#) on page 46
- [Rule filters](#) on page 122

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	Objects that only exist in one of the connected system are deleted from the system. The following applies to synchronization in One Identity Manager. 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 Synchronizing user data with different systems on page 58. For more information about deferred deletion, see the <i>One Identity Manager Configuration Guide</i> .
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

Processing method (technical name)	Meaning
	ignored by subsequent synchronization.
No processing	No processing methods are run.

Table 52: Meaning of the icons

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

Detailed information about this topic

- [Editing subsets](#) on page 117
- [Specifying additional processing methods](#) on page 116
- [Specifying custom processing methods](#) on page 118
- [Deleting objects in One Identity Manager](#) on page 60
- [Editing synchronization steps](#) on page 110

Specifying additional processing methods

Some target systems provide extra processing methods in addition to the default ones. One Identity Manager can run 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 run 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.

<u>Object set</u>	<u>Processing methods</u>
Objects only found in One Identity Manager are:	Insert AddExtID

Related topics

- [Specifying processing methods](#) on page 115

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 run. You can specify different processing methods for different sets of objects. These are run 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 conditions required for running 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 run:
Base.<schemaproperty>.
 - To access the schema properties of the other system, use the following expression in the condition: Other.<schema property>
4. Use **↑** and **↓** to specify the order in which to run 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 identity, are marked for deletion.	MarkForDeletion	Base.UID_Person <> ''
	All user accounts, not connected with an identity, 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 115
- [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

```
References VI.Projector.Database.dll
<Tag("Projector")>
<BaseObjectType("Table")>
Public Sub CCC_ScriptName(unit As IUnitOfWork, entity As IEntity(), args As
```

```

VI.Projector.Database.ScriptMethodArgs)
    '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 more information about creating scripts with the Script Editor, see the *One Identity Manager Configuration Guide*.

2. Compile the script.
3. In the Synchronization Editor, open the synchronization project.
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 scripts

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

```

References VI.Projector.Database.dll
<Tag("Projector")>
<BaseObjectType("Department")>
<BaseObjectType("Locality")>
Public Sub CCC_Department_RemoveManager(unit As IUnitOfWork, entities As IEntity
(), args As VI.Projector.Database.ScriptMethodArgs)
    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

```

The following sample script creates or updates database objects.

```

References VI.Projector.Database.dll
<Tag("Projector")>
<BaseObjectType("ADSAccount")>
Public Sub CCC_SpecialCommit(unit As IUnitOfWork, entities As IEntity(), args As
VI.Projector.Database.ScriptMethodArgs)
  For Each entity In entities
    For Each kvp In args.Changes
      entity.PutValue(kvp.Key, kvp.Value)
    Next
    unit.Put(entity)
  Next
End Sub

```

Related topics

- [Specifying processing methods](#) on page 115

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 are generally modified, added, or deleted in a connected system. If this number is exceeded when a processing method is run, a warning appears and synchronization is stopped. The synchronization step and mapping configurations can be checked and corrected before repeating synchronization.

To specify the maximum set of system objects that can be processed in a synchronization step, define quotas for each processing method. A quota provides the maximum number of objects to process relative to the total number of all objects in the schema class to be synchronized. When a synchronization step is run, One Identity Manager calculates the number of objects to process for each processing method with a quota. If this number exceeds the quota, processing of objects in this schema class stops. Synchronization stops and writes an error message in the synchronization log.

You can define different quotas for synchronizing with the target system and synchronizing with One Identity Manager. Variables can also be used for this.

Table 53: Quotas for a synchronization step

Property	Meaning
No quota	Specifies whether quotas are taken into account by synchronization. If this is set, quotas are not included.
Use following settings	Specifies whether the connected system takes quotas into account. Quotas are defined in the following settings.
Method	Processing methods that take quotas into account.
Quota (%)	<p>Quota in percent or as a variable defined in the quota.</p> <p>When you configure a new synchronization step for objects in One Identity Manager for the Delete processing task, a quota of 10% is automatically set. Adjust the quota as required.</p> <p>One Identity Manager specifies quotas for synchronization in the target system in workflows created with the workflow wizard, by default. Adjust the quota as required.</p> <ul style="list-style-type: none"> • Update processing method: 75% • Delete processing method: 10% for single objects, 20% for many-to-many schema types.
Use variable	<p>List of variables that can be used in quotas.</p> <p>If different quota are used for different start up configurations, specify variables for the quotas. Specify the value of the variable as an integer (0%-100%) or as a decimal (0.0-1.0).</p> <ul style="list-style-type: none"> • To use a variable, click Select and select the variable from the menu.

Notes

- Quotas can only be defined for processing methods which modify data (for example, Insert, Update, Delete).
- When the number of object to process is being calculated, One Identity Manager takes the amount of objects loaded in the slim list. Conditions defined for processing methods are not taken into account!
Enter an higher quota for processing methods use a condition to limit the number of objects to synchronize.
- To check whether the quota will be exceeded, all the objects to be processed are loaded first. Only then will the processing method be run. If there is a large amount of data, this can affect synchronization performance.
- If the quota is exceeded by a single object, that object will still be processed.
For example, if a quota of 10% is defined for a schema class with only 8 objects and exactly one object has been changed, then this object will be processed even though the quota has already been exceeded.

In provisioning workflows, quotas are ineffective because only single objects are ever processed.

- Quotas affect membership synchronization only when M:N schema types are processed in a separate synchronization step. (Example: Synchronization of assignments of SAP roles to SAP user accounts. The quota refers to the set of UserInRole objects).

If memberships are stored as a base object property (member list), the quota only affects the base object and not the individual members. (Example: Synchronization of Active Directory groups. The quota refers only to the number of groups and not to the number of members).

Related topics

- [Processing synchronization steps](#) on page 197
- [Using variables and variable sets](#) on page 132
- [Editing synchronization steps](#) on page 110

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 that are not to be applied during synchronization.

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

Detailed information about this topic

- [How does dependency resolution work?](#) on page 46
- [Editing synchronization steps](#) on page 110

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

Property	Description
Reload threshold	<p>change the performance/memory factor in favor of performance. Reduce the performance/memory factor if there are memory 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"> • Move the slider to the right to increase performance. This requires more memory. • Move the slider to the left to reduce memory requirements. This also reduces the performance. <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>To specify the threshold for a synchronization step</p> <ol style="list-style-type: none"> 1. Disable Use start up configuration settings. 2. Change the preset reload threshold.
Commit mode	<p>Specifies whether changes in the in-memory object are committed after the synchronization step has been run. This affects changes that are made through the property mapping rule's Force mapping against direction of synchronization 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"> • None: No changes are committed. • Automatic: It is decided automatically, which changes are committed. • UserDefined: Changes to the selected schema properties are committed. <p>Under Commit changes for, enable the schema properties whose changes are committed in the in-memory object.</p>

Property	Description
Do not filter outstanding objects	<p>Specifies whether default handling of objects that are marked as outstanding is disabled.</p> <p>By default, objects marked as outstanding are filtered out of the synchronization objects and thus ignored during synchronization. When two One Identity Manager databases are synchronized, outstanding objects are always matched so that the objects are mapped identically.</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 settings are only possible in expert mode. For more information, see [Extended properties for start up configuration](#) on page 183.

Detailed information about this topic

- [Performance and memory optimization](#) on page 66
- [Editing synchronization steps](#) on page 110

Displaying implementation plans

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

To display a workflow implementation plan

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

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

Detailed information about this topic

- [How does dependency resolution work?](#) on page 46
- [Setting up synchronization workflows](#) on page 104

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 Synchronization Editor is displayed in the  status bar 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 125

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. NOTE: 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.
Configuration	Opens a dialog for editing the system connection's general properties and configuring the contents of the synchronization log.
 Updating	Updates the schema.

Property	Description
schemas	<p>The synchronization project is saved before the schema is updated. This allows the existing schema to be reloaded if an error occurs during update.</p> <p>NOTE: The synchronization is deactivated if the schema of an activated synchronization project is updated. Reactivate the synchronization project to synchronize.</p>
 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	<p>Start the Target System Browser.</p> <p>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.</p> <p>The variable set selected in the Synchronization Editor's toolbar is used to connect to the target system.</p>
 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>NOTE: 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"> Click Update schema before continuing to edit the synchronization project.
Tasks > Query system information	<p>Displays detailed technical information about the connected system.</p> <p>The button is only displayed if the system connector provides the relevant information.</p>
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	This displays the target system schema with all its schema types and

Property	Description
browser	their properties. The schema browser is only available in expert mode.

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 run, 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 151
- [Using variables and variable sets](#) on page 132
- [Editing the scope](#) on page 128
- [Configuring the synchronization log](#) on page 127
- [Overview of schema classes](#) on page 148

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 and synchronization workflow.

To configure the content of the synchronization log for a system connection

1. To configure the synchronization log for target system connection, in the Synchronization Editor, select the **Configuration > Target system** category.

- OR -

To configure the synchronization log for the database connection, in the Synchronization Editor, select the **Configuration > One Identity Manager connection** category.

2. In the **General** section, click **Setup**.
3. In the **Synchronization log** section, set **Create synchronization log**.
4. 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.

5. Click **OK**.

To configure the content of the synchronization log for a synchronization workflow

1. In the Synchronization Editor, select the **Workflows** category.
2. Select a workflow in the navigation view.
3. In the **General** section, click **Edit**.
4. Select the **Synchronization log** tab.
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 125
- [Editing workflows](#) on page 106

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 43
- [What are filters?](#) on page 40
- [Scope properties](#) on page 130

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 125.
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 125.
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 125.
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 43.

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 <input type="checkbox"/> . <table border="0" style="margin-left: 20px;"> <tr> <td>Show all object types</td> <td>All object types of the schema are displayed.</td> </tr> <tr> <td>Only show hierarchically structured object types</td> <td>Only the object types of the schema that form a hierarchical structure are displayed.</td> </tr> </table>	Show all object types	All object types of the schema are displayed.	Only show hierarchically structured object types	Only the object types of the schema that form a hierarchical structure are displayed.				
Show all object types	All object types of the schema are displayed.								
Only show hierarchically structured object types	Only the object types of the schema that form a hierarchical structure are displayed.								
Is filtered?	All schema types with a filter are marked. <table border="0" style="margin-left: 20px;"> <tr> <td></td> <td>A filter is defined and effective.</td> </tr> <tr> <td></td> <td>A filter is effective.</td> </tr> </table>		A filter is defined and effective.		A filter is effective.				
	A filter is defined and effective.								
	A filter is effective.								
Condition	Specify the filter condition for the scope. Select an object type in the scope hierarchy for this. <table border="0" style="margin-left: 20px;"> <tr> <td>System filter</td> <td>Filter that immediately affects the connection system. Enter the filter in system specific notation, for example, as Where clause for a database system or as LDAP filter for an LDAP system. If tested against a fixed value that contains at least two dollar characters, the dollar characters must be masked. This filter is only effective when loading the system objects.</td> </tr> <tr> <td>Object filter</td> <td>Filter that affects loaded objects. <table border="0" style="margin-left: 20px;"> <tr> <td>Condition</td> <td>Formulate a query for loaded objects. Use the wizard for entering filter.</td> </tr> <tr> <td>Script</td> <td>You can also store a script which determines system objects. The script must be written in the script language specified in the synchronization project.</td> </tr> </table> </td> </tr> </table>	System filter	Filter that immediately affects the connection system. Enter the filter in system specific notation, for example, as Where clause for a database system or as LDAP filter for an LDAP system. If tested against a fixed value that contains at least two dollar characters, the dollar characters must be masked. This filter is only effective when loading the system objects.	Object filter	Filter that affects loaded objects. <table border="0" style="margin-left: 20px;"> <tr> <td>Condition</td> <td>Formulate a query for loaded objects. Use the wizard for entering filter.</td> </tr> <tr> <td>Script</td> <td>You can also store a script which determines system objects. The script must be written in the script language specified in the synchronization project.</td> </tr> </table>	Condition	Formulate a query for loaded objects. Use the wizard for entering filter.	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.
System filter	Filter that immediately affects the connection system. Enter the filter in system specific notation, for example, as Where clause for a database system or as LDAP filter for an LDAP system. If tested against a fixed value that contains at least two dollar characters, the dollar characters must be masked. This filter is only effective when loading the system objects.								
Object filter	Filter that affects loaded objects. <table border="0" style="margin-left: 20px;"> <tr> <td>Condition</td> <td>Formulate a query for loaded objects. Use the wizard for entering filter.</td> </tr> <tr> <td>Script</td> <td>You can also store a script which determines system objects. The script must be written in the script language specified in the synchronization project.</td> </tr> </table>	Condition	Formulate a query for loaded objects. Use the wizard for entering filter.	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.				
Condition	Formulate a query for loaded objects. Use the wizard for entering filter.								
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.								

Property	Description
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 Creating hierarchy filters on page 131.</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 note, 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.

To select all objects that match certain criteria, use the wizard.

To create a hierarchy filter using the wizard

1. In the hierarchy filter's toolbar, click .
2. Enter a search pattern.
Select whether you want to filter objects by wildcard or regular expression.
3. To apply the search criteria, click **Assign**.
You can apply different search patterns one after another.

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 43
- [Editing the scope](#) on page 128
- [Using variables and variable sets](#) on page 132

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.

The default variable set contains all variables that are required in the synchronization project. New variables are created in the default variable set.

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

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 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.

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 125.
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 136

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"> • To display and edit the value of a hierarchy filter, click Edit.... • To display and edit the script of a script variable, click Edit.
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 136
- [Creating hierarchy filters](#) on page 131

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 more 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 194
- [Support for scripting](#) on page 21

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 created 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.

Detailed information about this topic

- [How to create start up configurations](#) on page 137
- [How to edit start up configurations](#) on page 137
- [How to delete start up configurations](#) on page 138
- [Start up configuration properties](#) on page 138
- [Grouping](#) on page 139
- [Maintenance modes](#) on page 140
- [Extended properties for start up configuration](#) on page 183
- [Specifying a schedule](#) on page 141

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 main 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 main 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	<p>Direction in which synchronization will be run.</p> <p>Select a synchronization direction from the list when Defined when run and at least one Use workflow default synchronization step is saved with the workflow. Otherwise the direction of the synchronization workflow or synchronization step is used for synchronization.</p> <table border="0"> <tr> <td>To the target system</td> <td>One Identity Manager is the primary system for synchronization.</td> </tr> <tr> <td>To One Identity Manager</td> <td>The target system is the primary system for synchronization.</td> </tr> </table>	To the target system	One Identity Manager is the primary system for synchronization.	To One Identity Manager	The target system is the primary system for synchronization.
To the target system	One Identity Manager is the primary system for synchronization.				
To One Identity Manager	The target system is the primary system for synchronization.				
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 when Defined when run and at least one Use workflow default synchronization step is saved with the workflow. Otherwise the value of the workflow or synchronization step is used for synchronization.</p>				

Property	Description
	Use revision filter Only modified object are synchronized. Do not use revision filter All objects are synchronized.
Schedule	Schedule for starting synchronization.
Variable set	Assign the variable set with which to run synchronization. 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. 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.
Description	Text field for additional explanation.

Detailed information about this topic

- [Direction of synchronization and mapping](#) on page 51
- [How does revision filtering work?](#) on page 44
- [Using variables and variable sets](#) on page 132
- [Setting up synchronization workflows](#) on page 104
- [Specifying a schedule](#) on page 141

Grouping

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 61: Grouping start up configurations

Property	Description
Name	Name of the start up group. <ul style="list-style-type: none"> • To create a new start up group, enter a name. - OR - • Select an existing start up group from the menu.
Concurrency behavior	One Identity Manager behavior if multiple start up configurations are run simultaneously.

Property	Description
Ignore	<p>Multiple synchronization can be run simultaneously.</p> <p>NOTE: 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>
Stop on error	<p>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>
Postpone and wait	<p>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 Common Jobservice RedoDelayMinutes 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 Postpone and wait option. The default value is two minutes.</p>

Related topics

- [Running synchronization](#) on page 157

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 62: 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 50

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 running 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 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. In the Synchronization Editor, open the synchronization project.
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 142

Properties of a schedule

Enter the following properties for a schedule.

Table 63: 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. NOTE: Only active schedules are run. Active schedules are only run if the QBM Schedules configuration parameter is set.
Time zones	Unique identifier for the time zone that is used for running the schedule.

Property	Meaning
	<p>Choose between Universal Time Code or one of the time zones in the menu.</p> <p>NOTE:</p> <p>When you add a new schedule, the time zone is preset to that of the client from which you started the Synchronization Editor.</p>
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	<p>Period within which the schedule is run.</p> <ul style="list-style-type: none"> • If the schedule will be run for an unlimited period, select the Unlimited duration option. • To set a validity period, select the Limited duration option and enter the day the schedule will be run for the last time in End (date).
Occurs	<p>Interval in which the task is run. Other settings may be required depending on the settings.</p> <ul style="list-style-type: none"> • Hourly: The schedule is run at defined intervals of a multiple of hours such as every two hours. <ul style="list-style-type: none"> • Under Repeat every, specify after how many hours the schedule is run again. • The starting point is calculated from the rate of occurrence and the interval type. • Daily: The schedule is run at specified times in a defined interval of days such as every second day at 6am and 6pm. <ul style="list-style-type: none"> • Under Start time, specify the times to run the schedule. • Under Repeat every, specify after how many days the schedule is run again. • Weekly: The schedule is run at a defined interval of weeks, on a specific day, at a specified time such as every second week on Monday at 6am and 6pm. <ul style="list-style-type: none"> • Under Start time, specify the times to run the schedule. • Under Repeat every, specify after how many weeks the schedule is run again. • Specify the set day of the week for running the schedule. • Weekly: The schedule is run at a defined interval of months, on a specific day, at a specified time such as every second month on the 1st and the 15th at 6am and 6pm.

Property	Meaning
----------	---------

- Under **Start time**, specify the times to run the schedule.
- Under **Repeat every**, specify after how many months the schedule is run again.
- Specify the days of the month (1st - 31st of the month).

NOTE: If the **Monthly** interval type with the sub interval **29, 30** or **31** does not exist in this month, the last day of the month is used.

Example:

A schedule that is run on the 31st day of each month is run on April 30th. In February, the schedule is run on the 28th (or 29th in leap year).

- **Yearly:** The schedule is run at a defined interval of years, on a specific day, at a specified time such as every year on the 1st, the 100th, and the 200th day at 6am and 6pm.

- Under **Start time**, specify the times to run the schedule.
- Under **Repeat every**, specify after how many years the schedule is run again.
- Specify the days of the year (1st - 366th day of the year).

NOTE: If you select the 366th day of the year, the schedule is only run in leap years.

- **Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday:** The schedule is run on a defined day of the week, in specified months, at specified times such as every second Saturday in January and June at 10am.

- Under **Start time**, specify the times to run the schedule.
- Under **Repeat every**, specify after how many days of the month the schedule is run again. The values **1** to **4**, **-1** (last day of the week), and **-2** (last day but one of the week) are permitted.
- Specify in which month to run the schedule. The values **1** to **12** are permitted. If the value is empty, the schedule is run each month.

Start time	Fixed start time Enter the time in local format for the chosen time zone. If there is a list of start times, the schedule is started at each of the given times.
Repeat every	Rate of occurrence for running the schedule within the selected time interval.

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 creating 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 object's main 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 generic database connector.

The wizard is not available if the target system type does not permit synchronizing different target systems with one synchronization project.

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 establish 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 more information about the connection parameter you require, see the administration guides of the respective target systems.

6. On the **Synchronization server** page, select the synchronization server to run 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 main 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 64: 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, ADSDomain.
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 Single object synchronization and provisioning 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 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.
Offline mode available	Specifies whether the target system can be flagged as temporarily offline. This makes it possible to respond to short-term system outages.

Related topics

- [Load balancing during provisioning and single object synchronization](#) on page 201
- [Using variables and variable sets](#) on page 132
- [Pausing handling of target system specific processes](#) on page 218

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 125.
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 125.
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 85.
5. Save the changes.

To create a new mapping for a schema class

1. Create a new mapping.
For more information, see [Creating mappings](#) on page 82.
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 85.

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 125.
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 85.
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 [Editing mappings](#) on page 83.
2. Edit the system connection properties.
For more information, see [How to edit system connection properties](#) on page 125.
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 61.

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 method, 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 home 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 65: 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 the **General** view on the home 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. In the Synchronization Editor, open the synchronization project.
2. Select the **General** view on the home page.
3. Click **Deactivate project**.

Related topics

- [Checking the consistency of the synchronization configuration](#) on page 150
- [System connection properties](#) on page 125
- [How to remove unnecessary project data](#) on page 61
- [Updating schemas](#) on page 62

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 run 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 Google Workspace 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 152
- [Editing start up sequences](#) on page 153
- [Deleting start up sequences](#) on page 153
- [Start up sequence properties](#) on page 154
- [Running start up sequences](#) on page 159
- [Monitoring start up sequences](#) on page 159

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 main 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 154

Editing start up sequences

To edit a start up sequence

1. In the Synchronization Editor, select the **Database > Manage start up sequences** menu item.
2. In the **Sequences** pane, double-click the start up sequence.
3. Edit the start up sequence's main 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 154

Deleting start up sequences

To delete a start up sequence

1. In the Synchronization Editor, select the **Database > Manage start up sequences** menu item.
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 159

Start up sequence properties

Enter the following properties for a start up sequence.

Table 66: 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 Allow multiple starts option. If the option is not set, the start up sequence is not restarted until the current instance is finished.
Quit with an error	Specifies whether the start up sequence is canceled if it was repeated more than once and Allow multiple starts is disabled. System synchronizations that start frequently should not have this set. If the start up sequence is restarted, a new synchronization cannot be run until the current synchronization finishes.
Description	Text field for additional explanation.

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

Table 67: Start up configuration properties in a start up sequence

Property	Description
Runs simultaneously	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. Do not set this option if the start up configurations handle the same

Property	Description
	target system objects.
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 Google Workspace 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 Google Workspace 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. Google Workspace Domain
Runs simultaneously: set

Detailed information about this topic

- [Specifying a schedule](#) on page 141
- [Monitoring start up sequences](#) on page 159

- [Running synchronization](#) on page 157

Copying synchronization projects

To reuse existing synchronization configurations, you can copy synchronization projects. The copy is initially deactivated.

To copy a synchronization project

1. In the Synchronization Editor, open the synchronization project.
2. Select the **Edit > Create copy** menu item.
3. Confirm the security prompt with **Yes**.
4. If you immediately want to edit the copy, confirm the prompt with **Yes**.
5. Edit the synchronization configuration and then activate it.
6. Click **Commit to database** to save the new project.

Related topics

- [Creating a synchronization project](#) on page 72

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 stopped 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 in which they are run. For more information about start up sequences, see the *One Identity Manager Target System Synchronization Reference Guide*.

Detailed information about this topic

- [Simulating synchronization](#) on page 158
- [Starting synchronization manually](#) on page 158
- [Running start up sequences](#) on page 159

- [Handling unexpected interruption of synchronization](#) on page 161
- [Grouping](#) on page 139

Simulating synchronization

You can simulate synchronization before using a start up configuration to run 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 runs the following actions:

- Show implementation 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 run

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. In the Synchronization Editor, open the synchronization project.
2. Select the **Configuration > Start up configurations** category.

3. Select a start up configuration in the document view and click **Run**.
4. Confirm the security prompt with **Yes**.

Related topics

- [Running start up sequences](#) on page 159

Running 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** menu item.
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 152
- [Monitoring start up sequences](#) on page 159
- [Starting synchronization manually](#) on page 158

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 .
This displays the start up sequence instances and their runtimes.
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 68: 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.

To restart a sequence if it was unexpectedly stopped, you can delete the start up sequence's instance in the Synchronization Editor.

To delete the instance of a start up sequence

1. In the Synchronization Editor, select the **Database > Manage start up sequences** menu item.
2. In the **Start up sequences** pane, click .
3. Double-click on the start up sequence instance.
4. In the **Included start up configurations** pane, click .

Related topics

- [Deleting start up sequences](#) on page 153
- [Start up sequence properties](#) on page 154

Handling unexpected interruption of synchronization

If synchronization is run 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 stopped unexpectedly because a server was not available, for example, 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 stopped.

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 44

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 69: 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 activation time.
	Sort by processing status.

How to display synchronization logs

To display a synchronization log

1. In the Synchronization Editor, open the synchronization project.
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. In the Synchronization Editor, open the synchronization project.
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

1. Select the object on the target system synchronization form.
2. 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 run the respective method.

Table 70: 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. Indirect memberships cannot be deleted.
	Publish	The object is added to the target system. The Outstanding label is removed from the object. This runs a target system specific process that triggers the provisioning process for the object. Prerequisites: <ul style="list-style-type: none">• The table containing the object can be published.• The target system connector has write access to the target system.• A custom process is set up for provisioning the object.
	Reset	The Outstanding label is removed for the object.

TIP: If a method cannot be run due to certain restrictions, the respective icon is disabled.

- To display the constraint's details, click the **Show** button in the **Constraints** column.

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

NOTE: By default, the selected objects are processed in parallel, which speeds up 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

- Disable the  icon in the form's toolbar.

For more information about post-processing outstanding objects from connected target systems, see the target system connection guides.

Related topics

- [Include custom tables in the synchronization](#) on page 192
- [Handling outstanding objects automatically](#) on page 167

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 71: 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 XOrigin 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

Pat Identity1 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'). Pat Identity1 is member of the business role "Project A". This business role is assigned to the Active Directory group "Backup operators". Therefore, Pat Identity1 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 Pat Identity1'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 60
- [Target system synchronization](#) on page 164

Handling outstanding objects automatically

After synchronizing, either none or only a manageable number of objects should be marked as outstanding. These can be checked individually and further processed using target system comparison. If a lot of objects are marked as outstanding during synchronization, editing them individually can be too time-consuming. The One Identity Manager provides customizer methods to handle outstanding objects in an automated way. These methods can be called in scripts or processes.

NOTE: If a lot of objects are marked as outstanding during synchronization, this may be due to incorrect data. Before applying the methods, fix the cause of the incorrect data.

Call syntax: <method> ("

This method requires two parameters:

- Table
Table containing the outstanding objects to be processed.
- Condition
Condition that restricts the objects to be processed.
The condition XMarkedForDeletion & 2 = 2 is used to select all outstanding objects of the specified table. You can extend the condition to further restrict objects for processing.

Method: BulkDeleteOutstanding

Deletes the outstanding objects from the One Identity Manager database.

Example of a method call: BulkDeleteOutstanding ("ADSAccount", "XMarkedForDeletion & 2 = 2")

Deletes all outstanding objects of the ADSAccount table in the database.

Method: BulkDeleteOutstandingState

Resets the status of the outstanding objects.

Example of a method call: BulkDeleteOutstandingState ("ADSAccount", "XMarkedForDeletion & 2 = 2")

Resets the status of all outstanding objects of the ADSAccount table.

Method: BulkPublishOutstanding

Publishes the outstanding objects in the target system.

Example of a method call: BulkPublishOutstanding ("ADSAccount", "XMarkedForDeletion & 2 = 2")

Publishes all outstanding objects of the ADSAccount table.

Example of a method call by process

For example, to reset the status of all Active Directory user accounts marked as outstanding in bulk while synchronizing by process call, define a process and use the CallMethod process task in the process step. Pass the following parameters to the process task:

Process task: **CallMethod**

MethodName: **Value = "BulkDeleteOutstandingState"**

ObjectType: **Value = "DPRNameSpace"**

WhereClause: **Value = "Ident_DPRNameSpace = 'ADS'"**

Param1: **Value = "ADSAccount"**

Param2: **Value = "XMarkedForDeletion & 2 = 2"**

For more information about creating processes, see the *One Identity Manager Configuration Guide*.

Related topics

- [Target system synchronization](#) on page 164

Help for analyzing 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:

- Directly supported target systems

Separate modules are provided for mapping and processing target system objects. Each target system has its own connector. This includes target systems such as:

- Active Directory
- SharePoint
- SAP R/3

Connectors for directly 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 identities.

For more 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 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 information, see the One Identity Manager User Guide for the One Identity Manager Connector.

- Target systems that are not directly supported

You can use the Windows PowerShell connector to connect target systems to One Identity Manager that are not directly supported in One Identity Manager. Windows PowerShell cmdlets are used to run read and write operations in the target system.

For more detailed information, see the One Identity Manager Windows PowerShell Connector User Guide.

- Other database systems

With this generic database connector, you can synchronize external databases with the One Identity Manager database.

For more information, see the following guides:

- One Identity Manager Generic Database Connector User Guide for Connecting DB2 (LUW) Databases
- One Identity Manager Generic Database Connector User Guide for Connecting MySQL Databases
- One Identity Manager Generic Database Connector User Guide for Connecting Oracle Databases
- One Identity Manager Generic Database Connector User Guide for Connecting SQLite Databases
- One Identity Manager Generic Database Connector User Guide for Connecting SQL Server Databases
- One Identity Manager Generic Database Connector User Guide for the CData ADO.NET Provider
- One Identity Manager Generic Database Connector User Guide for the generic ADO.NET Provider
- One Identity Manager Generic Database Connector User Guide for Connecting SAP HANA Databases
- One Identity Manager Generic Database Connector User Guide for Connecting PostgreSQL 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 way to do this:

- Apply any patches required to the existing synchronization projects.

Hotfix packages and migration packages are used to install patches for new or changed features and solved issues in One Identity Manager. You must apply these patches manually for the changes to take effect in existing synchronization projects. The default configuration of these synchronization projects is update in the process. Custom modifications are not effected by the patches.

This way is recommended if the synchronization projects correspond to the default configuration and contain no or only minor customizations.

Checks are made during daily maintenance to find out if there are patches available for the existing synchronization projects. This information is displayed on the Synchronization Editor's start page. If there are patches, the  icon and the number of patches are displayed next to the synchronization project's name. This display is updated each time a synchronization project is saved.

- 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.

For more information about setting up synchronization projects, see the administration guides for connecting target systems.

Detailed information about this topic

- [Applying patches](#) on page 174
- [Patch view, patch types and dependencies](#) on page 173
- [How to delete a synchronization project](#) on page 74

Patch view, patch types and dependencies

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 72: Patch types

Patch type	Description
Enhancement	Patch for new or changed functionality.
Fix	Patch for solved issues.
Mile stone	Milestones are provided with every new One Identity Manager version. A milestone is provided for each context, which includes all the solved issues and enhancements 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 73: Meaning of icons in the rule tool bar

Icon	Meaning
 Solved issues	Shows patches for solved issues.
 Enhancements	Shows all patches for new or changed features.
	Shows all patches that are cannot be applied to the synchronization project.
	Shows all patches that are already applied to the synchronization project.

Related topics

- [Applying patches](#) on page 174
- [Automatic patches](#) on page 175

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.

NOTE: As long as the update is running, none of the changes can be saved in the synchronization project.

Some patches required user input during installation, for example, to confirm that you really want a particular change to be run.

To apply patches

1. Open the synchronization project in the Synchronization Editor.
2. In the menu bar, select the **Edit > Update synchronization project...** menu item.
3. Select the milestone to apply under **Available patches**.
In the patch details view, all dependent 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. Optional: Select the patches to apply for new functions under **Available patches**. Multi-select is possible.
In the patch detail view, patches are listed in the order in which they will be applied.
7. Click **Apply selected patches**.

8. Enter any user input as prompted.
9. If necessary, use the patch log to check whether customization need to be reworked.
10. If required, rework customizations in the synchronization configuration.
11. Run a consistency check.
12. Simulate the synchronization.
13. Activate the synchronization project.
14. 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

- [Patch view, patch types and dependencies](#) on page 173
- [Synchronization project migration data](#) on page 75
- [Automatic patches](#) on page 175
- [Issues migrating synchronization projects](#) on page 226

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. Synchronization and provisioning processes are deferred until migration is complete. You can adjust the deferral time using the **Common | JobService | RedoDelayMinutes** configuration parameter.

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 run 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 174

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 generic 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 are used in different synchronization projects are labeled 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 more information about the One Identity Manager script library, see the *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 178
- [Editing scripts in the script library](#) on page 179
- [Using scripts across projects](#) on page 180
- [Validating scripts](#) on page 194

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 74: 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 75: 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 76: 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 178
- [Editing scripts in the script library](#) on page 179
- [Using scripts across projects](#) on page 180

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 main 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 176
- [Editing scripts in the script library](#) on page 179

Editing scripts in the script library

To edit a script's main data

1. Open the script library.
2. Select the script in the **Script** view.
3. Click **Edit**.
4. Edit the script's general main 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. Select a script in the **Script** view.
3. In the **Editor** view, 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 176

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 main 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 display if the script template was changed in the script. You can decide 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 176

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. In the Synchronization Editor, select the **Database > Settings** menu.
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 77: 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 83

Extended properties for start up configuration

In expert mode, the tab **Advanced** is displayed in the start up configuration dialog.

Table 78: 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">• 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 once an object fails.• Ignore: 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. <p>NOTE: 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>
Max. retries	<p>Maximum number of retries for synchronizing failed objects.</p>
Collision detection	<p>Mode for checking processing conflicts during synchronization. Select when One Identity Manager checks whether synchronization objects have already been processed by another system process (provisioning, for example).</p> <ul style="list-style-type: none">• Before processing (default): Checks synchronization objects for possible collision conflicts immediate after they are loaded. Advantage: Detected objects are not processed. Disadvantage: Conflicts are not detected if synchronization objects are then processed by other system processes during synchronization. Conflicts can still occur due to the time delay before the objects are saved.

Property	Description
	<ul style="list-style-type: none"> • Before committing: Synchronization objects are checked for possible concurrency conflicts before committing. Advantage: Conflicts are detected immediately before committing. This increases the detection rate. Disadvantage: Objects are processed unnecessarily if their processing conflicts could already have been detected after loading. • Multiple: Synchronization objects are checked for possible concurrency conflicts before processing starts and before saving. Advantage: High detection rate. Disadvantage: Multiple checks can reduce synchronization performance.
Cached data retention time	Specifies how many seconds data is cached while processing conflicts are being checked during synchronization.
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	Specifies the number of objects and object pairs that 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.
Bulk level	<p>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.</p> <p>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.</p>
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 197
- [Performance and memory optimization](#) on page 66
- [Concurrency behavior of synchronization objects](#) on page 68

Related topics

- [Setting up start up configurations](#) on page 137
- [Extended synchronization step properties](#) on page 122

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 run 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 the **Configuration > One Identity Manager connection** category.
- OR -
Select **Configuration > Target system** category.
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 88

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">• 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).• If you create a project template from an existing synchronization project, it only supports the script language of the underlying synchronization project.

Related topics

- [Creating project templates](#) on page 188
- [Creating synchronization projects from a custom project template](#) on page 188
- [Specifying the script language in synchronization projects](#) on page 76

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 174.

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 79: 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 188

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 the synchronization server to run the synchronization.

If the synchronization server is not declared as a Job server for this target system 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.

TIP: You can also implement an existing Job server as the synchronization server for this target system.

- To select a Job server, click .

This automatically assigns the server function matching this Job server.

- iii. Click **OK**.

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

- iv. **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 134
- [How to create base objects](#) on page 145
- [How to edit a scope](#) on page 129
- [Specifying a schedule](#) on page 141
- [Configuring the synchronization log](#) on page 127
- [Checking the consistency of the synchronization configuration](#) on page 150

- [Activating the synchronization project](#) on page 151
- [Operations for provisioning and single object synchronization](#) on page 200

Related topics

- [Creating project templates](#) on page 188

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 the **Database > Manage templates...** menu item.
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's toolbar.
3. To hide default project templates, disable  in the dialog's toolbar.

Table 80: Project template properties

Property	Description
Project template	Name of the project template.
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 more 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's 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's toolbar.
2. Select the project template.
3. Click  in the dialog's 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 more 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.

To publish outstanding objects in a custom table

1. Create a process that performs provisioning of objects for:
 - Simple tables
 - Assignment tables that contain additional information, such as a valid-from date

Use the AdHocProjection process task of the ProjectorComponent process component.

For more information about defining processes, see the *One Identity Manager Configuration Guide*.

2. Create the HandleOutstanding event for this process.

For memberships mapped to simple assignment tables, the **Dependencies modified on** (XDateSubItem column) is changed on the base table of the mapping when publishing. This triggers the default update process that is set up for this base table. For more information, see [Changing a membership label](#) on page 64.

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 more information about setting up processes, see the *One Identity Manager Configuration Guide*.

- Record the path to the base object of synchronization for the custom table in the Manager.

For more information about this, please consult the manuals for connecting target systems.

Detailed information about this topic

- [How to add schema classes](#) on page 148
- [Operations for provisioning and single object synchronization](#) on page 200

Related topics

- [Deleting objects in One Identity Manager](#) on page 60

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 generic 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 81: Edit box buttons

Button	Description
	Opens advanced edit mode.
 Compile	Checks the script's syntax. ✔ Script was compiled without errors. ✘ Script contains syntax errors.
 Debug	Export the current script to a Visual Studio project. This button is available only in the Edit Schema Properties dialog and in the system connection wizard for the generic database connector.

Compile

To verify the script's syntax

- Open the script in the Synchronization Editor.
- 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 generic 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.

A backup of the original script is saved in the
%USERPROFILE%\Documents\OneIM.Projector.Scripting <version>\ directory.

Related topics

- [Support for scripting](#) on page 21
- [Error log](#) on page 222

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. In the Synchronization Editor, open the synchronization project.
2. Select the **Configuration > Start up configurations** category.
3. Select a start up configuration in the document view and click **Run**.
4. Confirm the security prompt with **Yes**.

Defining downstream processes

Certain actions must be run 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 run 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 identities 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 an implementation 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 183.

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 183.

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 run according to the given condition.

If a quota is defined for a processing method, all objects to be processed from all partitions are loaded first to check whether the quota is exceeded. If there is a large amount of data, this can affect synchronization performance. If the quota is not reached, the processing method will be run afterward. If the quota is exceeded, the synchronization step is not run and subsequently, synchronization is halted. A message is written to the synchronization log.

Detailed information about this topic

- [How does revision filtering work?](#) on page 44
- [Start up configuration properties](#) on page 138
- [Editing property mapping rules](#) on page 90
- [Specifying processing methods](#) on page 115
- [Specifying quotas](#) on page 120

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 125
- [How to create base objects](#) on page 145
- [Specifying a schedule](#) on page 141
- [Configuring the synchronization log](#) on page 127
- [Checking the consistency of the synchronization configuration](#) on page 150
- [Activating the synchronization project](#) on page 151

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 82: 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 runs 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.
 - Job servers that share processing must have the **No process assignment** option enabled.
 - 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 more 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 main 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 run 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 HCL Domino and Google Workspace 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 146
- [Properties of base objects](#) on page 147

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.
 - (Optional) If a remote connection is going to be used for automatically creating synchronization projects, establish a remote connection when the reference project is set up.
 - 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 run 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. (Optional) If a remote connection is going to be used to automatically update the synchronization project, establish the connection now.
 - c. Select **Edit > Update synchronization project** from the menu.
 - d. Optional: Select the patches to be applied under **Available patches**. Select at least one patch or milestone. Multi-select is possible.
 - e. Click **Save configuration**.
 - f. 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 run 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 73
- [Establishing remote connections](#) on page 27
- [Customizing the configuration file](#) on page 204
- [Synchronization Editor Command Line Interface](#) on page 210
- [Synchronization Editor Module for Windows PowerShell](#) on page 213
- [Configuration file examples](#) on page 230

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 207.
- Global definitions
For more information, see [Global definitions](#) on page 208.
- Editor Definitions
For more information, see [Defining the editor for new synchronization projects](#) on page 209 or [Defining the editor for existing synchronization projects](#) on page 210.

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 more information about the connection data for a SQL Server database, see the *One Identity Manager Installation Guide*. For more 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 230.

Parameter definitions

First, define all the parameters for variable settings. You can use these parameters in the global and editor definitions.

Table 83: 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"> • False: The parameter value is passed on the command line. • True: The parameter value is queried after the command is 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"> • False: The parameter value is displayed when the user enters it. • True: The parameter is masked when the user enters it.
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"> • DBConnectionParameterValue: The value is formatted as the connection parameter for logging in to the One Identity Manager database. Special characters are masked. • ConnectorConnectionParameterValue: The value is formatted as the connection parameter for the connector. Special characters are masked.

Attribute	Description
	<ul style="list-style-type: none"> • Default: The parameter value is handled as given. <p>If no ValueFormat is defined, the parameter value is handled as given.</p>
Inherit	<p>Parameter whose value is inherited.</p> <p>This allows a parameter value to be used with different formats, if special characters must be masked in different ways, for example.</p> <p>Example:</p> <pre><Parameter Name="DBPassword" ValueFormat="DBConnectionParameterValue" IsQueryParameter="True" IsSecret="True" /> <Parameter Name="OneIMConnectorDBPassword" ValueFormat="ConnectorConnectionParameterValue" Inherit="DBPassword" /></pre> <p>The OneIMConnectorDBPassword parameter inherits the value from the DBPassword parameter, but formats it differently. The DBPassword parameter is used in the global definitions; the OneIMConnectorDBPassword parameter is used in the editor definitions.</p> <p>If synchronization projects are to be created or updated automatically, only the DBPassword parameter can be queried in the corresponding call. Its value is passed to the OneIMConnectorDBPassword parameter.</p> <pre>SynchronizationEditor.CLI.exe --CreateShell -V ... /SetParam DBPassword="P\$ wor1"</pre>

Global definitions

The global definitions contain the information required for logging in to the One Identity Manager database where the changes are to be made. If the connection to the target system is supposed to be established over a remote connection, the address data of the remote connection server is also stored here.

Table 84: Global definitions

Elements	Description
WorkDatabase.ConnectionString	<p>Database server connection parameter.</p> <p>Modify these settings or define a parameter if adding new synchronization projects to a different database.</p>
WorkDatabase.AuthenticationString	Login data for the One Identity Manager

Elements	Description
	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.
Remoting.Address	Address of the remote connection server.
Remoting.Port	Port of the remote connection server.

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 85: 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.

Elements	Description
TemplateConfiguration	<p>Additional settings that were made in the project wizard. For example:</p> <ul style="list-style-type: none"> • Provisioning data • Enabled revision filter • Setting for the synchronization log • Selected synchronization server <p>This element does not exist if the reference project was created without a project template.</p>

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 86: 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"> • AllFixes: Applies all patches to resolved issues. • AllFeatures: Applies all patches to new and changed features. <p>Example: <code><Data Name="PatchesToApply" Display="Patches to apply" Type="System.String, mscorlib">AllFixes,AllFeatures</Data></code></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 213.

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. Run 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. (Optional) Run the Synchronization Editor Command Line Interface with the option -R.

This establishes a remote connection.

```
Example: SynchronizationEditor.CLI.exe --CreateShell -R /Workspace=D:\ActiveDirectoryProject.sews
```

6. If no error occur, run 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. Run 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-99D111DD1CF11111BCF11111E1111BE9" /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">/Parameter>`

Example of a command line call: `SynchronizationEditor.CLI.exe --PatchShell -V /Workspace=D:\ActiveDirectoryProject.sews /SetParam SyncProject="CCC-99D111DD1CF11111BCF11111E1111BE9" /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. (Optional) Run the Synchronization Editor Command Line Interface with the option `-R`.

This establishes a remote connection.

Example: `SynchronizationEditor.CLI.exe --PatchShell -R /Workspace=D:\ActiveDirectoryProject.sews`

6. If no error occur, run 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 87: Synchronization Editor Command Line Interface commands

Command	Description
<code>--CreateShell</code>	Creates a new synchronization project using the data from the defined workspace. Short form: <code>--CS</code>
<code>--PatchShell</code>	Applies patches to an existing synchronization project. Short form: <code>--PS</code>

Table 88: 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.
-R	Establishes the connection to the target system over a remote service connection. Use a remote connection if it is not possible to directly access the target system from the workstation where the Synchronization Editor is installed.

Table 89: 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 210.

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 run the CmdLet without additional input.

5. Enter values for the parameters requiring user input.
 - To enter an empty value, press **ENTER**.
6. (Optional) Run the New-ProjectorShell CmdLet with the -Remote option.
This establishes a remote connection.
Example: New-ProjectorShell -Workspace D:\ActiveDirectoryProject.sews -Remote
7. If no error occur, run 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 run 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. (Optional) Run the `Update-ProjectorShell` CmdLet with the `-Remote` option. This establishes a remote connection.

Example: `Update-ProjectorShell -Workspace D:\ActiveDirectoryProject.sews -Remote`
7. If no error occur, run 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 90: 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 91: 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: - WorkspaceParameter @ {ParamName1="Value1";ParamName2="Value2"}</p>
-Remote	<p>Establishes the connection to the target system over a remote service connection.</p> <p>Use a remote connection if it is not possible to directly access the target system from the workstation where the Synchronization Editor is installed.</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 50
- [Maintenance modes](#) on page 140

Disabling the synchronization buffer

In synchronization projects created using a standard project template, the synchronization buffer is enabled by default. The synchronization buffer can be disabled for schema properties in the One Identity Manager schema that map members of many-to-many schema types or key resolutions.

The synchronization buffer can become very large if thousands of unresolvable references are read in by partial synchronizations. This can affect the synchronization performance. In such cases, it can be helpful to disable the synchronization buffer.

Disable the synchronization buffer if the following is true:

- The number of objects in the synchronization buffer is very large and causes problems
- Merge mode is enabled for the members of M:N schema types during provisioning
- These memberships are never transferred to the target system by full synchronization

IMPORTANT: If the synchronization buffer is disabled, references that are missing in One Identity Manager will be deleted in the target system when synchronizing into the target system or during provisioning. Therefore, check carefully whether the synchronization buffer can be disabled.

To disable the synchronization buffer

1. In the Synchronization Editor, open the synchronization project.
2. Select the **Mappings**.
3. In the navigation view, select a mapping.
4. In the One Identity Manager schema view, double-click on the schema property that maps an object reference.
5. Disable the **Save unresolvable keys** option.
6. Click **OK**.
7. Save the changes.

Related topics

- [Unresolvable references](#) on page 50
- [Property mapping rule details](#) on page 92
- [Single membership provisioning](#) on page 65

Pausing handling of target system specific processes

Sometimes a target system is not available. For example, during maintenance. If synchronizations are started or data is changed in One Identity Manager during this time, synchronization and provisioning tasks are queued in the Job queue. As long as the target system is down, these processes are sent into a **FROZEN** state and must be verified and re-enabled once the target system is available again.

One Identity Manager allows you to temporarily label the target system connection as offline. During this offline phase, synchronization is not run and provisioning tasks are put on hold. The respective synchronization server pauses Job queue processing. Once the target system is available again, the system connection must be switched to online. This starts Job queue processing again and all pending processes are run in sequence.

IMPORTANT: To prevent data inconsistencies, the offline phase should be kept as short as possible.

The number of processes to handle depends on the extent of the changes in the One Identity Manager database and their effect on the target system during the offline phase. To establish data consistency between the One Identity Manager database and the target system, all pending processes must be handled before synchronization can start.

Only use offline mode, if possible, for short system downtimes such as maintenance windows.

Detailed information about this topic

- [Enable offline mode](#) on page 218
- [Enabling offline mode](#) on page 220
- [Run Synchronization Editor without target system connection](#) on page 31

Enable offline mode

If a target system connector is not able to reach the target system temporarily, you can enable offline mode for the target system. This stops target system specific processes from being frozen and having to be manually re-enabled later.

Whether offline mode is generally available for a target system connection is set in the base object of the respective synchronization project. Once a target system is truly unavailable, the target system connection can be switched offline and online again with the Launchpad.

In offline mode, all Job servers assigned to the base object are stopped. This includes the synchronization server and all Job servers involved in load balancing. If one of the Job servers also handles other tasks, these are not processed either.

Prerequisites

Offline mode can only be specified for a base object if certain prerequisites are fulfilled.

- The synchronization server is not used for any other base object as a synchronization server.
- If a server function is assigned to the base object, none of the Job servers with this server function may have any other server function (for example, update server).
- A dedicated synchronization server must be set up to exclusively process the Job queue for this base object. The same applies to all Job servers that are determined by the server function.

To allow offline mode for a base object

1. In the Synchronization Editor, open the synchronization project.
2. Select the **Base objects** category.
3. Select a base object in the document view and click .
4. Enable **Offline mode available**.
5. Click **OK**.
6. Save the changes.

IMPORTANT: To prevent data inconsistencies, the offline phase should be kept as short as possible.

The number of processes to handle depends on the extent of the changes in the One Identity Manager database and their effect on the target system during the offline phase. To establish data consistency between the One Identity Manager database and the target system, all pending processes must be handled before synchronization can start.

Only use offline mode, if possible, for short system downtimes such as maintenance windows.

To flag a target system as offline

1. Start the Launchpad and log in on the One Identity Manager database.
2. Select **Manage > System monitoring > Flag target systems as offline**.
3. Click **Run**.

This opens the **Manage offline systems** dialog. The **Base objects** section displays the base objects of target system connections that can be switched to offline.

4. Select the base object whose target system connection is not available.
5. Click **Switch offline**.
6. Confirm the security prompt with **OK**.

This stops all the Job servers assigned to the base object. No more synchronization or provisioning Jobs are performed. The Job Queue Info program shows when a Job server has been switched offline and the corresponding tasks are not being processed.

For more information about offline mode, see the *One Identity Manager Target System Synchronization Reference Guide*.

Related topics

- [Pausing handling of target system specific processes](#) on page 218
- [Enabling offline mode](#) on page 220
- [Properties of base objects](#) on page 147

Enabling offline mode

Once the target system is available again, switch it back to online.

If offline mode should not be used for a target system in general, disable the option on the base object.

To flag a target system as online

1. Start the Launchpad and log in on the One Identity Manager database.
2. Select **Manage > System monitoring > Flag target systems as offline**.
3. Click **Run**.

This opens the **Manage offline systems** dialog. The **Base objects** section displays the base objects of target system connections that can be switched to offline.

4. Select the base object whose target system connection is available again.
5. Click **Switch online**.
6. Confirm the security prompt with **OK**.

The Job servers assigned to the base object then resume their work. Synchronization and provisioning tasks that were not processed during the offline phase are now carried out. Depending on the extent of the changes made during the offline phase, this may take some time.

To prohibit offline mode for a base object

1. In the Synchronization Editor, open the synchronization project.
2. Select the **Base objects** category.
3. Select a base object in the document view and click .
4. Disable **Offline mode available**.
5. Click **OK**.
6. Save the changes.

Related topics

- [Enable offline mode](#) on page 218
- [Pausing handling of target system specific processes](#) on page 218
- [Properties of base objects](#) on page 147

Maintaining synchronization information in column definitions

All columns in the One Identity Manager schema can store additional information, which is evaluated when synchronization is set up. This information is mainly required for setting up synchronization with the One Identity Manager connector, but can also be used when synchronizing custom tables and columns.

Settings in the synchronization information do not override the default behavior of the One Identity Manager connector. They provide information if the default behavior cannot be determined automatically. For example, if a column is marked as a mandatory column by the `MinLen='1'` property, the connector will automatically recognize it as a mandatory column even if the **Mandatory column** value is disabled in the **Synchronization information** field.

To edit synchronization information in column definitions

1. In the Designer, select **One Identity Manager Schema**.
2. Select the table and start the Schema Editor with the **Show table definition** task.
3. Select the column and then the **Column properties** view.
4. Select the **More** tab.
5. Select all applicable values from the **Synchronization information** menu.
 - **Not relevant for synchronization:** The column is not displayed in the Synchronization Editor.
 - **Has unique value:** The column contains a unique value.
 - **Has conditional default value:** The column contains a value that is formatted automatically under certain conditions, for example by a customizer.
 - **Has a default value:** The column contains a value that is formatted automatically, for example by a formation rule.
 - **Conditional mandatory column:** The column is a mandatory column under certain conditions, for example if the value is checked by triggers.
 - **Mandatory column:** The column is a mandatory column.
 - **Multi-value sort order is significant:** When identifying rogue modifications, the order of the values of multi-value schema properties is taken into account.
6. Select the **Database > Commit to database** menu item and click **Save**.

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 163.
- One Identity Manager Service log files on the synchronization server
- Synchronization analysis report
For more information, see [Help for analyzing synchronization issues](#) on page 169.
- Error log
For more information, see [Error log](#) on page 222.
- Messages logged with NLog
Configure the required security level in the SynchronizationEditor.exe.config file.

For more 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 more information about functions in the error log, see the *One Identity Manager Process Monitoring and Troubleshooting Guide*.

Ignoring data error in synchronization

By default, objects with incorrect data are not synchronized. For example, a user account is not loaded in the One Identity Manager database if, in the user account table, the formatting script of a column contains an email address detects invalid data. These objects can be synchronized once the data has been corrected. In certain situations, however, it might be necessary to synchronize objects like these and ignore the data properties that have errors. This synchronization behavior can be configured in One Identity Manager.

To ignoring data errors during synchronization in One Identity Manager

1. In the Synchronization Editor, open the synchronization project.
2. Select the **Configuration > One Identity Manager connection** category.
3. In the **General** view, click **Edit connection**.

This starts the system connection wizard.

4. On the **Additional options** page, enable **Try to ignore data errors**.

This option is only effective if **Continue on error** is set in the synchronization workflow.

Default columns, such as primary keys, UID columns, or mandatory input columns cannot be ignored.

5. Save the changes.

IMPORTANT: If this option is set, One Identity Manager tries to ignore commit errors that could be related to data errors in a single column. This causes the data changed in the affected column to be discarded and the object is subsequently saved again. This effects performance and leads to loss of data.

Only set this option in the exceptional circumstance of not being able to correct the data before synchronization.

Troubleshooting 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, these 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 run in one synchronization step. The parent object is 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.
 1. In the Synchronization Editor, select the **Database > Settings** menu.
 2. Enable **Enable expert mode**.
 3. Click **OK**.
2. Edit the start up configuration properties.
 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. Select the **Extended** tab.
4. In the **Partition size** field, enter the value **1**.

For more information, see [Extended properties for start up configuration](#) on page [183](#).
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.

Issues migrating synchronization projects

After updating the One Identity Manager database, all synchronization projects are migrated. This updates the schemas and applies any automatic patches. The `DPR_Migrate_Shell` process is run to do this. If the process fails because, for example, the target systems could not be reached the effected synchronization project is deactivated. Therefore synchronization cannot run. When you open the synchronization project in the Synchronization Editor, a detailed error message is displayed.

To use a synchronization project again after failed migration

1. Solve the issue that prevented the migration.

TIP: To display the error message

1. In the Synchronization Editor, select the **Edit > Edit synchronization project** menu item.
 2. Select the **Migration** tab.
2. Save the changes.
 3. Re-enable the DPR_Migrate_Shell process.

Related topics

- [Applying patches](#) on page 174

Configuration parameters for target system synchronization

The following configuration parameters are additionally available in One Identity Manager after the module has been installed.

Table 92: Configuration parameters for target system synchronization

Configuration parameters	Description
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">• ByUser: Shows encryption dialog when the synchronization project opens.• IgnoreAll: Does not show encryption dialog when the synchronization project opens. All encrypted values are ignored by default. (default)

The following configuration parameters are also required.

Table 93: Additionally required configuration parameters

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

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 230
- [Configuration file for updating existing synchronization projects](#) on page 231
- [Automatically create and update synchronization projects](#) on page 202

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 204.

```
<?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" ValueFormat="DBCOn-
nectionParameterValue"></Parameter>
    <Parameter Name="DBPassword" Display="Database server
password" IsQueryParameter="True" IsSecret="True" ValueFormat="DBCOn-
nectionParameterValue"></Parameter>
    <Parameter Name="OneIMConnectorDBUser" ValueFormat="Connec-
torConnectionParameterValue" Inherit="DBUser"></Parameter>
    <Parameter Name="OneIMConnectorDBPassword" ValueFormat="Connec-
torConnectionParameterValue" Inherit="DBPassword"></Parameter>
    <Parameter Name="SystemUser" Display="One Identity Manager system user" IsQueryPara-
meter="False" IsSecret="False"></Parameter>
    <Parameter Name="SystemPassword" Display="Password of system
user"
```

```

IsQueryParameter="True" IsSecret="True" ValueFormat="DBConnectionParameterValue"></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="ConnectionString" Type="System.String, mscorlib">data source=DatabaseServerName;initial catalog=$Database$user id=DBUser$;pooling=False;Password=$DBPassword$</Data>
  <Data Name="WorkDatabase.AuthenticationString" Display="Authentication string" Type="System.String, mscorlib">Module=ADSAccount;User[VI.DB_USER]=$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$</Data>
    <!-- ... -->
    <Data Name="MainConnection.ConnectionParameter" Display="Connection parameter" Type="System.String, mscorlib">Authentication=ProjectorAuthenticator;data source=DatabaseServerName; DBFactory="VI.DB.ViSqlFactory, VI.DB";initial catalog=$Database$;password=$OneIMConnectorDBPassword$; pooling=False;user id=$OneIMConnectorDBUser$</Data>
    <!-- ... -->
    <Data Name="ConnectedSystemConnection.ConnectionParameter" Display="Connection parameter" Type="System.String, mscorlib">ADAuthentic-
ation=1;ADEnableras=False;ADEnablerecyclebin=False; ADEnab-
leterminal=True;ADPort=389;ADRootdn=$Domain$;ADServer=$DomainController$;
ADTypeEnableExtensions=True;ADTypeExtensions=;baseloginaccount=$ADUser$; basepass-
word=$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" ValueFormat="DBCo-
nnectionParameterValue"></Parameter>
    <Parameter Name="DBPassword" Display="Database server
password" IsQueryParameter="True" IsSecret="True" ValueFormat="DBCo-
nnectionParameterValue"></Parameter>
    <Parameter Name="SystemUser" Display="One Identity Manager system user" IsQueryPara-
meter="False" IsSecret="False"></Parameter>
    <Parameter Name="SystemPassword" Display="Password of system
user"
IsQueryParameter="True" IsSecret="True" ValueFormat="DBConnectionParameterValue"></Para-
meter>
    <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=DatabaseServerName;initial catalog-
g=$Database$;user id=DBUser$;pooling=False;Password=$DBPassword$</Data>
    <Data Name="WorkDatabase.AuthenticationString" Display="Authentication
string" Type="System.String, mscorlib">Module=ADSAccount;User[VI.DB_USER]=$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$</Data>
  </Global>
  <Editors>
    <Editor Name="ShellPatchEditor" Type="VI.Pr-
ojector.Editor.AppModel.Editors.ShellPatchEditor, VI.Projector.Editor">
      <Data Name="PatchesToApply" Display="Patches to apply" Type="System.String,
mscorlib">$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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Technical support is available to One Identity customers with a valid maintenance contract and customers who have trial versions. You can access the Support Portal at <https://support.oneidentity.com/>.

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- Sign up for product notifications
- Download software and technical documentation
- View how-to videos at www.YouTube.com/OneIdentity
- Engage in community discussions
- Chat with support engineers online
- View services to assist you with your product

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