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SimApi

Planning and Installation Guide



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1 Introduction to SimApis



A SimApi is a software interface between the Umetrics Suite software and a data source. The primary purpose of a SimApi is to provide data to SIMCA®-online, SIMCA®, or Easy Analytics from the data source.

Sartorius Stedim Data Analytics develops SimApis for many different data sources, such as process historians and general purpose databases.

This document shows what a SimApi is, and how it is used in Umetrics Suite products. You learn important technical aspects on SimApis, and finally installation and troubleshooting are described.

1.1 A SimApi provides data for tags to Umetrics Suite products

A SimApi exposes a hierarchy of nodes, corresponding to folders in a file system. Each node can contain other nodes, or tags. A tag corresponds to a variable. For these variables Umetrics Suite products can obtain data. The following pictures illustrates the process of selecting a tag from a data source.

1.2 SimApi usage in the Umetrics Suite

SIMCA can use a SimApi to retrieve data for project creation and model building as the following picture illustrates.

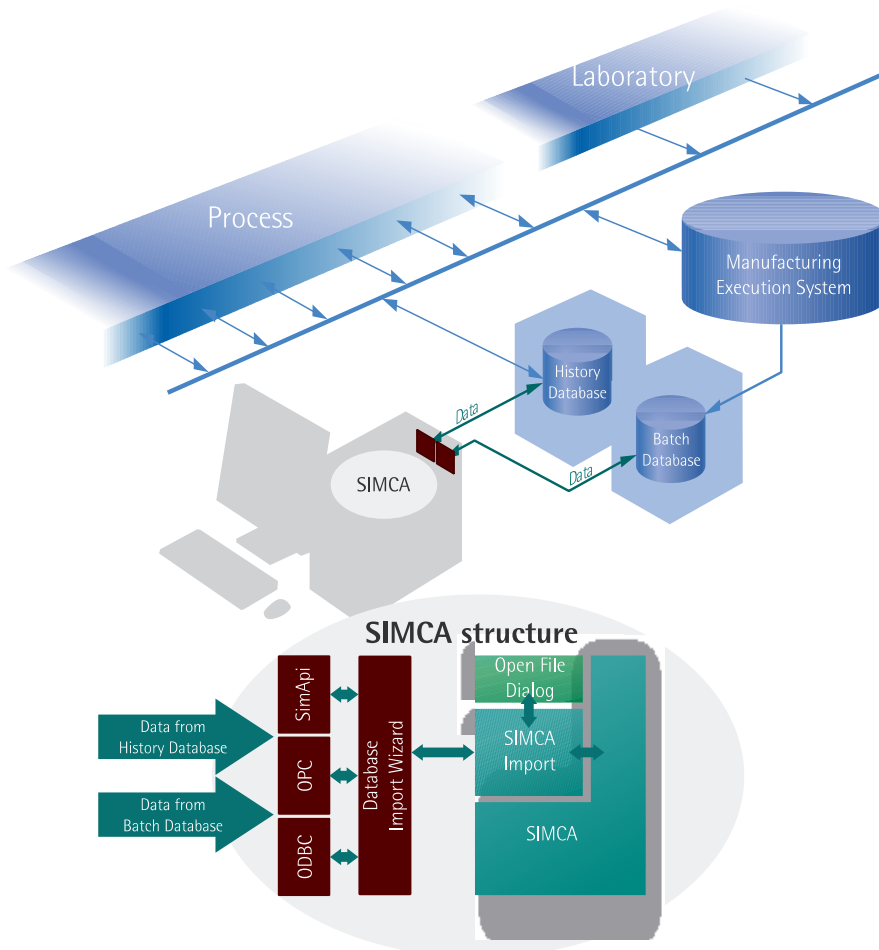
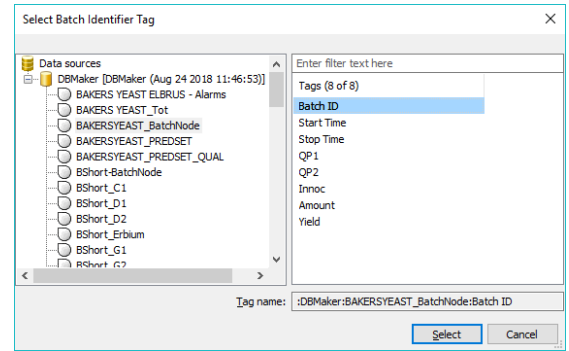


Figure 1. SIMCA used to obtain data from a data source through a SimApi. Easy Analytics has a similar setup.

SIMCA-online use SimApis to obtain data in real-time for monitoring and control, as well as write back of data to the data source. The following picture shows where the SimApi is located in a system consisting of a data source, SIMCA-online server, and clients.

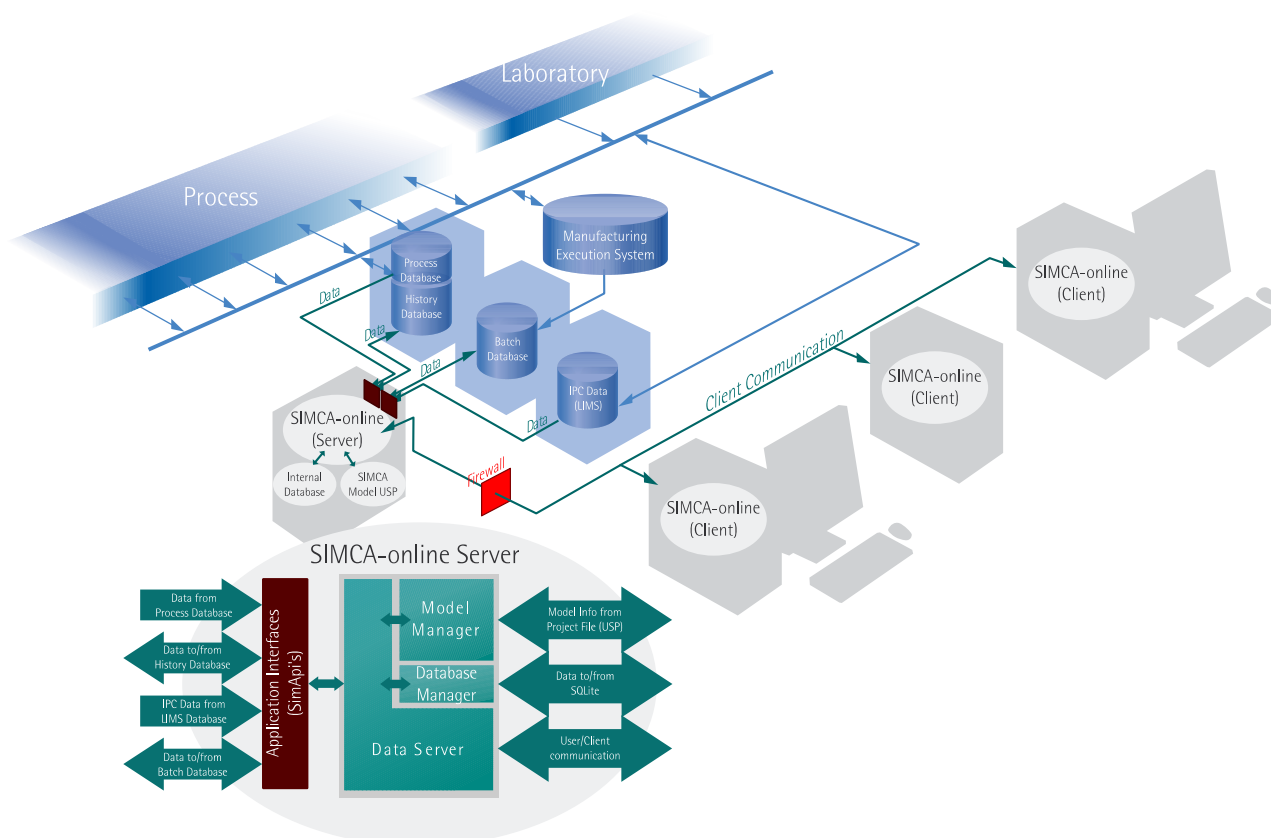


Figure 2. A SIMCA-online installation with a server with SimApis connecting to data sources, and SIMCA-online clients working with data on the SIMCA-online server.

1.3 Commonly used SimApis

The SimApis often used by customers are:

- PI. There are two SimApis: the PI Batch SimApi developed by OSIsoft, or the new PI AF SimApi developed by Sartorius.
- ODBC - for general access to databases such as SQL Server or Oracle
- OPC HDA – using the standard from the OPC Foundation

We recommend that customers use one of these tried and tested SimApis that provides full functionality with SIMCA-online or SIMCA.

The available SimApis are listed below in 3.

1.4 The DBMaker SimApi for simulation data

DBMaker is an application provided with the SIMCA-online server installation. It simulates a data source, such as a process historian, by using a preloaded data table with a number of observations which are provided one by one to SIMCA-online through the DBMaker SimApi.

DBMaker is only used for demonstrational purpose data and cannot be used in production with real data from an external data source¹.

1.5 Other documentation

The document you are reading now is one of a set of related documents, each with different focus and target audience. Refer to the below table to learn more.

¹ You can publish your own data with DBMaker for testing SIMCA-online. See the following knowledgebase article for more information: umetrics.com/kb/testing-simca-online-real-world-data-without-simapi

Source	What	Where
Umetrics.com web site	Introductory information, as well as downloads of most other documentation below	umetrics.com
SIMCA-online ReadMe and Installation.pdf	Installation of SIMCA-online and how to quickly get started with demo data.	In the installation zip file
SIMCA-online Implementation Guide	Outlines SIMCA-online functionality, puts it in context with other Umetrics Suite software, describes requirements and best practices for successful deployment, and step-by-step installation instructions.	umetrics.com/download/online
SimApi Planning and Installation Guide	Preparing for and performing SimApi installations, including troubleshooting.	umetrics.com/simapi
SimApi User Guides	One for each published SimApi. Lists the features, installation instructions, and configuration specifics of each individual SimApi.	umetrics.com/simapi
SIMCA-online Technical Guide	Technical reference for SIMCA-online server installation planning, SimApi functionality, troubleshooting, and how SIMCA-online really works.	umetrics.com/download/online
SIMCA-online help	How to use SIMCA-online and how SIMCA-online works. Less depth than in the Technical Guide but with detailed user interface instructions.	In the installation zip file, and in the software itself
SIMCA-online Web Client User Guide	Describes the features, installation, and usage of the optional SIMCA-online Web Client.	umetrics.com/download/online
Umetrics knowledge base	Searchable database with articles about each released software version, technical articles, and known issues on Umetrics Suite products.	umetrics.com/kb
SIMCA help	How to use SIMCA for creating projects.	

1.6 Technical support

Sartorius Stedim Data Analytics *online support team* answers technical questions about SimApis, and can also forward requests for enhancement of SimApis to the appropriate people. umetrics.com/support

The public SimApi specification for developers and a software development kit with sample code can be obtained from Sartorius Stedim Data Analytics by contacting your sales representative.

2 Obtaining SimApis

Sartorius Stedim Data Analytics web site provides documentation for SimApis, and links to SimApis which are offered from partners. See umetrics.com/simapi.

All SimApis built in-house can be acquired in the web shop on that page. SimApis are often included in maintenance agreements for Umetrics Suite products. Talk to your Sartorius sales representative.

Consult the feature matrix in the next chapter to learn more about SimApi functionality and which SimApis support which features.

For details about a specific SimApi, see its User Guide. You should also download and read the SimApi Overview User Guide (this document) for SimApi planning, installation instructions and troubleshooting tips.

3 SimApi features

Not all data sources are alike. A SimApi need not implement all functions in the specification. For these reasons, different SimApis offer different functionality. The following matrix lists available SimApis and their features. Individual features are explained below.

	BatchTableWrapper	BiopAT® Spectro	CSV	Discoverant	IP21	IP21 Batch	ODBC	OPC DA	OPC HDA	OPC/ODBC	PI AF	SIPAT	SynTQ	Wonderware
Current data	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Historical continuous data	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Discrete data	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Batch data	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Batch context node	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Write back - continuous data	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Write back - discrete data	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Write back - batch data	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Node hierarchy	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Array tag expansion	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Multiple data sources	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Connection resiliency	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Developed in-house	o	o	o	o	o	o	o	o	o	o	o	o	o	o

The table below explains all features used in the above feature matrix. Notice that the table has separate columns to show which features are available in SIMCA-online and SIMCA/Easy Analytics respectively.

Feature	Purpose	SIMCA-online usage	SIMCA and Easy Analytics usage
Current data	Read the most recent value from the data source.	Real-time normal execution	
Historical data	Read historical data from the data source.	Catch-up and repredict of past data, create projects using File > New	Database Import Wizard to import process data for model creation.
Discrete data	Read laboratory/IPC data from the data source. Discrete data can be used for batch configurations when data needs to be re-read during the batch evolution. Many observations per batch.	For batch projects with phases configured for discrete data retrieval.	

Batch data	Read batch conditions and final quality attributes (or other MES type data). One observation per batch.	Batch conditions or local centering.	Database Import Wizard to read batch conditions for batch level model creation.
Batch node	Specify the start time and the end time (empty for an active batch) for a specific batch. Enumerate all batches that existed in a time range.	Required for execution of batch configurations.	Database Import Wizard to select batches to import.
Write back - continuous data	Write continuous data, such as predictions, back to the data source.	Write back for batch configurations for the batch evolution level or for continuous configurations	
Write back - discrete	Write discrete data, such as predictions, back to the data source.	Write back for batch configurations at the batch evolution level for phases configured for discrete data retrieval	
Write back - batch data	Write back batch level data, such as predictions or final quality attributes, to the data source.	Write back for batch configuration at the batch level	
Node hierarchy	The SimApi supports a hierarchy of nodes, similarly to a file system. Each node can contain tags and other nodes. The hierarchy makes it easier to manage a large number of nodes and tags.	Supported in all places where tags are used.	Supported in SIMCA.
Array tag expansion	An array tag stores multiple values. The SimApi expands the array tag to many individual tags, one for each value in the array.	Supported where tags are used for continuous data.	
Multiple data sources	The SimApi can connect to more than a single data source, or supports multiple instances of itself with individual settings and log files for each instance.	Connect to several different data sources of the same kind. See umetrics.com/kb/multiple-instances-same-simapi-simca-online-server	
Connection resiliency	If the SimApi becomes disconnected from the data source, it will try to reestablish the connection.	The SIMCA-online server doesn't have to be restarted to reestablish connections to the data source.	
Developed in-house	The SimApi is developed, provided and supported by Sartorius Stedim Data Analytics.		

3.1 Only Current data is not recommended

Some SimApis, notably OPC DA, only supports reading current data, and not historical data.

A SimApi that only supports current data cannot be used in SIMCA, because it won't be able to read historical data on which to build the models.

For SIMCA-online, we recommend a SimApi that supports historical data, but a SimApi with only current data can work, but there are issues you have to be aware of. Learn more in the SIMCA-online Technical Guide.

4 Preparing for a SimApi installation

This section describes important information that apply to most SimApis. This information can be useful to know to successfully install and configure a SimApi.

4.1 32- or 64-bit SimApis

There are 32-bit and 64-bit versions of the SimApis available. Which one to use depends on the architecture of the program you want to use it with. For example, a 64-bit SIMCA-online server requires a 64-bit SimApi DLL but a 32-bit SIMCA desktop software requires a 32-bit SimApi DLL.

4.2 Location for log file and settings

A SimApi stores its log files in the **Program Data** folder² in the following location:

%programdata%\Umetrics\SimApi, where %programdata% maps to the actual folder on your computer. It defaults to C:\ProgramData.

Each SimApi typically uses its own log file, which similarly to the SIMCA-online server log file will contain more or less data depending on a log level setting. This file is useful for troubleshooting. The log file is named <simapi>.log where <simapi> is the SimApi that you are installing, for example PIAFSimApi. Also see the next section for SIMCA-online SimApi instance names.

This folder also contains the SimApi settings in a XML file named <simapi>.xml.

Most SimApis have graphical user interfaces that make the settings in the xml file, but for some you make the changes directly in the XML file with a text editor, such as Notepad. See the user guide for each SimApi for more information.

4.2.1 File names when named instances are used with SIMCA-online 13.1 or later

With SIMCA-online 13.1 or later, each SimApi instance get its own configuration file and log file in order to support multiple instances of each SimApi. The names of these files are suffixed by the name of the instance as given on the SimApi tab in the SIMCA-online Server Options dialog. The following example shows the naming of these files, where <simapi> needs to be replaced with the SimApi name.

Configuration name given when the instance is added: **OmegaServer**

Configuration file name: <simapi>**OmegaServer**.xml

Log file name: <simapi>**OmegaServer**.log

Note that the generic file <simapi>.log file still is created. This log file contains entries that for technical reasons cannot be directed to the log file of the instances.

Note that SIMCA and Easy Analytics do not support multiple instances, and therefore use the names without instance name as described above.

4.3 Network planning

You should locate the SIMCA-online server close to the external data source in the network. This ensures a fast connection between SIMCA-online and its data source.

Be aware that networking equipment may interfere with the connection between SIMCA-online and the external data sources; firewalls can for example drop connections after a period of inactivity resulting in problems in SIMCA-online where the data source becomes disconnected in a SimApi.

4.4 User accounts and data source permissions

Data sources typically control access to their data. This is usually done with user names and passwords but IP-address- or DNS-based restrictions can also be used (for example PI Trusts in OS/soft PI).

The user name and password are provided to the data source in different ways depending on the system:

- For generic ODBC you can use the ODBC Data Sources Administrator application found on Start in Windows.
- Some database providers provide their own drivers and tools for their databases. Oracle databases, for example, use the Oracle Data Access Components (ODAC).
- Some SimApis have configuration dialogs that store the encrypted credentials in the SimApi XML configuration file.

² This folder is hidden in Windows by default. In order to see it in Windows Explorer you configure File Explorer to show hidden files. Note that you still can navigate to a hidden folder by copying and pasting the folder path to File Explorer's address bar.

- OPC uses DCOM as the transport between data source and SimApi. DCOM is configured with the Component Services tool (DCOMCNFG.EXE) in Windows, and uses Windows authentication.
- For the OSIsoft PI SimApi (not the newer AF SimApi), the OSIsoft AboutPI-SDK application (PISDKUtility.exe) is used to set up the connection to the PI server. PI also has various security options available in the PI System Management Tools on the PI server computer. Read more in the PI AF SimApi User Guide. This guide is helpful even if you use the older OSIsoft PI SimApi.

4.5 Verifying SimApi connectivity

When you want to install a SimApi on a computer it can be useful to verify the connectivity from that computer to the data source with another tool. Here are some tips on how to do that:

- **Matrikon OPC Explorer** for DA or HDA (these are separate tools) can be used to test OPC connectivity, and **Matrikon OPC Analyzer** can be used to diagnose the OPC connectivity issues. Download these free tools from <https://www.matrikonopc.com/products/opc-desktop-tools/index.aspx>
- **OPC Rescue** from the *OPC Training Institute's web site* "enables users to easily diagnose communication and security problems, and repair them instantly with the push of a button. All this can be done without ever having to learn to configure DCOM"
- **ODBC Data Sources** in Windows is used to configure and test generic ODBC. Note that there are two versions of this tool on 64-bit Windows: one for 32-bit applications and one for 64-bit³. Use the Test Data Source button at the end of the ODBC configuration wizard to verify connectivity to the database. We recommend that you configure your data sources as **System DSNs**.
- **A database specific connection tool** from the provider of the database, such as the Oracle Data Access Components.
- **AboutPI-SDK application** (PISDKUtility.exe) can be used to test connectivity and to view any error messages that might have been logged when SIMCA-online tries to connect to the PI server. This is only used for the older OSIsoft SimApi, not PIAF.
- **PI System Management Tools** are used on the PI server computer for troubleshooting from that side. For example, to look for security issues preventing access from the SIMCA-online server. Learn [more on PI system troubleshooting in this YouTube video](#).
- **Excel** can be used to obtain data from an ODBC connection and most other systems when a suitable plugin is installed.

5 Installing a SimApi

Here is how to install a SimApi on a computer:

1. Read the user guide for the SimApi. It contains specifics for that SimApi that complement the general instructions you are reading now.
2. Install and configure any prerequisites mentioned in the SimApi User Guide (for example Oracle Data Access Components for the ODBC SimApi if you want to connect to an Oracle database).
3. Run the setup program to install the SimApi. Install the 64-bit (x64) or the 32-bit (x86) version that matches the software you will run it in.
4. Configure the SimApi in SIMCA-online, SIMCA or Easy Analytics as described in the following sections, and refer to the user guide of the SimApi for descriptions of available settings.
5. Start the SIMCA-online server. Note: when the SimApi is initialized, it will enumerate all tags in the data source. This can take time, especially if there are many tags, if the data source is slow, or if the network latency is high.
6. If the SimApi fails to work as expected, refer to the SimApi log files to help troubleshooting. Increase the log level if needed. Refer to the SimApi user guide.
7. Test the SimApi. For SIMCA-online, you can use File > Extract as described in 6.2.

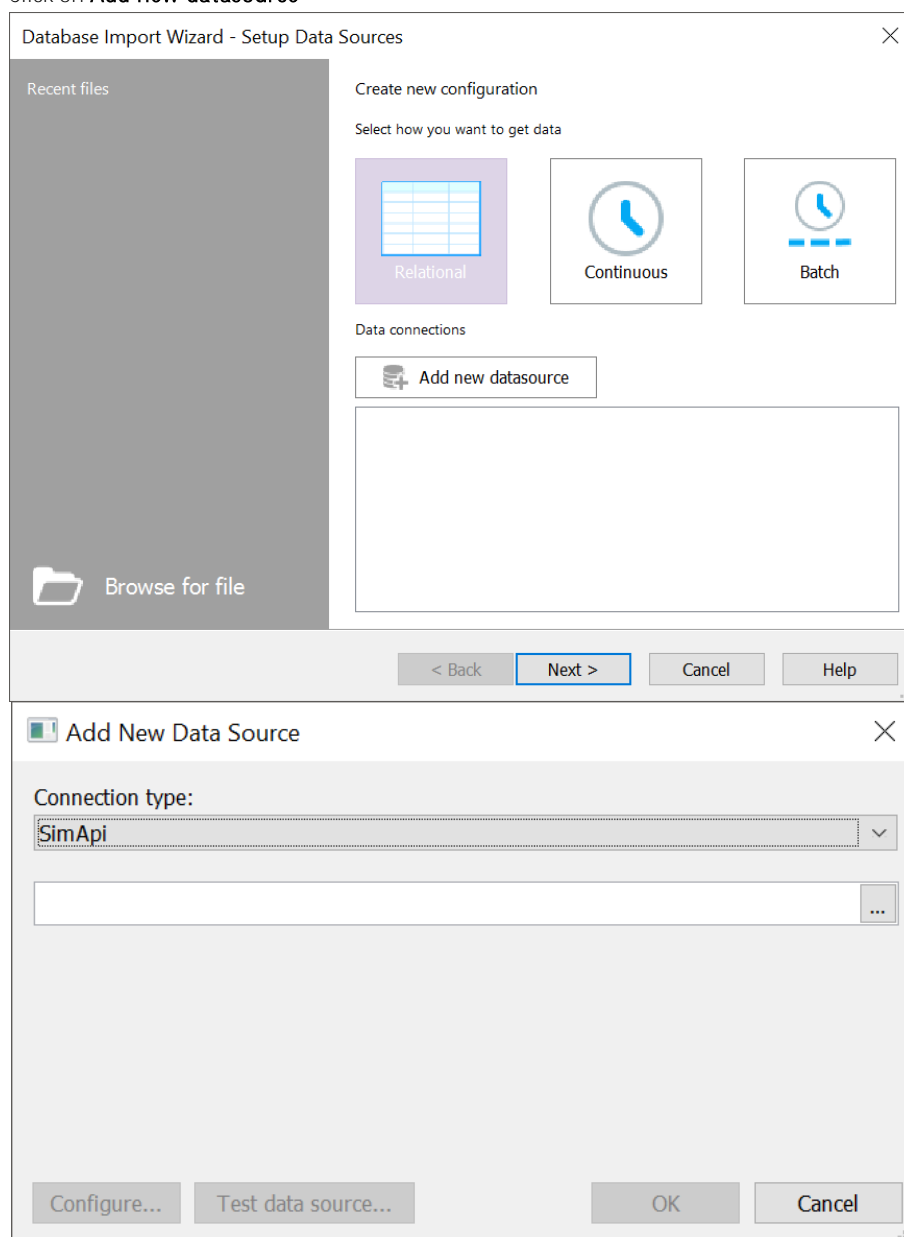
5.1 Setting up the SimApi for use in SIMCA or Easy Analytics

Here's how to use the SimApi in SIMCA or Easy Analytics:

1. Start the database import in one of the following ways:
 - a. **In SIMCA: File > New Regular Project or New Batch Project.** If the database import wizard is not opened automatically, open it from **File > New Spreadsheet > From Database.**
 - b. **In SIMCA: Import Dataset** on the Data tab of an open SIMCA project.
 - c. **In Easy Analytics: Add data** from the left side pane, and select **Add from database.**

³ In Windows, use Start search to find both the 32- and 64-bit ODBC Data Sources tools. In 64-bit Windows 7 the start menu only lists the 64-bit version, but you can start the 32-bit ODBC Data Sources program by launching it manually from the SysWow64-folder, typically C:\Windows\SysWOW64.

2. Click on **Add new datasource**



3. Select **SimApi** as the connection type, click the ...-button and locate the <simapi>.dll in the installation folder, and click **Open**.
4. Click **Configure...** and refer to the individual SimApi User Guide how to make the settings.
5. Click the **Test data source** connection to verify that you can connect to the database.
6. Click **OK** to complete the configuration.
7. Refer to the SIMCA help for how to import data.

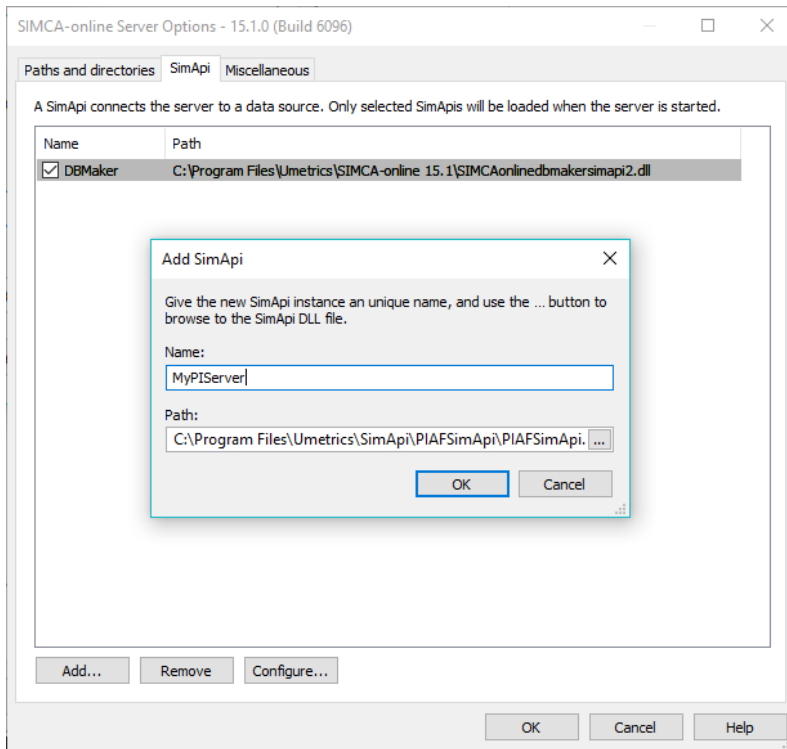
5.2 Setting up the SimApi for use in SIMCA-online

Note: SIMCA-online uses a server license to control which features are available. To be able to use a SimApi you have to have a license that permits it. A demo license of SIMCA-online does not allow SimApis to be used.

Here's how to set up the SimApi in SIMCA-online:

1. On the server computer, start the **SIMCA-online Server Options** utility from Start in Windows. Go to the SimApi tab and click **Add...**
2. Give this instance of the SimApi a name. Use a name that distinguishes it from other data sources, such as the server name and type (for example MyPIServer).

- Click the ...-button to browse to and select the <simapi>.dll located in the installation folder.



- Click **OK** to add the new SimApi and answer **Yes** to the question about launching the SimApi configuration program to make the settings for the SimApi instance.
- Refer to the user guide of the specific SimApi for information about the available settings for it.

To configure multiple instance of this SimApi, repeat the above steps and use unique names for each instance. Read more about the different log and configuration files for the instances above.

6 Troubleshooting and testing a SimApi installation

This chapter is about testing and troubleshooting a SimApi installation.

6.1 Problems caused by not testing with the SIMCA-online service account

When you are testing access to the external data source, remember that you are logged in as a specific user on the server computer (typically your own user account in a Windows domain), but that the SIMCA-online server by default is running as LocalSystem which has **different** access rights compared to your user account. For this reason, it is not uncommon that the above listed tests work fine, but that SIMCA-online fails to connect to the data source.

To solve this issue, access must be granted for the account that is used by the SIMCA-online server service.

6.2 Testing a SimApi from SIMCA-online

Here is how to test the SimApi connection from a SIMCA-online client, once the SIMCA-online server has been started successfully with the new SimApi loaded.

Extract tests the SimApi by obtaining data through it using the different modes of data retrieval: current-, historical-, batch- and discrete data can be extracted and thus tested. Extract is found on the File tab.

Repredict for batch configurations uses the batch node to list available batches in a time range. If you don't see any batches within a time range, then the problem is related to the batch node that is specified for the configuration. Repredict is found on the Administration tab in the ribbon or in the Project Administration window.

Find batches found on the Batch node page of the project configuration wizard can like **Repredict** be used to search for batches in a batch node.

The server log and the SimApi logs are useful if Extract or Repredict doesn't work as you expect. Enable Debug-level logging in both the server log and the SimApi log to get full details. Learn more in <http://umetrics.com/kb/making-use-simca-online-server-logging-finding-problems>