



Sample Scheduler for OpenLab

Installation & Configuration Guide

Notices

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Software Revision

This guide is valid for the 2.7 revision of Agilent Sample Scheduler for OpenLab, until superseded.

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In this Guide ...

This guide describes the requirements, installation, configuration and maintenance of the Sample Scheduler for OpenLab software version 2.7.

In addition, it contains information on LIMS commands, XML structures, and troubleshooting hints.

Sample Scheduler for OpenLab was designed to work with two Agilent Chromatography Data Systems: OpenLab CDS and EZChrom. Some features or behaviors of the Sample Scheduler software differ depending on your CDS. This document includes details on these differences.

Table 1 Terms and abbreviations

Term	Description
CDS	Chromatography Data System
Content Management	Data storage component provided as part of the OpenLab system
EZChrom	OpenLab CDS EZChrom Edition and OpenLab EZChrom
Control Panel	Control Panel for Agilent OpenLab software
Microsoft Control Panel	Part of the Microsoft Windows operating system
AIC	Agilent’s Analytical Instrument Controller

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Sample Scheduler for OpenLab is an application intended to improve the productivity of chromatographic analysis in the laboratory by fully automating the analysis.

Sample Scheduler is a powerful interface between any front-end platform like a Laboratory Information Management System (LIMS) that sends analysis orders, and the OpenLab Chromatography Data System (CDS) solution that performs and processes the analysis.

Sample Scheduler for OpenLab supports two types of LIMS:

- LIMS that are able to provide analysis orders via a structured XML file in a dedicated folder
- LIMS that can provide the information required to create an analysis order, by answering a structured SQL query sent by the Sample Scheduler

In both cases, when Sample Scheduler receives a LIMS command (that is an analysis order) in which the analysis status is set to **Scheduled**, it checks the command's validity and the availability of the required chromatographic instrument. A user can review and complete the analysis parameter in Sample Scheduler before the acquisition or it can be automatically scheduled for acquisition if specified by the LIMS. Then, Sample Scheduler submits the analysis to the instrument queue in the CDS, where it is acquired as soon as the instrument is idle, and an instrument connection license is available. This way the samples are analyzed quickly, and the laboratory instrument use is optimized.

Sample Scheduler for OpenLab is composed of:

- a database (SQL Server or OpenLab Data Repository)
This database is used to store the Sample Scheduler configuration parameters and all the analyses with their parameters and states.
- one LIMS agent
- one or several Scheduler agent(s)
- a webserver
- multiple instances of the user interfaces: Sample Scheduler configuration, Sample Scheduler client and web interfaces
- the Database Management Agent
- the Sample Scheduler Orchestrator

Architecture

The LIMS agent:

- scans the folder in which the LIMS generates the commands or periodically queries the LIMS thanks to a SQL query to recover analysis order,
- checks the commands' validity,
- transforms valid commands into analyses stored in the database and sends invalid commands into a trash folder located in the LIMS_Commands folder root and, if enabled, notifies the administrator.

Scheduler Agent: Several Scheduler agents can be installed (one per computer). The role of each Scheduler agent is to manage a pool of instruments.

Each Scheduler agent ...

- requests the Sample Scheduler database to know if there is an analysis to handle on one of the instruments it manages,
- requests the Chromatography Data System to check the instrument license availability and its status,
- initiates an acquisition through a specific agent: the *Scheduler acquisition agent* (one per instrument). Then this specific agent will handle the acquisition, through the Chromatography Data System acquisition process, and updates the analysis state.

The user interface of the *Sample Scheduler for OpenLab Client* ...

- lists all analyses stored in the database,
- displays in real time the state of the analyses and available information,
- allows the analyst to add/edit analyses, etc.

The user interface of the *Sample Scheduler for OpenLab Configuration* allows the Sample Scheduler administrator to configure the Sample Scheduler (LIMS commands folder path, SQL queries, etc.).

The *Sample Scheduler web server and web interface* ...

- allow users a controlled access to view, edit, and schedule analyses by simply using a web browser,
- give managers an overview of the total analyses workload of the laboratory as well as the usage and status of all instruments,
- give operators a simple overview of their daily workload of chromatographic analyses.

Architecture

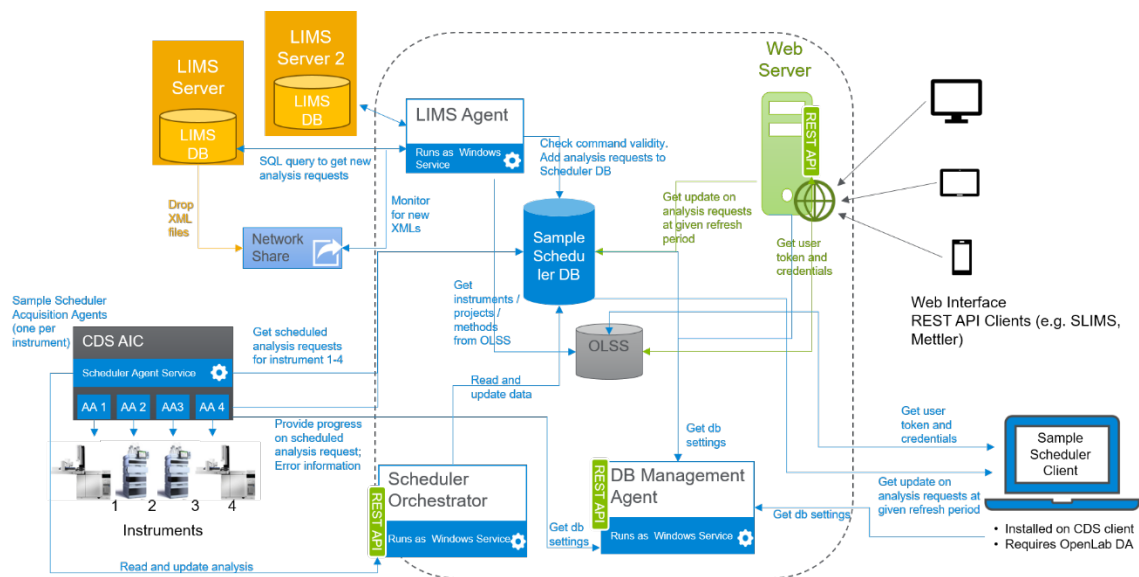


Figure 1 Sample Scheduler Architecture

Software Requirements

Operating Systems

Sample Scheduler client, Sample Scheduler configuration, and Sample Scheduler agent:

- Win 10 64 bit Pro or Enterprise (version 1809 LTSC, 20H2, 21H2)
- Windows 11 64 bit Pro or Enterprise
- Windows Server 2012 R2
- Windows Server 2016
- Windows Server 2019

Sample Scheduler LIMS agent and Sample Scheduler web interface:

- Windows Server 2012 R2
- Windows Server 2016
- Windows Server 2019

.NET Framework

Sample Scheduler for OpenLab requires the .NET framework 4.7.2, ASP.NET Core, and .NET Core 3.1. The version for the .NET Core Runtime needs to be the same or higher as the version of the ASP.NET Core Runtime.

NOTE

For localized versions of Sample Scheduler for OpenLab, install the .NET framework language pack corresponding to the version of the .NET framework.

Supported Browsers

- Chrome: 99
- Microsoft Edge 99
- Safari iOS version 15
- Safari Mac OS version 15

The Sample Scheduler Web Interface user interface is responsive. Thus, the view shown in a web interface depends on the screen size of your device.

Requirements

Language Compatibility

The English version of Sample Scheduler for OpenLab is validated on Windows English.

Localized versions of Sample Scheduler for OpenLab are supported on the following localized language versions of Windows:

- Chinese
- Japanese

Sample Scheduler for OpenLab can run on other language versions of Windows as well, but the user interface will be English.

The Sample Scheduler web interface is localized for the following browser languages:

- Chinese
- Japanese

For other browser languages the web interface will be in English.

Computer Date/Time

All Sample Scheduler computers must be synchronous: same date/time.

Databases

Sample Scheduler for OpenLab can use one of the following databases:

- OpenLab Data Repository

OpenLab Data Repository (OLDR) is available as part of the OpenLab Platform, which is a component of OpenLab CDS 2.5 or higher. It is used to store diagnostic and topology related information but can also host a Sample Scheduler database. Note that OLDR is available only for OpenLab CDS configurations without EZChrom.

- SQL Server

The supported SQL Servers are:

- SQL Server 2016 Express or Standard
- SQL Server 2017 Express or Standard
- SQL Server 2019 Express or Standard

For more information about configuring the SQL Server, refer to [“Appendix A: Microsoft SQL Server Configuration”](#) on page 122.

Requirements

If you use an SQL Server instance, a valid administrator name and password must be available prior to the Sample Scheduler installation. You will have to enter the name of the SQL Server computer, the name of the instance and the associated credentials during the Sample Scheduler installation.

Installing SQL Server Management Studio can be useful if you need to set up database users.

OpenLab CDS and EZChrom Supported Configurations

Sample Scheduler for OpenLab is not supported on a Standalone Workstation.

Sample Scheduler for OpenLab version 2.7 is compatible with:

- OpenLab CDS 2.5 Client/Server System with a content management system
- OpenLab CDS 2.6 Client/Server System with a content management system
- OpenLab CDS 2.7 Client/Server System with a content management system
- OpenLab CDS EZChrom Edition A.04.09 or OpenLab EZChrom A.04.10 Distributed System with file system storage, Content Management, ECM XT, ECM 3.5 Update 6, or ECM 3.6
- Mixed configurations using ECM XT or OpenLab Server are supported with OpenLab CDS versions 2.5 or 2.6 with OpenLab CDS EZChrom Edition A.04.09 or OpenLab EZChrom A.04.10.

In an environment regulated by 21 CFR Part 11 and Annex 11, Sample Scheduler for OpenLab is only supported in combination with OpenLab CDS 2.5 or higher. A configuration with EZChrom is not supported in a regulated environment.

SLIMS Compatibility

Sample Scheduler 2.7 is compatible with SLIMS 6.7 and 6.8.

Network Requirements

Firewall Settings

The following ports are used by default for the Sample Scheduler:

- CDS versions older than 2.7: TCP port 52088 (https protocol, used to reach the Sample Scheduler web interface, used to remotely start/stop/restart services via the Sample Scheduler configuration)
- CDS version 2.7 and newer: only TCP port 443
- OLDR: port 5433

They will automatically be opened if you install the Sample Scheduler web interface.

In addition, exceptions for the ports used by Microsoft SQL Server needs to be added. For details, see "[Configure Firewall for SQL Server](#)" on page 136.

Hardware

PC Graphics Display Resolution

The minimum screen resolution for OpenLab CDS is 1600 x 900 pixels (1920 x 1080 is recommended).

The minimum screen resolution for EZChrom is 17 " 1280 x1024 pixels (SXGA) (19" 1440 x 900 is recommended).

Requirements

Required Resolution to Access the Sample Scheduler Web Interface

For mobile devices the minimum display width is 360 pixels.

You can only access the **Sequence View** with a tablet or desktop that supports a minimum display width of 1024 pixels.

Disk Space

The disk space required to install Sample Scheduler for OpenLab is about 220 Mb.

RAM Requirements

- RAM requirements of Sample Scheduler depend on:
- The role of the computer (Scheduler agent, LIMS agent, Sample Scheduler client),
 - The number of instruments, and
 - The number of analyses to store in Sample Scheduler database.

Table 2 Roles and required RAM

Role	Physical memory (RAM)
LIMS agent	120 MB
Scheduler agent	150 MB
+ Scheduler Acquisition agent (multiply with no. of instruments managed by the Scheduler agent)	+ 150 MB multiplied with no. of instruments
Scheduler client	Depends on the number of analyses stored in Sample Scheduler database. 5000 analyses: 500 MB 20 000 analyses: 900 MB
SQL Server/OLDR	Depends on the number of analyses stored in Sample Scheduler database. SQL Server manages the memory usage in a nonlinear manner (not proportional to the number of entries in the database). Refer to SQL Server specifications to properly set the SQL Server sizing.
Webserver	approx. 150 MB. Depends among others on the number of analyses, Instruments, and users in the system
Database Management Agent	50 MB

Requirements

Example

RAM required for a computer, where:

- One OpenLab CDS client, one Scheduler agent managing 5 instruments and one Sample Scheduler client are installed.
- About 5000 analyses are displayed in the Sample Scheduler user interface:

The required RAM for Sample Scheduler is: 150MB plus 750MB (150MB multiplied by 5) plus 500 MB = 1.4 GB.

The RAM of the computer must be equal to the OpenLab CDS required RAM plus about 2 GB for Sample Scheduler.

NOTE

It is advised to store no more than 20 000 analyses in the Sample Scheduler database. Excess of analyses might induce Sample Scheduler performance loss. Sample Scheduler client is not opened if there are more than 20 000 analyses in the database because the memory capacity of the 32-bit process is limited.

To avoid the accumulation of **Ended** analyses in the Sample Scheduler database, you can configure the time until the **Ended** analyses are automatically removed from database. To learn more about the parameter **Database command life time**, refer to the *System Configuration* chapter of the Sample Scheduler online help (search for **Command processing**).

Number of Instruments

A maximum of 20 instruments can be managed per Scheduler agent.

Other Requirements

Sample Scheduler for OpenLab is working with OpenLab CDS or OpenLab EZChrom. Thus, systems with Sample Scheduler installed must satisfy the corresponding Chromatography Data System requirements.

Please refer to the *OpenLab CDS Requirements guide (CDS_Requirements.pdf)* or *OpenLab EZChrom Requirements guide*.

For requirements of the server in an OpenLab System, please refer to the *OpenLab Server and OpenLab ECM XT Hardware and Software Requirements guide (ECM_XT_HardwareSoftwareRequirements.pdf)*.

Additional restrictions might apply depending on other software that is installed on the same machine, for example, SQL server.

Considerations in a Regulated Environment

In regulated environments, you must reduce user privileges to a minimum in order to protect the system. Therefore, a specific OpenLab CDS user account is required for a Service user: This is a user with the privileges required to run automated Sample Scheduler services in the background. For example, the service user schedules analyses that are provided by the LIMS. The service user must remain enabled if you use Sample Scheduler for OpenLab in your laboratory environment,

3 Licensing

Every LIMS connection configured in the Sample Scheduler system requires a license. Each time the LIMS agent service starts, it checks the licensing server for an available license for each LIMS connection and uses it during its operation. If the LIMS agent is stopped or fails, the licenses are released again.

- In addition, you also need a Sample Scheduler Expansion Pack license to use instruments. The number of connection licenses depends on the number of instruments you want to use at the same time.
- You need to have a Sample Scheduler for OpenLab license for each LIMS. Add the license prior to the Sample Scheduler installation.

To add a license:

- In the Control Panel under **Administration**, select **Licenses** and click **Add**. Enter the license number.
- After adding a Sample Scheduler for OpenLab license: Start the LIMS Agent service on the respective computer, and set its startup type to Automatic.

NOTE

Load the license onto the licensing server of the respective host. If there is no Sample Scheduler for OpenLab license on the specified licensing server, the LIMS agent cannot be started.

Only as many LIMS connections are possible as licenses are available. If the number of LIMS connections exceeds the number of available licenses, the last connections in the list **Selected LIMS (Sample Scheduler configuration > LIMS tab)** are not established by Sample Scheduler. XML commands or actions addressed to a not established LIMS connection will not be executed and moved to the trash folder.

The users defined in the **Notification** tab will be informed about the trashing of the XML and the reason for it (in this case, the missing license). The notification can happen by email and/or on the Notification tab of the Sample Scheduler client. For more information, refer to the *System Configuration* chapter of the Sample Scheduler online help (search for **Notifications**).

4

Installation

Control Panel Configuration

- Only the *Internal* or *Windows Domain* authentication modes are supported.
- *Projects* are defined with a valid project folder path (where the CDS files are stored: methods, chromatograms, etc.).
- One user, with the required privileges to activate Sample Scheduler for OpenLab must exist in the Control Panel. This user's credentials will also be used by Sample Scheduler services (*Agilent Sample Scheduler LIMS Agent* and *Agilent Sample Scheduler Agent*) to run automated Sample Scheduler services in the background.

In regulated environments, you will create a Service user for this purpose (see ["In a Regulated Environment: Create a Service User"](#) on page 43).

Sample Scheduler Deployment

The Scheduler deployment is strongly linked to the settings in the OpenLab Control Panel.

Please consider each of the following system components while deploying the application:

- The server in the OpenLab system manages Shared Services, and, if applicable, Content Management.
- The *Analytical Instrument Controller (AIC)* manages the communication between CDS and instruments.
- The *CDS Client* Interface allows you to create methods, process analyses, perform analyses, etc.
- The *Sample Scheduler database* (SQL Server instance or OpenLab Data Repository for use with Sample Scheduler for OpenLab) stores Sample Scheduler configuration parameters and analyses.
- The *Sample Scheduler LIMS agent* monitors analysis requests generated by the LIMS.
- The *Sample Scheduler agent* monitors instrument(s) activity and submits acquisitions to the CDS. A single Sample Scheduler agent can manage up to 20 instruments, but it is strongly advised to distribute the instruments on several Sample Scheduler agents.
Sample Scheduler agent can be installed on CDS Clients or CDS Analytical Instrument Controllers (AICs).
The Sample Scheduler Agent service must be started on a user account with administrative privileges for actions related to machine configuration or certificate installation.
- The *Sample Scheduler Orchestrator* is a new service. This service handles the communication between Sample Scheduler Agent and Acquisition Agent on the AIC with the Sample Scheduler database.

It is installed together with the Scheduler Webserver feature as a Windows Service.

The service is disabled before activation. When activating Scheduler, the startup type is set to **Automatic** before enabling the Scheduler Agents. Uninstalling the Scheduler removes this service.

- The *Sample Scheduler client* provides an interface that displays all the analyses to perform.
Sample Scheduler client can be installed on CDS Clients or Analytical Instrument Controllers (AICs).

Installation

- The **Scheduler Database** parameter for database access has to meet the database access requirements for all distributed Sample Scheduler components which need to access the database. It is not sufficient to meet the needs of the local services which are checked during the installation. Otherwise services on other computers may not be able to start after installation.
- The database access parameters can be adjusted after installation with the Database Access Reconfiguration Tool **Agilent.Scheduler.Database.Access.Reconfiguration.exe**, available from the \bin folder of the Sample Scheduler installation directory located only on the Shared Services server (default path: **C:\Program Files (x86)\Agilent Technologies\Sample Scheduler for OpenLab\Bin**).

Some roles can co-exist on a single machine, some others are mutually exclusive. The following rules must be respected:

- Only one Sample Scheduler database, and one Sample Scheduler LIMS agent can be installed for the entire application.
Scheduler webserver can be installed on any server with the necessary CDS components.
- The Sample Scheduler database may run on the server of the OpenLab system (optional with SQL Server, always with OpenLab Data Repository). If it runs on the server, make sure that the server is powerful enough (RAM and CPU must consider both OpenLab system requirements and Sample Scheduler requirements). If you use an SQL Server instance and your activity is intense, you might need to install it separately.
- The Sample Scheduler LIMS agent should be installed on the server operating system. It can be installed on a CDS Client computer if the Client is installed on a server operating system.

Installation

- Sample Scheduler agent:
 - Several Sample Scheduler agents can be installed only once per computer.
 - Sample Scheduler agent should be installed on an AIC. Using OpenLab CDS, a Sample Scheduler agent is already pre-installed on AICs.

OpenLab CDS installs the following Sample Scheduler agent versions:

Table 3 Pre-installed Sample Scheduler agent versions

OpenLab CDS version	Sample Scheduler agent version
OpenLab CDS 2.3	SampleScheduler agent 2.1
OpenLab CDS 2.4	SampleScheduler agent 2.2
OpenLab CDS 2.5	SampleScheduler agent 2.4
OpenLab CDS 2.6	Sample Scheduler agent 2.6
OpenLab CDS 2.7	Sample Scheduler agent 2.7

- The target folder for the LIMS-generated XML commands:

The folder "LIMS_Commands" can be defined on any computer, with or without OpenLab CDS, EZChrom, or Sample Scheduler for OpenLab installed. If it is not on the CDS machine, the LIMS_Commands folder must be shared over the network. The LIMS agent service must be started on a user account that has full access (write, read, delete, create) to this Share.

Supported Deployments

Table 4 Minimal deployment

Computer	Scheduler database	Scheduler database Management agent	Scheduler LIMS agent	Scheduler agent	Scheduler client	Scheduler webserver
C1 (Server)	✓	✓	✓	-	-	✓
C2 (AIC)	-	-	-	✓	-	-
C3 (CDS Client)	-	-	-	-	✓	-

Table 5 Advanced deployments with several Sample Scheduler agents

Computer	Scheduler database	Scheduler database Management agent	Scheduler LIMS agent	Scheduler agent	Scheduler client	Scheduler webserver
C1 (Server)	✓	✓	✓	-	-	✓
C2* (AIC)	-	-	-	-	-	-
C3* (CDS Client)	-	-	-	-	✓	-
C4* (AIC)	-	-	-	✓	-	-

* Several computers can be installed with this configuration

Installation

According to this exemplary deployment:

- LIMS agent can be installed on every computer on which a CDS is installed.
- If you use an SQL Server instance, the Sample Scheduler database can be installed on a separate machine. This separate machine does not need a CDS installation.

Table 6 Advanced deployments with multiple servers

Computer	Shared Services Server	Database Server	Scheduler Server	CDS Client	AIC	Scheduler database	Scheduler LIMS agent	Scheduler agent	Scheduler webserver	Scheduler client
C1	✓	-	-	-	-	✓	-	-	✓	-
C2	-	✓	-	-	-	-	-	-	-	-
C3	-	-	✓	-	-	-	✓	-	-	-
C4	-	-	-	-	✓	-	-	✓	-	-
C5*	-	-	-	✓	-	-	-	-	-	✓

* Several computers can be installed with this configuration

Another deployment option is to install *one Sample Scheduler agent per AIC*, and to configure the application such that the *Sample Scheduler agent manages the same instruments as the AIC*. This approach can make maintenance more intuitive, since both CDS acquisition services and Sample Scheduler services are located on the same computer. If the computer has to be switched off for maintenance purpose, this ensures that both CDS and Sample Scheduler are switched off properly.

Table 7 Advanced deployments with one Sample Scheduler Agent

Computer	Scheduler database	Scheduler database Management agent	Scheduler LIMS agent	Scheduler agent	Scheduler client	Scheduler webserver
C1 (Server)	✓	✓	-	-	-	✓
C2* (AIC)	-	-	-	✓	-	-
C3* (CDS Client)	-	-	✓	-	✓	-
C4* (CDS Client)	-	-	-	-	✓	-

* Several computers can be installed with this configuration

Installation

According to this exemplary deployment:

- LIMS agent can be installed on every computer on which a CDS is installed.
- If you use an SQL Server instance, the Sample Scheduler database can be installed on a separate machine. This separate machine does not need a CDS installation.

Sample Scheduler Installation Instructions

Install Sample Scheduler

NOTE

If you install OpenLab CDS 2.7, or upgrade OpenLab CDS to version 2.7, Sample Scheduler for OpenLab is installed automatically. You only need to activate it (see [“Activate Sample Scheduler”](#) on page 45). You only need the following instructions if you use a CDS system lower than 2.6, or if you install or upgrade individual Sample Scheduler modules on dedicated machines.

Prerequisites:

- The computer matches the requirements described in the [“Requirements”](#) section on page 13.
 - The Control Panel configuration matches the requirements described in the [“Control Panel Configuration”](#) section on page 19.
 - The Sample Scheduler configuration is defined according to the [“Sample Scheduler Deployment”](#) section on page 22.
- 1 Download the Agilent.Scheduler.Install_XX.msi file from SubscribeNet (XX stands for the language code).

Important: The first Sample Scheduler installation must be done on the Shared Services server.

- 2 Click **Next** on the Welcome page.

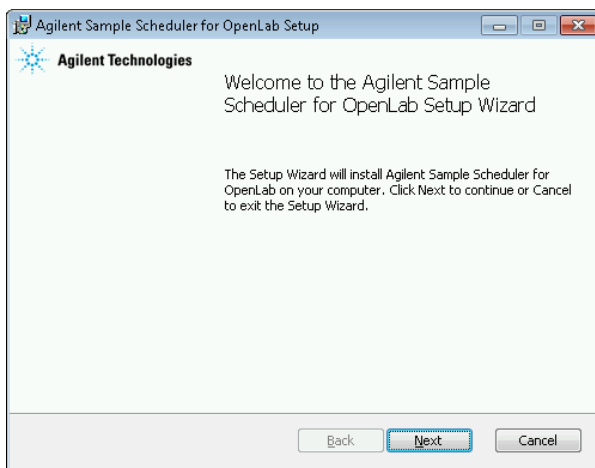


Figure 2 Welcome page

Installation

- 3 Read the License Agreement and accept it. Click **Next** to continue the installation.

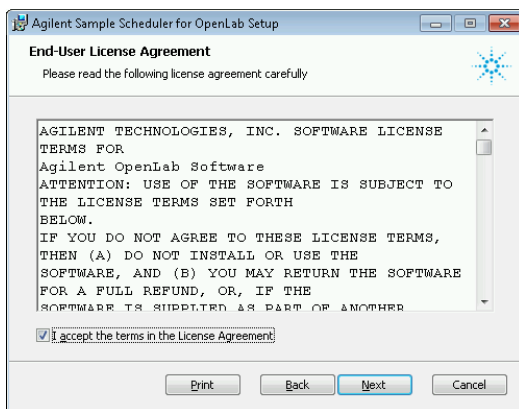


Figure 3 License Agreement

- 4 On the **Custom Setup** page, select the application module(s) to be installed among the list, according to the desired configuration:
 - **Sample Scheduler agent**
 - **Sample Scheduler LIMS agent** (installed only on one computer)
 - **Scheduler Database**
 - **Sample Scheduler client**
 - **Sample Scheduler web interface**

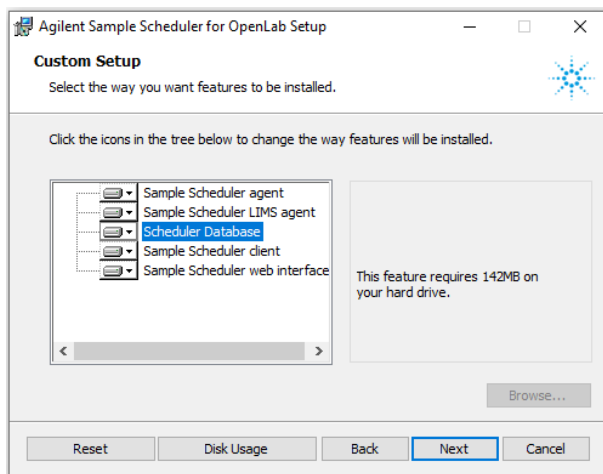


Figure 4 Custom Setup page

Installation

- 5 For each module you can choose to install the feature (select either **Will be installed on local hard drive** or **Entire feature will be installed on local hard drive**, both lead to the same result), or to not install it by choosing **Entire feature will be unavailable**.

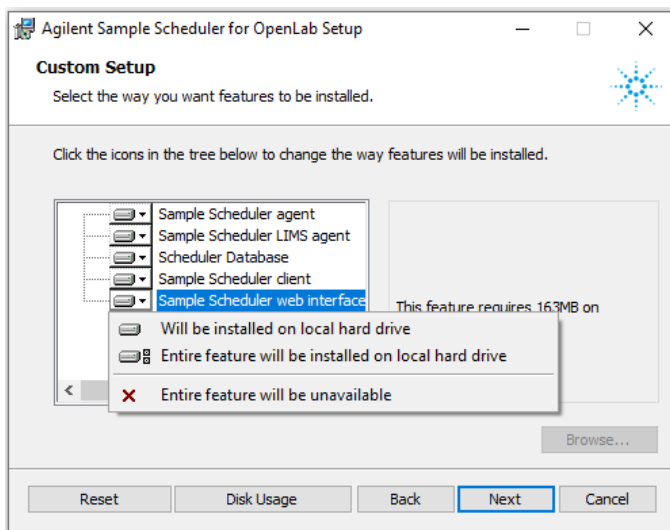


Figure 5 Install features

- Install **Sample Scheduler agent** on a computer that will manage instruments (for Scheduler use).
- Install **Sample Scheduler LIMS agent** on the computer on which the LIMS will send the commands.

Only one single **Sample Scheduler LIMS agent** must be installed for the entire application

- Install **Sample Scheduler client** on every computer used by the operators. Several modules can be installed on the same computer.

The **Sample Scheduler configuration** interface, which allows you to configure the application, is installed with the **Sample Scheduler client**. Therefore, install the Sample Scheduler client on all computers from which you wish to edit configuration parameters

Installation

- Install **Sample Scheduler web interface** on a computer on which you want to install the web interface. This will install the webserver as a service. You can deploy the webserver on any PC that has a CDS component installed:

EZChrom client, AIC, or server

OpenLab CDS 2.x client, AIC, or server

The web interface will be available under the address <https://<hostname>:52088/openlab/samplescheduler>, or via **Agilent Technologies > Agilent Sample Scheduler** from the Start menu.



Figure 6 Sample Scheduler launch icon

To avoid warnings when calling the https address, you need to install a trusted SSL certificate. For more information, see section [“Install a Trusted SSL Certificate”](#) on page 49

Refer to the [“Architecture”](#) chapter on page 10 to learn more about these modules and to the [“Sample Scheduler Deployment”](#) chapter on page 22 to know on which computer to install the modules.

Once the modules are selected, click **Next**.

- 6 On the Destination Folder page, enter the path where the setup will install files. Then click **Next**.

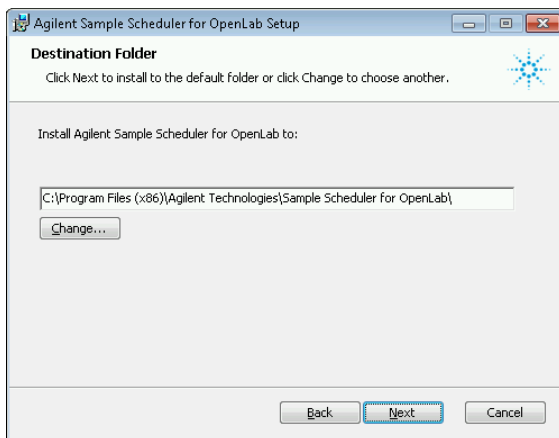


Figure 7 Destination Folder page

Installation

7 For Sample Scheduler installation on EZChrom only:

Provide the Sample Scheduler service account.

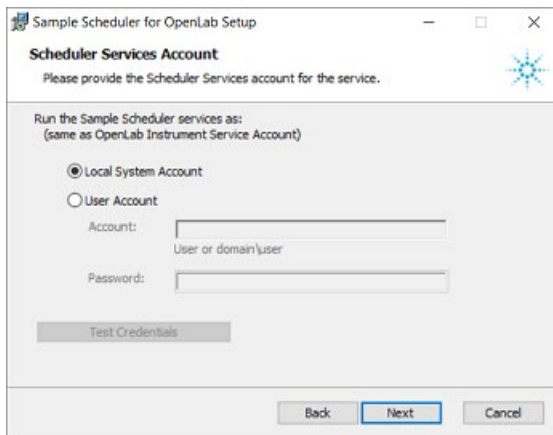


Figure 8 Scheduler Service Account (for EZChrom only)

- Select **Local System Account** to keep the default Windows SYSTEM user.
 - Select **User Account** if you created an Instrument Service Account (Windows account) during the installation of EZChrom. Enter the credentials (username and password) for the created Service Account. Make sure that this Instrument Service Account has administrative privileges for actions related to machine configuration or certificate installation.
- 8** For installation of Sample Scheduler database feature only: Identify the database instance (SQL Server or OpenLab Data Repository) used by the Sample Scheduler.

Note that OpenLab Data Repository is available only for pure OpenLab CDS configurations without EZChrom.

Installation

To create or connect to a Sample Scheduler database instance in the SQL Server, proceed as follows:

NOTE

The "Scheduler Database" parameter for database access has to meet the database access requirements for all distributed Sample Scheduler components which need to access the database. It is not sufficient to meet the needs of the local services which are checked during the installation. Otherwise services on other computers may not be able to start after installation.

The database access parameters can be adjusted after installation with the Database Access Reconfiguration Tool

Agilent.Scheduler.Database.Access.Reconfiguration.exe, available from the \bin folder of the Sample Scheduler installation directory located only on the Shared Services server (default path: **C:\Program Files (x86)\Agilent Technologies\Sample Scheduler for OpenLab\Bin**).

- a As database type, select **SQLServer**.

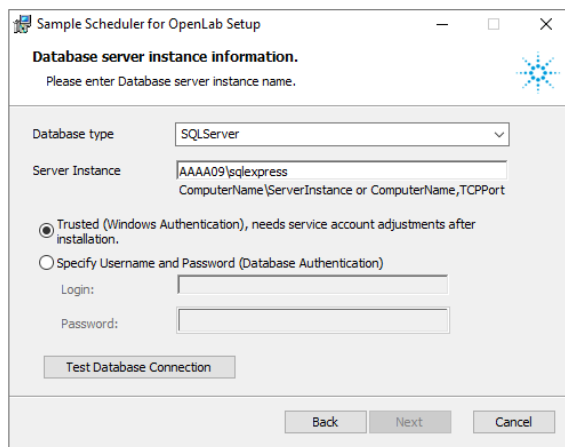


Figure 9 SQL server instance information

- b Enter the SQL Server instance name: Different ways of connecting to the SQL Server are possible. Check with your IT department which one you should use.
- Enter the name of the computer where the SQL Server is installed, and the name of the instance that should be used with Sample Scheduler for OpenLab: **Computer Name\Instance Name**
 - Enter the IP address of the computer where the SQL Server is installed, and the name of the instance that should be used with Sample Scheduler for OpenLab: **IP address\Instance Name**
 - Enter the name of the computer where the SQL Server is installed, and the associated port number: **Computer Name, Port number**.

Installation

- c Select the authentication mode you desire: **Windows Authentication** or **Database Authentication** (To learn more about authentication mode, refer to “[Appendix A: Microsoft SQL Server Configuration](#)” on page 122).
 - If selecting **Database Authentication** (recommended) specify the database administrator, then click **Test Database Connection**.
 - If selecting **Windows Authentication**, click directly **Test Database Connection**.

CAUTION

If selecting Windows Authentication mode, the Sample Scheduler services will not be able to connect to the Sample Scheduler database with the default ‘Local System account’.

Ask your system database administrator to assign a Windows account that has enough privileges to access the OpenLab Scheduler database (for example: sysadmin) to the following services: Agilent Sample Scheduler Agent, Agilent Sample Scheduler LIMS Agent, Agilent Sample Scheduler Orchestrator, and Agilent Sample Scheduler Webserver.

Ensure also that all the Windows users that will log on to Sample Scheduler computers are also assigned the privileges to access the OpenLab Scheduler database.

For detailed information about configuring the OpenLab Scheduler database users privileges, refer to “[Appendix A: Microsoft SQL Server Configuration](#)” on page 122.

- d The setup will check if the SQL Server\instance is reachable. If the connection is established, the setup checks if the Scheduler database already exists or not in the instance. If it exists, it proposes you either to keep the existing database or to create a new one (empty). Then click **Next**.

NOTE

Creating a new database will delete all stored analyses and reset the configuration parameters.

Installation

If you are experiencing troubles while connecting to the SQL Server instance (instance not reachable), do not hesitate to pause the installation and to check the SQL Server connectivity as described in "[Appendix A: Microsoft SQL Server Configuration](#)" on page 122. Once the connectivity is established, the installation can be resumed or re-launched.

You can check the following parameters:

- Credentials and connection mode,
- Replace the computer name by its IP address (in case of a DNS issue) in the SQL Server Instance section,
- Firewall for SQL Server (on the SQL Server computer),
- TCP/IP Protocol for SQL Server instance (on the SQL Server computer).

Installation

To create or connect to a Sample Scheduler database instance in OpenLab Data Repository (OLDR), proceed as follows:

- a As database type, select **OLDR**.

If you use OLDR as a database, Windows authentication is not available and disabled.

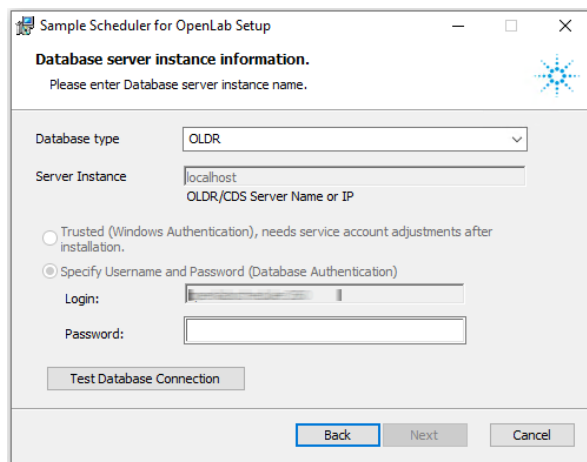


Figure 10 OLDR server instance information

If using the OLDR option, the instance name is the Shared Services server name. Also the login name is set to a default name that cannot be changed. You only need to enter the password for the OLDR database. There are no restrictions regarding the characters and length of the password. If you are re-installing Sample Scheduler and want to keep the existing database, you must provide the credentials used for the first installation when the database was created.

- b Click **Test Database Connection**.

The setup will check if the database instance is reachable. If the connection is established, the setup checks if the Scheduler database already exists or not in the instance. If it exists, it proposes you either to keep the existing database or to create a new one (empty). Then click **Next**.

NOTE

Creating a new database will delete all stored analyses and reset the configuration parameters.

Installation

- 9 For installation of Sample Scheduler LIMS agent only:

On the LIMS Commands Folder page, enter the path where the LIMS will push the command files. Then click **Next**.

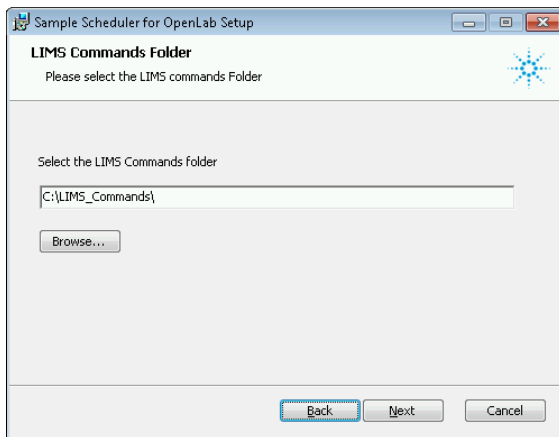


Figure 11 LIMS Commands folder

NOTE

If the folder used by LIMS to place the commands is located on a different computer than the one on which the LIMS agent is installed, enter:

**\\ComputerName\SharedFolderName or
\\ComputerIPAddress\SharedFolderName.**

In this example, the 'LIMS_Commands' folder is created by the setup.

It is possible to modify the LIMS commands afterwards.

Installation

- 10 On the Ready to Install page, click **Install**.

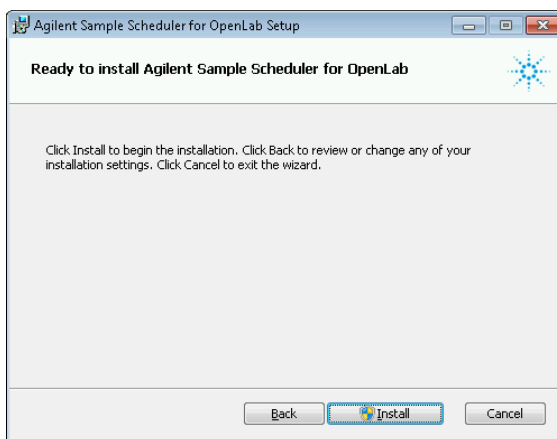


Figure 12 Ready to install

- 11 Click **Finish** on the last page.
- 12 If you are using an SQL Server instance for the Sample Scheduler database, configure the SQL Protocol for remote access to allow the Sample Scheduler database to be accessed from other computers than the one where it is installed. For more information, refer to [“Configure SQL Protocol for Remote Access”](#) on page 122.
- 13 In regulated environment, create a service user (see [“In a Regulated Environment: Create a Service User”](#) on page 43).
- 14 Activate Sample Scheduler.

For details, see [“Activate Sample Scheduler”](#) on page 45.

NOTE

After the installation, the Scheduler Agent and LIMS Agent services are set to disabled. The services are set to automatically start when the Sample Scheduler is successfully activated.

Silent Installation

Sample Scheduler supports a command-line mode for installation, also referred to as *silent installation*. This mode supports installation and uninstallation, repair and upgrade are not supported. You can execute silent installations either manually or as part of software management systems such as LANDesk or HP CM.

Run Silent Installation

Silent installation can be used by executing the Sample Scheduler .msi package with msixec and providing the needed parameters for installation.

- 1 Copy the content of the USB media to a centralized folder.
- 2 Right-click the executable of the command prompt or Power shell prompt, and run it as administrator.
- 3 Navigate to the drive where you have saved the content of the USB media.
- 4 To start the installation, call msixec with the required parameters (see tables below).
- 5 Wait about 5 minutes while the installation takes place. To check the process of installation, look at the log files. By default, the log files will be in the same folder as the installer.

If a required installable is missing, the installer will create an entry in a log file, and, depending on the component type, will continue or roll back the installation. An error code will be returned in such scenarios.

- 6 After the installation has finished, reboot the PC.

NOTE

After the installation, the Scheduler Agent and LIMS Agent services are set to disabled. The services are set to automatically start when the Sample Scheduler is successfully activated.

Parameters

Table 8 Mandatory Parameters

Parameter Name	Allowed Values	Description
ADDLOCAL	SchedulerAgent SchedulerLimsAgent SchedulerClient SchedulerWebInterface SchedulerDatabaseAgent For CDS version \leq 2.6: RoboHelp2011 For CDS version $>$ 2.6: RoboHelp2022	Sample Scheduler component to be installed. To install multiple components at the same time, combine the values with a comma (","). For example: ADDLOCAL=SchedulerAgent,SchedulerClient To install also the Sample Scheduler Help use also "RoboHelp2011" or "RoboHelp2022" depending on the installed CDS version
INSTALLDIR	Any valid Windows path	Directory where Sample Scheduler should be installed to.
DATABASE_LOGON_TYPE	For OLDR: "DatabaseAccount" For SQL Server: "DatabaseAccount" Or empty	Database connection mode. If "DatabaseAccount" is specified for the SQL Server, you must provide DATABASE_USERNAME and DATABASE_PASSWORD as well. If nothing is specified for the SQL Server, the database connections will use the Windows Account under which the process runs that connects to the database. In this case you must set USEINTEGRATEDSECURITY to 1.
DATABASE_TYPE	SQLServer or OLDR	Database type to be used to create the Sample Scheduler database instance. Note that OLDR is available only for pure OpenLab CDS configurations without EZChrom.
DATABASE_USERNAME	In the case of the SQL Server, any valid SQL Server Username	DB account used by Sample Scheduler to connect to its database. For OLDR, the username is set as default and cannot be modified.
DATABASE_PASSWORD	Password of DB user	Password of the DB user.
DATABASE_SERVER	Any string	The name of the computer on which the database is installed, and the name of the instance that should be used with Sample Scheduler for OpenLab.
USEINTEGRATEDSECURITY	For OLDR: 0, For SQL Server: 0 or 1	0: use - server with database credentials. 1: use - server with Windows credentials. If Windows authentication is used, you must provide SERVICE_LOGON_FULLY_QUALIFIED_NAME and SERVICE_LOGON_PASSWORD as well.

Table 8 Mandatory Parameters

Parameter Name	Allowed Values	Description
CREATE_DATABASE	0 or 1	Set to 1 to create a new database. Only do this if no database for this version of Sample Scheduler has been created yet on the DB instance. Otherwise the existing database will be overwritten.

Table 9 Optional parameters

Parameter Name	Allowed Values	Description
SERVICE_LOGON_FULLY_QUALIFIED_NAME	Windows NT User account	User account that should be used for the Sample Scheduler service. In a regulated environment, this is the <i>Sample Scheduler Service</i> user. Provide this parameter if Services should be started with a user that is not "Local System", for example, in case of EZChrom Agents or if the LIMS agent needs to access a network share.
SERVICE_LOGON_PASSWORD	Windows NT User password	Password for the SERVICE_LOGON_FULLY_QUALIFIED_NAME.

Example 1: Sample Scheduler database instance is managed by SQL Server

- First Step: Installation of Lims Agent and Webserver with database creation:

```
Msiexec -I Agilent.Scheduler.Install_EN.msi  
ADDLOCAL="SchedulerLimsAgent,SchedulerDatabaseAgent,SchedulerWebInterface"  
INSTALLDIR="C:\Scheduler" DATABASE_LOGON_TYPE="DatabaseAccount"  
DATABASE_TYPE="SQLServer" DATABASE_SERVER="servername\squlexpress"  
DATABASE_USERNAME="sa" DATABASE_PASSWORD="Password123"  
USEINTEGRATEDSECURITY="0" CREATE_DATABASE="1" /q /l xv "log.txt"
```

- Install Sample Scheduler Agent on another machine:

```
Msiexec -I Agilent.Scheduler.Install_EN.msi ADDLOCAL="SchedulerAgent"  
INSTALLDIR="C:\Scheduler" /q /l xv "log.txt"
```

- Install Sample Scheduler Client on another machine:

```
Msiexec -I Agilent.Scheduler.Install_EN.msi ADDLOCAL="SchedulerClient"  
INSTALLDIR="C:\Scheduler" /q /l xv "log.txt"
```

- Uninstallation:

```
Msiexec -X Agilent.Scheduler.Install_EN.msi -q
```

Examples 2: Sample Scheduler database instance is managed by OLDR

- Installation of Lims Agent and Webserver with database creation:

```
Msiexec -I Agilent.Scheduler.Install_EN.msi  
ADDLOCAL="SchedulerLimsAgent,SchedulerDatabaseAgent,SchedulerWebInterface"  
INSTALLDIR="C:\Scheduler" DATABASE_LOGON_TYPE="DatabaseAccount"  
DATABASE_TYPE="OLDR" DATABASE_SERVER="servername,port"  
DATABASE_NAME="datarepo" DATABASE_USERNAME="openlabschedulerxxx"  
DATABASE_PASSWORD="Password123" USEINTEGRATEDSECURITY="0"  
CREATE_DATABASE="1" /q /l xv "log.txt"
```

NOTE

In the DATABASE_USERNAME replace the xxx with the current revision number without dot, for example openlabscheduler270.

Software Verification Check

To qualify the Sample Scheduler for OpenLab installation, launch the Agilent Software Verification Tool (from Agilent Technologies/Software Verification Tool).

Automatic Generation of Installer Logs

An installation log file is created automatically during a new installation or upgrade. The log file is created both during installation by the set-up wizard and in silent mode. The installation log file remains on the system even after uninstallation.

The installation logs are located in the **\ProgramData\Agilent\Sample Scheduler for OpenLab\InstallLogs** folder.

You can manually collect and export installation log files from the local computer in Sample Scheduler configuration (**Maintenance** ribbon tab > **Save all Logs**). For more information, refer to Sample Scheduler online help (search for "Save all log files").

In a Regulated Environment: Create a Service User in OpenLab

- 1 In the Control Panel (**Administration > Roles and Users**), create a new role *Operator*:
 - a Enter *Operator* as role name and *Laboratory Operator* as description.
 - b Assign the following project privileges to this role:
 - **View project or project group** (Role type **Project > Project Management**), enabled by default, cannot be disabled
 - **Edit content of project** (Role type **Project > Project Management**)
 - **Create and modify sequence** (Role type **Project > Sequence**)
- 2 In the Control Panel (**Administration > Users**), create a new service account user:
 - a Enter *Sample Scheduler Service* as a login name and *Account used by the Sample Scheduler services* as a description.

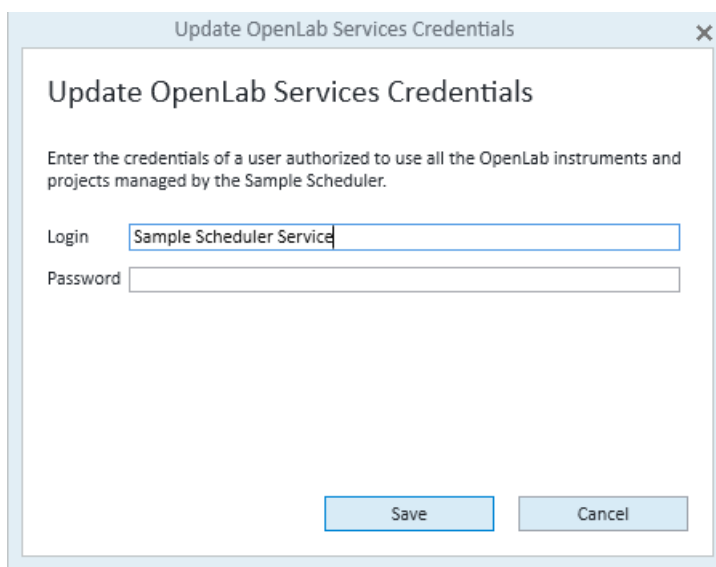
NOTE

This user is required to successfully run Sample Scheduler for OpenLab. Do not disable this user as long as you use Sample Scheduler for OpenLab in your laboratory environment.

- b Assign the following roles to this user:
 - Instrument User (built-in role)
 - Operator (created in step 1)

Installation

- 3 Assign the *Sample Scheduler Service* user to all instruments and projects used with Sample Scheduler for OpenLab. For more information, refer to the Control Panel online help (search for “Set Privileges”).
- 4 Assign the *Sample Scheduler Service* user to the Sample Scheduler services:
 - a In Sample Scheduler configuration, navigate to the **Maintenance** tab and select **Update OpenLab Services Credentials**.
 - b Enter the credentials of the *Sample Scheduler Service* user. For more information, refer to Sample Scheduler online help (search for “Service Credentials”).



Update OpenLab Services Credentials

Update OpenLab Services Credentials

Enter the credentials of a user authorized to use all the OpenLab instruments and projects managed by the Sample Scheduler.

Login

Password

Save Cancel

Figure 13 Update service credentials.

In a Regulated Environment: Restrict Access to LIMS Result Folder

If you use a LIMS system, access to the LIMS **Result folder** must be restricted at operating system level. There will be reports created in this folder, and only the LIMS system should be allowed to access these reports.

To restrict access, ensure the following:

- A specific Log On user is specified in the properties of the **Agilent Sample Scheduler LIMS Agent** service.
- This user has *Read* and *Write* access to the LIMS Result folder.
- Access to the LIMS Result folder is restricted for other users.

Activate Sample Scheduler

As long as Sample Scheduler is not activated the number of concurrent user sessions is limited to five, and several functions are inactive. Activate Sample Scheduler to explore it in a training mode.

Activation includes the following:

- The entered Sample Scheduler service credentials are applied.
- The system creates Sample Scheduler roles & privileges
- The system automatically assigns your instruments
- Scheduler Agent and LIMS Agent services are started, and the startup type is set to Automatic.
- The limit on the number of concurrent user sessions is removed.
- The start menu entry **Agilent Technologies > Agilent Sample Scheduler** proceeds directly to the login screen, skipping the information page in the future.

NOTE

The activation alone does not enable you to submit analysis requests to instruments. Ensure you have the required licenses (60 days trial license or Sample Scheduler Expansion pack).

NOTE

During activation all instruments are automatically assigned. To only assign a subset of instruments, deselect the check box **Instruments are assigned automatically** and assign instruments afterwards during the configuration.

Installation

Prerequisites:

- To be able to carry out the procedure as described, you need the privilege **Manage Security (Shared Services)**. Privileges are configured in the OpenLab Control Panel.

To activate Sample Scheduler:

- 1 In a regulated environment: Create a service user for Sample Scheduler before activation. See "[In a Regulated Environment: Create a Service User](#)" on page 43.
- 2 Ensure that all Instrument Controllers can be pinged.
 - a In the OpenLab Control Panel, select **Administration > Instrument Controllers**.
 - b Select each Instrument Controller and click **Ping Instrument Controller**.
- 3 Open the Sample Scheduler Web Interface

The web interface is available under the address
https://<Scheduler_webserver>:52088/openlab/samplescheduler
- 4 Log in as a user that has the **Manage Security (Shared Services)** privilege.
- 5 In the menu, click **Activation**.
- 6 In a regulated environment: Enter username and password of the Sample Scheduler Service user. Otherwise, use the built-in OpenLab CDS administrator. In a Windows domain environment, also provide the domain.
- 7 Click **Activate**.

A success message opens.
- 8 To apply the changes to your user session, log in again.

Configure Antivirus Program

If you use an antivirus program with behavior monitoring, add the files below to the list of approved programs:

- C:\Program Files (x86)\Agilent Technologies\Sample Scheduler for OpenLab\Bin\Agilent.OpenLab.Scheduler.Client.exe
- C:\Program Files (x86)\Agilent Technologies\Sample Scheduler for OpenLab\Bin\Agilent.OpenLab.Scheduler.Configuration.exe
- C:\Program Files (x86)\Agilent Technologies\Sample Scheduler for OpenLab\Bin\Agilent.Scheduler.Acquisition.Agent.exe
- C:\Program Files (x86)\Agilent Technologies\Sample Scheduler for OpenLab\Bin\Agilent.Scheduler.Agent.exe
- C:\Program Files (x86)\Agilent Technologies\Sample Scheduler for OpenLab\Bin\Agilent.Scheduler.Lims.Agent.exe
- C:\Program Files (x86)\Agilent Technologies\Sample Scheduler for OpenLab\Bin\Agilent.Scheduler.WebserverService.exe
- C:\Program Files (x86)\Agilent Technologies\Sample Scheduler for OpenLab\Bin\Agilent.Scheduler.Webstarter.exe
- C:\Program Files (x86)\Agilent Technologies\Sample Scheduler for OpenLab\Bin\Agilent.Scheduler.DBManagement.Agent.exe
- C:\Program Files (x86)\Agilent Technologies\Sample Scheduler for OpenLab\Bin\Agilent.Scheduler.Orchestrator.exe
- C:\Program Files (x86)\Agilent Technologies\Sample Scheduler for OpenLab\Bin\Agilent.ICDS.Remote.Satellite32.exe

Start Services

Start LIMS Agent Service

If you installed the LIMS agent manually (that is, you do not use the LIMS agent that is automatically installed with OpenLab CDS):

- 1 Set the startup type of the LIMS agent service to Automatic.
- 2 Start the LIMS agent service.

Start Sample Scheduler Agent

If you deployed an additional Analytical Instrument Controller (AIC) in your OpenLab CDS system:

- 1 Set the startup type of the Sample Scheduler agent service to Automatic.
- 2 Start the Sample Scheduler agent service.

NOTE

To start the Sample Scheduler agents, first ensure that the Sample Scheduler Webserver is running.

When adding a new AIC to the system after the Sample Scheduler is already activated:

- 1 Open the Sample Scheduler configuration.
- 2 Open the **Maintenance** tab.
- 3 Click **Update OpenLab Service Credentials**.
- 4 Enter valid credentials for the OpenLab Services user.
- 5 Click **Save**.

Configure LIMS Transfer

If you want to use the Sign-Off for LIMS feature, the following requirements must be met:

- A LIMS result folder must be available, to which the result reports are copied and then collected by the LIMS. The folder can be located on any computer. The LIMS agent does not necessarily run on the computer that hosts the LIMS results folder.
- A folder path must be defined that allows the LIMS agent to access the LIMS result folder. This path must be defined on the computer where the Sample Scheduler LIMS agent is installed.
- The LIMS agent collects all files with the specified extension (for example, csv, txt) regardless of the name. For dual injections assigned with front and back, the name of the report file is extended with 01 and 02, respectively.

Install a Trusted SSL Certificate

An SSL certificate is required to allow https connections on the web server. By default, Sample Scheduler uses the already installed SSL certificate of OpenLab CDS. This certificate is a so-called self-signed certificate. Therefore, you will receive a warning message from your browser if you start the web interface from outside the CDS system. In addition, your browser indicates in the navigation bar that the website is not trusted.

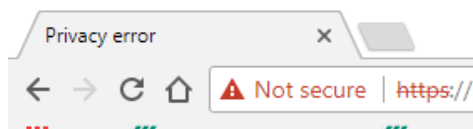


Figure 14 Warning navigation bar

The webserver of the Sample Scheduler also works properly with this warning. If you want to get trusted https connections, you need to install a trusted certificate (from your browser) on the Sample Scheduler webserver.

Install an SSL Certificate in the Windows Keystore

NOTE

This procedure is not required when installing a custom certificate using certificate service procedures. See certificate service documentation instead.

You need a certificate issued by a trusted certification provider. The format must match one of the supported formats for your Windows operating system (for example, PKCS #12 or PKCS #07).

- 1 Open the Microsoft Management Console (mmc.exe).
- 2 Add the certificate snap-in for your computer account (**File > Add/Remove Snap-in**).
- 3 Go to Personal\Certificates, in the context menu under **Action > All Tasks**, select the option Import.
- 4 Import the certificate into your Personal store:
 - a Double-click on the installed certificate to launch the Details dialog.
 - b Retrieve the thumbprint from the Details tab (for example, thumbprint: c42b1719d979c024d08402b9c894c894c973295dc9f6).
 - c Save the thumbprint in a text file.

Assign Trusted SSL Certificate to the Sample Scheduler Webserver

- 1 Log in to the computer on which the Agilent Sample Scheduler webserver is running.
- 2 Stop the service of the webserver (in **Services** under **Agilent Sample Scheduler Webserver**).
- 3 Open the command line window with administrator rights.
- 4 To show the current SSL certificate bindings, enter:

```
netsh http show sslcert
```

- 5 Copy the application ID of the binding from port 52088 into a text file that you will need later (for example, application ID: {12345678-db90-4b66-8b01-88f7af2e36bf}).
- 6 Remove the binding to the old certificate with the following command:

```
netsh http delete sslcert ipport=0.0.0.0:52088
```

- 7 Once the binding is removed, add a new binding to the new certificate:

```
netsh http add sslcert ipport=0.0.0.0:52088 appid=APPID  
certhash=THUMBPRINT
```

NOTE

APPID is the previously saved application ID, including the curly brackets.

THUMBPRINT is the previously saved thumbprint of the certificate, it must not contain any blank spaces, and you must also make sure that no leading question mark appears when inserting it into the command line.

- 8 Start the service of Sample Scheduler webserver.

Disable Legacy SSL Versions

Sample Scheduler webserver uses the HTTP.sys server built into Windows. This way, Sample Scheduler uses the default settings according to the Windows version on which it was installed.

Depending on your company's IT policy, you may need to disable legacy SSL versions when using the webserver. To disable individual protocol versions on Windows, follow the instructions at <https://docs.microsoft.com/en-us/windows-server/security/tls/tls-registry-settings#tls-10>

Use Sample Scheduler Lab Balance Bridge

The Lab Balance Bridge installer is available via subscribeNet. You need to start this installer independently from the Sample Scheduler installer.

See “[Appendix B: Sample Scheduler for OpenLab Lab Balance Bridge](#)” on page 145 for further information.

6

Configuration of Specific Sample Scheduler Settings

User Privileges

The configuration of the Sample Scheduler user privileges is performed in the Control Panel.

The privileges described in the following can be associated with different roles in the Control Panel. The following roles are available:

- **Sample Scheduler Administrator:** The privileges associated with this role allow you to configure the Sample Scheduler. For example, you can define default settings and mandatory commands, establish the LIMS connection (LIMS Commands folder or SQL statements), monitor notifications, and create Auto-fill templates.
- **Sample Scheduler Analyst:** The privileges associated with this role allow you to manage the entire laboratory workload as you have insight into the workload of all instruments and their users. You can review the results in the CDS for reprocessing.
- **Sample Scheduler Technician:** The privileges associated with this role allow you to manage the instruments and determine the analysis workflow (for example, you can create, change, delete, reset or restart analyses and sequences, set their priority, merge single or split dual analyses, and correct instrument errors). You have access to the data in the CDS.
- **Sample Scheduler Operator:** The privileges associated with this role allow you to prepare analyses/sequences, determine the vial position, select the instrument, and stop it in case of failure. With this role and this area of responsibility, you can work exclusively in the web interface.

The administrator of the OpenLab system can edit these roles or create new ones and assign them to the different Sample Scheduler users.

Configuration of Specific Sample Scheduler Settings

Table 10 List of privileges

Privilege	Description
Add analysis (Sample Scheduler)	Allow the user to use the Add button
Change priority (Sample Scheduler)	Allow the user to use the Sooner / Later buttons
Create sequence (Sample Scheduler)	Allow the user to use the Create sequence button
Delete notification (Sample Scheduler)	Allow a user to use the Delete buttons
Delete analysis (Sample Scheduler)	Allow the user to use the Delete button
Is an administrator (Sample Scheduler)	Allow the user to connect to Sample Scheduler configuration
Edit analysis (Sample Scheduler)	Allow the user to be displayed in the Assign User (client), Assign to (web interface), and OpenLab default user (configuration) drop-down lists Allow the user to schedule, pause, stop, and restart analyses or sequences Allow the user to stop instruments
Merge / Split analysis (Sample Scheduler)	Allow the user to Merge and Split analyses
Open data (Sample Scheduler)	Allow the user to open data in the CDS from the Sample Scheduler
Perform actions on sequence (Sample Scheduler)	Allow the user to use the actions button in the Sequence grid (add, delete, convert, etc.)
Reset analysis (Sample Scheduler)	Allow the user to use the Reset button
Restart analysis (Sample Scheduler)	Allow the user to use the Restart button
Review & submit results (Sample Scheduler)	Allow the user to submit results to LIMS
Schedule analysis (Sample Scheduler)	Allow the user to use the Schedule button
Set Favorites for all users (Sample Scheduler Web Interface)	Allow the user to use the Set Default Favorites button
Stop / Stop instrument (Sample Scheduler)	Allow the user to use the Stop and Stop Instrument buttons
View activity log	Allow the user to view the activity log. Required to view error information for instruments in the dashboard.
View all Analysis Details (Sample Scheduler Web Interface)	Allow the user to view the tabs of the categories and their parameters in the Details pane of the Sample Scheduler web interface The Favorites tab is visible for all users

Configuration of Specific Sample Scheduler Settings

Table 10 List of privileges

Privilege	Description
View and edit other users' analyses (Sample Scheduler)	Allow the user to view and edit analyses that are assigned to other users; analyses with no user entry are visible for all users Allow the user to view other users in the Assign User (client) and Assign to (web interface) drop-down list with which analyses and sequences are assigned
View lab manager start page (Sample Scheduler Web Interface)	Allow the user to view the start page of the Lab manager
View report (Sample Scheduler)	Allow the user to use the View PDF button in the Review ribbon tab of the Sample Scheduler client
Wait analysis (Sample Scheduler)	Allow the user to use the Wait button

Audit Trail

Enable Audit Trail

After installing or upgrading Sample Scheduler, the audit trail is disabled by default. Proceed as follows to enable the audit trail:

- 1 In Sample Scheduler configuration, go to the **System Configuration** tab.
- 2 For the parameter **Enable Audit Logging**, select **True**.

CAUTION

Once you have enabled the audit trail, you can no longer disable it.

Audit Trail Settings

If the **Write activity log** option is enabled for your CDS, every action in the Sample Scheduler will be recorded in the *System Activity Log* of the Control Panel. For the audit trail to function correctly, Sample Scheduler needs specific audit trail settings in the CDS project. Proceed as follows to ensure that the settings are correct:

- 1 In OpenLab Control Panel, click **Projects** and select the project to edit.
- 2 On the **CDS settings** tab, expand the **Audit Trail Settings** section.
- 3 Select the **Sequence** tab.

Only the Sequence Audit Trail settings are relevant for Sample Scheduler.

If reasons are required, Sample Scheduler will automatically enter its own default reasons to the entries. Therefore, ensure that either no reasons are required, or users can enter their own reasons:

Configuration of Specific Sample Scheduler Settings

▲ Audit Trail Settings

All

Method

Sequence

Results

Reason to be added:

List of reasons:

☐

 Allow users to type their own reason when saving sequences

☒ Automatically enable audit trail

☐

 Prompt for reason when saving sequences

☒

 Do not prompt for reason

Figure 15 No reasons required

▲ Audit Trail Settings

All

Method

Sequence

Results

Reason to be added:

List of reasons:

☒

 Allow users to type their own reason when saving sequences

☒ Automatically enable audit trail

☒

 Prompt for reason when saving sequences

☐

 Do not prompt for reason

Figure 16 Allow own reasons

NOTE

Only users with a role containing the **View activity log** permission are able to view the activity log and all its entries. By default, these roles are **Activity Log Access** and **Everything**.

Enable Single Sign-On

If **Single Sign-On** is enabled, you do not need to provide credentials to start Sample Scheduler configuration or Sample Scheduler client. This feature is available if you use Windows Domain authentication.

To enable Single Sign-On:

- 1 In the Control Panel under **Administration > System Configuration**, set the authentication provider to **Windows Domain**.
For more information, refer to the Control Panel online help (search for “set the authentication provider”).
- 2 In the Control Panel under **Administration > Set Security Policy**, enable **Single-On** for the system.
- 3 Import the domain users.
For more information, refer to the Control Panel online help (search for “import users”).

Once you have enabled **Single Sign-On** for the system, you can enable and disable Single Sign-On for each local computer (in the Control Panel under **Administration > Local Configuration**). To learn more about how to enable Single Sign-On, refer to the Control Panel online help (search for “single sign on”).

7

Upgrade

To upgrade from a previous version of Sample Scheduler, shut down all components of the Sample Scheduler system at the same time. First stop all the services, then upgrade every computer. This can be done without special preparation. Analyses that were in the old system will not be available on the new system.

NOTE

After the upgrade procedure finishes, you need to activate Sample Scheduler to make the system ready for use.

Upgrade to Sample Scheduler version 2.7 is possible for installations of Sample Scheduler version 2.4 or higher.

After the upgrade:

- All previously installed components remain and are upgraded
- Sample Scheduler database feature is added/updated
- The web server is always installed on the server

Upgrade with CDS Master Installer

Version 2.6 or lower: Sample Scheduler was *not* automatically upgraded when upgrading OpenLab CDS using the CDS Master Installer.

Version 2.7: When upgrading Sample Scheduler using the CDS installer, Sample Scheduler is always upgraded to the corresponding Sample Scheduler version provided by the CDS installer. This happens even if Sample Scheduler was activated and used with a previous Sample Scheduler version.

For details on the installation, see the instructions in *OpenLab CDS Clients and Instrument Controllers Installation and Configuration* (CDS_v2.7_ClientAICGuide).

NOTE

After the upgrade, you must activate Sample Scheduler again.

8

Migration

NOTE

Migration from all previous versions to the current Sample Scheduler version is supported. However, migration from OLDR to MS SQL is not supported.

Migration Tools for Moving from EZChrom to OpenLab CDS

Moving from EZChrom to OpenLab CDS is now supported with a set of tools to help you move all your data, methods, and report templates into the new system. The tools support the move from EZChrom to OpenLab CDS. These tools help you move to the new system by creating an export package of all the EZChrom data and importing them into the new CDS version. The data is organized in projects created by the tool. In addition, all your configuration information is captured and moved. This means that all your users, groups, roles, permissions and instrument configurations are moved over and installed on the new system. This significantly reduces the time and effort needed for this transition.

EZChrom to OpenLab CDS with Sample Scheduler

Supported transitions:

- **From:**
EZChrom,
with Sample Scheduler, rev. A.02.01 or A.02.02
- **To:**
OpenLab CDS,
with Sample Scheduler for OpenLab, rev 2.1 or higher

When moving from EZChrom with Sample Scheduler to OpenLab CDS with Sample Scheduler, the most important files will be the methods. The migration tool replicates your projects in the new software and moves all the methods into the correct projects. Entire configuration settings and instrument setting are moved as well. All that is needed is the process of converting the methods to CDS methods. This is done with the import functions within both Acquisition and Data Analysis.

Additional Information

For additional information about EZChrom to OpenLab CDS migration:

- See *Agilent Migration Tools for OpenLab - Workstations to OpenLab CDS Workstation* (OpenLabMigrationTool_en.pdf) on the OpenLab CDS installation medium.
- See OpenLab Help & Learning (Under **How To > OpenLab CDS > Data Analysis > Migration**).

Please check the following web site for your local sales and support contact:

<http://www.agilent.com/en-us/contact-us/page>

Data Migration Utility for Upgrading the Sample Scheduler Database

NOTE

Activate the upgraded system before using the migration tool.

When upgrading Sample Scheduler to the latest revision, use this tool to migrate the existing configuration and analyses from the old Sample Scheduler database to the newly installed Sample Scheduler database.

The upgrade uses the database type that was specified during the Sample Scheduler installation.

The Data Migration Utility is provided in the installation package under the Support folder. It contains an executable which supports the migration of the following data:

- Auto-Fill templates
- The settings from the **System Configuration** module of the Sample Scheduler configuration
- The settings of the **Commands** module of the Sample Scheduler configuration
- The settings of the **LIMS** module of the Sample Scheduler configuration
- The settings of the **Instrument Groups** module of the Sample Scheduler configuration
- Notifications about invalid commands generated by the LIMS
- Analyses and sequences in **Waiting**, **Stopped**, and **Incomplete** state of the Sample Scheduler client

Registration Tool

The following information is only relevant if you installed the Sample Scheduler automatically together with CDS 2.6 and higher.

The CDS 2.6 installation generated a random Sample Scheduler password. When migrating the database to the current Sample Scheduler version, you will need this password. To replace this randomly generated password with a user-generated password, use the Data Repository Registration Tool.

- 1 Navigate to the subfolder **RegistrationTool** in the installation path.
- 2 Execute **Agilent.OpenLab.DataRepository.RegistrationTool.exe**.
- 3 To replace the password, use the following command (replace **NewPassword** with the password of your choice):

```
Agilent.OpenLab.DataRepository.RegistrationTool.exe  
DbRegister --AppName "openlabscheduler260" --AppPassword  
"NewPassword" --Overwrite --AppKey  
"HKEY_LOCAL_MACHINE\SOFTWARE\Agilent\Scheduler260"
```
- 4 Note down the new password in a secure location.
- 5 Use the new password when you run the Data Migration Utility.

Run the Data Migration Utility

- 1 Run the executable on the server on which you want to migrate the Sample Scheduler database.
- 2 Enter the **Server Instance** on which the Sample Scheduler database is located (the database server and instance name is displayed in Sample Scheduler configuration in the **Deployment** tab).
Different ways of connecting to the SQL Server are possible. Check with your IT department which one you should use.
 - Enter the name of the computer where the SQL Server is installed, and the name of the instance that should be used with Sample Scheduler for OpenLab: **Computer Name\Instance Name**
 - Enter the IP address of the computer where the SQL Server is installed, and the name of the instance that should be used with Sample Scheduler for OpenLab: **IP address\Instance Name**
 - Enter the name of the computer where the SQL Server is installed, and the associated port number: **Computer Name, Port number**.

Migration

- 3 Specify the SQL authentication account and enter the corresponding credentials (user name and password) of the database administrator.

The data migration utility searches for the database. It only reads from the source database. It does not delete any records, database tables or databases.

If the connections were specified correctly and the databases are accessible, the detected version appears under **Migratable Scheduler Version**.

- 4 If multiple database versions are available, select the **Migratable Scheduler Version** from the drop-down list.
- 5 If you have any configuration settings (for example, commands, LIMS configurations, LIMS database queries, Instrument groups, notifications) to migrate, do this first before importing analyses, sequences, or templates.
 - a To import configuration settings, select **Migrate Configurations**.

NOTE

If you migrate the configurations of Sample Scheduler version 2.4 to a higher version, you will be asked to enable audit logging. In this dialog, select **Yes** if you want to enable the audit logging, or select **No** if you want to continue without audit logging. You can also enable the audit trail later in Sample Scheduler configuration.

The migration tool checks the existing settings of the target system. The number of migrated configurations, commands, and notifications is displayed after migration.

If instrument groups are also migrated, both the number of existing groups and the number of instruments (instrument group lines) are displayed.

- 6 If you want to migrate analyses or sequences, you must specify a path under which a csv file with their identifiers is to be exported.
 - a Click the button **Export identifiers to CSV**. The identifier as well as given mandatory parameter values (for example, project, instrument, injection source) of the analyses and sequences will be exported to the csv file.
 - b If necessary, make changes to the file, for example, by limiting only the analyses and sequences of a specific instrument in the file. Save your changes and keep the file in the above specified path.
 - c Select **Migrate Specified Analyses** to start the import of the identifiers.

The migration tool checks the existing analyses of the target system. The number of migrated analyses is displayed after migration.

Migration

- 7 If you want to migrate templates, select **Migrate Analyses Templates**.
The migration tool checks the existing templates of the target system. The number of migrated templates is displayed after migration.
- 8 To monitor the migrated elements, you can compare the number of migrated items with the number of actual records available for migration in the old database.
- 9 After the migration is finished, open Sample Scheduler configuration on the target system to confirm the successful migration.
- 10 Open the Sample Scheduler client on the target system to verify that all desired analyses and sequences have been migrated.

9

Uninstallation

To uninstall the application, you can either launch the setup and select the **Remove** option, or uninstall it from the Microsoft Control panel.

All the files installed by the setup will be deleted, and the registry key is removed.

The Sample Scheduler database stays intact.

If your topology includes multiple OpenLab servers, uninstall Sample Scheduler from those servers that do not host Shared Services. Alternatively, disable the Sample Scheduler Webserver service on those servers.

Uninstall Plugin in the CDS OpenLab Acquisition

The script can be executed to remove the Sample Scheduler button from the Acquisition clients on the specific machine.

```
$ErrorActionPreference = "stop"
$installDir = "not found"

Try {
    $installDir = Get-ItemProperty -Path
HKLM:\SOFTWARE\ChromatographySystem\OpenLABAcq
}
Catch [System.Management.Automation.ItemNotFoundException]
{
    $installDir = Get-ItemProperty -Path
HKLM:\SOFTWARE\WOW6432Node\ChromatographySystem\OpenLABAcq
}

Write-Output "Found Acquisition, installed on:"
Write-Output $installDir.ChromDir

$schedulerFile = Join-Path -Path $installDir.ChromDir -ChildPath
"Layouts\AcquisitionClient.workspace.extensions\Agilent.Scheduler.Acquis
ition.Plugin.xml"
if ($installDir -ne "not found") {
    try {
        $destination = $schedulerFile + ".old"
        Move-Item -Path $schedulerFile -Destination $destination
        Write-Output "Sample Scheduler extension succesfully disabled"
    } catch {
        Write-Warning "Could not move extension file  $($schedulerFile),
make sure to run this with Administrator privileges"
    }
}
else {
    Write-Warning "Could not find OpenLab Acquisition Installation
directory"
}
```

10

LIMS Command: Analysis Order generated by the LIMS

A command is an analysis order generated by the LIMS, leading to the analysis of a sample by OpenLab CDS or EZChrom via the Sample Scheduler.

Two types of commands are handled:

- XML commands generated by the LIMS and respecting the Scheduler XML command structure.
- Commands collected from the LIMS database by a periodically executed SQL query as defined in the Sample Scheduler configuration.

Both command types are handled by the Sample Scheduler (Scheduler LIMS agent) in the same consistent way.

- Collection of the command
- Checking the command validity
- Creation of an analysis in the Sample Scheduler database

NOTE

If you used to work with Sample Scheduler for OpenLab CDS A.02.x (that is, in combination with earlier versions of EZChrom):

XML commands and SQL queries can remain unchanged. The existing structures can be used as is, the current version of Sample Scheduler for OpenLab is backwards compatible. A new parameter Identifier will be added that contains the sample name.

NOTE

If you use a mixed configuration with EZChrom and OpenLab CDS, the same XML commands and LIMS database queries can be used regardless of the CDS.

If an EZChrom project is specified:

Make sure that only EZChrom methods and EZChrom instruments are used in this XML command/database query.

If it contains parameters that are not supported by EZChrom, these values will be removed by Sample Scheduler.

Commands with inconsistent data are ignored and deleted.

XML Commands

This chapter describes the XML scheme the LIMS must respect when it generates XML commands.

The structure of an XML file is defined to fit the CDS instrument/method architecture.

Sample Scheduler for OpenLab manages two types of XML files:

- XML commands, that handle:
 - The analysis of a sample with OpenLab CDS or EZChrom,
 - The population of the Auto-Fills table with Auto-fill templates (to be used to automatically fill incomplete commands).
- XML actions that initiate an action, for example:
 - Deleting an analysis, an entire sequence, or an analysis with a matching identifier from a sequence
 - Creating a sequence from a group of analyses
 - Creating an instrument group

The XML scheme is also described in the Sample Scheduler for OpenLab Command Guide (in the installation folder under **Documentation\xml\Sample_Scheduler_for_OpenLab_Command_Guide.chm**).

Encoding

Always declare the correct encoding in the XML file. To see how to declare the encoding, refer to the **Advanced_Command.xml** example in the **Documentation/xml** folder.

NOTE

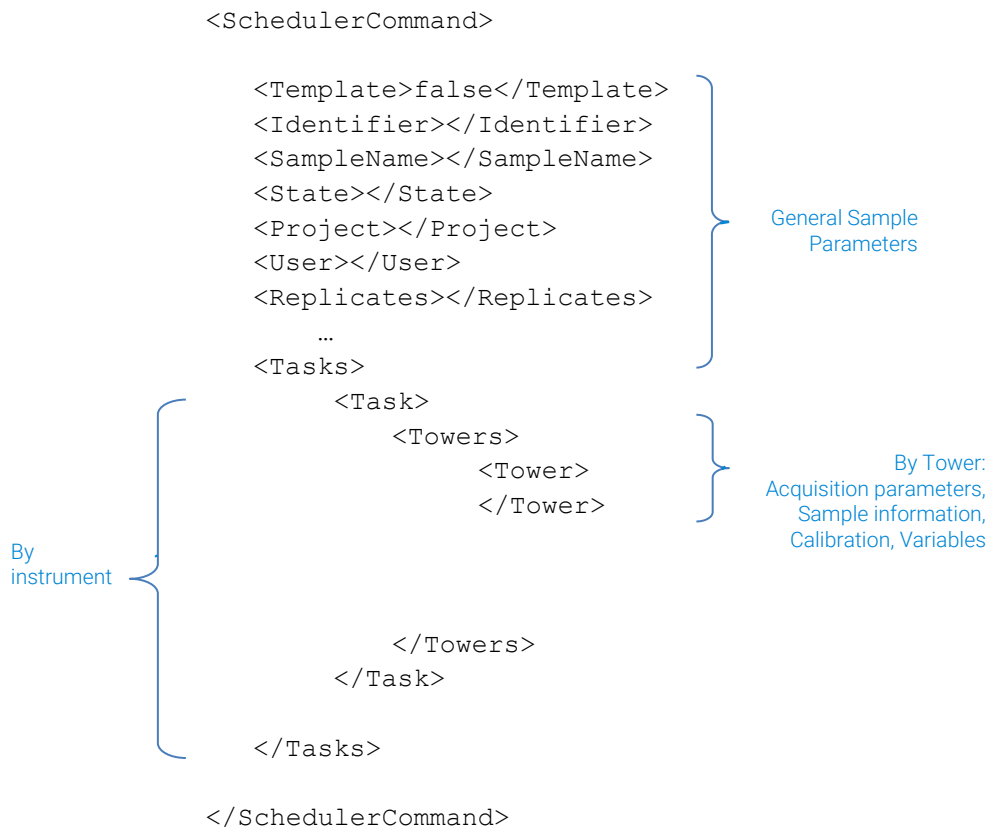
If you do not specify the encoding, the file is treated as UTF-8. This may lead to issues if the xml was not saved as UTF-8.

High Level XML Command Structure

The XML command matches the way one sample is analyzed:

On one instrument configured with one Injection source

It must conform with the following high-level structure:



LIMS Command: Analysis Order generated by the LIMS

- The *General parameters* are the parameters defined for the entire sample.
- The *Task parameters* are related to one instrument. In most cases only one task is defined by XML command as the sample acquisition is performed on one instrument. For some applications (for example, online gas analysis), the sample can be analyzed by two coupled instruments simultaneously. In this case, two tasks are defined in the XML command. A maximum of two tasks can be handled by the XML command.
- The *Tower parameters* are related to one injection source of the instrument. Acquisition parameters, sample information, calibration parameters and internal standards are defined in this section.

If the instrument is configured with two Injection sources, two Tower sections must be defined in the XML command.

Restart an Analysis from the LIMS

If the LIMS offers this function, you can restart analyses or sequences that are in **Ended**, **Error**, or **Stopped** state. Configure the LIMS to supply the same information in the XML as on the first submission to the Scheduler. Only the **Identifier** needs to be changed, since it must be unique.

Basic XML Command

The basic command lists the minimum set of parameters that need to be defined in an XML command to allow the CDS to perform the analysis.

The prerequisite to use such a command is to define a value for all the following default parameters in Sample Scheduler configuration/System configuration:

OpenLab default user, OpenLab default project, Default Sample name, Default data file, Default result path, and Default result name parameters.

```
<SchedulerCommand>
  <Identifier>LIMS_ID</Identifier> [Sample Identifier
    generated by the LIMS]
    <Tasks>
      <Task>
        <InstrumentMethods>
          <InstrumentMethod>
            <InstrumentName>
              OpenLabValidInstrument
            </InstrumentName>
            <AcquisitionMethodName>
              OpenLabValidMethod.amx
            </AcquisitionMethodName>
          </InstrumentMethod>
        </InstrumentMethods>

        <Towers>
          <Tower>
            <InjectionSource>
              InjectionSourceName
            </InjectionSource>
            <SampleInfo>
              <UseMethodInjectionVolume>
                true
                [Use the injection volume defined in CDS Acquisition method]
              </UseMethodInjectionVolume>
              <Vial>1</Vial> [Autosampler position]
            </SampleInfo>
          </Tower>
        </Towers>
      </Task>
    </Tasks>
  </SchedulerCommand>
```

NOTE

LIMS Command: Analysis Order generated by the LIMS

An XML template is provided to help you build a command: <Scheduler Install path>/Documentation / Basic_Command.xml.

NOTE

The InstrumentName tag is case sensitive. If the case is different from the one defined in the Control Panel, the XML command will be considered as not valid, and sent to the <LIMS_Commands>/Trash folder.

NOTE

If you are using an EZChrom System, the value of the InjectionSource tag should only be set to **Front**, **Back**, or **Dual**.

Advanced XML Command

The XML command allows you to define many parameters used to perform the acquisition (vial, injection volume...) and the processing (multiplier, sample amount...). In the XML command, you can set up an analysis with the instrument groups configured in the Sample Scheduler configuration. Later, when the analysis is edited in the Analysis table, you can switch between the instruments (and their associated parameters) of this group. The XML command also allows you to define an instrument group that consists of specific instruments for a particular analysis.

For more information on instrument groups refer to “[Instrument Groups with XML Commands](#)” on page 84.

The list of available parameters and their position in the XML is described below.

```
<SchedulerCommand>
```

```
<Template>>false</Template>
```

[‘true’ to create a template command in the Auto-Fills tab, ‘false’ to create an analysis]

```
<Identifier>LIMS_ID</Identifier>
```

[Sample Identifier generated by the LIMS]

```
<LimsConnection>ValidLIMSConnectionName</LimsConnection>
```

[With this command you refer to the LIMS connection configured in the **LIMS** tab of Sample Scheduler configuration. If the command does not contain a LIMS connection, the default LIMS connection is used. If the tag is blank or has an invalid LIMS connection specified, it will be not accepted and is deleted.

```
<State>Waiting</State>
```

[Waiting or Scheduled]

```
<Project>OpenLabValidProject</Project>
```

[Project defined in OpenLab, defines the path where CDS files will be stored. [If an instrument group is defined (see **InstrumentMethods** tag on page 77), this project is assigned to the first instrument group.]

LIMS Command: Analysis Order generated by the LIMS

```
<InstrumentGroupName>ValidInstrumentGroup  
</InstrumentGroupName>
```

[With this command you refer to the instrument groups configured in Sample Scheduler configuration. The instrument group name refers to the name of the instrument group that is defined in Sample Scheduler configuration. See example XML file **InstrumentGroup_Command.xml**]

```
<User>OpenLabValidUser</User>
```

[User defined in OpenLab]

```
<AlternativeProjects>  
  <Project>OpenLABValidProject2</Project>  
  <Project>OpenLABValidProject3</Project>  
</AlternativeProjects>
```

[If an instrument group is defined (see **InstrumentMethods** tag on page 77), the alternative projects are assigned to the instruments at the corresponding positions. For example, the first alternative project will be assigned to the second instrument in the group.]

```
<Replicates>3</Replicates>
```

[Number of injections]

```
<AnalysisVariable1>value 1</AnalysisVariable1>  
<AnalysisVariable2>value 2</AnalysisVariable2>  
<AnalysisVariable3>value 3</AnalysisVariable3>  
<AnalysisVariable4>value 4</AnalysisVariable4>  
<AnalysisVariable5>value 5</AnalysisVariable5>
```

LIMS Command: Analysis Order generated by the LIMS

```
<Tasks>
```

```
<Task>
```

```
<ResultName>ResultName1</ResultName>
```

```
[CDS .rslt folder name]
```

```
<InstrumentMethods>
```

```
<InstrumentMethod>
```

```
<InstrumentName>OpenLabValidInstrument1
```

```
</InstrumentName>
```

```
<AcquisitionMethodName>OpenLabValidMethod1.amx
```

```
</AcquisitionMethodName>
```

```
</InstrumentMethod>
```

```
<InstrumentMethod>
```

```
<InstrumentName>OpenLabValidInstrument2
```

```
</InstrumentName>
```

```
<AcquisitionMethodName>OpenLabValidMethod2.amx
```

```
</AcquisitionMethodName>
```

```
</InstrumentMethod>
```

```
</InstrumentMethods>
```

[If you define several InstrumentName/ AcquisitionMethodName couples, an instrument group **Defined by LIMS** is created for this analysis, and the user can choose the instrument. The first Instrument/method couple defined in this section will be applied to the analysis by default.]

LIMS Command: Analysis Order generated by the LIMS

<Towers>

<Tower>

<LimsID1>LIMSID1</LimsID1>

<LimsID2>LIMSID2</LimsID2>

<LimsID3>LIMSID3</LimsID3>

[Parameters supplied by the LIMS]

<ProcessingMethodName>OpenLabValidMethod1.pmx

</ProcessingMethodName>

<AlternativeProcessingMethodName>

<ProcessingMethodName>OpenLabValidMethod2.pmx

</ProcessingMethodName>

<ProcessingMethodName>OpenLabValidMethod3.pmx

</ProcessingMethodName>

</AlternativeProcessingMethodName>

[If an instrument group is defined (see **InstrumentMethods** tag on page 77), the alternative processing methods are assigned to the instruments at the corresponding positions. For example, the first alternative processing method will be assigned to the second instrument in the group]

<SampleName>Sample1</SampleName>

[CDS Sample name, stored with the raw data]

LIMS Command: Analysis Order generated by the LIMS

```
<InjectionSource>InjectionSourceName  
</InjectionSource>
```

[For an EZChrom System, the value of the InjectionSource tag should only be set to **Front**, **Back**, or **Dual**]

```
<AlternativeInjectionSource>  
  <InjectionSource>Dual</InjectionSource>  
  <InjectionSource>Dual2</InjectionSource>  
  <InjectionSource>Dual3</InjectionSource>  
</AlternativeInjectionSource>
```

[If an instrument group is defined (see **InstrumentMethods** tag on page 77), the alternative injection sources are assigned to the instruments at the corresponding positions. For example, the first alternative injection source will be assigned to the second instrument in the group]

```
<SamplePrepMethodName>  
OpenLabValidSamplePrepMethod1.smx  
</SamplePrepMethodName>
```

```
<SampleInfo>
```

```
<Description>  
  <Line>long description in</Line>  
  <Line>several lines</Line>  
</Description>  
<Vial>1</Vial>
```

[Autosampler location]

```
<UseMethodInjectionVolume>False  
</UseMethodInjectionVolume>
```

[‘true’ if the injection volume defined in the CDS Acquisition method is used to perform the analysis]

```
<InjectionVolume>5</InjectionVolume>
```

[Volume of sample to be injected. Mandatory if UseMethodInjectionVolume = False]

LIMS Command: Analysis Order generated by the LIMS

```
<SampleAmount>153.61</SampleAmount>
<SampleAmountUnit>mg</SampleAmountUnit>

<Multiplier1>2.369</Multiplier1>
...
<Multiplier5>2.369</Multiplier5>

<Dilutor1>3.124</Dilutor1>
...
<Dilutor5>3.124</Dilutor5>

<Target1>3.124</Target1>
...
<Target5>3.124</Target5>

<CustomParameters>

  <SampleCustomParameter1>
    <Name>CDSSampleCustomParameter</Name>
    <Value>limsvalue3</Value>
  </SampleCustomParameter1>
  ...
  <SampleCustomParameter20>
    <Name>20thCDSSampleCustomParameter</Name>
    <Value>limsvalue20</Value>
  </SampleCustomParameter20>

</CustomParameters>
</SampleInfo>
```


LIMS Command: Analysis Order generated by the LIMS

```
<Calibration>

<SampleType>Sample</SampleType>

    [Sample type: Sample, Cal.Std., Blank, Double blank, QC check, Spike,
    Sys. Suit]

<Level>1</Level>

    [Mandatory if SampleType = Cal.Std]

<CalibrationRuntype>ClearAllCalibration
</CalibrationRuntype>

    [Calibration runtype: ClearAllCalibration, ClearCalibrationAtLevel]

</Calibration>

<InternalStandard>
    <InternalStandardAmount1>5
    </InternalStandardAmount1>

    <InternalStandardAmount5>5
    </InternalStandardAmount5>

    <InternalStandardAmountUnit>mg
    </InternalStandardAmountUnit>
</InternalStandard>

</Tower>
</Towers>
</Task>
</Tasks>
</SchedulerCommand>
```

An XML template is provided with the user documentation to help you build your own command: It is installed with the Sample Scheduler software under **<Scheduler Install path>/Documentation/xml/ Advanced_Command.xml**.

LIMS Command: Analysis Order generated by the LIMS

NOTE

Ensure the instrument name, injection source and project are defined using the same spelling (including upper and lower case) as used in the Control Panel, otherwise the XML command will be considered as not valid, and sent to the <LIMS_Commands>/Trash folder.

Multiple LIMS Connections

Sample Scheduler provides the ability to connect to more than one LIMS with a single instance of the Sample Scheduler database. For backwards compatibility, Sample Scheduler is pre-configured with a default LIMS connection that allows existing installations to continue using Sample Scheduler, just as before, with a single LIMS connection after an upgrade. The default LIMS connection contains a minimum set of configuration parameters that you can change, if necessary.

You can add multiple LIMS connections, specifying the associated parameters for each LIMS connection. To address an XML command to a specific LIMS connection, you must specify the name of the LIMS connection in the XML command. Analyses and sequences will be processed by the Sample Scheduler with the corresponding parameters configured for the LIMS connection.

If a SQL query is specified for a LIMS database, the SQL command query is preferred for that LIMS connection. If XML commands are defined for the same LIMS connection, they are neglected and trashed.

LIMS connections are set up in the **LIMS** tab of Sample Scheduler configuration.

Dual Simultaneous Injection with XML Commands

For dual simultaneous injections the LIMS needs to write an XML file that has two Tower sections in a Task. The Injection Source must be the same for both towers and needs to support dual simultaneous injection. The string must match exactly the one provided by the acquisition client. Dual simultaneous injection is possible only if supported by the injection source.

NOTE

If dual simultaneous injection is not available in the acquisition client for the selected injection source, the device does not support dual simultaneous injections.

The acquisition method must be the same for both towers. The processing methods can be different.

The samples will be assigned to the injection source (front or back injector) in the same way as in acquisition client. In most cases the first line will be assigned to the Front injector, the 2nd line to the Back injector and so on, in alternating order.

An XML template is provided with the user documentation to help you build your own dual simultaneous injection command: It is installed with the Sample Scheduler software under **<Scheduler Install path>/Documentation/xml/DualInjection_Command.xml**.

Using Parameter 'Use Method Injection Volume' in XML Command

If a default injection volume is defined in the acquisition method (only for instruments configured with an autosampler), it can be explicitly used to perform the acquisition when submitted by the Sample Scheduler.

To use this option, you must define a 'true' value for the parameter `<UseMethodInjectionVolume>` in the XML command:

- `<UseMethodInjectionVolume>true</UseMethodInjectionVolume>`

The `<InjectionVolume> </InjectionVolume>` section is then optional in the XML as it is not used to perform the acquisition.

Note that even if an injection volume is defined in the Acquisition method, another value can be defined in the XML. In this case, `<UseMethodInjectionVolume>` must be false in the XML. In addition, it is mandatory that you set a value for the Injection volume in the XML (strictly positive value).

Instrument Groups with XML Commands

Instrument groups logically combine a set of alternative instruments that can do the same type of analysis. If instrument groups are configured, users can easily switch to another instrument for a specific analysis. The project, injection source, acquisition method, processing method can be defined for each instrument in the group and are automatically filled when the instrument is selected.

One XML file can contain only one instrument group.

The XML command can have the following functions:

- Create an analysis using existing instrument groups

The instrument groups are set up in Sample Scheduler configuration. The XML specifies the instrument group by its instrument group name, which is set in Sample Scheduler configuration.

See example XML file under **<Scheduler Install path>/Documentation/xml/InstrumentGroup_Command.xml**

- Define a temporary instrument group for a given analysis

This instrument group is not visible in Sample Scheduler configuration. In the Analysis table, the instrument group is referred to as **Defined by LIMS**. You can use the instrument group to switch to a different instrument as defined in the XML, but the group is not permanently stored in the Sample Scheduler database. Therefore, it cannot be used for another analysis, unless it is again completely defined in the respective XML.

See example XML file under **<Scheduler Install path>/Documentation/xml/InstrumentGroupSpecifiedByLims_Command.xml**

Add Multiple Instrument Lines to a Group

For each parameter you can provide multiple entries. The structure depends on the parameter:

- Instrument names and acquisition methods:

They are always provided as a pair within an <InstrumentMethod> tag.

NOTE

To guarantee backwards compatibility, the <InstrumentMethod> tag structure is the same as in previous releases.

- Projects:

The second and all further tags are added within the <AlternativeProjects> tag.

- Processing methods:

The second and all further tags are added within the <AlternativeProcessingMethodName> tag.

- Injection sources:

The second and all further tags are added within the <AlternativeProcessingMethodName> tag.

Always define the same number of alternative parameters. The first instrument line will contain the first project/instrument name/acquisition method/processing method/etc., the second line will contain the second parameter of each type, and so on. To use empty values, add empty tags.

Analysis Variables in the XML Command

Analysis variables (**Analysis variable i**) are variables created by the user in the Sample Scheduler configuration. They allow the user to display information in the Sample Scheduler client that is not provided by default by the Sample Scheduler: for example, the laboratory name where the instrument is located.

The user can assign a value to these variables either in the XML command or in the Sample Scheduler client.

These variables can also be part of the result name or sample name.

Up to five analysis variables can be defined per analysis.

Analysis variable values are displayed in the Sample Scheduler client in the Analysis Table, in **Analysis variable i** columns.

NOTE

The values of these variables are not transferred to the CDS and cannot be displayed or reported in the CDS. They only exist in the Sample Scheduler database.

Sample Custom Parameters in the XML Command

Sample custom parameters (**Sample custom parameter i**) are variables created by the user in OpenLab CDS or EZChrom on project level, or alternatively just in the Sample Scheduler. They allow the user to display and enter information in the Sample Scheduler client that may be transferred to and used by the CDS, but only if they were previously defined in the CDS settings for a given project.

The user can assign a value to these variables either in the XML command or in the Sample Scheduler client.

These variables can be part of the result name for single runs, and of the sample name.

Up to 20 sample custom parameters can be defined per analysis.

Sample custom parameters values are displayed in the Sample Scheduler client in the Analysis Table, in **Sample custom parameter i** columns.

Use Tokens in the XML Command

It is possible to use the same predefined identifiers (tokens) as the ones proposed by the Single Sample or Sequence in the CDS Acquisition to define the result name and the sample name in the XML command.

It is also possible to use Scheduler specific variables.

NOTE

Only Sample Scheduler tokens are applied, not CDS tokens.

LIMS Command: Analysis Order generated by the LIMS

Table 11 Tokens

Parameter	Token
SampleName	Acq. Method <AMX> Instrument name <I> Local date & time <D> Custom local date & time <CD> Proc Method <PMX> Short local date & time <DS> Username <U> Vial <V> Identifier <ID> Analysis variable i [i=1 to 5] <A1> to <A5> LIMS IDi [i=1 to 3] <LID1> to <LID3> Sequence name <SEQ> (Sequence only)
Result Name (single run)	Acq. Method <AMX> Instrument name <I> Local date & time <D> Custom local date & time <CD> Proc. Method <PMX> Sample name < S> Short local date & time <DS> Username <U> Vial <V> Identifier <ID> Analysis variable i [i=1 to 5] <A1> to <A5> LIMS ID I [i = 1 to 3] <LID1> to <LID3>
Result Name (sequences and dual simultaneous injections)	Instrument name <I> Local date & time <D> Custom local date & time <CD> Short local date & time <DS> Username <U> Sequence name <SEQ>
Result Path	Instrument name <I> Local date & time <D> Custom local date & time <CD> Short local date & time <DS> Username <U> Analysis variable i [i=1 to 5] <A1> to <A5> Sequence name <SEQ> Invalid characters that are not allowed in Databackends are removed from the resolved path
DataFile	Sample name <S> Acq. Method <AMX> Instrument name <I> Local date & time <D> Proc Method <PMX> Short local date & time <DS>

Table 11 Tokens

Username <U>
Vial <V>

If using **Sample Name** or **Sequence Name** as tokens, ensure that these names do not contain invalid characters, such as `?/|<>*.:`.

OpenLab CDS or EZChrom predefined name types contain `< >` symbols. Those symbols have a meaning in XML language and therefore cannot be expressed in this way in the Scheduler XML command.

The syntax to use in XML command is:

- `<` to replace `<`
- `>` to replace `>`

For example:

`<SampleName><AMX></SampleName>`

where SampleName is the Acquisition Method name

`<ResultName><ID>_ <D>_ <E1></ResultName>`

where Result name is the Id_Date&Time_Analysis variable 1

Priority Rules

The parameter values used by the CDS to perform an analysis (project, instrument, user, vial, etc.) can be defined in three ways in the Sample Scheduler:

- XML command: all parameters,
- Sample Scheduler configuration: user, project, result name, sample name, initial state (default values used to perform the analysis when no value is defined in the command),
- Sample Scheduler client: all parameters can be edited.

LIMS Command: Analysis Order generated by the LIMS

To manage possible priority conflicts, the following priority rules have been set:

Table 12 Priority rules

Parameter	Priority rules
Sample name, Result name, User, Project	1. XML commands 2. Sample Scheduler configuration default values
All parameters that are editable in Sample Scheduler client	1. Values as edited in the Sample Scheduler client 2. XML commands

XML Command Creation

Some example XML commands are available in the <SampleScheduler>/Documentation folder. They allow you to generate the XML commands properly in your LIMS.

- **Minimal_Command.xml**: minimal structure of the XML in the case no mandatory parameter has been added in the Sample Scheduler configuration > **System Configuration** window (only **Identifier** and **Sample name** are checked).
- **Basic_command.xml**: minimal required information to perform an acquisition. The OpenLab default user, OpenLab default project, Default sample name and Default result name must be assigned a value in the Sample Scheduler configuration to use such a command.
- **Advanced_command.xml**: structure containing all the possible parameters
- **SampleCustomParameters_ command.xml**: structure showing how to use Sample Custom Parameters with Sample Scheduler.
- **DualInjection_ command.xml**: structure showing how to create dual injection commands.
- **Holding_Command.xml**: structure to use in case of commands to merge (refer to the Sample Scheduler online help to learn more on the merge option).
- **Additional templates**: structure of the XML to set single injection source and dual injection source instruments with or without calibration. These commands contain all the parameters required by the CDS to perform an acquisition.
- **UnknownSample_Single_InjectionSource_Command.xml**: Acquisition of an Unknown sample in External standard calibration runtime, on a single injection source instrument.
- **CalibrationSample_Single_InjectionSource_Command.xml**: Acquisition of a Standard sample in internal standard calibration runtime, on a single injection source instrument.
- **InstrumentGroup_Command.xml**: Acquisition of an analysis using the instrument group defined in Sample Scheduler configuration.
- **InstrumentGroupSpecifiedByLims_Command**: Structure of the XML to define an instrument group for a given analysis.

LIMS Command: Analysis Order generated by the LIMS

XML Action

The Scheduler can manage XML files that are not intended to create an analysis, but to perform an action.

Those 'Action commands' do not match the classical XML command scheme, but a simplified scheme.

Two Action commands are proposed by default:

- Cancel command: to delete an analysis or sequence and that is stored in the Scheduler database and that has not yet been started (i.e., in **Waiting** or **Scheduled** state only). The analysis or sequence to delete is identified by its Identifier.

```
<SchedulerAction>
  <Identifier>Analysis_Or_Sequence_To_Delete</Identifier>
  <Type>Delete</Type>
  <LimsConnection>ValidLIMSConnectionName<LimsConnection>
</SchedulerAction>
```

The Cancel command is sent into the *<LIMS_Commands>* folder. The Scheduler handles it and deletes the corresponding analysis or sequence from the Scheduler database. The analysis or sequence is removed from the Scheduler interface. The **Cancel** command does not generate an analysis or sequence and is never displayed in the Scheduler client.

The LIMS connection is used to identify the corresponding **Processed command folder** where the XML file will be moved to after successful execution. If no LIMS connection is specified in the XML file, the **Processed command folder** of the default LIMS connection is used. Commands that have an invalid LIMS connection specified are not accepted and are deleted.

You can use the **Cancel_Analysis_Command.xml** template located in the **<SampleScheduler for OpenLab>/Documentation** folder to build your own command. The XML scheme **SchedulerAction.xsd**, which is provided by the setup in the same folder, is used by the Sample Scheduler LIMS agent to check the command validity before its entry in the database.

- Create sequence: to group a selection of analyses, stored in the Sample Scheduler database, into a sequence.

LIMS Command: Analysis Order generated by the LIMS

```
<SchedulerCreateSequenceAction>
  <LimsConnection>ValidLIMSConnectionName</LimsConnection>
  <SequenceName>MySequence</SequenceName>
  <SequenceState>Scheduled</SequenceState>
  <User>Analyst</User>
  <Identifiers>
    <Identifier>MySequenceLine-123</Identifier>
    <Identifier>MySequenceLine-456</Identifier>
    <Identifier>MySequenceLine-789</Identifier>
    <Identifier>MySequenceLine-555</Identifier>
    <Identifier>MySequenceLine-999</Identifier>
  </Identifiers>
</SchedulerCreateSequenceAction>
```

You must define:

- A LIMS connection (not mandatory). If the XML command does not contain the tag, the default LIMS connection is used. If the tag is blank, the command is sent to the trash folder.
- A sequence name (not mandatory).
- The initial sequence state. If not defined, the default state defined in the Sample Scheduler configuration is used.
- The user who is assigned to the sequence. If not defined, the acquisition user defined in the Sample Scheduler configuration is used.
- The list of analyses to group, identified by their identifier. The sequence is created only if:
 - All analyses exist in the Sample Scheduler database.
 - All analyses are assigned to the same instrument, project, injection source, and LIMS connection.
 - All analyses are in **Waiting**, **Incomplete** or **Waiting on error** state.
 - Otherwise the sequence is not created, and the XML file is sent to the trash folder.

You can use the **Create_Sequence_Command.xml** template located in the **<SampleScheduler for OpenLab>/Documentation** folder to build your own command. The XML scheme **SchedulerCreateSequenceAction.xsd**, which is provided by the setup in the same folder, is used by the Sample Scheduler LIMS agent to check the command validity before its entry in the database.

Sample Scheduler XML File Generator

The XML file generator enables the administrator to generate test XML commands for setting up the Sample Scheduler system. This tool makes it easy to create valid XML commands with the desired parameters that can be processed by LIMS.

The XML tool is located on the installation media in the folder **Support>Xml_tool**.

Working with the XML file generator

Using the XML file generator, you can create single or multiple analyses. You can also create a sequence from the analyses.

Mandatory parameters are marked with an asterisk and require entry of a value:

- Scheduler Identifier
For multiple analyses the entered value is the start value. The ID of the following analysis is incremented by one.
- LIMS identifier1
For multiple analyses the entered value is the start value. The ID of the following analysis is incremented by one.
- Project
- Instrument
- Acquisition method
An extension is not required. If no extension is given, the extension .amx is automatically appended in the XML. Entries for the extensions .amx or .met are accepted for XML command creation.
- Injection source
- Vial position

The optional parameters do not require value entry:

- Sequence name
The default name is sequence.
- Sample Name
For multiple analyses, select **Use sample name start counter**. The entered value is the start value. The value of the following analysis is incremented by one.
- State
The state can be set to **Holding**, **Scheduled**, or **Waiting**.

LIMS Command: Analysis Order generated by the LIMS

- Processing method

An extension is not required. If no extension is given, the extension .pmx is automatically appended in the XML. Entries for the extension .pmx are accepted for XML creation. For EZChrom, this parameter is not provided.

- Sample Type
- Set injection volume

If selected, *UseMethodInjVol*=false.

- User
- Injection per sample

The XML files are stored in a separate folder. This folder is created when generating the XML file. Sequence XML files are stored in a subfolder that is automatically created by the XML tool. The name of the subfolder corresponds to the name of the sequence. If a folder with this name already exists, an increment is automatically appended.

Command Collected via SQL Query

This chapter describes how Sample Scheduler must be configured to allow the collection of analysis orders directly in the LIMS database.

The Sample Scheduler provides a generic tool to gather analysis orders from the LIMS database (that handles SQL Queries). As all LIMS databases are different, it is up to your database system administrator to configure the parameters detailed below to fit your LIMS database structure.

The configuration is done in the **LIMS** tab of the **Home** ribbon tab (see also the **LIMS** section in the Sample Scheduler online help).

Both analyses and sequences can be submitted to the Sample Scheduler via SQL query. They are automatically assigned the LIMS connection from the configured LIMS database.

Configure the Connection String

The connection string is a chain of characters containing the required information to establish a connection between the Sample Scheduler and your LIMS database. This chain contains the provider, the user/password, etc.

- Examples for an MS SQL Server:

SQL Server and Windows Authentication mode:

```
Server=ComputerName\DB_Instance Name;  
Database=DatabaseName;  
Password=XXX; User ID=Database_User;
```

Windows Authentication mode:

```
Server= ComputerName\DB_Instance Name\SQLEXPRESS;  
Database= DatabaseName;trusted_connection=yes;
```

- Example for an Oracle Server:

```
Data Source= (DESCRIPTION =  
(ADDRESS = (PROTOCOL = TCP) (HOST = XXXXXX) (PORT = XXXX) )  
(ADDRESS = (PROTOCOL = TCP) (HOST = XXXXXX) (PORT = XXXX) )  
(CONNECT_DATA =  
(SDU = 8192)  
(TDU = 8192)  
(SERVER = DEDICATED)  
(SERVICE_NAME = XXXX)  
)  
);user id=XXXXXX;password=XXXXXX;
```

The database user must have 'Select' and 'Update' rights on the LIMS database.

To know which connection string is required according to your database, refer to the <http://www.connectionstrings.com/> site.

To test your connection string, click **Test connection**.

Write an SQL Query

The LIMS query must be based on the structure of data expected by the Sample Scheduler.

- For an analysis on a Single Injection Source instrument, the LIMS Query returns a single entry to the Sample Scheduler, allowing the creation of the Single Injection Source analysis.
- For an analysis on a dual injection source instrument, the LIMS Query returns two entries to the Sample Scheduler, allowing the creation of the dual injection source analysis.
- For a sequence, the LIMS Query returns the <number of sequence lines> entries for the specified sequence to the Sample Scheduler, allowing the creation of the sequence.

The LIMS Query result must match the following structure and syntax:

Table 13 SQL query

Sample Scheduler parameter	Value	Type	Description
Identifier	n/a	Varchar (not null, unique)	The sample identifier. Must be unique. It is used to notify the LIMS that a command has been handled, to avoid it to be considered a second time.
Barcode	n/a	Varchar (null accepted)	Gives the option to identify a sample by scanning a barcode. Specific to individual analyses and analyses within a sequence, but not available for an entire sequence.
Template	n/a	Boolean (null accepted)	Specifies if this experiment should be used as a template for the auto-fill feature. Make sure that the template identifiers do not collide with analysis identifiers that will be handled by the system.
LimsIDi, [i=1 to 3]	n/a	Varchar (null accepted)	Values supplied by the LIMS for usage in the CDS.
SampleName	n/a	Varchar (not null)	The sample name.

LIMS Command: Analysis Order generated by the LIMS

Table 13 SQL query

Sample Scheduler parameter	Value	Type	Description
State	1= Scheduled 3=Waiting 10=Holding	Integer (null accepted)	The initial state assigned to the analysis. If no value, the default state defined in the Sample Scheduler configuration is used.
InstrumentGroupName	n/a	Varchar	Name of instrument group
SequenceId	n/a	Integer (null accepted)	The sequence id assigned to the analysis. Analyses with the same sequence id belong to the same sequence. If no value is assigned, the analysis does not belong to a sequence.
SequenceName	n/a	Varchar (null accepted)	The sequence name
SequencePosition	n/a	Integer (null accepted)	The sequence position of the analysis in the sequence. The first sequence position of a sequence begins with 1.
ProjectName	n/a	Varchar (null accepted)	CDS project name
UserName	n/a	Varchar (null accepted)	CDS user name
Replicates	n/a	Integer (null accepted, default value 1)	Sample Scheduler parameter. If greater than one, the analysis will be replicated n times with the same parameters as specified in the SML/SQL result.
AnalysisVariableN, [N=1 to 5]	n/a	Varchar (null accepted)	Custom parameters.
ResultName	n/a	Varchar (null accepted)	The name of the result files to be generated by the CDS. If no value is specified, the default result name defined in the Sample Scheduler configuration is used.

LIMS Command: Analysis Order generated by the LIMS

Table 13 SQL query

Sample Scheduler parameter	Value	Type	Description
ResultPath	n/a	Varchar (null accepted)	Path where the CDS results are stored, including subfolders separated by slashes. If no value is specified, the default result path defined in the Sample Scheduler configuration is used.
InstrumentName	n/a	Varchar (null accepted)	CDS instrument name.
AcquisitionMethodName	n/a	Varchar (null accepted)	Method used to perform the analysis in the CDS.
ProcessingMethodName	n/a	Varchar (null accepted)	Method used to process the analysis in the CDS.
AlternativeInstrumentsMethods	pattern like "inst1/meth1 inst2/meth2 inst3/meth3"	Varchar (null accepted)	Combination of instrument and acquisition method that can be used to perform the analysis instead of the nominal InstrumentName / AcquisitionMethodName couple. No limit in the number of alternative instrument/method couples.
*InjectionSource	n/a	Varchar (null accepted)	Injection source of the autosampler used to perform the analysis
*InjectionLocation	0=Front injection 1=Back injection	Integer (null accepted)	Location of the injector, for dual simultaneous injections. Is one set to a valid value and the other is null or another incorrect value, the valid value is used to set the order. Are both set to null or another not valid value then the order will not be changed. Are both set to the same valid value an error occurs.
*SampleDescription	n/a	Varchar (null accepted)	Description of the sample.
Vial	n/a	Varchar (null accepted)	The vial position where the sample is taken.

LIMS Command: Analysis Order generated by the LIMS

Table 13 SQL query

Sample Scheduler parameter	Value	Type	Description
*UseMethodInjection Volume	n/a	Boolean (null accepted)	The injection volume defined in the acquisition method that is used to perform the analysis.
*InjectionVolume	n/a	Float (null accepted)	Volume of the sample injected.
*SampleAmount	n/a	Float (null accepted)	Amount of sample. Used to perform quantitation in the CDS.
*SampleAmountUnit	n/a	Varchar (null accepted)	Unit of the sample amount.
*SamplePrepMethod	n/a	Varchar (null accepted)	Sample prep method used by the CDS.
*TargetN, [N=1 to 5]	n/a	Varchar (null accepted)	The target fields can be used to specify the target masses or formulas for compounds that are analyzed using an MS or LC/MS sample purity method.
*MultiplierN, [N=1 to 5]	n/a	Float (null accepted)	Used to perform quantitation in the CDS.
*SampleCustomParameterN Name [N=1 to 20]	n/a	Varchar (null accepted)	Used to submit Sample Custom Parameters to the CDS.
*SampleCustomParameterN Value [N=1 to 20]	n/a	Varchar (null accepted)	The value that gets submitted to the CDS under the Sample Custom Parameter specified in the SampleCustomParameterName. This value needs to be valid according to the type that was specified for the Sample Custom Parameter in OpenLab CDS. (E.g.: a value for a Custom Parameter with type Date has to be convertible to a date)
DilutorN, [N=1 to 5]	n/a	Float (null accepted)	Used to perform quantitation in the CDS.

LIMS Command: Analysis Order generated by the LIMS

Table 13 SQL query

Sample Scheduler parameter	Value	Type	Description
*SampleType	0=Sample, 1=Cal.Std. 2=Blank 3=DoubleBlank 4=QCCheck 5=Spike 6=Sys.Suit	Integer (null accepted)	Define if the sample is analyzed as a Sample or another type. Default is Sample.
*InjectionsPerSample	n/a	Integer (null accepted)	Define how often the sample should be injected by the CDS.
*Level	n/a	Integer (null accepted)	Calibration level defined in the processing method.
*CalibrationRuntype	0=ClearAllCalibration 1=ClearCalibrationAtLevel	Integer (null accepted)	Define the way previous calibration points are considered when a new standard point is added to the calibration curve
*InternalStandardAmountN, [N=1 to 5]	n/a	Float (null accepted)	Amount of internal standard in the sample. Used to perform quantitation in the CDS.
*InternalStandardUnit	n/a	Varchar (null accepted)	Unit of the internal standard amount.

* Parameters to be defined by Injection source.

LIMS Command: Analysis Order generated by the LIMS

All the commands defined into the LIMS database must contain at least the following parameters to be considered valid by the Sample Scheduler:

- Identifier
- Sample name
- The list of mandatory parameters defined in the **Home/Commands** tab, **Mandatory** column.

SQL Query Examples

With the Sample Scheduler documentation comes an SQL connection example that can be used to understand how to setup a LIMS connection via SQL. The example scripts are written for a Microsoft SQL database and are installed under:

<Scheduler Install path>/Documentation/sql.

The queries and the database show how to get all available parameters from a simulated LIMS into the Scheduler.

Find below a simple example of queries built for an MS SQL Server LIMS database that could be handled by the Sample Scheduler.

Figure 17 shows an example of a LIMS database (LIMS_DB) consisting of two tables:

LIMS Command: Analysis Order generated by the LIMS

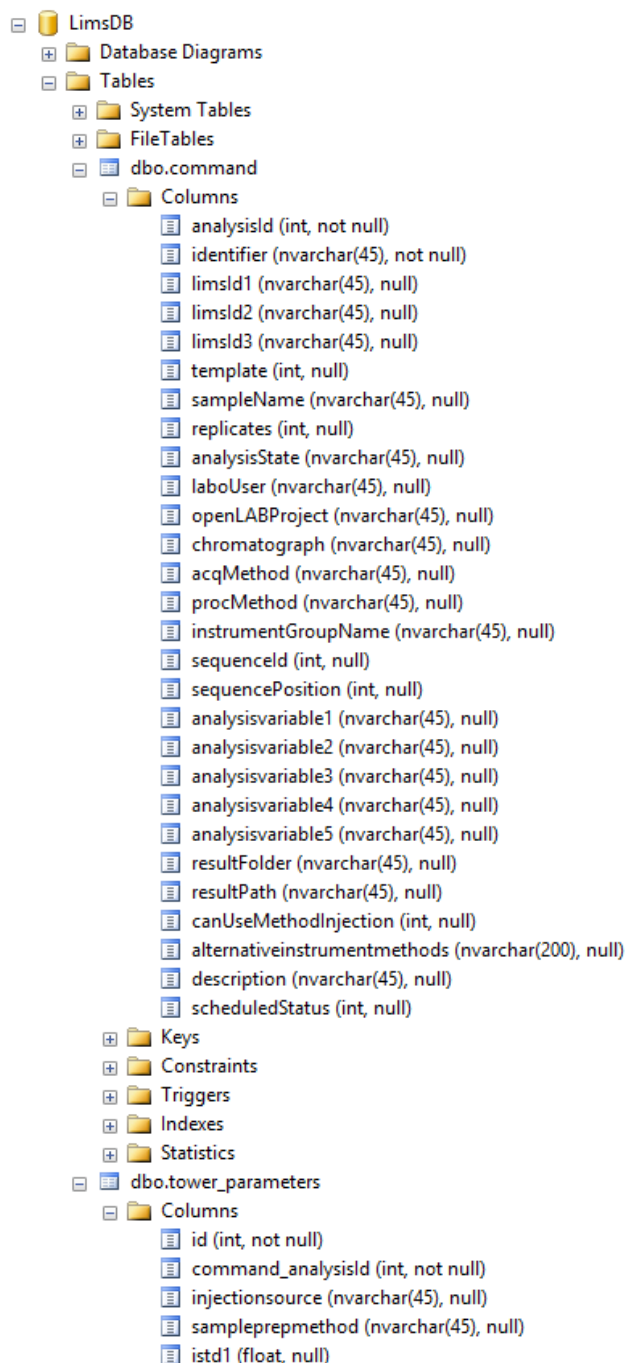


Figure 17 LIMS database

LIMS Command: Analysis Order generated by the LIMS

dbo.command table:

Lists all parameters to be defined by analysis

dbo.tower_parameters table:

Lists all parameters to be defined by Injection source.

The **scheduledStatus** parameter has been added to assign a flag to the command:

0: already handled by the Sample Scheduler,

1: properly handled, 2: handled but invalid.

In the case of an analysis to be performed on a single Injection source instrument:

One entry in the **dbo.commands** table

One entry in the **dbo.tower_parameters** table.

In the case of an analysis to be performed on a dual injection source instrument:

One entry in the **dbo.commands** table

Two entries in the **dbo.tower_parameters** table.

In the case of a sequence with analyses to be performed on a single injection source instrument:

<Number of sequence lines> entries in the **dbo.commands** table

<Number of sequence lines> entries in the **dbo.tower_parameters** table.

In the case of a sequence with analyses to be performed on a dual injection source instrument:

<Number of sequence lines> entries in the **dbo.commands** table

Twice the <Number of sequence lines> entries in the **dbo.tower_parameters** table.

NOTE

Only some of the parameters that can be defined in an analysis are proposed in this example, but you can define all the parameters listed in the table above.

LIMS Command: Analysis Order generated by the LIMS

The following example handles the case where the LIMS database (LIMS_DB) provides parameters with names different than the ones expected by the Sample Scheduler (for example, 'chromatograph' in the LIMS database corresponds to 'InstrumentName' in the Sample Scheduler database). It is up to the LIMS query to link the LIMS parameters and the corresponding Sample Scheduler parameters:

chromatograph as InstrumentName.

In this example, we also manage the notification back to the LIMS database, to inform that a defined command has been handled (with success or not), to avoid handling the same command several times. It is the role of the **LIMS notification: Valid command** and **LIMS notification: invalid command** queries.

SQL Query

```
SELECT
c.sampleName as SampleName,
c.analysisId as Identifier,
c.sequenceId as SequenceId,
c.sequencePosition as SequencePosition,
CASE
    WHEN analysisState='Scheduled' THEN 1
    WHEN analysisState='Waiting' THEN 3
    WHEN analysisState='Holding' THEN 10
    ELSE NULL
END as [State],
c.laboUser as [UserName],
c.openLabProject as ProjectName,
c.chromatograph as InstrumentName,
c.CDSMethod as AcquisitionMethodName,
c.resultFolder as ResultName,
t.analysis_tower as InjectionSource,
t.analysis_sample_mass as SampleAmount,
t.analysis_dilutor as Dilutor1,
c.Variable as AnalysisVariable1,
CAST(t.analysis_multiplier as float) as Multiplier1,
t.analysis_level as Level,
t.analysis_vial as Vial,
t.analysis_injection_volume as InjectionVolume,
t.analysis_tower as InjectionSource,
'Plantidentifier' as SampleCustomParameter1Name,
t.customer_custom_field1 as SampleCustomParameter1Value
CASE
    WHEN t.analysis_sample_type='Sample' THEN 0
```


LIMS Command: Analysis Order generated by the LIMS

```
    WHEN t.analysis_sample_type='Calib' THEN 1
    ELSE NULL
END as SampleType,
c.alternative as AlternativeInstrumentsMethods
FROM [LIMS_DB].[dbo].[command] c LEFT JOIN
[LIMS_DB].[dbo].[tower_parameters] t ON (c.analysisId =
t.command_analysisId)
WHERE scheduledStatus = 0;
```

The Sample Scheduler manages only commands with **scheduledStatus = 0**.

Once the Sample Scheduler has handled a command, it sends a value back to the LIMS database/**scheduledStatus** parameter. In this example:

- **scheduledStatus=1** if the command has been properly handled (valid command),
- **scheduledStatus=2** if the command was invalid (not transformed into an analysis in the Sample Scheduler database).

LIMS Notification

LIMS Notification: Valid Command (example for SQL server)

```
UPDATE LIMS_DB.[dbo].[command] SET scheduledStatus = 1 WHERE analysisId =
@Identifier;
```

LIMS Notification: Invalid Command (example for SQL server)

```
UPDATE LIMS_DB.[dbo].[command] SET scheduledStatus = 2 WHERE analysisId =
@Identifier;
```

Only the parameter **Identifier** can be provided by the Sample Scheduler for both the valid and the invalid command.

In the notification query, the variable name depends on the used database connection provider. For example, as variable name Microsoft SQL-Client expects **@Identifier** and Oracle-Client expects **:Identifier**. For an exact definition of the notation, see the documentation of the database connection provider that you use to access the LIMS database.

Dual Simultaneous Injection via SQL Query

To create dual simultaneous injection commands, the results from the command creation query need to fulfill the following requirements:

- For both lines of the dual injection command, the identifier must be the same. This will instruct Sample Scheduler to create a dual injection sample analysis. For the parameters that are common to both injectors, it will use the values specified for the front injector (first line).

To ensure that the correct parameters are assigned to the front and back injector, the command creation query needs to consider the order of the analyses submitted by the LIMS. This can be achieved by adding a "sort by clause" statement. For example, if the LIMS always sends a higher value for the vial location of the back injection the analyses could be sorted by vial location. Alternatively, you may use an analysis or instrument custom parameter to sort by. Another way to determine the order of the analyses is to define the Injection Location field for each of the towers. Lines set to 0 refer to the front position, lines set to 1 refer to the back position. The injection source must be the same for both front and back injector, and it needs to support dual simultaneous injection.

Sequence Creation via SQL Query

To create a sequence via SQL query, the results from the command creation query need to fulfill the following requirements:

- For all the analyses belonging to the same sequence, the sequence id must be the same.
- The first analysis of the sequence gets the first sequence position (sequence position = 1).
- For the other sequence lines, the sequence position must be incremented consecutively by one.
- Parameters that are common to a sequence must be the same for all sequence lines.

It is not possible to append sequence lines via SQL query to an already existing sequence in the Sample Scheduler database.

11 Command Validity Process

When a command is generated by the LIMS, it is handled by the Sample Scheduler (Sample Scheduler LIMS agent). The following validity control process is applied:

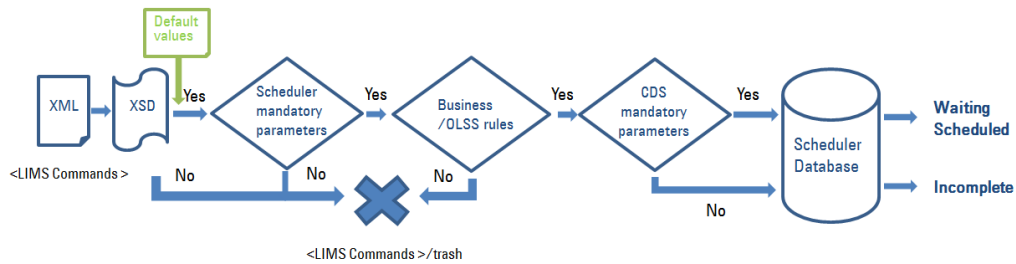


Figure 18 Validity control process

Command Validity Process

- 1 The command matches the expected syntax format.
 - The XML command must match the XML scheme (XSD). This scheme checks the XML syntax, the XML structure, the type (integer, boolean, etc.) and the properties of each parameter (For example, the sample type can only be **Sample**, **Cal.Std.**, etc.; the injection volume must be a number; etc.). The **SchedulerXmlCommand.xsd** file is provided in the **Sample Scheduler for OpenLab/Documentation** folder.
 - The commands collected via SQL Query must also respect the expected structure, and contain parameters respecting the rules defined in the query (valid parameter name, type, properties, etc.).
- 2 The command contains the mandatory parameters defined in the **Command/Mandatory** tab. If **Project**, **User**, **Sample Name**, **Result Name** or **State** parameters have no value, they are assigned the default values defined in the Sample Scheduler configuration, **System Configuration** tab.
- 3 The command satisfies the business rules (if **Dilutor**, **Multiplier**, **Sample amount** equal 0, they are assigned the value 1). The server in the OpenLab system checks if the **Project**, **User**, **Instrument**, and **Acquisition methods** exist.
- 4 If the command does not satisfy at least one of the steps 1 to 3, it is sent to the <LIMS Commands>/trash folder. No analysis is generated.
- 5 If steps 1 to 3 are satisfied, an analysis is generated in the Scheduler database.
- 6 Steps 1 to 3 are satisfied if:
 - all parameters needed by the CDS are defined,
 - the analysis is set to either the **Waiting** or the **Scheduled** state.
- 7 If at least one of these parameters is missing, the analysis is assigned the **Incomplete** state.
- 8 *Mandatory parameters in the CDS:* Instrument, Injection source, Project, Acquisition method, Result file name, Vial, Injection volume.

Command Validity Process

If the Auto-fill command option is used, the validity process is modified as follows:

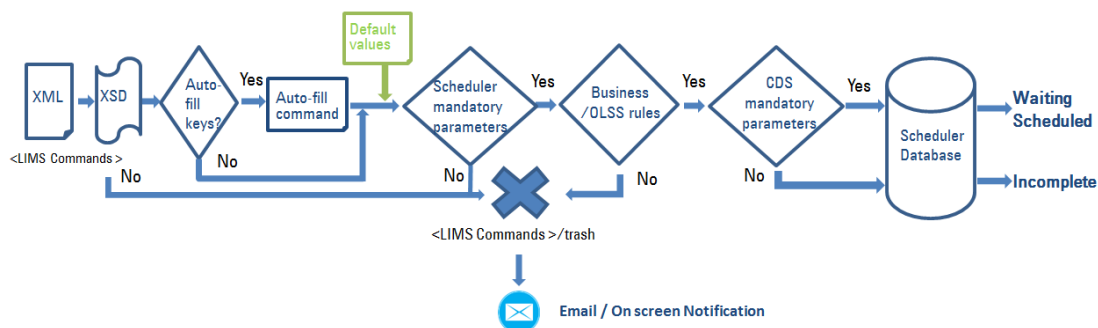


Figure 19 Auto-fill command validity process

- 1 The command matches the expected syntax, format.
 - The XML command must match the XML scheme (XSD). This scheme checks the XML syntax, the XML structure, the type (integer, boolean, etc.) and the properties of each parameter (for example, the sample type can only be **Sample**, **Cal.Std.**, etc.; the injection volume must be a number, and so on). The **SchedulerXmlCommand.xsd** file is provided in the **Sample Scheduler for OpenLab/Documentation** folder.
 - The commands collected via SQL Query must also respect the expected structure, and contain parameters respecting the rules defined in the query (valid parameter name, type, properties, etc.).
- 2 A value is assigned to all the *Auto-fill trigger* parameters, and a template analysis exists in the *Auto-fill command table*: the command is completed according to the template analysis.
- 3 The command contains the mandatory parameters defined in the Command/Mandatory tab. If **Project**, **User**, **Sample name**, **Result file name**, and/or **State** parameters have no value after completion with template analysis, they are assigned the default values defined in the Sample Scheduler configuration, **System Configuration** tab.
- 4 The command satisfies the business rules (if Dilutor, Multiplier, Internal standard amount, or Sample amount equal 0, they are assigned the value 1). The server in the OpenLab system checks if the **Project**, **User**, **Instrument**, and **Acquisition methods** exist.
- 5 If the command does not satisfy at least one of the steps 1, 3 or 4, it is sent to the <LIMS Commands>/trash folder. No analysis is generated.
- 6 If steps 1, 3 and 4 are satisfied, an analysis is generated in the Scheduler database.

Command Validity Process

- Steps 1, 3 and 4 are satisfied: If all parameters needed by the CDS to perform an acquisition are defined, the analysis is assigned either the **Waiting** or the **Scheduled** state. If at least one of these parameters is missing, the analysis is assigned the **Incomplete** state.

NOTE

If a wrong ticket is defined, for example the credentials correspond to an OpenLab user that cannot use the instrument, the Sample Scheduler will not be able to perform an analysis, as the Agilent Sample Scheduler agent service will not start.

12 Activity Logs

Sample Scheduler offers the possibility to log your activities in the software. Once the audit trail is enabled (Sample Scheduler configuration > **System Configuration**), all the actions performed by Sample Scheduler for OpenLab are traced in the **System Activity Log** of the Control Panel (under **Administration**). Those logs can be useful to understand the reason and to perform the appropriate action to correct a potential problem. For more information on how to search, filter, export, print or refresh the activity log, refer to the Control Panel online help (search for “System Activity Logs”).

NOTE

Once the audit trail has been enabled, you can no longer disable it.

If an error occurs, refer to the “[Troubleshooting](#)” section on page 150, to see if it deals with the issue you encountered. If not, send the above log files to your Technical Support.

Some problems may be induced by a database connection issue, so be sure to check the database connectivity in case of doubt.

Reconfigure Sample Scheduler Database

If the Sample Scheduler database access has been modified (after the Sample Scheduler has been installed and configured), you must reconfigure the Sample Scheduler database access parameters.

This can happen in the following situations:

- Change of database computer/Instance
- Change of the authentication mode (Windows authentication or SQL authentication)
- Change of user credentials (login and/or password).

- 1 To reconfigure the database access, ensure that no analysis is running.
- 2 Start the **<Sample Scheduler for OpenLab>\bin\Agilent.Scheduler.Database.Access.reconfiguration.exe** installed together with the **Scheduler Database**.

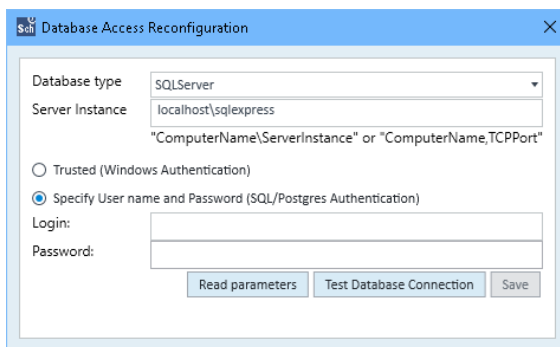


Figure 20 Database Access Reconfiguration

Maintenance Operations

- 3 Update the values of the parameters:
 - Define the Database type (SQL server or OLDR)
 - Provide the Server Instance name
 - Authentication mode (in case of SQL Server instance) with credential (in case SQL Authentication)
 - Password to access the OLDR (created during the installation of Sample Scheduler on the server)
- 4 Then click **Test Database Connection**. If the parameters are valid, you can save the new parameters. The connection parameters are updated in the registry.

Restart the *Agilent Sample Scheduler LIMS agent* service and all *Agilent Sample Scheduler agent* services (**Home/Deployment**).

Change the Sample Scheduler Agent assigned to an Instrument

In the **Instrument management** tab of Sample Scheduler configuration:

- 1 Assign the new Sample Scheduler agent computer name to the instrument, click **OK**.
- 2 Save.

In the **Deployment** window:

- 3 Restart the two Sample Scheduler agent services: the old one and the new one (ensure no analysis is currently running on the instruments managed by the Sample Scheduler agents).
- 4 Restart the Sample Scheduler LIMS agent.
- 5 Click **Refresh**.

Rename a Computer that is the Host of a Sample Scheduler Agent

- 1 Rename the computer.
- 2 If this computer is an OpenLab AIC, register the AIC.

No action is needed in Sample Scheduler; the new computer name is automatically updated in both the **Home/Instrument management** and **Home/Deployment** tabs.

Rename the Instrument in the Control Panel

In the **Instrument Management** window:

- 1 Assign the Sample Scheduler agent computer name to the instrument and click **OK**.
- 2 Save.

In the **Home>Deployment** tab:

- 3 Restart the Sample Scheduler agent service (ensure no analysis is currently running on the instruments managed by this Sample Scheduler agent).
- 4 Restart the Sample Scheduler LIMS agent.
- 5 Click **Refresh**.

Add an Instrument in the Control Panel

- 1 Create and configure the new instrument in the Control Panel.
- 2 Start a new session of Sample Scheduler configuration

In the **Instrument management** window:

- 3 Assign the Sample Scheduler agent computer name to the instrument and click **OK**.
- 4 Save.

In the **Deployment** window:

- 5 Restart the Sample Scheduler agent service assigned to the new instrument (ensure no analysis is currently running on the instruments managed by this Sample Scheduler agent).
- 6 Wait until a Sample Scheduler acquisition agent is created by the instrument managed by the Sample Scheduler agent (especially for the new instrument).
- 7 Restart the Scheduler LIMS agent.

Delete an Instrument in the Control Panel

- 1 Delete the instrument in the Control Panel.
 - 2 Start a new session of Sample Scheduler configuration
- In the **Deployment** window:
- 3 Restart the Sample Scheduler agent service that managed the deleted instrument.
 - 4 Restart the Scheduler LIMS agent.
 - 5 Click **Refresh**.

In the **Instrument management** window, ensure that the instrument name is listed no more.

Deploy a Reconfigured Instrument in Sample Scheduler

- 1 Reconfigure the instrument in the Control Panel.
 - 2 Start a new session of Sample Scheduler configuration.
- In the **Deployment** window:
- 3 Restart the Sample Scheduler agent service assigned to the instrument (ensure no analysis is currently running on the instruments managed by this Sample Scheduler agent).
 - 4 Wait until a Sample Scheduler acquisition agent is created by the instrument managed by the Sample Scheduler agent.
 - 5 Restart the Scheduler LIMS agent.

Change Project Settings in the Control Panel

If you change the project settings in the Control Panel (for example, enabling the audit trail, allowing to prompt for a reason), you must restart the Sample Scheduler agent in Sample Scheduler configuration (**Deployment** tab) for the changes to be applied.

Adding an AIC after Activation

After installing Sample Scheduler on an additional OpenLab AIC, you have to provide the Sample Scheduler Agent with valid user credentials.

- 1 Open the Sample Scheduler configuration.
- 2 Go to the **Maintenance** tab.
- 3 Select **Update OpenLab Services Credentials** and enter user name and password.
- 4 On the additional AIC, make sure that the Sample Scheduler Agent service is set to start automatically.

Uninstall/Update Sample Scheduler for OpenLab

If you want to uninstall Sample Scheduler from one computer, with either Sample Scheduler agent or Sample Scheduler LIMS agent installed, you must stop the corresponding services (Agilent Sample Scheduler agent /Agilent Sample Scheduler LIMS agent) prior to the uninstallation. Sample Scheduler client and Sample Scheduler configuration must also be closed.

If services are not stopped prior to the uninstallation, the list of agents will not be updated properly into the Sample Scheduler database, and the agents will still be listed in the Sample Scheduler configuration, **Deployment** table (in stopped state).

Connect to Another Server

If you change the server in your OpenLab system, you will also have to update the OpenLab Services Credentials in Sample scheduler. For details, refer to the Sample Scheduler online help (search **for Update OpenLab Services Credentials**).

Check up the SQL Server connectivity in case of doubt.

Change Authentication Mode

If you change the authentication mode in the Control Panel, you must also manually update the Sample Scheduler service credentials on each Sample Scheduler computer that was set up with that provider.

Back up the Sample Scheduler database

The Sample Scheduler database contains only a few entries that are persisted for a longer time. A risk-based analysis should be done to decide if, when, and how often a backup of the Sample Scheduler database is required.

If you only need to back up the configuration of Sample Scheduler after it is considered final: It may be enough to either print out the configuration from the Sample Scheduler configuration application, or export the data directly from the relevant database tables via SQL Server Management Studio.

If you need to back up data concerning the analyses: Decide how frequently the database should be backed up and how much data would be acceptable to lose in a worst-case scenario.

Consider the following for the database backup strategy:

- Check (either manual or automatic) which analyses have already been performed (for example, the backup still has analyses in Waiting state while the runs have already been carried out successfully) in order to avoid duplicate runs and re-analyses during a database restore.
- Decide on how often a backup should be done
- Make sure that the backup location is protected against possible disk failures

Recovery models

Microsoft SQL server supports several recovery models. These models affect what the backup contains, and how the database can be restored from a backup. An administrator needs to decide which recovery model should be used when coming up with a backup strategy.

- Simple Recovery model

No database transaction logs get backed-up. You can only restore back to the point in time when the backup was finished, no further back. The database cannot be reverted to a state before errors occurred (such as user mistakes or applications mistakes).

- Full Recovery model

The database and the transaction logs are backed-up. You can restore back to any point in time.

- Bulk Recover model

The database and the transaction logs are backed-up, however, bulk transactions in the transaction log are compressed. As Sample Scheduler does not use bulk transactions, this recovery model should not be used with Sample Scheduler.

Set up the recovery model settings on the database first, before backing up using that recovery model.

For a detailed comparison, refer to the Microsoft documentation:

<https://docs.microsoft.com/en-us/sql/relational-databases/backup-restore/recovery-models-sql-server>

Backup Procedure

After deciding if backups should be done, establish a backup procedure.

For detailed information on the data repository backup of the OLDR server instance, refer to the document *Configuring OpenLab CDS with OpenLab ECM*.

Depending on the SQL server edition, different options are available:

- SQL Express

Microsoft SQL Express only offers manually or job triggered backups.

For manual backups, log in to the database server with Microsoft SQL Server Management Studio, right-click the Sample Scheduler database, and select **Tasks > Back Up...**

For automating the procedure, follow the Microsoft guide on <https://support.microsoft.com/en-us/help/2019698/how-to-schedule-and-automate-backups-of-sql-server-databases-in-sql-se>

- SQL Server Standard or Enterprise

Backups on SQL Server Standard or Enterprise should be automated with the SQL Server Agent. To set this up, follow the procedures on <https://docs.microsoft.com/en-us/sql/relational-databases/maintenance-plans/use-the-maintenance-plan-wizard?view=sql-server-2017>

Restore in case of failure

If a database failure occurred, proceed as follows to restore the database to the consistent state of the backup:

- 1 If the Sample Scheduler configuration is still able to start and display the running agents in the **Deployment** tab, first stop the running Scheduler agents, then log in to the Microsoft SQL Server Management Studio.
- 2 To disconnect all connections to the database and set them offline, execute the following statement in a new SQL query:

```
alter database OpenLabSchedulerDBXXX set offline with  
rollback immediate
```
- 3 After this has finished executing, restore a backup:
 - a Right-click the database, then select **Tasks > Restore > Database**.
 - b Select the backup you want to restore.
 - c In case of a Full Recovery model setting on the database, choose the point in time to which the database should be restored to.
- 4 After finishing the restore procedure on the database, log in to the Sample Scheduler configuration and restart all services in the **Deployment** tab.

Appendix A: Microsoft SQL Server Configuration

Find below some information regarding the configuration of SQL Server. According to the version of SQL Server you are installing, the interfaces could be different, but you should access the same options.

Configure SQL Protocol for Remote Access

- 1 Start the application *Microsoft SQL Server 20xx/Configuration Tools/SQL Server Configuration Manager*.

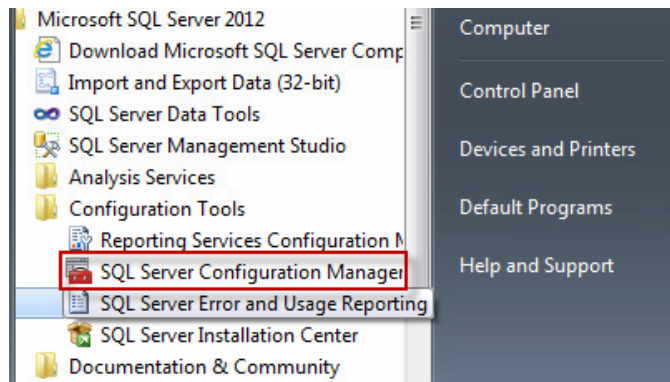


Figure 21 SQL Server Configuration Manager

- 2 Select the SQL Server Instance in the left panel

Appendix A: Microsoft SQL Server Configuration

- 3 Edit the **TCP/IP** properties
- 4 Enable the protocol TCP/IP

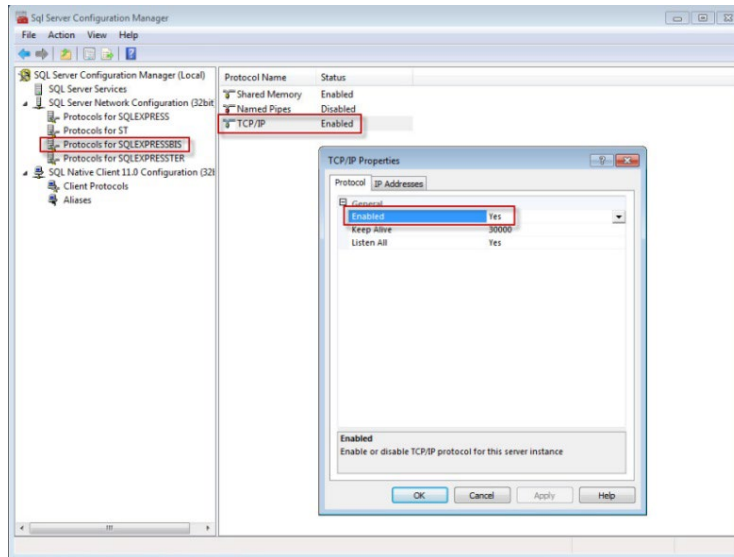


Figure 22 Enable TCP/IP

- 5 Select the second tab **IP Addresses**

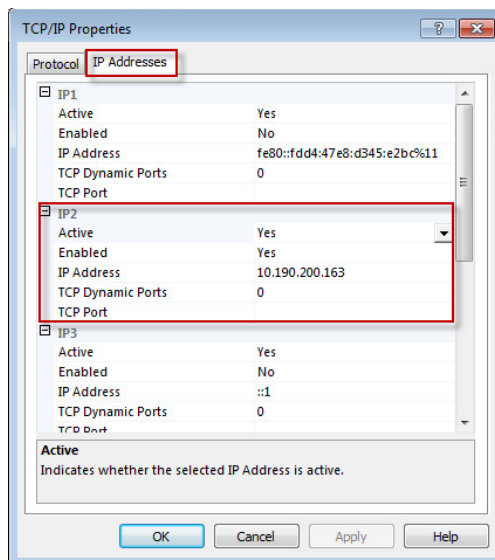


Figure 23 IP Addresses

Appendix A: Microsoft SQL Server Configuration

- 6 Activate and enable the IP address allocated to the current machine over the network.
- 7 Close the dialog.

Another option is to make the SQL Server instance listening to a static port. This TCP port must be defined with the help of your network IT people. Also, you may have to allow this static port in the Firewall's exclusions.

Setting a static port can be done by disabling all TCP dynamic Ports options in the scrolling list. Then, you must define the static TCP Port in the IP All section.

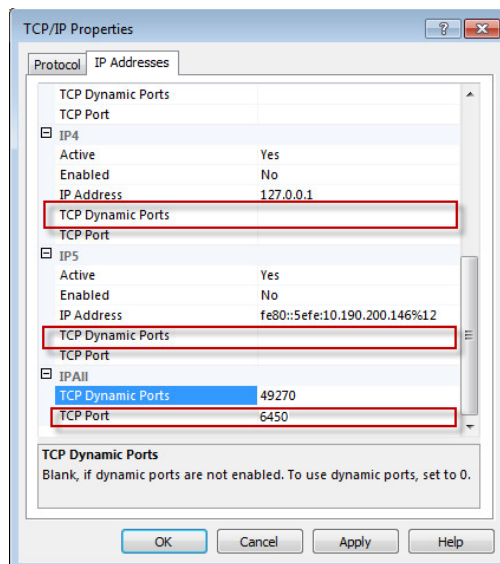


Figure 24 TCP Port

- 1 Select SQL Server Services in the left pane.
- 2 In the right pane, select the following services:
 - SQL Server (INSTANCE NAME),
 - SQL Server Browser (if fixed port is not set).

Appendix A: Microsoft SQL Server Configuration

3 Set Automatic start mode.

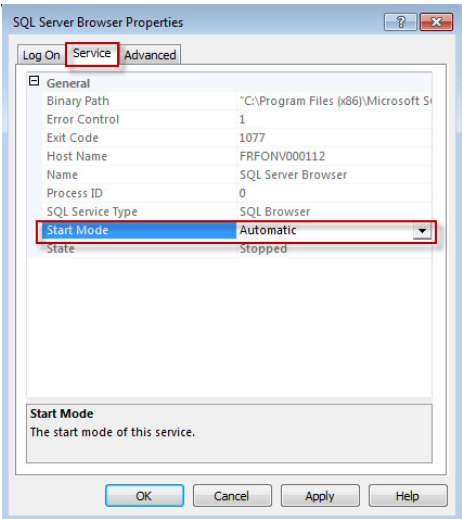


Figure 25 Automatic Start Mode

4 Restart both services.

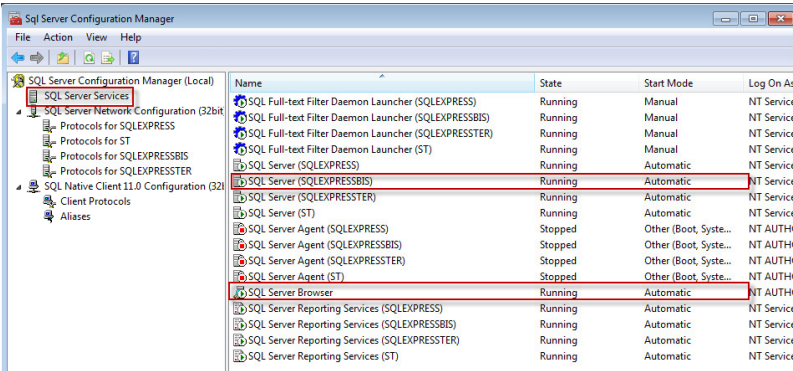


Figure 26 Configuration Manager

5 Close the application.

Switch SQL Server Authentication Mode

- 1 Start SQL Server Management Studio.

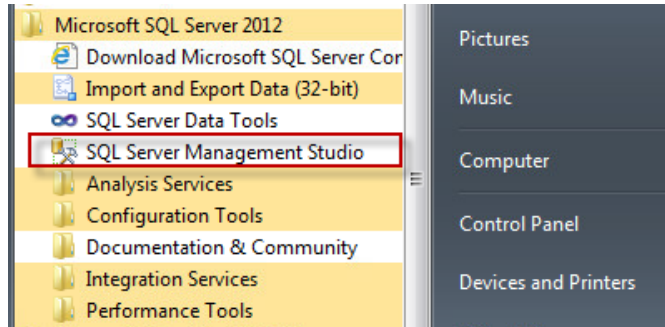


Figure 27 SQL Server Management Studio

- 2 Connect to the **SQL Server** instance with valid **Authentication** mode and credentials.



Figure 28 Connect to Server

Appendix A: Microsoft SQL Server Configuration

- 3 Select the instance and click **Properties**.

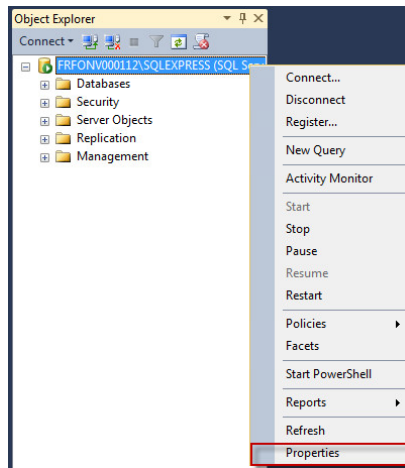


Figure 29 Properties

- 4 Select **Security** and change the **Server Authentication mode**.

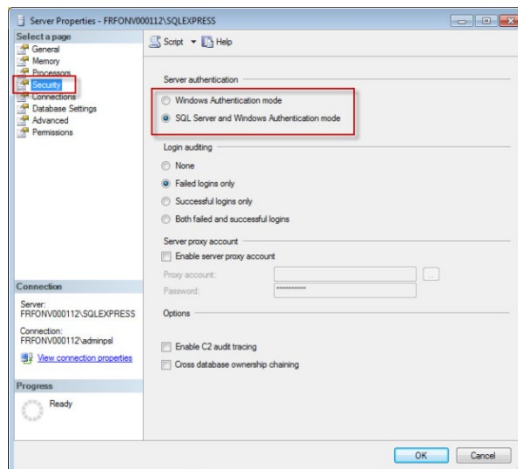


Figure 30 Security

- 5 Close the dialog.

After switching to Server Authentication Mode, you must restart the **SQL Server service SQL Server (INSTANCE NAME)**.

CAUTION

If configuring the Windows Authentication mode, ensure that all the Windows users that will log on Sample Scheduler computers have the privilege to access the OpenLab Scheduler database (for example, sysadmin). Contact your database administrators to know which privilege you must set to be consistent with your company policy rules.

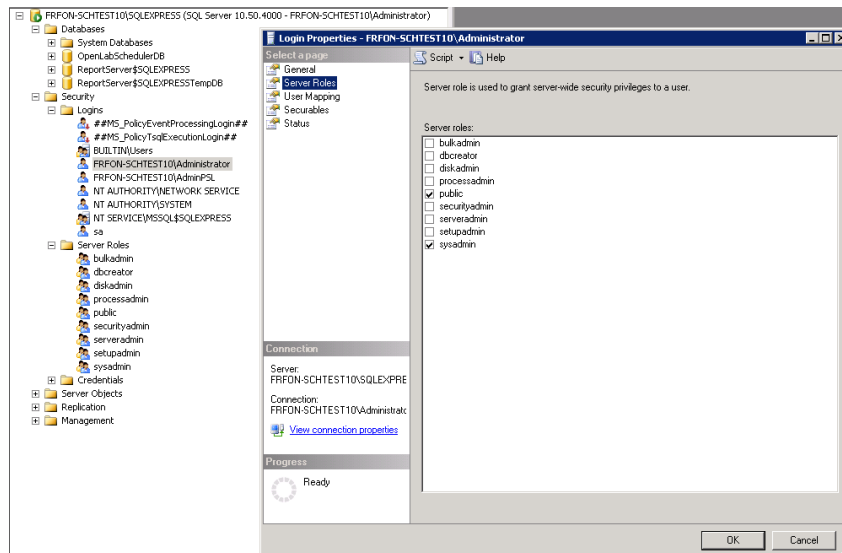


Figure 31 Server Roles

Edit or Add System Administrator

If you have selected *SQL Server and Windows Authentication Mode*, you can add a system administrator user or edit the default one (sa).

- 1 Start SQL Server Management Studio.
- 2 Edit the *System Administrator* password (sa):
- 3 On the left pane, select **Security/Logins/sa**.

Appendix A: Microsoft SQL Server Configuration

4 Click **Properties**.

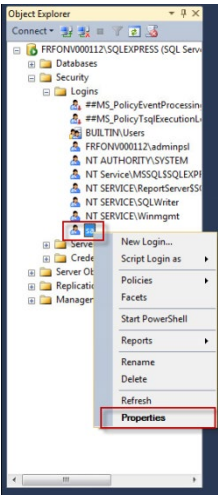


Figure 32 Properties

5 Change the password.

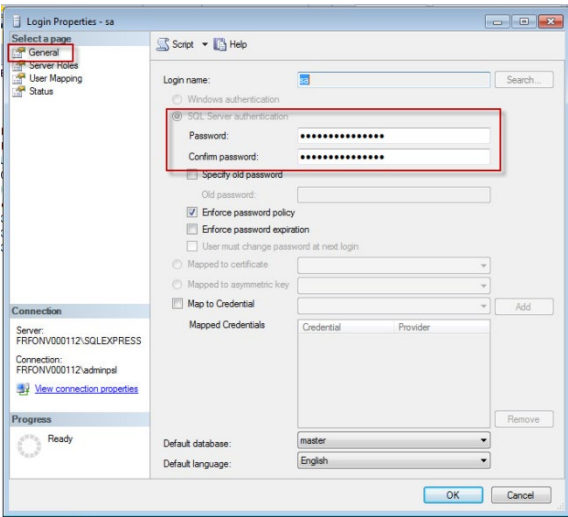


Figure 33 Change password

Appendix A: Microsoft SQL Server Configuration

- 6 Ensure the user is **Enabled**.

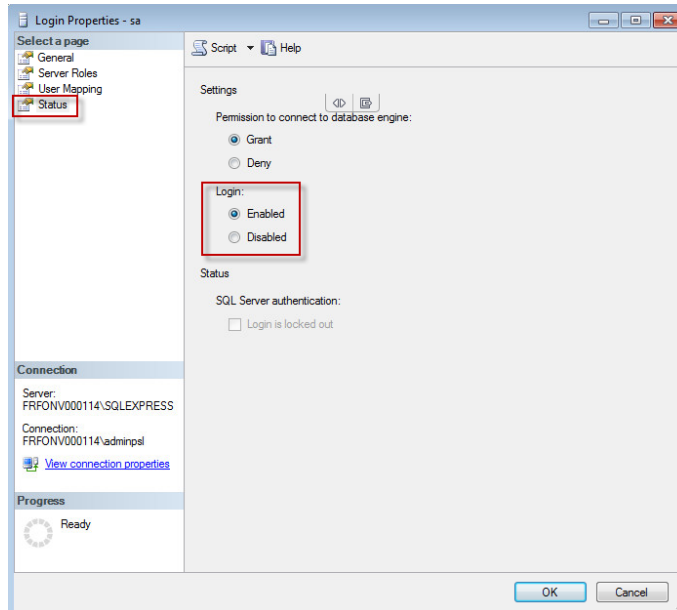


Figure 34 Enable user

- 7 Close the dialog.

The SQL Service (INSTANCE NAME) service does not need to be restarted.

Setting Up SQL Server Accounts other than 'sa'

CAUTION

If you want to use Windows Authentication Mode to let the Sample Scheduler components log in to the SQL Server database, you must change the user who runs the Sample Scheduler agent and Sample Scheduler LIMS agent. Change users via the Windows Services application. The services need to run with an account that has the required privileges on the database, as described below.

If the installation was done by an administrator using an SQL Server account with the privilege to create a database, it might be required to make Sample Scheduler use an SQL Server account with less privileges. This depends on your company policies.

The following instructions are guidelines on how to setup accounts that should be used by Sample Scheduler. There are other possibilities setting up and organizing the privileges on the SQL Server side, however this document is not the SQL Server documentation. This document lists which privileges are required to get Sample Scheduler working, and it shows how to achieve that goal in a simple way.

Create the User/Group that should be used by Sample Scheduler

- 1 To add a new database user for use with Sample Scheduler, connect to the database instance with Microsoft SQL Management Studio. You need to do this with an account that has the privilege to create new users and assign permissions to them.
- 2 On the instance level, right-click **Security>Logins**, then select **New Login**.

Appendix A: Microsoft SQL Server Configuration

- 3 If the new user should be a Windows user or group, you can search for it. For finding groups click **Object Types...** and select **Groups** to add **Groups** to the Object Types that should be searched for.

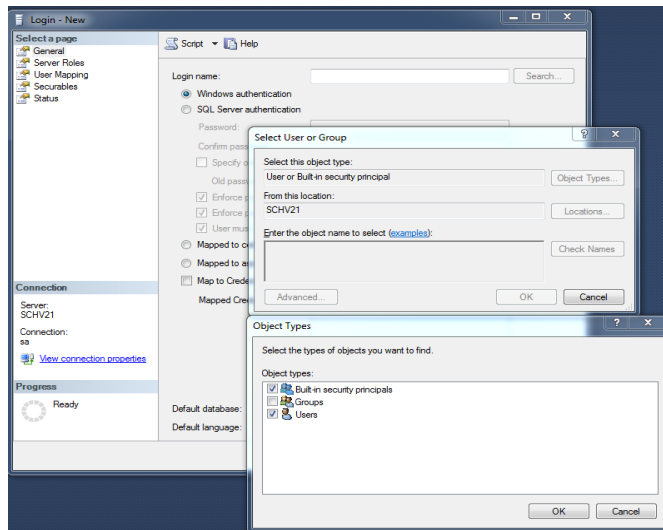


Figure 35 Object types

- 4 If you want to use SQL Server authentication with the new account, you need to specify passwords. Make sure that you either **clear User must change password at next login**, or that you change the password manually before using the account with Sample Scheduler.
- 5 After you are done specifying the login details, switch to the **Server Roles** tab.
- 6 Select **Server Roles**. Only **public** should be selected, the other ones are not needed during operation of Sample Scheduler.
- 7 Switch to the **User Mapping** tab. Select OpenLab Scheduler database (**OpenLabSchedulerDB+<version number>**).
- 8 The user column will be set to the new user you created. You can leave that as it is, no default Schema has to be selected.

Appendix A: Microsoft SQL Server Configuration

- 9 In the list of Database roles, select **public**, **db_datareader** and **db_datawriter**.

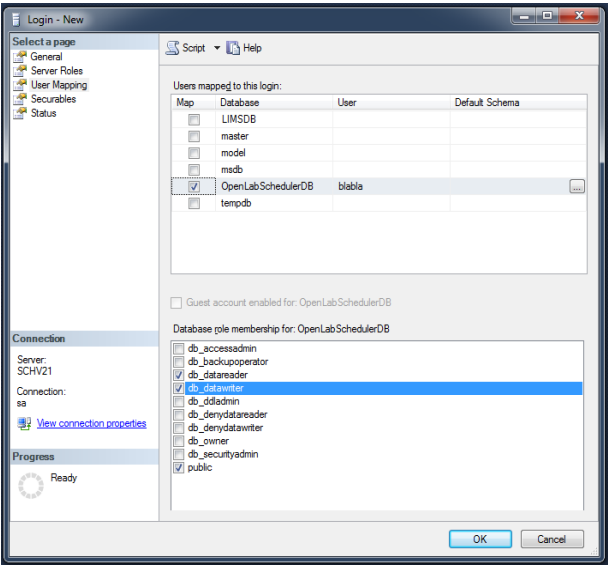


Figure 36 Database roles

Give Execute Permission to the New User/Group

- 1 Select the OpenLab Scheduler database (**OpenLabSchedulerDB+ <version number>**) in the Object Browser (**InstanceName > Databases > OpenLabSchedulerDBxxx > Properties**).
- 2 Go to the **Permissions** tab and execute a search for the user/group that was just created. Then select that user/group under the **User or roles** section.
- 3 On the **Explicit** tab select the **Grant** check box for **Execute**:

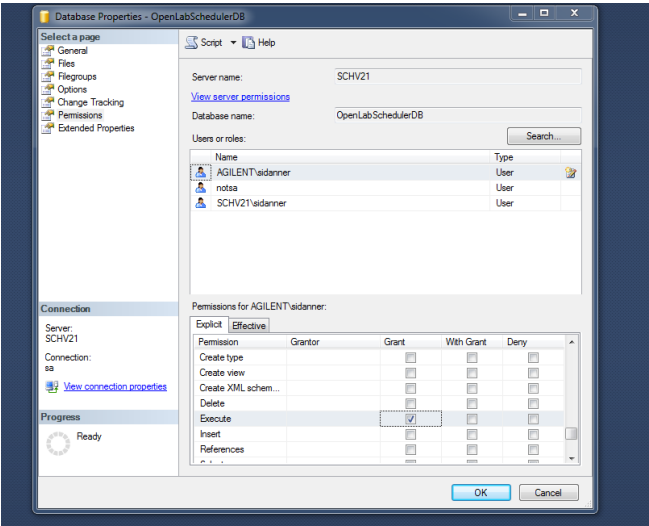


Figure 37 Grant execute permission

Give User the Right to Execute Stored Procedure

- 1 Go to **InstanceName > Databases > OpenLabSchedulerDBxxx> Programmability > Stored Procedures** and right-click **dbo.GetUpdatedExperiments**. Search again for the user that should be set up.
- 2 Then select **Grant** in the line **Execute** for that user.
- 3 Click **OK**.

After doing this step you need to reconfigure Sample Scheduler to use the new account. Do that using the Database reconfiguration tool as described under ["Reconfigure Sample Scheduler Database"](#) on page 112.

Also make sure that, if you use Windows authentication, you set up the Sample Scheduler services to run under a services account that has been added to the database.

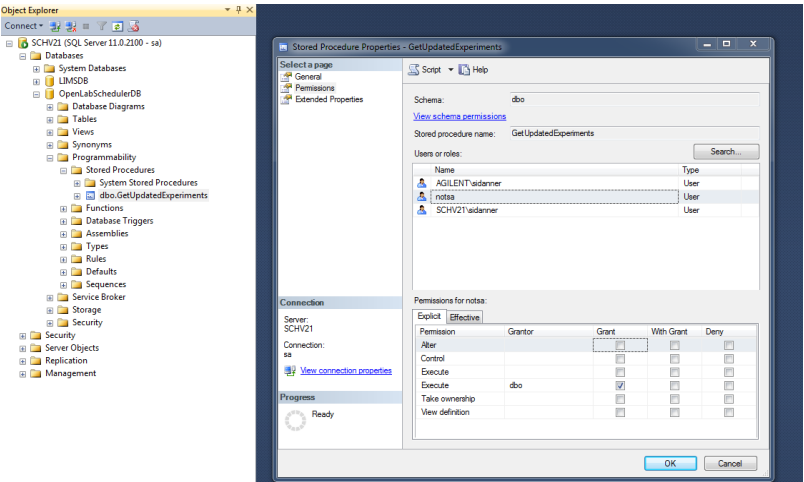


Figure 38 Set up Sample Scheduler services

Configure Firewall for SQL Server

The Firewall can block the communication between the SQL Server and the client application.

If the firewall is activated and you are not allowed to stop it, you have to add the following exclusions:

- Inbound rule, protocol TCP, port 1433,
- Inbound rule, protocol UDP, port 1434,
- Inbound rule, all ports for the application.
For SQL server 2012, use **%ProgramFiles% (x86)\Microsoft SQL Server\MSSQL11.SQLEXPRESS\MSSQL\Binn\sqlservr.exe**.
The path can differ depending on the SQL Server version.

See Microsoft documentation: <http://msdn.microsoft.com/en-us/library/cc646023.aspx>

If you still have some issues, check the firewall on the client side.

Testing Sample Scheduler Database Connectivity

Microsoft SQL Server has been installed successfully, providing an “instance” in which the Sample Scheduler database exists or is going to be created. But it might be useful to check that the instance (and the databases inside) can be accessed from any machine that should have a role in the Sample Scheduler deployment. Furthermore, it could be useful to check that connectivity is easy, at any time, for example in case of network configuration changes.

The following steps below provide a persistent way to check the implementation by defining an ODBC source. You only have to gather the following information, maybe with the help of your network IT people. Some of this information will remain unused depending on your network architecture:

- The name of the SQL Server machine.
- The IP address of that machine if the name cannot be resolved automatically by the DNS (The SQL Server machine could be unknown to the DNS which manages the current machine).
- The name of the SQL Server instance in which the Sample Scheduler database is created.
- Did you define a **static** TCP/IP port that the SQL Server instance must listen to, or did you keep it as **dynamically determined**? (This refers to the section [“Configure SQL Protocol for Remote Access”](#) on page 122, **TCP/IP properties** in the SQL Server installation above).

Check Database Connectivity

- 1 Launch Microsoft Control Panel from the start menu.
- 2 Select **Administrative Tools**, then launch **Data Sources (ODBC)**.

Appendix A: Microsoft SQL Server Configuration

- 3 Select the **User DSN** tab and start creating a brand-new data source by clicking **Add**.

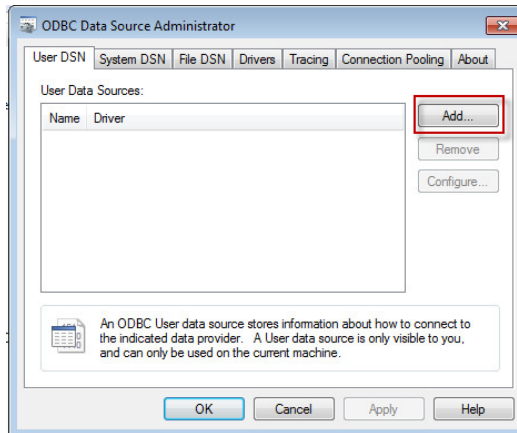


Figure 39 User DSN

- 4 Select the driver for which you want to set up a data source. The list provided here probably already contains **SQL Server** from Microsoft Corporation since it is often installed with Windows.

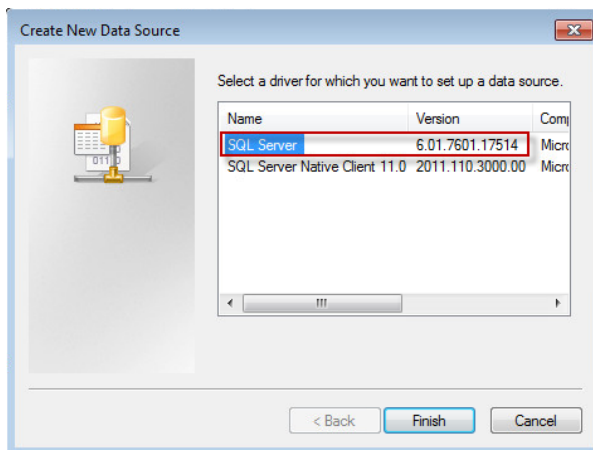


Figure 40 Create New Data Source

Appendix A: Microsoft SQL Server Configuration

- 5 Click **Finish** once you have selected **SQL Server**.
- 6 Choose a name and enter any description (for example, testing Sample Scheduler connectivity). Then identify the SQL Server you want to connect to.

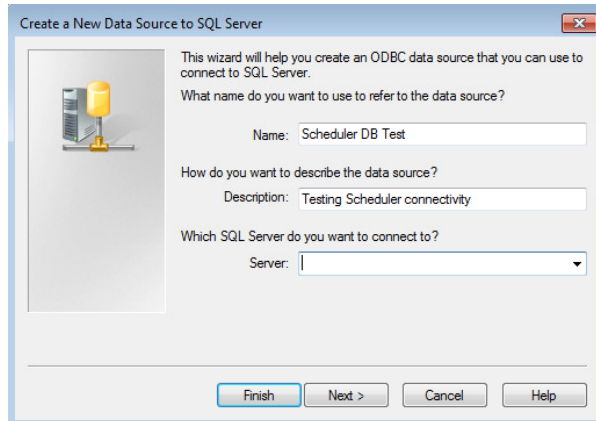


Figure 41 Choose a name

Appendix A: Microsoft SQL Server Configuration

- 7 The Server field can be filled manually or with the help of the combo box. As you can see below, you may have several possible ways to follow. Beginning from the easiest one:
 - The combo box provides an option composed by the SQL Server machine and the SQL Server instance:
 - Go ahead; you probably do not have any problem of connectivity from that computer.
 - The combo box provides an option only composed by the SQL Server machine:
 - Select that option and append it with “\” and the name of the instance.
 - Enter the IP address of the SQL Server machine by yourself, forget the instance.

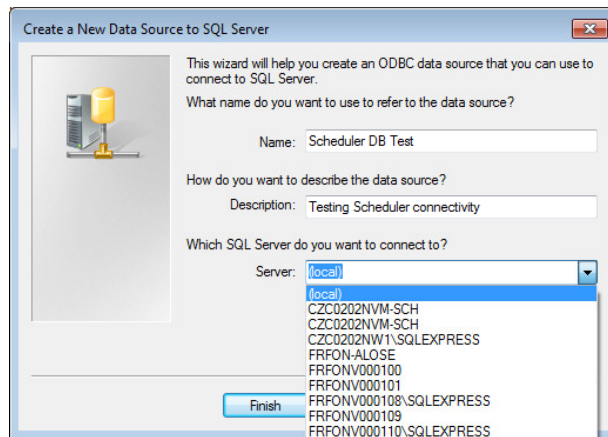


Figure 42 Identify SQL Server

- 8 Click **Next**.

Appendix A: Microsoft SQL Server Configuration

- 9 Select some authentication parameters according to the options you selected while installing Microsoft SQL Server and setting the instance.

If a static TCP/IP port was defined so that the SQL Server instance must listen to it, click **Client Configuration**. This refers to the section “[Configure SQL Protocol for Remote Access](#)” on page 122, **TCP/IP properties** in the SQL Server installation above.

Otherwise click **Next**.

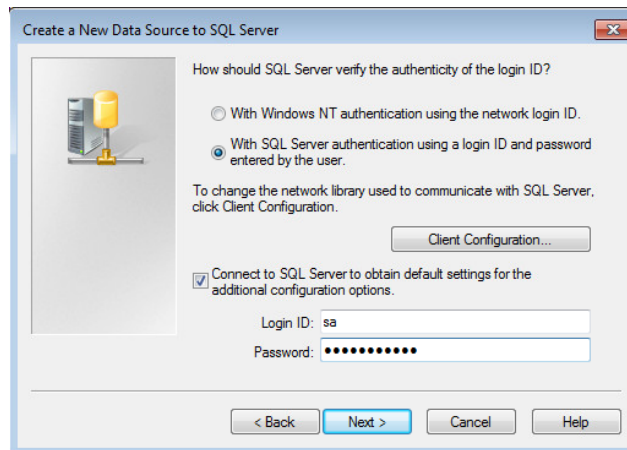


Figure 43 Select authentication parameters

Appendix A: Microsoft SQL Server Configuration

10 If you have to deal with the **Client Configuration**, then settings must be defined in the following way:

- Network libraries are set to TCP/IP.
- Server name only contains the SQL Server machine name.
- Uncheck **Dynamically determine port** and enter the port number that the SQL Server instance is expected to listen to.
- Click **OK** to go back on the authentication panel and click **Next** from there.

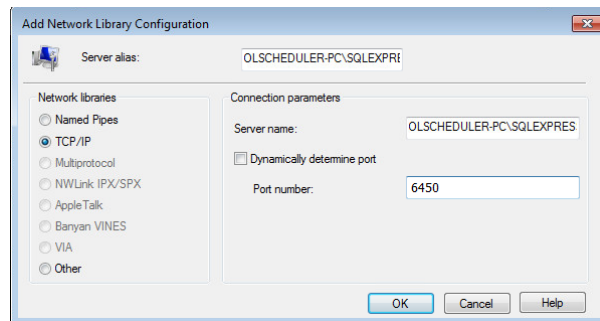


Figure 44 Client Configuration

Appendix A: Microsoft SQL Server Configuration

- 11** At this stage, the process tries to connect to the SQL Server instance with all parameters you gave.

In case of failure a popup message appears. The connection could not be established, and you may consider the following actions:

- Check SQL Server installation (machine and instance name, authentication mode, credential and TCP/IP properties).
- Check firewall settings on the SQL Server machine.
- Replace the name of the SQL Server machine by its IP address (DNS issue).
- Check that the SQL Server machine is really reachable over the network from where you are.

It might be useful to report to the network IT people you usually contact in case of trouble.

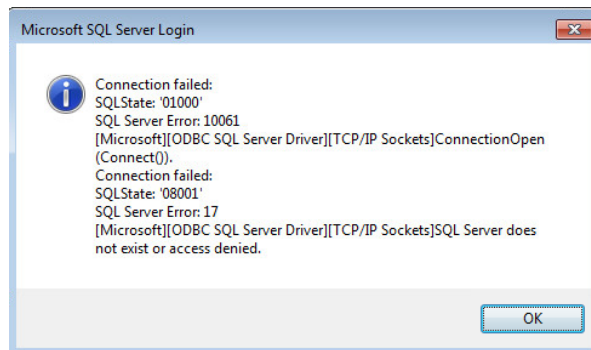


Figure 45 Error message

Appendix A: Microsoft SQL Server Configuration

- 12 If the connection succeeded, click **Next** on the following panels until you can use the **Finish** button that really creates the ODBC source.

Then the last panel appears and summarizes the settings of the ODBC source. You can now Test Data Source.

From now you are able to test your data source at any time without having to define again all parameters seen above (except possible passwords).

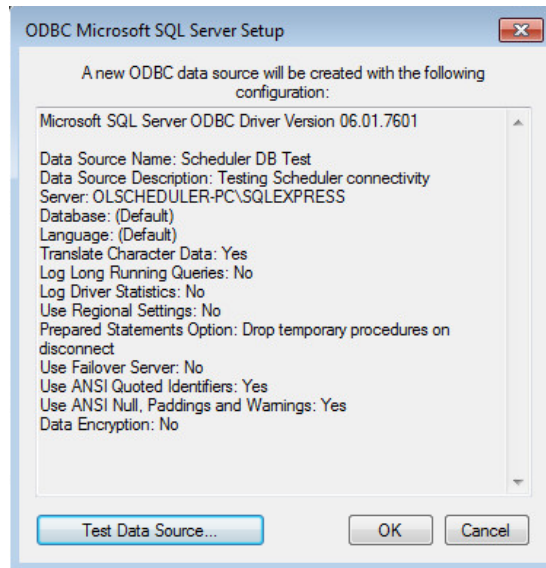


Figure 46 Test Data Source

Appendix B: Sample Scheduler for OpenLab Lab Balance Bridge

Compatibility

The Bridge is supported with the following software revisions:

- Sample Scheduler 2.7
- LabX Version 11
- LabX Version 12.

Any other product versions have not been qualified by the software vendors.

Requirements

The Sample Scheduler Balance Bridge has the following hardware and software requirements:

- Needs to be installed on a Windows machine
- Operating system:
 - Windows 10
 - Windows 11
 - Windows Server 2019
- RAM: 500 MB for use of the Bridge
- The host needs to be able to reach both application servers, the LabX Integration Service (running by default on port 51155), and the Sample Scheduler Webserver (running by default on port 443).
- The Sample Scheduler Bridge can only be used in combination with LabX Balance and the LabX System Integration Option.
- Needs to be installed on the server after the Sample Scheduler.

After installation, the files can be verified using the Software Verification Tool.

Configuration

After installation, configure the service for the environment.

- 1 In the installation folder, right-click **LabXSampleSchedulerBridge.exe**.
- 2 Select **Run as administrator**.
A command line window opens.
- 3 Update the settings as required.
Once you finish the guided update process, the changes are saved automatically. The credentials are encrypted when saving.

NOTE

To configure the logging and poll interval for LabX setting, you need to directly edit the **appsettings.json** file.

The following tables list the parameters that need to be adapted to match the environment.

Table 14 Balance Bridge LabX integration settings

Description	JSONPath	Comment
LabX Service user username	LabX.ServiceConfig.ApiUser	Needs to have the following LabX privileges: Results.View
LabX Service user password	LabX.ServiceConfig.ApiUserSecret	
LabX Service Service URL	LabX.ServiceConfig.ServiceURL	http://localhost:51155/LabX/BasicSystemIntegrationService

Table 15 Agilent Sample Scheduler for OpenLab integration settings

Description	JSONPath	Comment
OpenLab user name	SampleScheduler.ApiUser	Needs to have the following OpenLab Sample Scheduler privileges: Is a user (Sample Scheduler), Add analysis (Sample Scheduler)
OpenLab user password	SampleScheduler.ApiUserSecret	
OpenLab user domain	SampleScheduler.Domain	Optional, if OpenLab is configured to use Domain credentials
Sample Scheduler Webserver host	SampleScheduler.ServerHost	

Logging Configuration:

The third section should be left as is. It configures the logging location and behavior and can be used to diagnose configuration failures. Two parameters can be adapted, if needed to diagnose issues.

Table 16 Logging configuration

Description	JSONPath	Comment
Logfile path	Serilog.WriteTo.Args.path	Path to the logfile
LogLevel	Serilog.MinimumLevel	Available levels: Debug, Warning

Optional OpenLab Configuration

To have additional parameters submitted from LabX to OpenLab CDS, the following Sample Custom Parameters can be set up in projects via the OpenLab Control Panel that will be used for samples coming from the LabX software.

Table 17 OpenLab configuration

Sample Custom Parameter Name	Sample Custom Parameter Type	Description
BatchID	Text	Contains LabX BatchID
LabX meta data	Text	Contains: LabX User, LabX TaskID and LabX Status, in a key value format: <key_name1>:<key_value1> <key_name2>:<key_value2>

LabX Task Result Mapping

The connection tool monitors LabX for tasks that have been completed and transfers the relevant data of that task over to Sample Scheduler according to the mapping definitions defined below.

Only tasks that have normally completed will be picked up by the tool. Tasks that were stopped are ignored and their data is not transferred to Sample Scheduler.

Mapped Method Function Names

The mapping between results in the LabX tasks and the parameters in Sample Scheduler is based on the method function names in the LabX method. The following table lists the correlations between LabX results and Sample Scheduler parameters.

Global Parameters

Following parameters are expected once per task (outside sample scope).

Table 18 Global parameters

Method Function Name	Transferred Data	Comments
BatchID	Text	See optional OpenLab configuration

Appendix B: Sample Scheduler for OpenLab Lab Balance Bridge

LabX Sample Parameters

Following parameters are expected once per sample (inside sample scope).

Table 19 LabX sample parameters

Method Function Name	Transferred Data	Sample Scheduler Parameter	Comments
Sample.ID2	Text	Barcode	The value is taken from SampleID2 instead of a Method Function
SampleType	Text	SampleType	Defaults to Undefined ; accepted Text values are: Sample, Calibration Standard, Blank, Doubleblank, QC Check, Sys Suit, Spike. Spaces and upper and lower case are ignored
ConcentrationLevel	Number	Level	Defaults to 1
SolventName	Text	-	
LiquidVolume	Number & Unit	Description	Mandatory*
Density	Number & Unit	-	
CompoundName	Text	Compound Name	Mandatory*
CompoundAmount	Number & Unit	Description	Mandatory* Only available for sample type: Cal. Std., QC Check
SampleAmount	Number	Sample amount, Description	Only available for sample type: Sample
FinalConcentration	Number & Unit	Description	Mandatory*

* Mandatory: LabX sample is ignored if value is not present. If no valid sample detected, the whole task is ignored.

Weighing Results Transmitted to OpenLab Sample Scheduler

The LabX Bridge submits values to different parameters depending on the sample type submitted by LabX. In case of calibration samples, the concentration as calculated by LabX is mapped to the **CompoundAmount**. In case of samples of the type **Sample**, the weighed-in amount is mapped to the **SampleAmount**.

Appendix C: Troubleshooting

In case of any error, you can refer to the logs generated by the application to understand the reason and perform by yourself a corrective action. Logs are generated in the **%ProgramData%\Agilent\Sample Scheduler for OpenLab\Logs** folder.

For details on how the logs are produced, refer to the “[Activity Logs](#)” chapter on page 111.

- Command blocked in the LIMS Commands folder or trashed: **Agilent.Scheduler.Lims.Agent.log**.
- Acquisition not managed properly: **Agilent.Scheduler.Agent.log** or **Agilent.Scheduler.Acquisition.Agent.InstrumentName.log**
- Display issue in Scheduler interface: **Agilent.Scheduler.Client.log**

NOTE

Some problems are induced by a database connection issue. Keep it in mind while investigating and do not hesitate to check up the database connectivity. How to check SQL Server connectivity is described in Appendix A.

Some errors can be solved by following one of the simple procedures described below.

Core Engine Service does not Start

Without the Database Management Service, the following Sample Scheduler services are unable to start:

- Agilent Sample Scheduler Agent
- Agilent Sample Scheduler LIMS Agent
- Agilent Sample Scheduler Orchestrator
- Agilent Sample Scheduler Webserver

Both Sample Scheduler Services do not Start

When the service (Agilent Sample Scheduler agent or Agilent Sample Scheduler LIMS agent) is stopped and cannot be started, with an error listed in the logs, check the following points:

- The Enterprise path is properly configured in the OpenLab system, and is reachable (that is: No network communication issue). If it is not the case, contact the CDS administrator to solve the issue.
- The user used to connect to the OpenLab system has no privilege to use any of the instruments configured in Sample Scheduler configuration / Instrument Management:

Ensure that the user configured in the Sample Scheduler configuration/Maintenance/Update OpenLab Services Credentials screen has privileges to use all instruments and all projects to be managed by the Sample Scheduler.

- To start the Sample Scheduler agents, first ensure that the Sample Scheduler Webserver is running.

Sample Scheduler Agent Service does not Start

When several Scheduler agents are installed, one or more instruments must be assigned to each agent. If one Scheduler agent has no instrument assigned, the agent automatically stops.

When Agilent Sample Scheduler Agent service stopped automatically, open the Sample Scheduler configuration, go to **Instrument management**, and check that the agent manages at least one instrument.

Changing the password of the Instrument Service Account for EZChrom systems also causes the Sample Scheduler Agent service not to start. In this case, change the Log On credentials for the Agilent Sample Scheduler Agent service on every Sample Scheduler installation in the EZChrom system (under **Services>Agilent Sample Scheduler Agent > Properties**).

XML Command Management

Command File got Stuck in the LIMS_Commands Folder

When commands are blocked in the LIMS_Commands folder, check that the Agilent Sample Scheduler LIMS agent is started. If it is not the case, start it. If it automatically stops again, read the **Agilent.Scheduler.Lims.Agent.log** to understand the reason.

Command File is not Archived in the Processed Folder

Check that the processed folder defined in the Sample Scheduler configuration exists. If that is not the case, create it.

Command is Rejected in the Trash Folder

Read the **Agilent.Scheduler.Lims.Agent.log** stored in the **%ProgramData%\Agilent\Sample Scheduler for OpenLab\Logs** folder to know why the command has been trashed. This log is located on the computer where the LIMS agent is installed. It can be due to an invalid value, a syntax error or the absence of a mandatory parameter.

Command collected in LIMS from SQL Query

LIMS Database not notified back

Due to a Loss of Connection

You may have defined SQL queries in the Sample Scheduler configuration in order to notify the LIMS database about a command that has been handled. If a momentary loss of connection occurs, the LIMS database is not notified. The Sample Scheduler could handle again the same command, then trash it as it detects an analysis with the same name already exists.

In this case you get the following message in the LIMS agent log:

```
| Info | Notifying LIMS database for VALID command Id 3...
| Warn | Unable to notify LIMS database,
'System.Data.SqlClient.SqlException' occurred with message
'A transport-level error has occurred when sending the
request to the server. (Provider: TCP Provider, error: 0 -
An existing connection was forcibly closed by the remote
host.)'.
| Warn | Unexpected result while notifying LIMS database on
try 1/5
...
| Warn | Unable to notify LIMS database, connection state is
'Closed'
| Warn | Delete Analysis - no analysis found in the database
| Warn | Try to reopen 'Closed' LIMS database connection...
| Warn | Unexpected result while notifying LIMS database on
try 2/5
...
```

The SQL Query cannot Update the Command in the LIMS Database

You may have defined SQL queries in the Sample Scheduler configuration to notify the LIMS database about a command has been handled. The Sample Scheduler is expected to update the command in the LIMS database. In some cases, the update could fail (note that five update attempts are performed). The following message is displayed in the LIMS agent log:

```
| Info | Notifying LIMS database for VALID command Id 1...  
| Warn | Notification has been successfully sent to LIMS  
database but no row was affected.  
| Warn | Unexpected result while notifying LIMS database on  
try 1/5  
| Warn | Notification has been successfully sent to LIMS  
database but no row was affected.  
| Warn | Unexpected result while notifying LIMS database on  
try 2/5  
| Warn | Notification has been successfully sent to LIMS  
database but no row was affected.  
| Warn | Unexpected result while notifying LIMS database on  
try 3/5  
| Warn | Notification has been successfully sent to LIMS  
database but no row was affected.  
| Warn | Unexpected result while notifying LIMS database on  
try 4/5  
| Warn | Notification has been successfully sent to LIMS  
database but no row was affected.  
| Warn | Unexpected result while notifying LIMS database on  
try 5/5
```

Analysis got Stuck During Life Cycle

Analysis Stays in Scheduled State

- Check that the instrument on which the analysis is launched is assigned to a Sample Scheduler agent in Scheduler configuration/Instrument management. If it is not the case, assign it to a Sample Scheduler agent, then restart the corresponding Scheduler agent in the Sample Scheduler configuration/Deployment tab. If the analysis still not starts, end the AcquisitionServer.exe (OpenLab CDS or EZChrom service) in the task manager, to release the connection with the instrument.
- Check that the user defined in the OpenLab services credentials in the Sample Scheduler configuration still exists in the Control Panel and that he has the privilege to use the instrument and the project on which the analysis is launched. If it is not the case, update the credentials with a user who can access all relevant instruments and projects to perform analyses with Sample Scheduler.

Analysis Stays in Submitted State

Before starting an analysis, the Sample Scheduler acquisition agent checks for the instrument license and uses it during operation. If an analysis stays in **Submitted** state, check that an *Agilent OpenLab Sample Scheduler Expansion Pack* license is available. In the web browser, insert the following address: `http://<name of the License Server>:8090`.

If no license is available (because the instrument is currently running), the Sample Scheduler acquisition agent tries to obtain a license in a loop (in a time interval of 30 seconds). After 15 attempts the analysis turns into the **Error** state.

The users defined in the **Notification** tab will be informed about the missing license (by email and/or on the Notification screen of the Sample Scheduler client).

Analysis Blocked in the Sample Scheduler database

When an analysis is blocked in the Sample Scheduler database, connect to the Scheduler client, select the analysis, and click **Reset**. To be able to reset the analysis, you need the privilege **Reset analysis**. The analysis will be either turned into **Error** or **Waiting** state (according to its state while it was stuck in the database).

Analysis Turns into Error/Waiting on Error

Analysis Turns into Error after Having been Stopped from the CDS

When an analysis running in the Sample Scheduler is stopped from the CDS, it turns into **Error** state in the Scheduler. Then the other scheduled analyses on the same instrument turn into **Waiting on error** state. The Scheduler is not informed that the acquisition has been stopped from the CDS; it is only informed that the acquisition didn't go up to the end, which is an abnormal behavior from its point of view.

CAUTION

Reason of abort is not communicated to the CDS

The CDS interprets this as abnormal behavior and puts the analysis into Error state.

- ✓ Do not stop an acquisition from within the CDS that has been launched from the Sample Scheduler.
- ✓ Reschedule the analyses that have been put into Waiting on error state.

Analysis Passes from Scheduled to Error or Waiting on Error State

When an analysis passes from **Scheduled** to **Error** or **Waiting on error** state, it can be due to an instrument error, a connection issue between Sample Scheduler and OpenLab CDS. You can access the reason of the error in the Sample Scheduler client by clicking the **State** cell of the **Error** analysis. A message extracted from Sample Scheduler logs and the OpenLab system logs is displayed explaining the reason why the analysis turned into **Error**.

Client or Configuration Connection Issues

If you get the **User is not authenticated** message when connecting either to the Sample Scheduler client or Sample Scheduler configuration, check that the user name still exists in the Control Panel and that the password is correct.

If you get the **User 'Username' is not administrator** message when connecting to Sample Scheduler configuration, check that the user has the **Is an administrator** (Sample Scheduler) privilege in the Control Panel under **Administration**.

Analyses are not Displayed in the Sample Scheduler Client

The user connected to the Sample Scheduler client can only see the analyses launched on the instruments/projects he has access to.

If the user access privileges have been modified in the Control Panel (allow the user to use an instrument and/or project) while a Sample Scheduler client session is still open, the changes are not considered. The user cannot see the analysis associated with the new instrument/project in the Sample Scheduler client. The OpenLab user instruments/projects access privileges are loaded only at the Sample Scheduler client opening. To load the new instruments/projects access privileges, close and reopen the Sample Scheduler client. The analyses will be visible.

Loss of Connection

A loss of connection can be caused by database, network related or instance specific errors.

When getting the message box **Agilent Sample Scheduler Client (or Configuration) has stopped working**, it could mean that you have lost the connection with the Sample Scheduler database. The reason can be that the connection mode and /or the credentials have been modified. Please read the **Agilent.OpenLab.Scheduler.Client**, or **Agilent.OpenLab.Scheduler.Configuration** logs to have more information. If analyses were running, they will be turned into the **Error** state. In the corresponding Scheduler agent log you will get the message **Impossible to update agent instance Computer name: ComputerName, agent Id: scheduler agent...**

For more information about changing these parameters on the SQL Server, refer to the sections of [“Switch SQL Server Authentication Mode”](#) on page 126 and [“Edit or Add System Administrator”](#) on page 128.

Critical Error when Saving Configuration

When getting the following critical error on saving configuration: **Configuration value could not be modified in database**, and no connection is established to the database (**Not connecting** message in the status bar), check that the connection mode and the credentials have not been modified for Sample Scheduler database.

For SQL Server, refer to [“Switch SQL Server Authentication Mode”](#) on page 126 and [“Edit or Add System Administrator”](#) on page 128.

Impossible to Start Sample Scheduler Services

When you cannot start either the Sample Scheduler LIMS agent service or the Sample Scheduler agent service, and you get the **Invalid OpenLab Authentication Ticket** message in the corresponding log file:

- 1 Check if the ticket is correct:
 - a Open the Sample Scheduler configuration **Maintenance/ Update OpenLab Services Credentials**, define the credentials and click **Save**.
 - b Start again the Sample Scheduler agent service or Sample Scheduler LIMS agent service.
 - c If it still does not start, and OpenLab is configured in *Windows domain* authentication mode, perform step 2.
- 2 Check on *all computers* where either a Sample Scheduler agent or a Sample Scheduler LIMS agent is installed that the Shared Services are defined by their IP or as: ComputerName.DNSdomain (for example, MyComputerName.mydomain.com). If it is not the case, modify them.
Open Shared Services Maintenance > Server settings > Add server. Define the correct server, and set this server as default.

Scalable System Shows Multiple Main Instances

In some instances of scalable environments, the **Deployment** screen shows multiple instances of the following Sample Scheduler services:

- Scheduler LIMS Agent
- Scheduler Webserver

This can happen in the following circumstance:

Load balanced system or scalable system: CM2/CM3/Index servers, if the load balancer is configured as the primary OLSS server on the additional servers in the Shared Services maintenance utility

For proper usage of Sample Scheduler, only activate the services on the active OLSS server. Deactivate them on all other servers.

Dashboard does not Open After Reinstallation With new Database

If you have already opened a Sample Scheduler session before an upgrade, data is cached within the browser session. This prevents login after upgrade.

Empty the browser cache after upgrading.

Appendix D: Parameter Mapping to CDS

Table 20 Mapping of Parameters used in Sample Scheduler for OpenLab, OpenLab CDS version 2.x, and EZChrom

Parameter XML in Sample Scheduler for OpenLab, version 2.x	Parameter XML in Sample Scheduler for OpenLab CDS, version A.02.x	Parameter in OpenLab CDS version 2.x	Parameter in EZChrom ASCII Sequence
SampleName	SampleId	SampleName	SampleId
ProcessingMethodName	MethodName	ProcessingMethod	MethodName
AcquisitionMethodName	MethodName	AcquisitionMethod	n/a
InjectionSource	Position	InjectionSource	Tower
Description	Line	SampleDescription	RunDescription
Vial	Vial	SampleLocation	Vial
UseMethodInjectionVolume	UseMethodInjectionVolume	UseMethodInjectionVolume	InjectionVolumeFromMethod
InjectionVolume	InjectionVolume	Volume	InjectionVolume
SampleAmount	SampleMass	SampleAmount	SampleMass
Dilutor1	Dilutor	Dilutor1	DilutionFactor1
Dilutor2	n/a	Dilutor2	DilutionFactor2
Dilutor3	n/a	Dilutor3	DilutionFactor3
Dilutor4	n/a	Dilutor4	n/a
Dilutor5	n/a	Dilutor5	n/a
Multiplier1	Multiplier	Multiplier1	MultiplicationFactor1
Multiplier2	n/a	Multiplier2	MultiplicationFactor2
Multiplier3	n/a	Multiplier3	MultiplicationFactor3
Multiplier4	n/a	Multiplier4	n/a
Multiplier5	n/a	Multiplier5	n/a
Description	Description	Description	RunDescription
SampleType	SampleType	SampleType	RunType
CalibrationRunType	CalibrationMode	CalibrationRunType	RunType
Level	Level	CalibrationLevel	CalibrationLevel
InjectionsPerSample	n/a	InjPerVial	InjectionsPerVial

Appendix D: Parameter Mapping to CDS

Table 20 Mapping of Parameters used in Sample Scheduler for OpenLab, OpenLab CDS version 2.x, and EZChrom

Parameter XML in Sample Scheduler for OpenLab, version 2.x	Parameter XML in Sample Scheduler for OpenLab CDS, version A.02.x	Parameter in OpenLab CDS version 2.x	Parameter in EZChrom ASCII Sequence
n/a	PrintMethodReports	n/a	Check box in the Sequence Run dialog
Datafile	DataFileName	n/a	DataFileName
SamplePrepMethodName	n/a	SamlePrepMethod	PretreatmentFileName
n/a	n/a	n/a	FractionCollectorFileName
n/a	not supported anymore by current EZChrom	n/a	Action
Target1	n/a	Target1	n/a
Target2	n/a	Target2	n/a
Target3	n/a	Target3	n/a
Target4	n/a	Target4	n/a
Target5	n/a	Target5	n/a
InternalStandardAmount1	InternalStandardAmount	InternalStandardAmount1	InternalStandardAmount
InternalStandardAmount2	n/a	InternalStandardAmount2	n/a
InternalStandardAmount3	n/a	InternalStandardAmount3	n/a
InternalStandardAmount4	n/a	InternalStandardAmount4	n/a
InternalStandardAmount5	n/a	InternalStandardAmount5	n/a
LimsID1	n/a	LimsID1	n/a
LimsID2	n/a	LimsID2	n/a
LimsID3	n/a	LimsID3	n/a
SampleCustomParameters	n/a	SampleCustomParameters in selected Project	n/a

In This Book

This manual describes the following:

- Sample Scheduler Requirements
- Sample Scheduler Installation
- Privileges
- Upgrade
- Migration
- Uninstallation
- LIMS Commands and command validity process
- Activity Logs
- Maintenance operations

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