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Siemens OPC UA Modeling Editor Functional description

SiOME / OPC UA / TIA V15

<https://support.industry.siemens.com/cs/ww/en/view/109755133>

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1 Introduction

1.1 Overview

The OPC UA communication protocol enables companies and organizations to create their own standards for an OPC UA information model. You can generate a standardized server interface with these functions. For communication to your system or system parts, the OPC UA clients only have to know the defined standard without taking into account detailed information on the system and its devices.

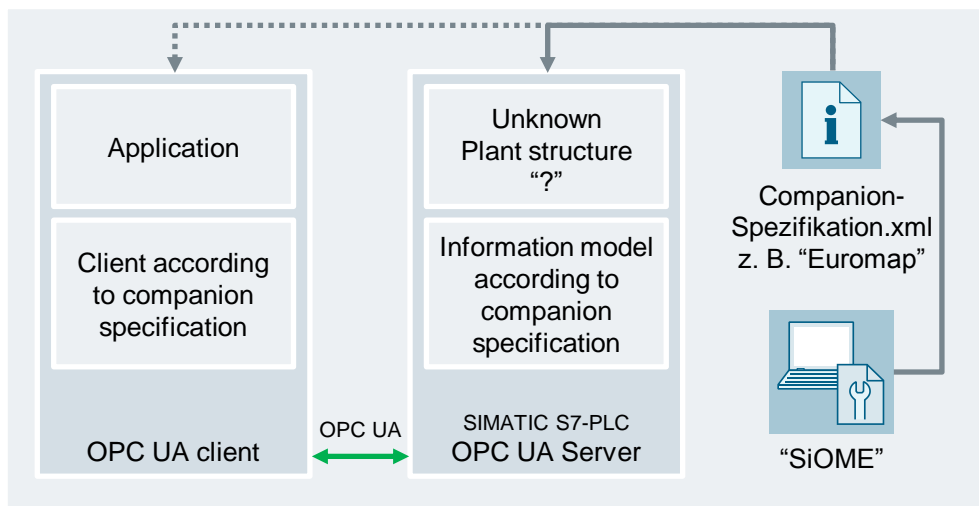
The platform-independent OPC UA protocol with the companion specifications extension greatly facilitates standardized cross-manufacturer communication and reduces implementation effort.

Many organizations and associations already have standardized OPC UA information models for your industry-specific systems and solutions. These include the following organizations, for example:

- Euromap
- AIM
- VDMA
- AutomationML
- OMAC

With the free "Siemens OPC UA Modelling Editor" (SiOME) tool, we have created an editor for defining your own OPC UA information models or mapping existing companion specifications on your SIMATIC PLC. Using this tool, you can import and edit information models as XML files or generate and export individualized models.

Figure 1-1 Operating principle:



1.2 Highlights

The Siemens OPC UA Modelling Editor offers the following functions which facilitate the generation of information models:

- Import of prefabricated OPC UA companion specifications.
- Saving of the work status (project) in XML format and re-import.
- Modeling of own types, objects and methods.
- Importing a TIA portal project directly into the tool via the TIA Openness interface.
- Quick linking of OPC UA objects from the OPC UA information model with control variables and methods via drag & drop.
- Comprehensive access monitoring by setting the access rights.
- Freely selectable description of the OPC UA nodes including localization.

New in V1.5

- New Modeling Rules (Mandatory Placeholder, Optional Placeholder)
- Union
- Creation of OPC UA models directly from the data blocks of the TIA Portal project
- Transfer of comments from the TIA Portal project as description for the OPC UA model
- Jumping to nodes in the OPC UA model
- Search function for nodes
- Bookmark frequently used nodes
- Additional information through "MouseOver" in important places

Note

The following system requirements apply to SiOME:

- .NET Framework 4.5 or higher
- Windows 7 (x64)
- Windows 10 (x64)

The following system requirements also apply for the use of the TIA Openness function of SiOME:

- Windows 7/10 (x64)
- TIA Portal openness installation

2 Handling and functions of SiOME

In this chapter you will learn how to integrate the library into your user project.

2.1 Description of the user interface

The following figure explains the interface of the Siemens OPC UA Modelling Editor (SiOME):

Figure 2-1 SiOME interface

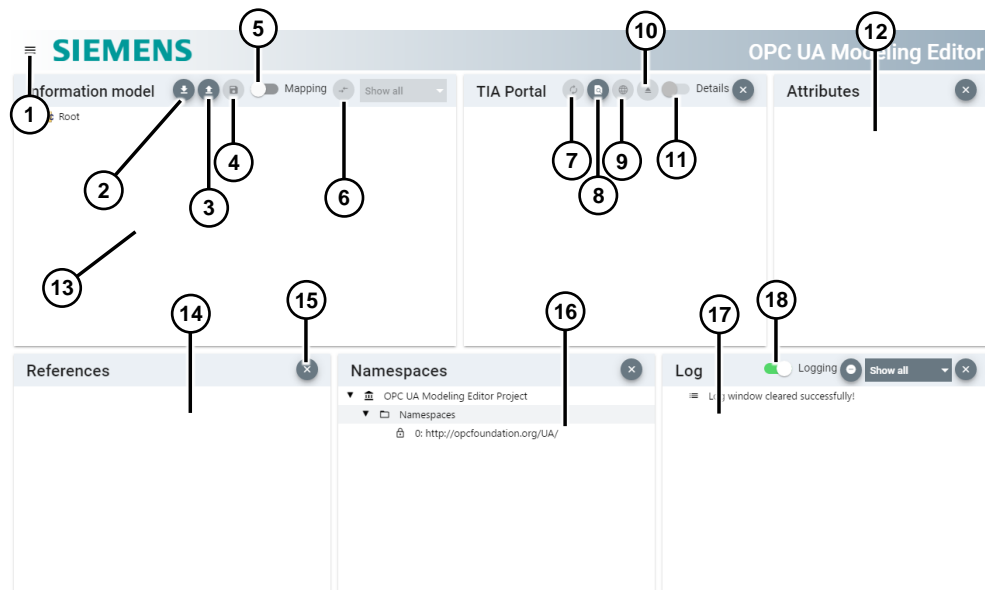


Table 21- Description of the interface

No.	Object	Function
1.	"Settings" menu	Shows the options for changing the tool layout. In the "About" dialog, you will find version information and the link to this application example. The "Refresh" entry resets the current information model.
2.	"Import XML" button	Imports a pre-defined NodeSet or a saved XML project status.
3.	"Export XML" button	Exports a modeled NodeSet or saves the current status in an XML file.
4.	"Quick save" button	Saves the current status in an XML file.
5.	"Mapping" slider	Activates the mapping in the program to link variables by drag&drop ("TIA Openness") or manually by text input.
6.	"Validate mapping" button	Validates the linking of OPC UA variables with PLC variables. Displays unresolved conflicts.
7.	"Refresh TIA Portal project" button	Updates an open TIA project.
8.	"Open TIA Portal project" button	Opens a TIA project via its Openness interface.

No.	Object	Function
9.	"Close TIA Portal project" button	Closes an open TIA Portal project.
10.	"Open TIA Portal project" button	Opens a window to select the language of the open TIA Portal project.
11.	"Details" slider	Displays the variables of the selected data blocks.
12.	"Attributes" area	This section displays the attributes of the OPC UA nodes. You can add a description of the nodes or change their value here.
13.	"Information model" area	This section shows the information model and offers all functions for modifying it.
14.	"References" area	This section contains an overview of the referencing level of the OPC UA nodes. You can switch over between optional and required nodes.
15.	"Close Window" button	Closes the selected window. Windows can be displayed again at any time via menu (1)
16.	"Namespaces" area	This section lists all name spaces which are currently used in the tool. You can generate your own name spaces by right-clicking.
17.	Area "Log"	A log is created in the SiOME directory. The log is used to collect debug information and readjust user input.
18.	"Logging" slider	Enables or disables logging.

Note

If logging is activated, SiOME creates the "Log" folder in the same directory as the SiOME EXE. In this folder you will find the logs in CSV format.

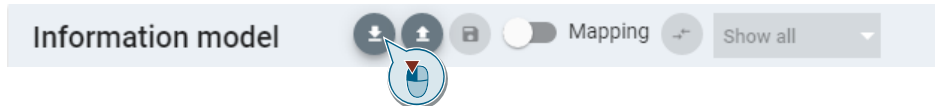
2.2 Function description

This chapter describes the process connection options.

2.2.1 Import of OPC UA models

To import a NodeSet file into SiOME, proceed as follows:

1. Click on the "Import XML" button:

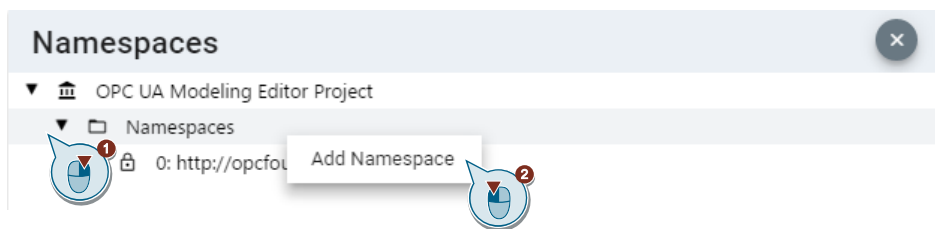


2. In the dialog box, select the file you want to import.
3. Click Open in the dialog.

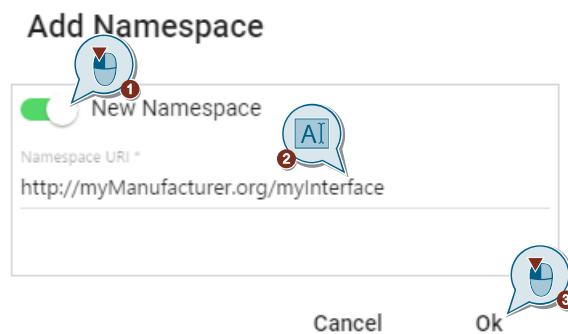
2.2.2 Creating new OPC UA namespaces

To create a new OPC UA address space, proceed as follows:

1. Create a new name space for your machine. Right-click on "Namespaces" in the "Namespaces" area and select "Add Namespace".



2. Activate the slider "New Namespace" in the appearing dialog and assign a name. Then confirm with "Ok".



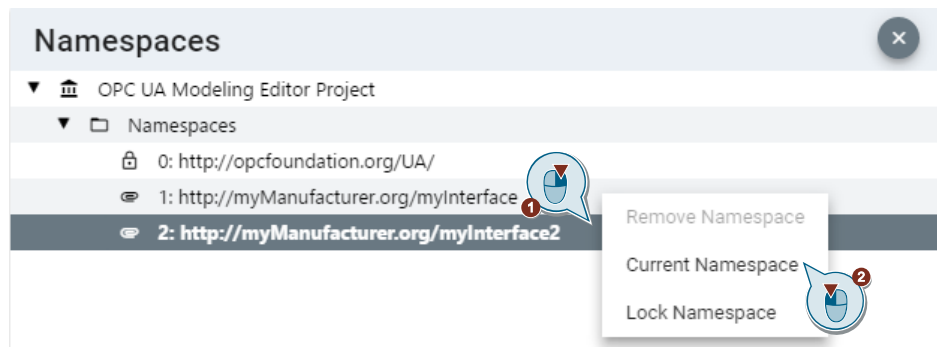
2.2.3 Select or lock the current namespace

You have the option of selecting the currently active namespace or locking an existing namespace to prevent unwanted modifications.

Select or lock the current namespace

Each type and object in the information model must be assigned to a namespace. You can preselect the currently active namespace. Proceed as follows:

1. Import an information model or create several namespaces of your own.
2. Right-click on a desired namespace and then click "Current Namespace" to select the namespace.

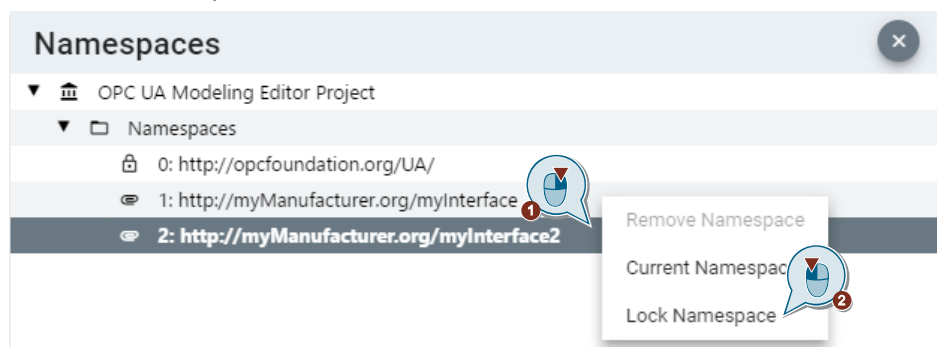


3. All objects created from now on are automatically assigned to the selected namespace. You can change the assignment subsequently.

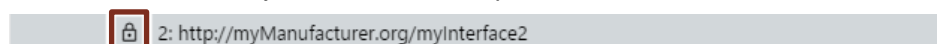
Locking a namespace

For example, if you have created all objects of a namespace and want to protect them against further modifications, you can lock the namespace. Proceed as follows.

1. Import an information model or create your own namespace.
2. Right-click on the desired namespace and then click "Lock Namespace" to select the namespace.



3. A lock symbol indicates that the namespace is locked. From now on, you cannot create new objects for this namespace.



2.2.4 Displaying the Data Types in the Current Model

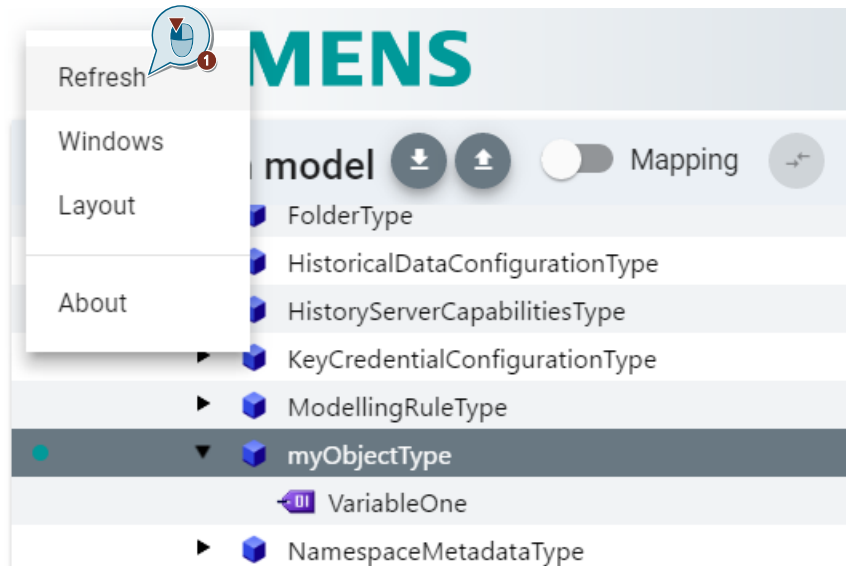
If you want to display the data types for all variables in the information model, proceed as follows:

1. Click on the button in the upper left corner to open the menu.
2. Select the item "Layout".
3. Select the checkbox "Show dataTypes for variables and variableTypes in information model".

2.2.5 Delete the current object model

To discard the entire project or object model, proceed as follows:

1. Left-click on the menu at the top left.
2. Select the "Refresh" button.



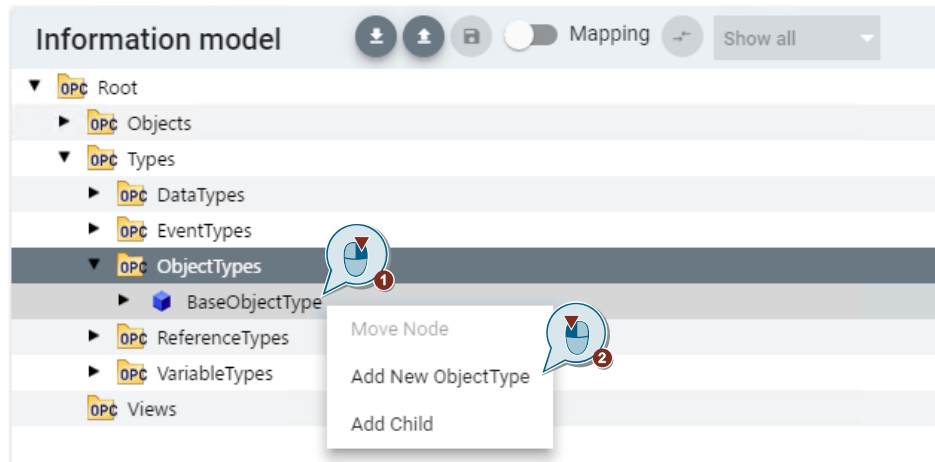
CAUTION Permanent!

If you reset the project by "Refresh", all changes are lost. Save your project/information model beforehand by exporting it via the "Export XML" button. This allows you to import it again at a later time and process it further.

2.2.6 Creating a new object type

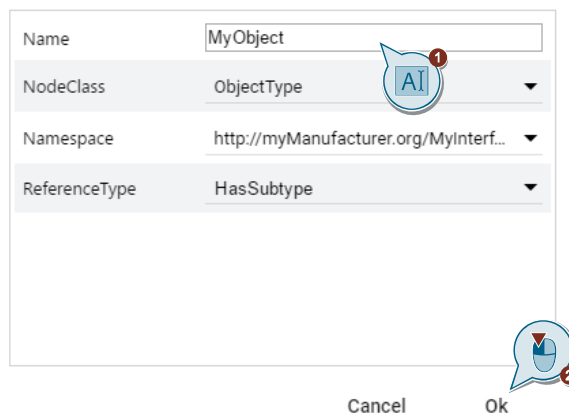
To define a new object type, proceed as follows:

1. Create an object type to instantiate it later as an object. In the "Information model" area, navigate to "Types > ObjectTypes", right-click "BaseObjectType" and select "Add New ObjectType".



2. In the dialog that appears, enter a name for the object type and confirm with "OK".

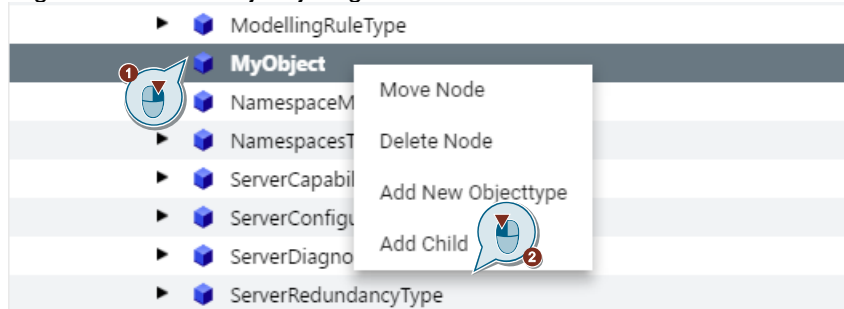
Add New Objecttype



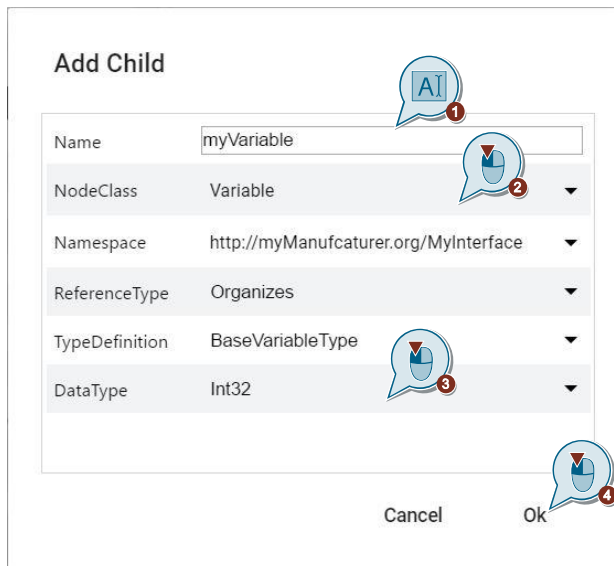
Creating a child object

To fill an object with children, proceed as follows:

1. Right-click on the object just generated and select "Add Child".

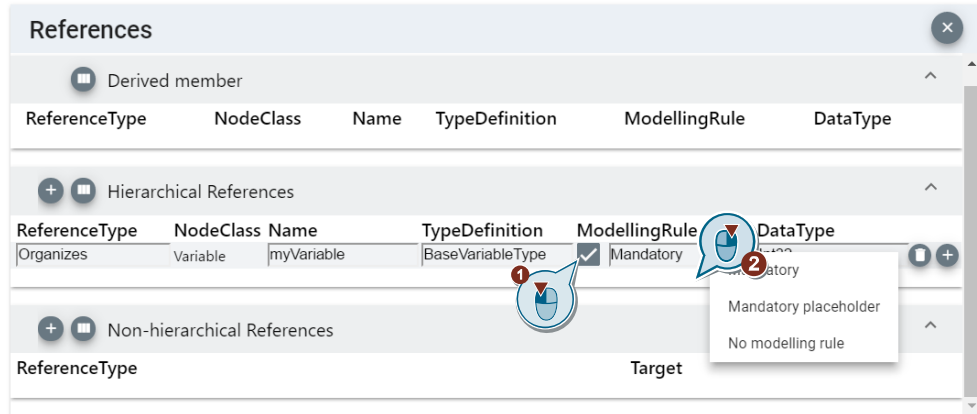


2. Enter a name for the variable in the dialog that appears and select the class "Variable" as "NodeClass", for example. Then select a suitable data type (in the example: "Int32") and confirm with "Ok".



Define modeling rules for object children

Select the previously created object type by left-clicking on it. The modeling rules can then be found in the "Hierarchical References" section.



To change the modeling rule, proceed as follows:

- You can change the modeling rule from "optional" to "mandatory" using the "ModellingRule" checkbox.
- Right-click on the "ModellingRule" selection box to select between "Mandatory", "Mandatory placeholder" or "No modelling rule".

Derived object type references

If you derive an object type from another, it inherits the attributes and nodes of its parent object.

An example:

The screenshot shows the 'Information model' interface. The 'StateMachineType' is expanded to show its children: 'CurrentState', 'FiniteStateMachineType', 'LastTransition', 'StateType', 'SubscribedDataSetType', 'TemporaryFileTransferType', 'TransitionType', 'VendorServerInfoType', 'WriterGroupMessageType', and 'WriterGroupTransportType'. Below this, there are folders for 'ReferenceTypes' and 'VariableTypes'. The 'References' panel is open, showing two tables:

Derived member						
	ReferenceType	NodeClass	Name	TypeDefinition	ModellingRule	Data
<input checked="" type="checkbox"/>	HasComponent	Variable	CurrentState	FiniteStateVariable	<input checked="" type="checkbox"/> Mandatory	Local
<input checked="" type="checkbox"/>	HasComponent	Variable	LastTransition	FiniteTransitionVariable	<input type="checkbox"/> Mandatory	Local

Hierarchical References						
	ReferenceType	NodeClass	Name	TypeDefinition	ModellingRule	Data
	HasComponent	Variable	Availability	BaseDataVariable	<input type="checkbox"/> Mandatory	NodId
	HasComponent	Variable	Availability	BaseDataVariable	<input type="checkbox"/> Mandatory	NodId
	HasSubtype	ObjectType	Exclusive			

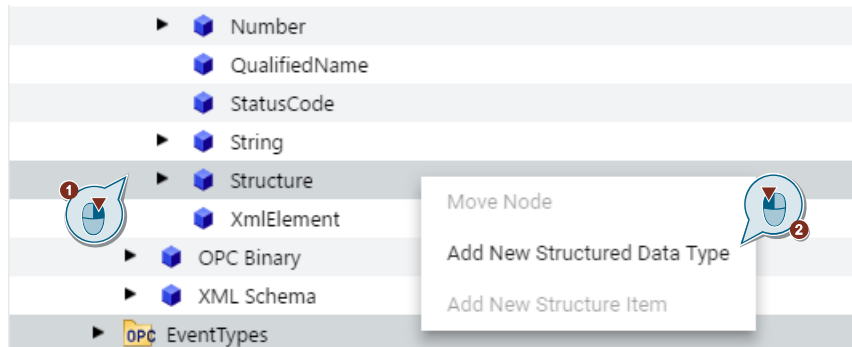
The object type "FiniteStateMachineType" is derived from the parent object "StateMachineType". This has given him so-called inherited attributes ("Derived members").

The node "CurrentState" was inherited as "Mandatory". The variable "LastTransition" is optional, but can still receive the modeling rule "Mandatory" afterwards.

2.2.7 Creating a new data type

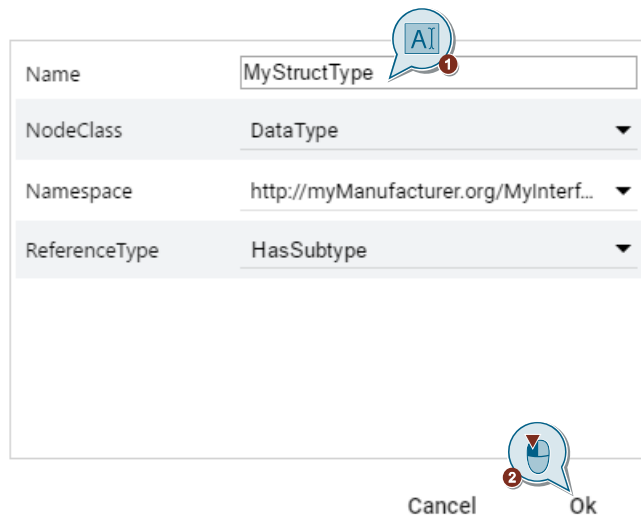
To create a data type, proceed as follows. A new structure is defined as an example:

1. Navigate to "Types > DataTypes > BaseDataTypes", right-click on "Structure" and select "Add New Structured Data Type".

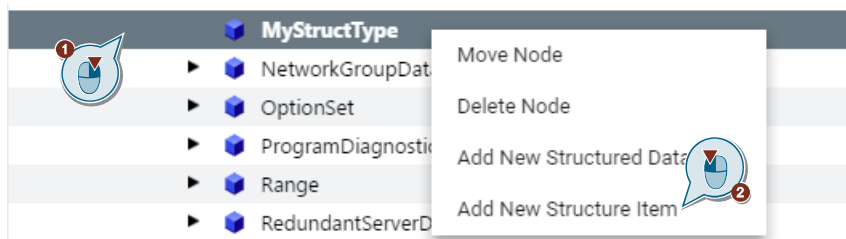


2. Enter a name for the structure in the dialog that appears and confirm with "Ok". The active namespace is automatically selected as the namespace in which the structure definition is to be stored.

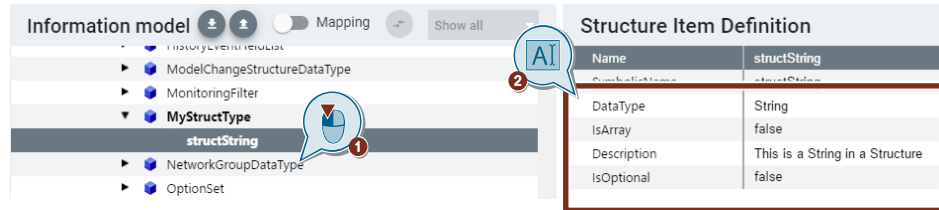
Add New Structured Data Type



3. Fill the structure with items. Right-click on the structure you just created and select "Add New Structure Item".



- In the tree view, select the created item with the left mouse button, assign a name in the "Structure Item Definition" area and select the desired data type.



- Repeat steps 3 and 4 for each required item within your structure.

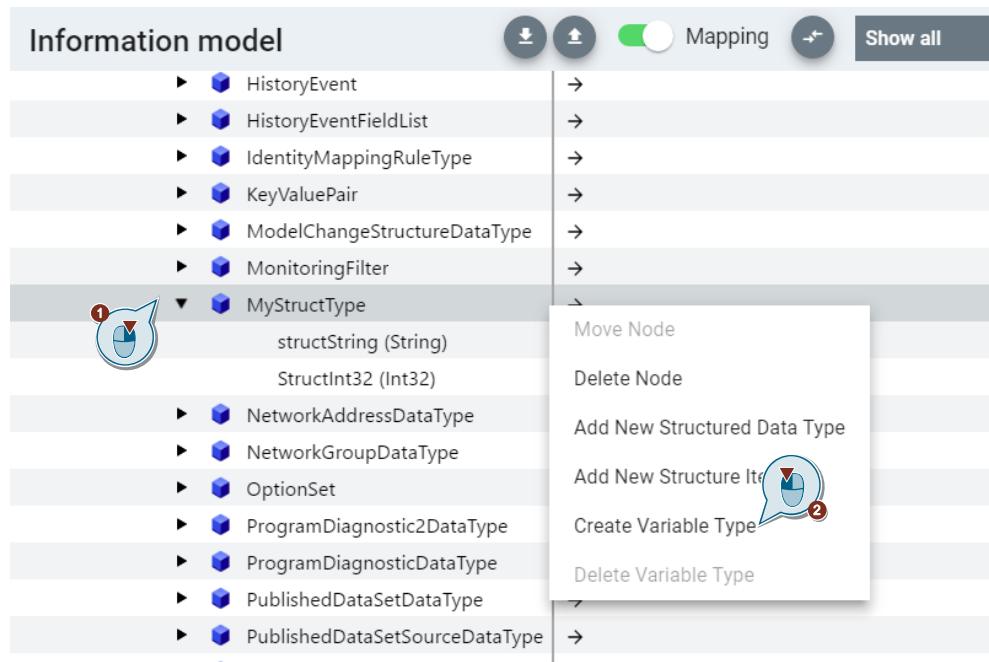
2.2.8 Creating a new variable type

Once you have created a structure type, you can also create the variable type from it. The advantage is that when you create an instance of the structure and select the variable type, the structure elements are displayed in the OPC UA model. These can then be processed as individual elements in the structure by OPC UA clients.

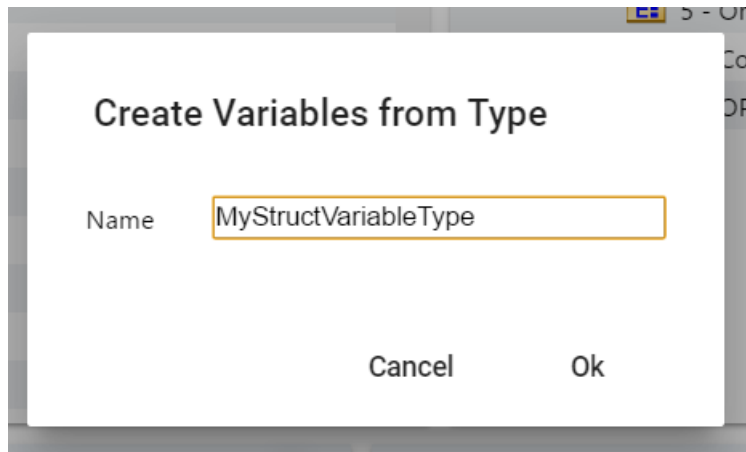
The disadvantage is that the OPC UA information model contains significantly more nodes.

Procedure:

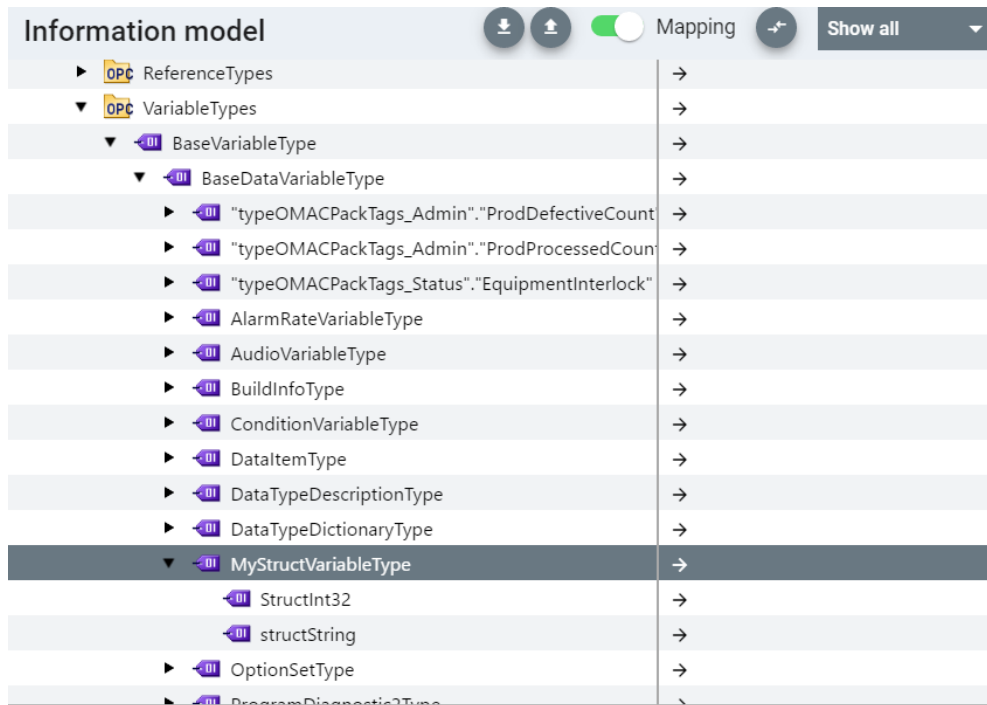
- Right-click on your structure type and then left-click "Create Variable Type" in the context menu.



2. Assign a name for the variable type



Then you can find your variable type in the directory VariableTypes > BaseVariableType > BaseDataVariableType:

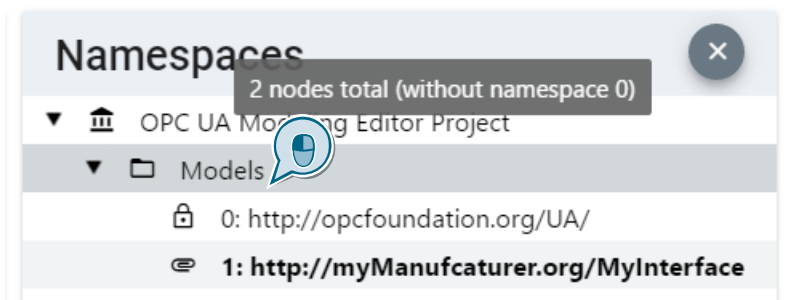


2.2.9 “Mouseover” Functions

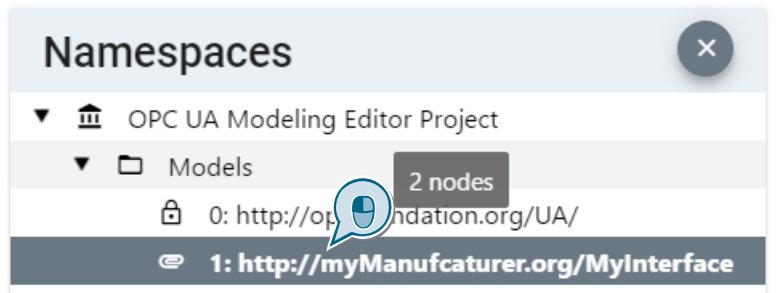
SiOME offers a "mouseover" function for various elements. The elements are explained below.

Current number of nodes in the project

If you move the mouse over the "Models" entry, the current number of nodes of all namespaces available in the project is displayed.

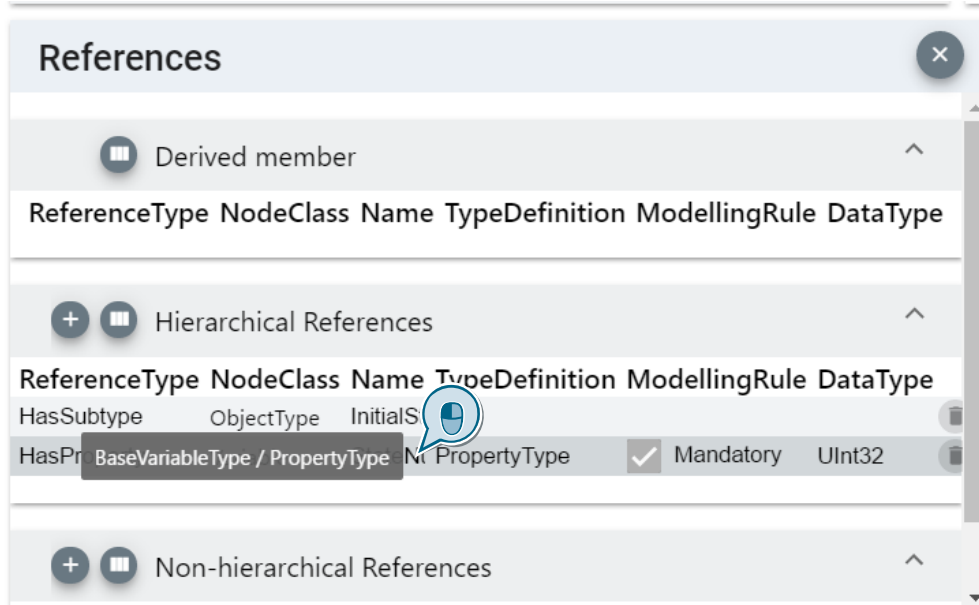


When you move the mouse over a particular namespace, the number of nodes in that namespace is displayed.

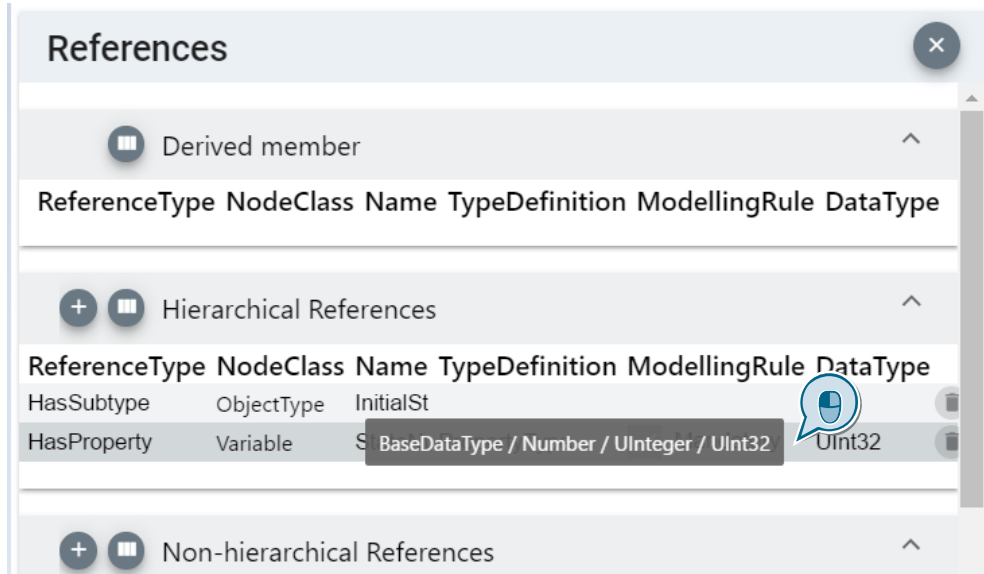


Displaying the Data Type and Type Definition Path

If you move the mouse over a type, the path to this type is displayed.



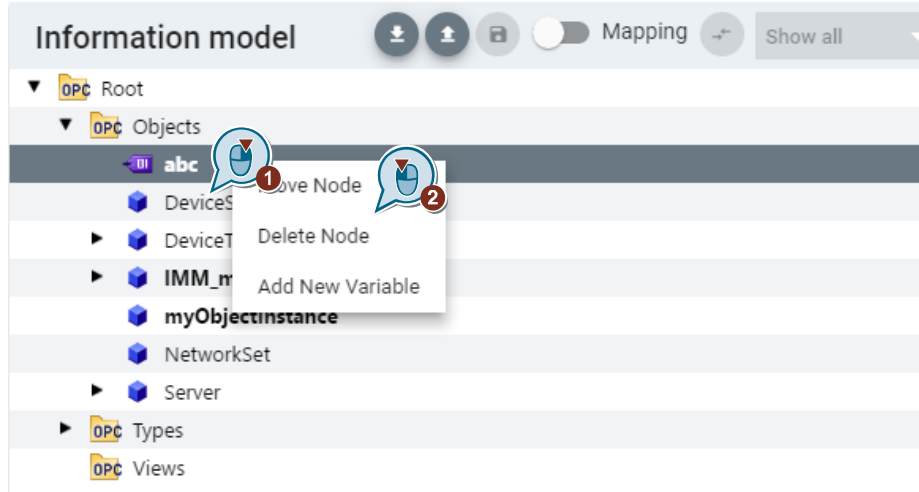
The same applies to the data type:



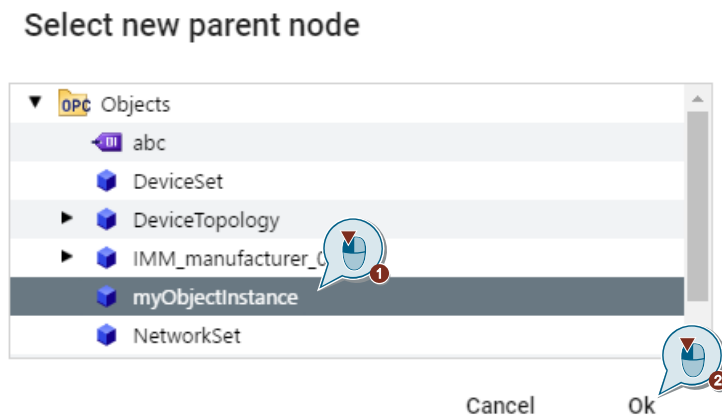
2.2.10 Moving and Renaming Nodes

Moving nodes

1. Right-click a node in the address space that you want to move:

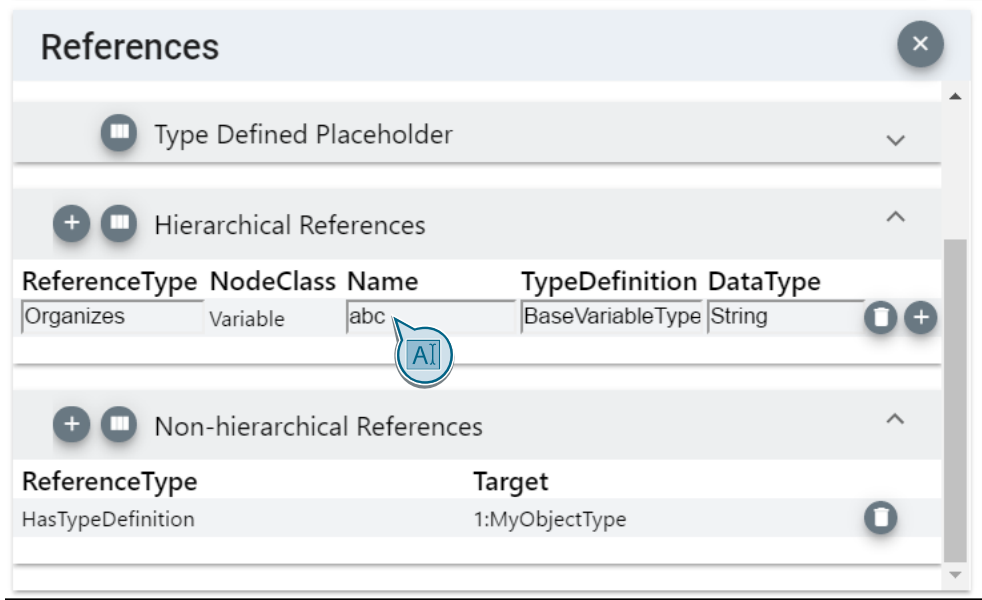


2. In the dialog that appears, select the object to which you want to move the selected node and confirm with "Ok":



Renaming nodes

Select a node in the "Information model" section and edit its name in the "References" section:



After the entry, the result is automatically accepted.

2.2.11 Navigating in the Address Space Model

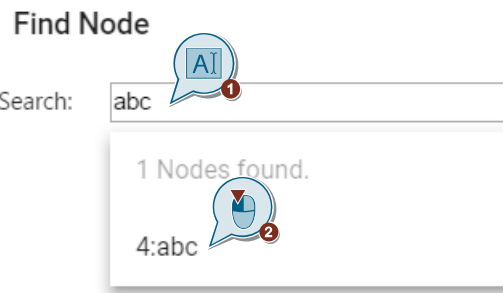
To navigate in the address space, you can search for nodes and jump directly to them. You can also add a new bookmark.

Find a node and jump directly to the node

1. If you right-click on the "Information model" label field or use the key combination "<STRG> + <F>", you can jump directly to a node using the "Find Node" button:



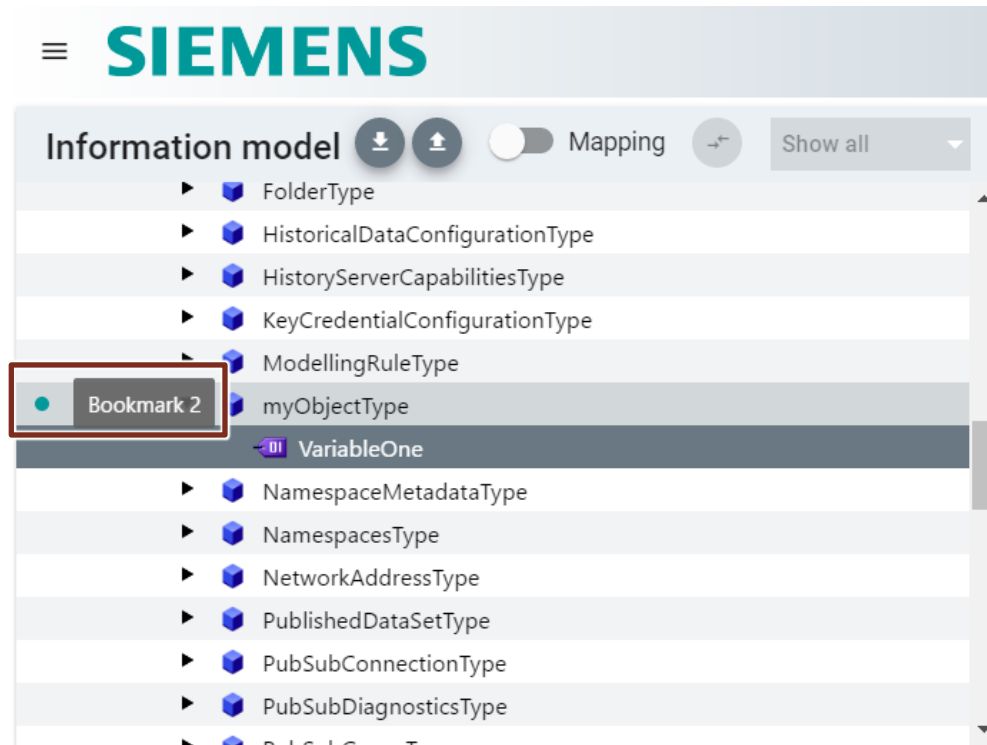
2. In the dialog that appears, enter either the BrowseName or the Node Id with namespace and click on a proposed node to jump to it:



Book mark:

To navigate quickly in an object model, you can bookmark nodes.

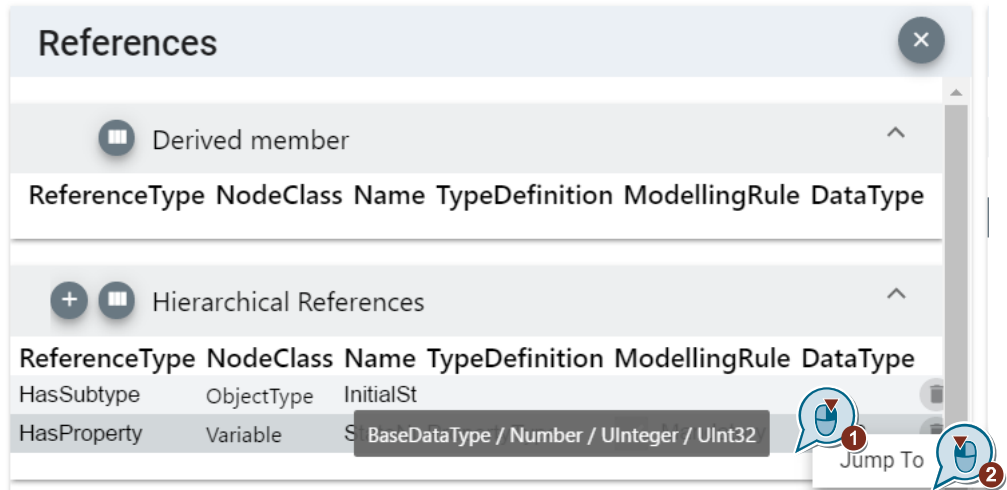
To add a bookmark, use the key combination "<STRG> + <K>". This allows you to delete the bookmark again.



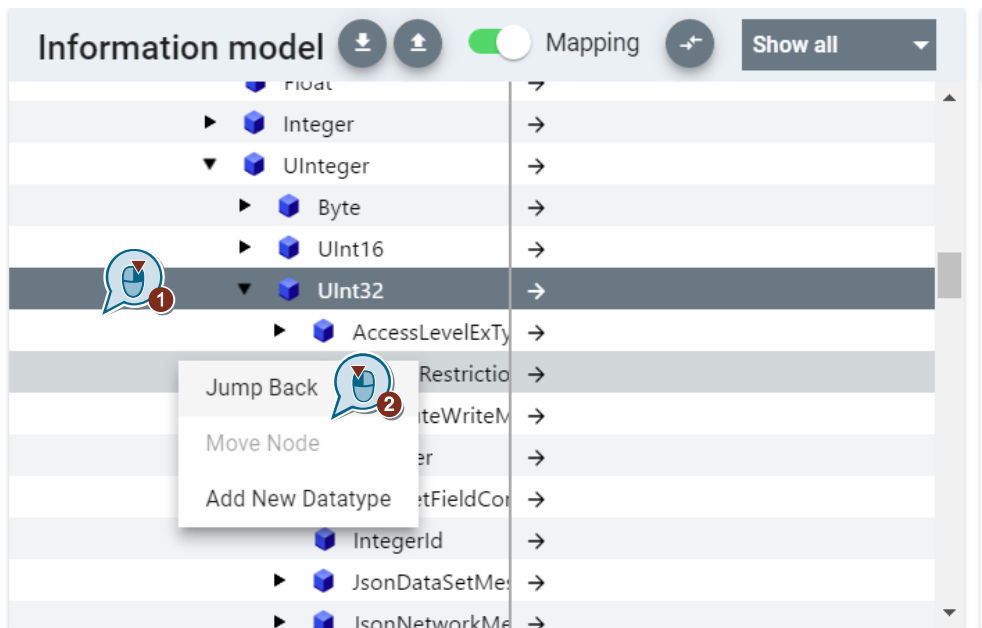
To jump from one bookmark to another, use the key combination "<ALT> + <left arrow>" or "<ALT> + <right arrow>".

Jumping to a Data Type Definition

Right-click on the desired data type in the "References" area and then click on "Jump To" in the context menu to jump to its node:



You can then right-click anywhere in the context menu to return to the previous screen:



2.2.12 Create information model from TIA Portal project

SiOME offers you the possibility to create an information model directly from TIA Portal. You can derive and map objects directly from an (instance) data module.

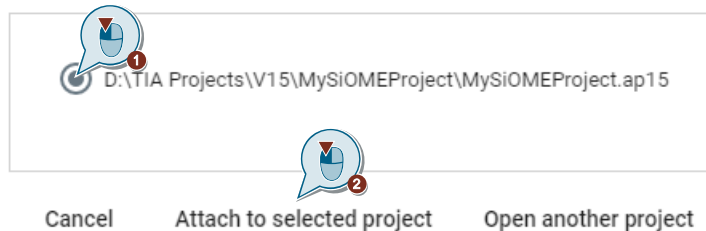
TIA Open project:

To create an information model or an object from a TIA Portal project, open the TIA Portal project via the button "Open TIA Portal project" in SiOME:



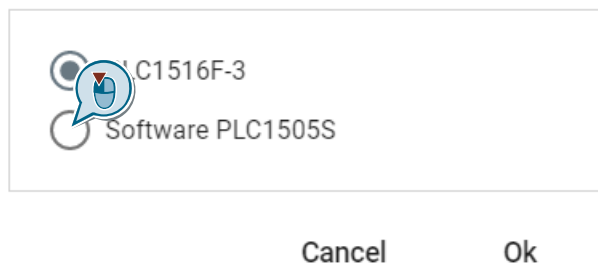
If TIA Portal has already been started and a project is open in the TIA Portal, the "Attach to already opened TIA Portal project" dialog opens. Select the open project and then click on "Attach to selected project":

Attach to already opened TIA Portal project



If more than one SIMATIC S7-1500 controller has been configured, select the one that is suitable for you:

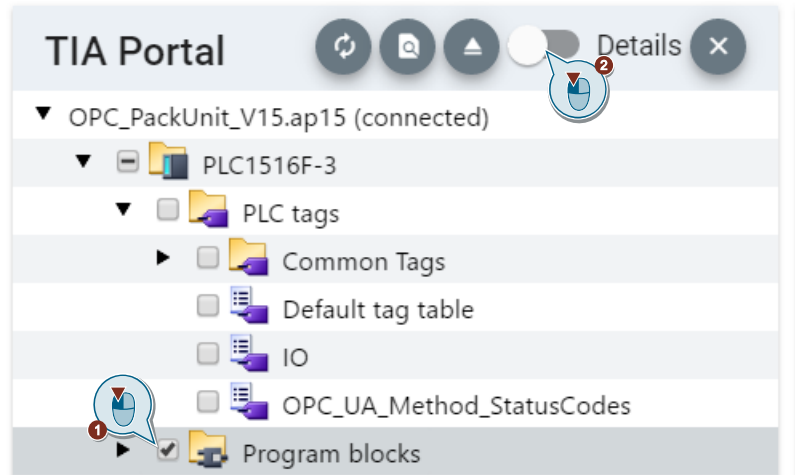
Select PLC



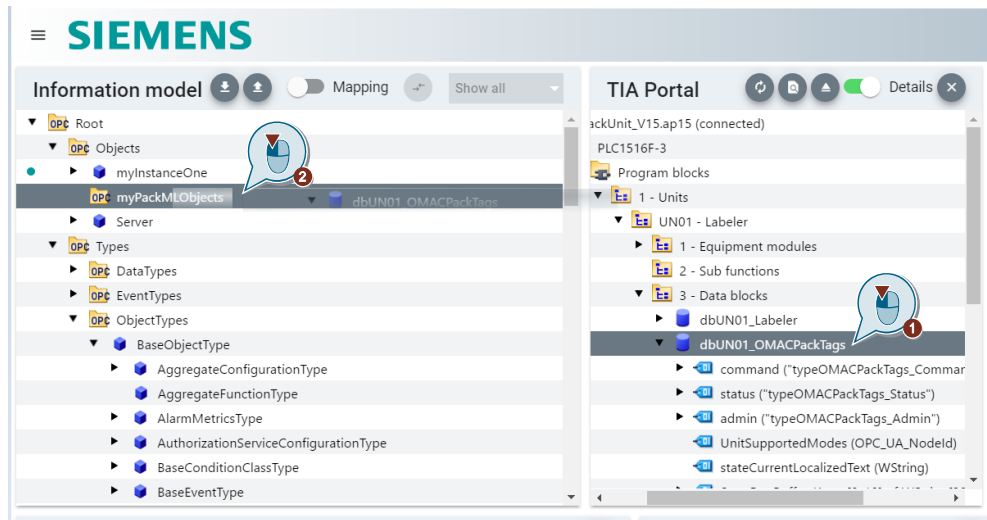
Reference the information model

To create objects in the information model from the TIA Portal project, proceed as follows:

1. Select the data blocks or folders you want to use and click on the "Details" slider.

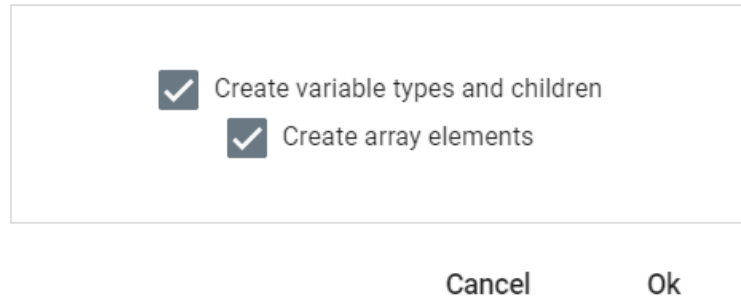


2. Select a data block from which you want to create an object in the OPC UA information model.
3. Hold down CTRL + left-click and use drag & drop to store the data component in the information model.



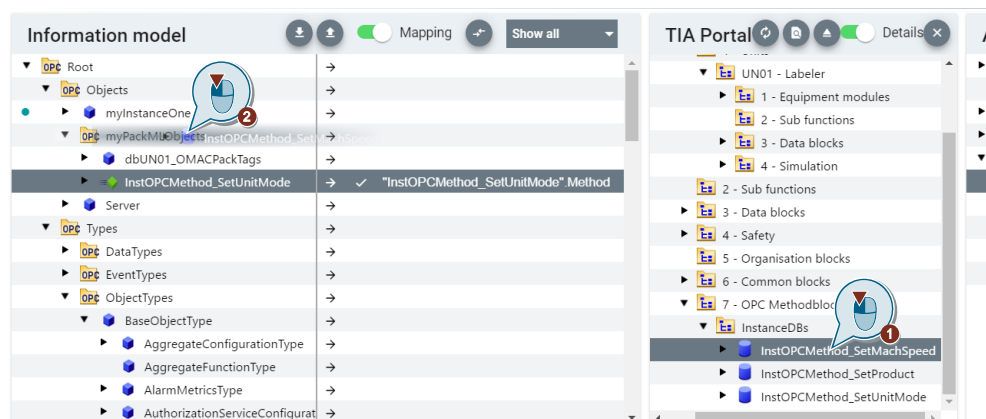
4. If the data block contains a structure, an array element or a UDT, SiOME asks if you want to create a variable type for it.

Create OPC UA instance



You can do the same for OPC UA methods:

1. Select an instance data block of an OPC UA method programmed in the TIA Portal project from which you want to create a method in the OPC UA information model.
2. Hold down CTRL + left-click and use drag & drop to store the data component in the information model.



3 Appendix

3.1 Service and Support

Industry Online Support

Do you have any questions or need assistance?

Siemens Industry Online Support offers round the clock access to our entire service and support know-how and portfolio.

The Industry Online Support is the central address for information about our products, solutions and services.

Product information, manuals, downloads, FAQs, application examples and videos – all information is accessible with just a few mouse clicks:

<https://support.industry.siemens.com>

Technical Support

The Technical Support of Siemens Industry provides you fast and competent support regarding all technical queries with numerous tailor-made offers – ranging from basic support to individual support contracts. Please send queries to Technical Support via Web form:

www.siemens.com/industry/supportrequest

SITRAIN – Training for Industry

We support you with our globally available training courses for industry with practical experience, innovative learning methods and a concept that's tailored to the customer's specific needs.

For more information on our offered trainings and courses, as well as their locations and dates, refer to our web page:

www.siemens.com/sitrain

Service offer

Our range of services includes the following:

- Plant data services
- Spare parts services
- Repair services
- On-site and maintenance services
- Retrofitting and modernization services
- Service programs and contracts

You can find detailed information on our range of services in the service catalog web page:

<https://support.industry.siemens.com/cs/sc>

Industry Online Support app

You will receive optimum support wherever you are with the "Siemens Industry Online Support" app. The app is available for Apple iOS, Android and Windows Phone:

<https://support.industry.siemens.com/cs/ww/en/sc/2067>

4 References

Table 4-1

	Topic
\1\	Siemens Industry Online Support https://support.industry.siemens.com
\2\	Download page of this entry https://support.industry.siemens.com/cs/ww/en/view/109755133
\3\	Download from .NET Framework https://www.microsoft.com/de-de/download/details.aspx?id=55170

5 Document history

Table 5-1

Version	Date	Change
V1.0	07/2018	First version
V1.5	08/2018	New version