SIEMENS

SIMATIC HMI

WinCC V7.4
WinCC/Connectivity Pack

System Manual

Print of the Online Help

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

> ⚠ **DANGER**
>
> indicates that death or severe personal injury **will** result if proper precautions are not taken.

> ⚠ **WARNING**
>
> indicates that death or severe personal injury **may** result if proper precautions are not taken.

> ⚠ **CAUTION**
>
> indicates that minor personal injury can result if proper precautions are not taken.

> **NOTICE**
>
> indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

> ⚠ **WARNING**
>
> Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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WinCC/Connectivity Pack Installation Notes

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1.1 Licensing

Introduction

The WinCC/Connectivity Pack enables licensed access to online and archive data of WinCC.

The Connectivity Pack includes licenses for access using:

- WinCC OPC XML DA Server
- WinCC OPC-DA Server
- WinCC OPC HDA Server
- WinCC OPC A&E Server
- WinCC OPC UA Server

Starting from WinCC/Connectivity Pack V7.0, a WinCC Client Access License (WinCC/CAL) is no longer required.

1.2 How to Install MS Message Queuing

Introduction

WinCC implements the Message Queuing services from Microsoft. It is a component part of the operating system. MS Message Queuing is however not included in the standard Windows installation and must be installed separately if required.

The Windows installation CD is required to complete the installation.

Note

WinCC is enabled for operation within a domain or workgroup.

Note however that domain group policies and restrictions in the domains may prevent installation. In this case, remove the computer from the domain before installing Microsoft Message Queuing, Microsoft SQL Server 2014 and WinCC. Log on to the computer concerned locally with administrator rights. Carry out the installation. Following successful installation, the WinCC computer can be registered in the domain again. If the domain-group policies and domain restrictions do not impair the installation, the computer must not be removed from the domain during installation.

Note however that domain group policies and restrictions in the domain may also hinder operation. If these restrictions cannot be overcome, operate the WinCC computer in a work group.

If necessary, contact the domain administrator.

Procedure for Windows 7

1. In the operating system Start Menu, open "Control Panel > Programs and Functions".
2. Click the "Enable/Disable Functions" button on the left menu bar. The "Windows Function" dialog opens.
3. Select the "Microsoft Message Queue (MSMQ) Server" component.
4. Activate the "Microsoft Message Queue (MSMQ) Server Core" component.
5. Deactivate the subsidiary components.
6. Confirm with "OK".

Procedure for Windows 8.1

1. Go to "Control Panel > Programs and Features".
2. Click the "Turn Windows features on or off" button on the left menu bar. The "Windows Features" dialog opens.
3. Select the "Microsoft Message Queue" component.
4. Activate the "Microsoft Message Queue Server Core" option.
5. Deactivate the subsidiary components.
6. Confirm with "OK".

Procedure with Windows 10

1. Go to "Control Panel > Programs and Features".

2. Click the "Turn Windows features on or off" button on the left menu bar. The "Windows Features" dialog opens.

3. Activate the "Microsoft Message Queue (MSMQ) server" component.
   The "Microsoft Message Queue (MSMQ) Server Core" entry is selected.
   The subcomponents remain disabled.

4. Confirm with "OK".

Procedure for Windows Server 2008 R2

1. Start the Server Manager.

2. Right-click on "Features" in the navigation area and select "Add features".

3. Activate the "Message Queuing" option, and under it also the "Message Queuing Services" and "Message Queuing Server" options.

4. Click "Install".

Procedure for Windows Server 2012 R2

1. Start the Server Manager.

2. Click on "Add roles and features". The "Add Roles and Features Wizard" window opens.

3. Click "Server selection" in the navigation area. Ensure that the current computer is selected.

4. Click "Features" in the navigation area.

5. Activate the "Message Queuing" option, and under it also the "Message Queuing Services" and "Message Queuing Server" options.

6. Click "Install".

1.3 Installation of the Connectivity Pack Server

Introduction

The installation of the Connectivity Pack Server includes the following components:

- WinCC OLE DB Provider

- SQL Server 2014 SP1 32-bit

- "Automation License Manager" for Management of WinCC Licenses

- WinCC Archive Connector

- WinCC DataConnector

- WinCC Basic Components

- Documentation

- Examples

Requirements

- Hardware requirement:
  Observe the WinCC V7.4 hardware requirements for WinCC server.

- Operating system:

  – Windows 7 SP1 (max. 3 clients) 32-bit/ 64-bit

  – Windows 8.1 (max. 3 clients) 32-bit/ 64-bit

  – Windows 10 (max. 3 clients) 64-bit [1]

  – Windows Server 2008 Standard R2 SP1 64-bit

  – Windows Server 2012 Standard R2 64-bit

- Microsoft Message Queuing must be installed.

- Microsoft Internet Explorer as of V11.0 (32-bit)

- For access to WinCC RT archives WinCC V7.4 must be installed.

1) Windows 10 only has restricted release. You can find detailed information in the Product Support under the entry number="109482899":

- Internet: Windows 10 for WinCC V7.4 - FAQ (http://support.automation.siemens.com/WW/view/en/109482899)

Note

To use more than three clients, you must install the server version. With the workstation version, you can use max. three clients.

Procedure

1. In order to configure a computer as Connectivity Pack Server, run the Connectivity Pack Server setup on the computer.

2. Select the "ConnectivityPack-Server" entry on the WinCC Product DVD in the "Program Packages" dialog.

Licensing

For operation of the Connectivity Pack Server, the license for the WinCC Connectivity Pack option is required.

Access rights

All the users of the WinCC/Connectivity Pack have to be included in the Windows user group "SIMATIC HMI".

The user has to be a member of the user group "SIMATIC HMI" on the Connectivity Pack server for remote access of a Connectivity Pack client.

See also

Licensing (Page 7)

Internet: Windows 10 for WinCC V7.4 - FAQ (http://support.automation.siemens.com/WW/view/en/109482899)

1.4 Installation of the Connectivity Pack Client

Introduction

The installation of the Connectivity Pack Client includes the following components:

- WinCC OLE DB Provider
- WinCC DataConnector
- SQL Connectivity Tools
- Documentation

Note

In order to install the SQL Connectivity Tools, you will need administrator rights on the computer.

Requirements

- Operating system:
  - Windows 7 SP1 (max. 3 clients) 32-bit/ 64-bit
  - Windows 8.1 (max. 3 clients) 32-bit/ 64-bit
  - Windows 10 (max. 3 clients) 64-bit [1]
  - Windows Server 2008 R2 Standard SP1 64-bit
  - Windows Server 2012 R2 Standard 64-bit
- Microsoft Message Queuing must be installed.
- Microsoft Internet Explorer as of V11.0 (32-bit)

1) Windows 10 only has restricted release. You can find detailed information in the Product Support under the entry number="109482899":

- Internet: Windows 10 for WinCC V7.4 - FAQ (http://support.automation.siemens.com/WW/view/en/109482899)

Procedure

1. In order to configure a computer as Connectivity Pack Client, run the Connectivity Pack Client setup on the computer.
2. Select the "ConnectivityPack-Client" entry on the WinCC Product DVD in the "Program Packages" dialog.
3. If WinCC V7.4 is already installed on the client, an additional installation of the Connectivity Pack Client is not required.

Access rights

All the users of the WinCC/Connectivity Pack have to be included in the Windows user group "SIMATIC HMI".

The user has to be a member of the user group "SIMATIC HMI" on the Connectivity Pack server for remote access of a Connectivity Pack client.

See also

Licensing (Page 7)

Internet: Windows 10 for WinCC V7.4 - FAQ (http://support.automation.siemens.com/WW/view/en/109482899)

WinCC/Connectivity Pack Release Notes

<div style="text-align: right; font-size: 3em;">2</div>

2.1 Important information on the Connectivity Pack

Content

These release notes contain important information.

The statements in these release notes take precedence over information provided in the manuals and in the online help.

Please read these release notes carefully as they contain useful information.

Exchange of data between OPC client and Connectivity Station via OPC UA

A OPC UA server is implemented in the Connectivity Station which is available at the address "opc.tcp://[HostName]:[Port]".

HostName	Placeholder for the computer name; is inserted automatically.
Port	Port number. The default is "4864".

Limitation for use of WinCC OLEDB Provider

As of WinCC V7.2, the function "Import" via the interface "WinCC OLEDB Provider" does not run in MS Office Excel.

Updated demo project for Connectivity Pack

The WinCC demo project "OPConPack" in the directory "Samples\Connectivity Pack \DemoProject" on the WinCC DVD has been revised regarding the software interface. Some of the buttons and designations as well as illustrations in the examples referencing the demo project in the WinCC/Connectivity Pack documentation do not match the updated demo project. The functionality and operation of the demo project has not changed fundamentally.

Saving examples prior to uninstallation

When uninstalling the Connectivity Pack, the included examples are also uninstalled from the path "Installation Directory>\SAMPLES". If you want to save the examples, you need to copy the files from this path to a different directory.

2.2 Service and Support

2.2.1 Warnings

Safety notes

This manual contains information that must be observed to ensure your personal safety and to prevent property damage. Notices referring to your personal safety are highlighted in the manual by a safety alert symbol; notices referring to property damage only have no safety alert symbol. Depending on the hazard level, warnings are displayed in a descending order as follows:

⚠ **DANGER**

means that there can be severe physical injury or even death if the corresponding safety measures are not followed.

⚠ **WARNING**

means that there can be severe physical injury or even death if the corresponding safety measures are not followed.

⚠ **CAUTION**

indicates that minor personal injury may result if proper precautions are not taken.

NOTICE

indicates that damage to property may result if proper precautions are not taken.

Note

is an important information about the product, the way to handle the product or the respective part of the documentation and we wish to especially bring this to your notice.

If multiple levels of hazards can occur, the warning is always displayed with the highest possible level. If a warning with a warning triangle is to be indicate physical injury, the same warning may also contain information about damage to property.

Qualified Personnel

The corresponding machine/ system may only be set up and operated with the help of this documentation. A device/system must only be commissioned and operated by qualified personnel. Qualified persons in the sense of safety instructions in this documentation stand for persons who are authorized to operate, earth and mark machines, system and electrical circuits according to safety standards.

Proper use

Please observe the following:

> ⚠ **WARNING**
>
> **Proper use**
>
> The machine may only be used for the application instances that have been described in the catalog and the technical description and only in combination with third-party devices and components recommended and/or approved by Siemens. Smooth and safe operations demand proper transport, proper storage, installation and assembling as well as careful operations and maintenance.

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Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, solutions, machines, equipment and/or networks. They are important components in a holistic industrial security concept. With this in mind, Siemens' products and solutions undergo continuous development. Siemens recommends strongly that you regularly check for product updates.

For the secure operation of Siemens products and solutions, it is necessary to take suitable preventive action (e.g. cell protection concept) and integrate each component into a holistic, state-of-the-art industrial security concept. Third-party products that may be in use should also be considered. For more information about industrial security, visit

- http://www.siemens.com/industrialsecurity (http://www.siemens.com/industrialsecurity)

To stay informed about product updates as they occur, sign up for a product-specific newsletter. For more information, visit

- http://support.automation.siemens.com (http://support.automation.siemens.com)

Disclaimer of liability

We have checked the contents of the description to ensure that it matches with the hardware and the software it describes. Nevertheless, we cannot assume responsibility for any deviations that may arise. The details outlined in this description are checked regularly and the required corrections are done in the subsequent editions. Suggestions for improvement are welcomed.

The statements in the online documentation are more binding than the statements in the manuals and PDF files.

Please follow the Release Notes and Installation Notes. The information in these Release Notes and Installation Notes has priority over that in the manuals and online help with regard to legal validity.

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See also

http://support.automation.siemens.com (http://support.automation.siemens.com)

http://www.siemens.com/industrialsecurity (http://www.siemens.com/industrialsecurity)

2.2.2   Customer Support

Customer Support and Technical Support

You can reach the SIMATIC hotlines at the times specified in the following table. The SIMATIC hotline employees speak German and English. The Authorization hotline offers French, Italian or Spanish customer support in addition to German and English.

Technical support

Nuremberg   (GMT +1:00)

Service HoursMonday - Friday, 8:00 to 17:00 (CET/CEST)

Phone	+49 (0)911 895 7222
Fax	+49 (0)911 895 7223
E-mail	http://www.siemens.com/automation/support-request (http://www.siemens.com/automation/support-request)

An overview of the Technical Support is available at the following URL:

- http://support.automation.siemens.com/WW/view/en/16605032 (http://support.automation.siemens.com/WW/view/en/16605032)

Automation Value Card (AVC)

The Automation Value Card (AVC) provides extended Technical Support and is available 24 hours every day of the week. Information on the AVC can be found at the following URL:

- http://support.automation.siemens.com/WW/view/en/28448132 (http://support.automation.siemens.com/WW/view/en/28448132)

SIMATIC Customer Online Support

Service and Support

An overview of the support offering for our products is available at the following URL:

- http://www.siemens.com/automation/service&support (http://www.siemens.com/automation/service&support)

In Product Support, for example, you will find downloads of firmware updates, service packs and useful utilities.

Online Help is available so that you can successfully use the Support offering. Open the Online Help by selecting the corresponding button on the Internet site or at the following URL:

- http://support.automation.siemens.com/WW/support/html_00/help/Online_Hilfe.htm (https://support.industry.siemens.com/cs/helpcenter/en/index.htm)

WinCC FAQs

WinCC Online Support with information on FAQs (Frequently Asked Questions) may also be found at the following URL:

- http://support.automation.siemens.com/WW/view/de/10805548/133000 (http://support.automation.siemens.com/WW/view/en/10805583/133000)

Technical Forum

The Technical Forum supports exchange with other SIMATIC users. It is available at the following URL:

- http://www.siemens.com/automation/csi/forum (http://www.siemens.de/automation/csi_en/forum)

Technical documentation for SIMATIC products

You can find a guide to the technical documentation provided for individual SIMATIC products and systems at the following URL:

- http://www.siemens.com/simatic-tech-doku-portal (http://www.siemens.com/simatic-tech-doku-portal)

Contact person database

To contact your local agent, search our contact database at the following URL:

- http://www.automation.siemens.com/partner/index.asp (http://www.automation.siemens.com/partner/index.asp?lang=en)

Product Information

SIMATIC WinCC

Go to the following URL for additional information about WinCC products:

- http://www.siemens.com/wincc (http://www.siemens.com/wincc)

SIMATIC Products

Go to the following URL for additional information about SIMATIC products:

- http://www.siemens.com/simatic (http://www.siemens.com/simatic)

See also

Internet: Support Request (http://www.siemens.com/automation/support-request)

Internet: Technical support (http://support.automation.siemens.com/WW/view/en/16605032)

Internet: Automation Validation Card (AVC) (http://support.automation.siemens.com/WW/view/en/28448132)

Internet: Service and Support (http://www.siemens.com/automation/service&support)

Internet: WinCC FAQs (http://support.automation.siemens.com/WW/view/en/10805583/133000)

Internet: Support Technical Forum (http://www.siemens.de/automation/csi_en/forum)

Internet: Support Search (http://www.siemens.de/automation/csi_en/km)

Internet: Support Online Help (https://support.industry.siemens.com/cs/helpcenter/en/index.htm)

Internet: Technical documentation for SIMATIC products (http://www.siemens.com/simatic-tech-doku-portal)

Internet: Contact person database (http://www.automation.siemens.com/partner/index.asp?lang=en)

Internet: Information about WinCC (http://www.siemens.com/wincc)

Internet: SIMATIC Products (http://www.siemens.com/simatic)

2.2.3 Support Request

Dear customer

In order to provide you with fast and effective support, please complete the "Support Request" form online on the Internet. Describe the problem in as much detail as possible. We would appreciate if you would provide us with all project data, so that we can reproduce the error situation or shorten the turn-around time.

Before filling out the support request, check whether your configured quantity structure is within the range of tested quantity structures (see topic "Performance Data").

Support Request form

The Support Request form is available at the following URL:

- http://www.siemens.com/automation/support-request (http://www.siemens.com/automation/support-request)

When filling out the report, you will be guided through several steps, which will ask about all required information.

A detailed description of the Support Request can be found at the following URL:

- http://support.automation.siemens.com/WW/view/en/16605654 (http://support.automation.siemens.com/WW/view/en/16605654)

Procedure

1. Open the "Support Request" form using the link on the Internet. Step 1 "Select product" is displayed:

2. Enter the project name in the "Product/Order number" box. Upper/lower case is not relevant. Search for parts of the product name or enter the full product name in the correct order.
   You can e. g. search for the following terms:
   - "WinCC Runtime"
   - "WinCC DataMonitor"
   - "wincc webnavigator"
   - "Connectivity"
   The found products are offered in the "Product selection" field.

3. Select the desired product and click on "Next" to switch to step 2 "Select use case".

4. Select a use case or describe your specific use case in the "Other use case" field.

5. Press "Next" to switch to step 3 "Our solutions".
   Suggested solutions and FAQs for the selected key words are listed.
   Once you have found a suggested solution for your problem, you can close the form in the browser.
   If you did not find any applicable suggested solutions, press "Next" to switch to step 4 "Describe problem".

6. Describe your problem as exactly as possible in the "Details" field.
   Pay particular attention to the following questions and comments. Please also check the WinCC installation and configuration with regard to the following references.
   If you have any idea what has caused the error, please let us know. No detail should be omitted, even if you consider it unimportant.
   - Was the configuration data created with older WinCC versions?
   - How can the error be reproduced?
   - Are other programs running simultaneously with WinCC?
   - Have you deactivated the screen saver, virus checker and power management function?
   - Search the computer for log files (WinCC\Diagnose*.log, drwatson.log, drwtsn32.log).
   The log files are needed for error analysis. Thus, be sure to send the log files as well.

7. Use the "Search" button to upload your affected project and the log files (e. g. as a Zip file) to the Support Request.
   Press "Next" to switch to step 5 "Provide contact information".

8. Enter your contact information.
   Read the privacy notice and choose whether your personal data should be permanently saved.
   Press "Next" to switch to step 6 "Summary & Send".

9. Press the "Print" button if you would like to print the support request.
   You close the support request by clicking the "Send" button.
   Your data will be transmitted to Customer Support and processed there.

Thank you for your cooperation. We hope that we can be of assistance in solving your problems.

Your WinCC Team

See also

Internet: Error Report (http://www.siemens.com/automation/support-request)

Internet: Overview of Support Request (http://support.automation.siemens.com/WW/view/en/16605654)

WinCC/Connectivity Pack documentation 3

3.1 WinCC/Connectivity Pack

Content

Through the WinCC Connectivity Pack, you receive licensed access to WinCC databases via OPC or WinCC OLE DB Provider.

This chapter will show you

- how to install the Connectivity Pack Server and Client;
- the OPC servers of WinCC;
- how to configure access to the alarm message archive;
- how to configure access to the process value archive.
- how to configure the Connectivity Station.

Target group of this documentation

This documentation was designed for developers with Visual Basic and SQL Server knowledge.

3.2 Overview: WinCC/Connectivity Pack

Introduction

Licensed access to online and archive data of WinCC is enabled with the WinCC / Connectivity Pack.

The WinCC OLE DB Provider makes access to the process value and alarm archives possible. Data that is stored, compressed in the database can be read as decompressed data. The WinCC OLE DB Provider also provides analysis functions such as Minimum, Maximum of archive tags for example.

OPC enables cross-manufacturer communication in automation via the following standardized interfaces:

- OPC HDA 1.20 (Historical Data Access)
- OPC A&E 1.10 (Alarm & Events)
- OPC DA 2.05a, 3.00
- OPC XML DA 1.01
- OPC UA 1.02

As a result, WinCC operating as an OPC server can forward current process data and messages to other OPC clients (e.g. Microsoft Excel).

The WinCC Connectivity Station also uses OPC to access data of different WinCC stations.

The Connectivity Pack includes:

- The WinCC OLE DB Provider for directly accessing process value and alarm archives in the SQL server database on the WinCC RT computer and on an archive server.
- The tool "Archive Connector" for configuring the database access. With it, swapped out WinCC archive databases can be connected to or disconnected for the SQL server. In doing so, an overview of the individual database segments is generated. The Archive Connector can monitor folders and automatically connect copied in archives.
- WinCC DataConnector for configuration and access to the process value and alarm archives in process images.
- WinCC Connectivity Station
- License for Server OPC HDA 1.20 (Historical Data Access) for access to historical data in the WinCC archive system.
- License for Server OPC A&E 1.10 (Alarms & Events) for forwarding and acknowledging of messages.
- License for Server OPC XML DA 3.00 (OPC eXtensible Markup Language).
- License for the OPC UA Server 1.02
- The licenses for access to the WinCC archive databases through the WinCC OLE DB-Provider or WinCC User Archive through Microsoft OLE DB.

WinCC OLE DB Provider

The WinCC OLE DB Provider is available on the following systems:

- Connectivity Pack Client

- Connectivity Pack Server

- The WinCC Station

- Connectivity Station

Using WinCC OLE DB Provider, the Connectivity Pack Client has direct access to the WinCC archive data in the process value and message archives.

Access may take place under various configurations of the Connectivity Pack Client.

- A WinCC software like WinCC Basis, Web Navigator Server, DataMonitor Server or Connectivity Pack Server exists on the client computer.
  The Connectivity Pack Client does not have to be installed explicitly. Licensing is provided through WinCC licenses.

- The client computer has no installation of WinCC software.
  In this case, the Connectivity Pack Client needs to be installed on the client computer.

Simultaneous access to archive and Runtime databases

The Connectivity Pack provides the function "ArchiveMonitor". The function automatically merges the data from runtime and archive databases of the activated WinCC project into an SQL database "CC_ExternalBrowsing" and creates the "AMT" and "ARCHIVE" views in it. Since these views provide all the necessary information for the WinCC OLE DB Provider, the "CC_ExternalBrowsing" database can be used as a data source for the provider. On deactivating WinCC runtime, views additionally created in "CC_ExternalBrowsing" are deleted.

When an archive server does not contain any runtime databases, access to the archive databases using the "CC_ExternalBrowsing" database is not possible.

WinCC OLE DB Provider as a "Linked Server"

The WinCC OLE DB Provider can be registered in the SQL server in the list of "Linked Servers". This is independent of whether the database is local or remote.

Note

When configuring WinCC OLE DB Provider as a "Linked Server", the "WinCC OLE DB Provider for Archives" entry must be selected in the "Provider Name" field of the "Linked Server Properties" dialog. Activate the "AllowInProcess" checkbox in the "Provider Options" dialog. You will find more detailed information in the "SQL Server Books Online" under "Configuring OLE DB Providers for Distributed Queries".

Example of a WinCC OLE DB Provider as a Linked Server with the server name "WinCC":

```
select min(realvalue) from openquery(WINCC,'Tag:R,1,''0000-00-00
00:01:00.000'',''0000-00-00 00:00:00.000''')
```

```
select * from openquery(WINCC,'Tag:R,1,''0000-00-00
00:01:00.000'',''0000-00-00 00:00:00.000''')
```

WinCC Archive Connector

The Connectivity Pack also includes the tool "Archive Connector" for the configuration of the database access. With it, swapped out WinCC archives can be reconnected to an SQL server. The archive data is made available again via the WinCC OLE DB Provider. With the Archive Connector, the following functions are possible:

● Manual Connection: Locally swapped out WinCC archive databases are selected and connected to the local SQL server.

● Manual Disconnection: Connected databases are selected and disconnected from the SQL server.

● Automatic Connection: Local folders for swapped out WinCC archives are selected. All archives in the selected folders are automatically connected to the SQL server when copied in.

The Archive Connector may only be operated using a local SQL Server and a Connectivity Pack license.

Note

If you access message archives or swapped out archives via "CC_ExternalBrowsing", this access may take several minutes.

WinCC DataConnector

The DataConnector provides the following functions.

● Using the DataConnector Wizard, a process picture may be configured in Graphics Designer for an archive inquiry for message or process value archives.

● DataConnector Control will execute the archive inquiry in Runtime after opening the process picture and will display the data found.

Inquiries using relative or absolute time ranges are possible. The result of the inquiry may be shown in table format for messages, and in table or trend format for process values.

OPC

WinCC supplies historical data from the archive system to other applications via the WinCC OPC HDA server. An OPC HDA client - such as a reporting tool - can specify the beginning and the end of a time interval and specifically request the corresponding data. An OPC HDA client can also specifically request previously processed data on the WinCC OPC HDA server and actively affect data compression prior to data transfer.

With the WinCC OPC A&E server, a WinCC message is portrayed as an alarm. The alarm can only be forwarded with its accompanying process values to the production or management

level of the company, where it is also acknowledged. Via filters, only selected data is transferred.

The WinCC OPC-XML server provides the OPC-XML client with the OPC process data as a web service. OPC-XML clients can access WinCC runtime data via any platforms as well as via both Intranet and Internet.

The WinCC OPC UA Server provides process values, values from tag archives, and WinCC messages.

Access via OPC can only take place on computers on which WinCC Runtime is running.

Note

For access to WinCC archive databases using OPC HDA, process values with OPC XML and alarms with OPC A&E, a Connectivity Pack license is required on the computer with this data. An installation of Connectivity Pack Server or Client is not required.
OPC DA is licensed with a valid RT license for WinCC.

WinCC Connectivity Station

The Connectivity Station allows access to the data of various different WinCC stations, such as the WinCC server. The Connectivity Station is configured in the S7 projects, which also manage these WinCC stations.

You will access the WinCC stations via an OPC client via the OPC-Server.

See also

Access Using OPC to WinCC Archives, Tags, and Messages (Page 35)

3.3 Applications

3.3.1 Use Case 1: Local Access to WinCC RT Databases
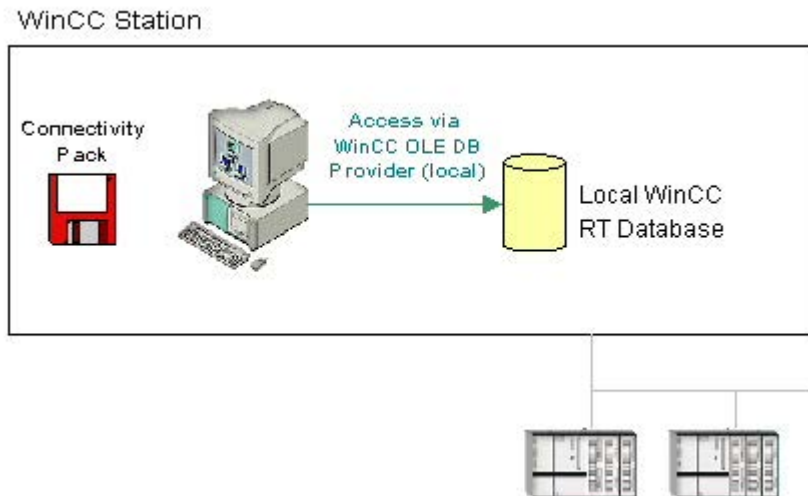
Principles

An application uses WinCC OLE DB Provider to access the local WinCC RT database.

You may locally analyze the archive data and may, for example, calculate the standard deviation of a process value.

Software requirements

On the WinCC station, the following licenses need to be installed:

- A valid RT license for WinCC
- WinCC Option Connectivity Pack

See also

Examples for Access Using OLE DB Provider (Page 196)

Licensing (Page 7)

3.3.2 Use Case 2: Remote Access to WinCC RT Databases
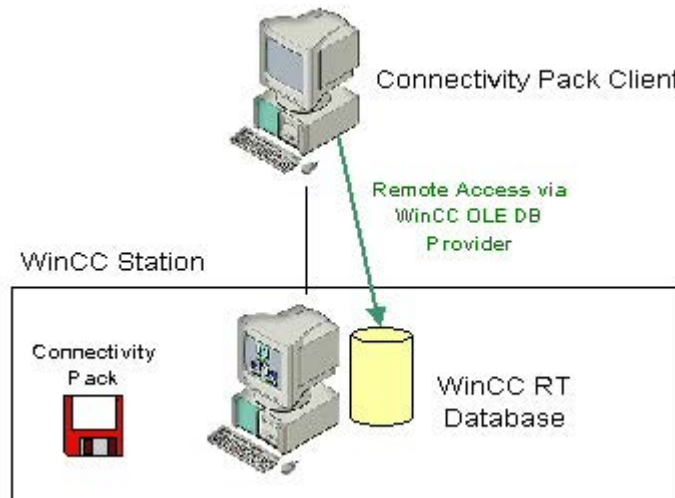
Principles

The Connectivity Pack Client remotely accesses the WinCC RT database of a WinCC station. Via the WinCC OLE DB Provider, the Connectivity Pack Client reads the data of the process value and alarm message archives.

Since in this use case, the swapped-out WinCC archive is not accessed, the Archive Connector does not have to connect WinCC archives to an SQL server.

You may use the Connectivity Pack Client to display, analyze, or process the data, e.g. by exporting it to a CSV file.

Software requirements

On the WinCC station, the following licenses need to be installed:

- A valid RT license for WinCC
- WinCC Option Connectivity Pack

The access may take place under various configurations of the Connectivity Pack Client.

- A WinCC software like WinCC Basis, Web Navigator Server, DataMonitor Server or Connectivity Pack Server exists on the client computer.
  The Connectivity Pack Client does not have to be installed explicitly. Licensing is provided through WinCC licenses.

- The client computer has no installation of WinCC software.
  Then the Connectivity Pack Client needs to be installed on the client computer.

See also

Examples for Access Using OLE DB Provider (Page 196)

Licensing (Page 7)

3.3.3 Use Case 3: Local Access to WinCC Archive Databases
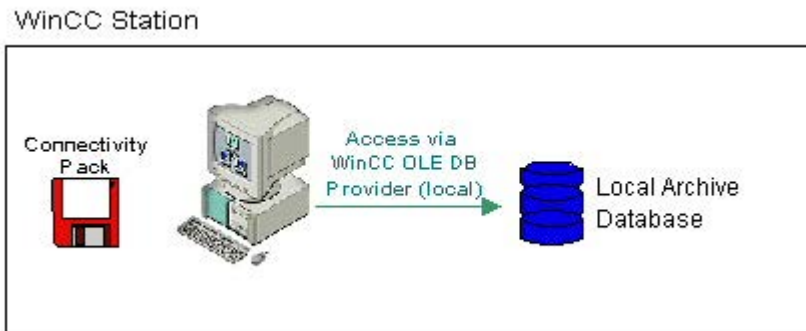
Principles

An application accesses the local archive database using WinCC OLE DB Provider. The older archive data are copied from the WinCC RT database to a separate directory on the same computer.

With the Archive Connector, the swapped out WinCC archives are reconnected to an SQL Server. The archives are then available for access using WinCC OLE DB Provider.

Local archive data may be displayed, searched or analyzed, e.g. to search for process errors or to optimize processes.

Software requirements

The WinCC station requires the following installations:

- WinCC Basic System
- A valid RT license for WinCC
- License for WinCC Option Connectivity Pack

See also

Examples for Access Using OLE DB Provider (Page 196)

Licensing (Page 7)

3.3.4 Use Case 4: Remote Access to WinCC Archive Databases
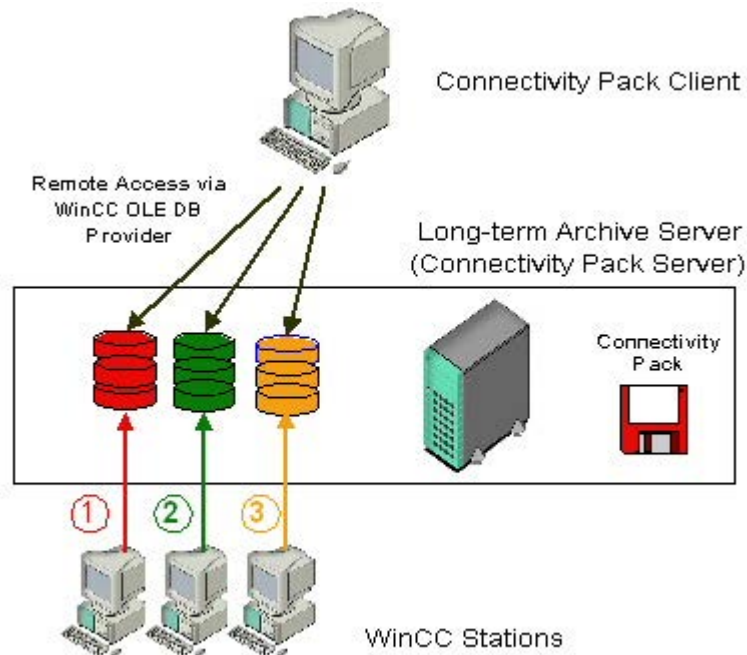
Principles

A long-term archive server is used to secure database files of process value and message archives, for example, in a monthly backup.

With the Archive Connector, the swapped out WinCC archives are reconnected to an SQL Server. The archives are then available for access using WinCC OLE DB Provider.

The Connectivity Pack Client accesses the archives via the WinCC OLE DB Provider. Using a VB application, for example, the archives may be analyzed, and process values of a specific day may be displayed.

Note

If you access message archives or swapped out archives via "CC_ExternalBrowsing", this access may take several minutes.

Software Requirements

The long-term archive server requires the following to be installed:

- Connectivity Pack Server
- License for WinCC Connectivity Pack

Access may take place under various configurations of the Connectivity Pack Client.

● A WinCC software like WinCC Basis, Web Navigator Server, DataMonitor Server or Connectivity Pack Server exists on the client computer.
The Connectivity Pack Client does not have to be installed explicitly. Licensing is provided through WinCC licenses.

● The client computer has no installation of WinCC software.
Then the Connectivity Pack Client needs to be installed on the client computer.

See also

3.3.5   Use Case 5: Local Access to WinCC User Archive
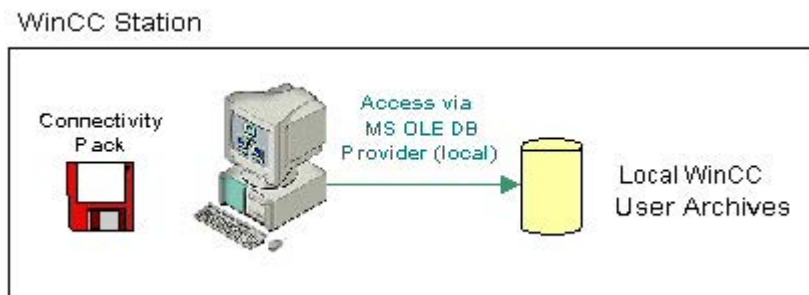
Principles

An application accesses the local archive WinCC user archives using the MS OLE DB Provider.

Using a VB application, for example, you may display, search, and write back modified values for local archive data.

Software requirements

The WinCC station requires the following installations:

● WinCC Basic System

● A valid RT license for WinCC

● License for WinCC Option Connectivity Pack

See also

Examples for Access Using OLE DB Provider (Page 196)

Licensing (Page 7)

3.3.6 Use Case 6: Remote Access to WinCC User Archives
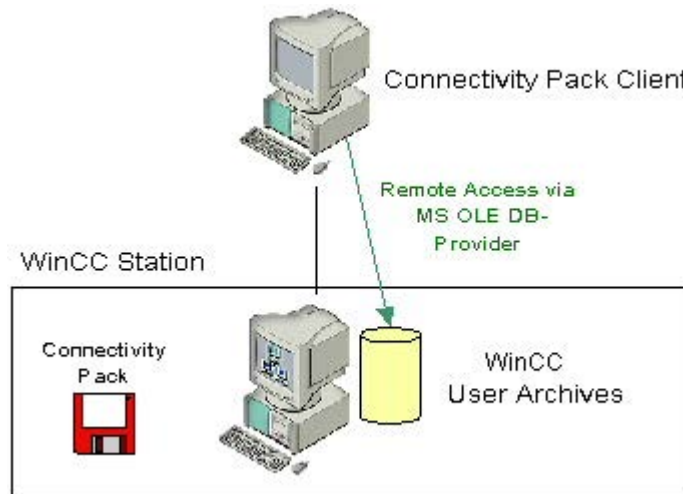
Principles

The Connectivity Pack Client accesses the WinCC user archives using the MS OLE DB Provider.

Using a VB application, for example, you may display, search, and write back modified values for archive data.

Software requirements

The WinCC server requires the following installations:

- WinCC Basic System

- A valid RT license for WinCC

- License for WinCC Connectivity Pack

Access may take place under various configurations of the Connectivity Pack Client.

- A WinCC software like WinCC Basis, Web Navigator Server, DataMonitor Server or Connectivity Pack Server exists on the client computer. The Connectivity Pack Client does not have to be installed explicitly. Licensing is provided through WinCC licenses.

- The client computer has no installation of WinCC software.
  Then the Connectivity Pack Client needs to be installed on the client computer.

See also

Examples for Access Using OLE DB Provider (Page 196)

Licensing (Page 7)

3.3.7   Use Case 7: Access Via the WinCC OLE DB Provider
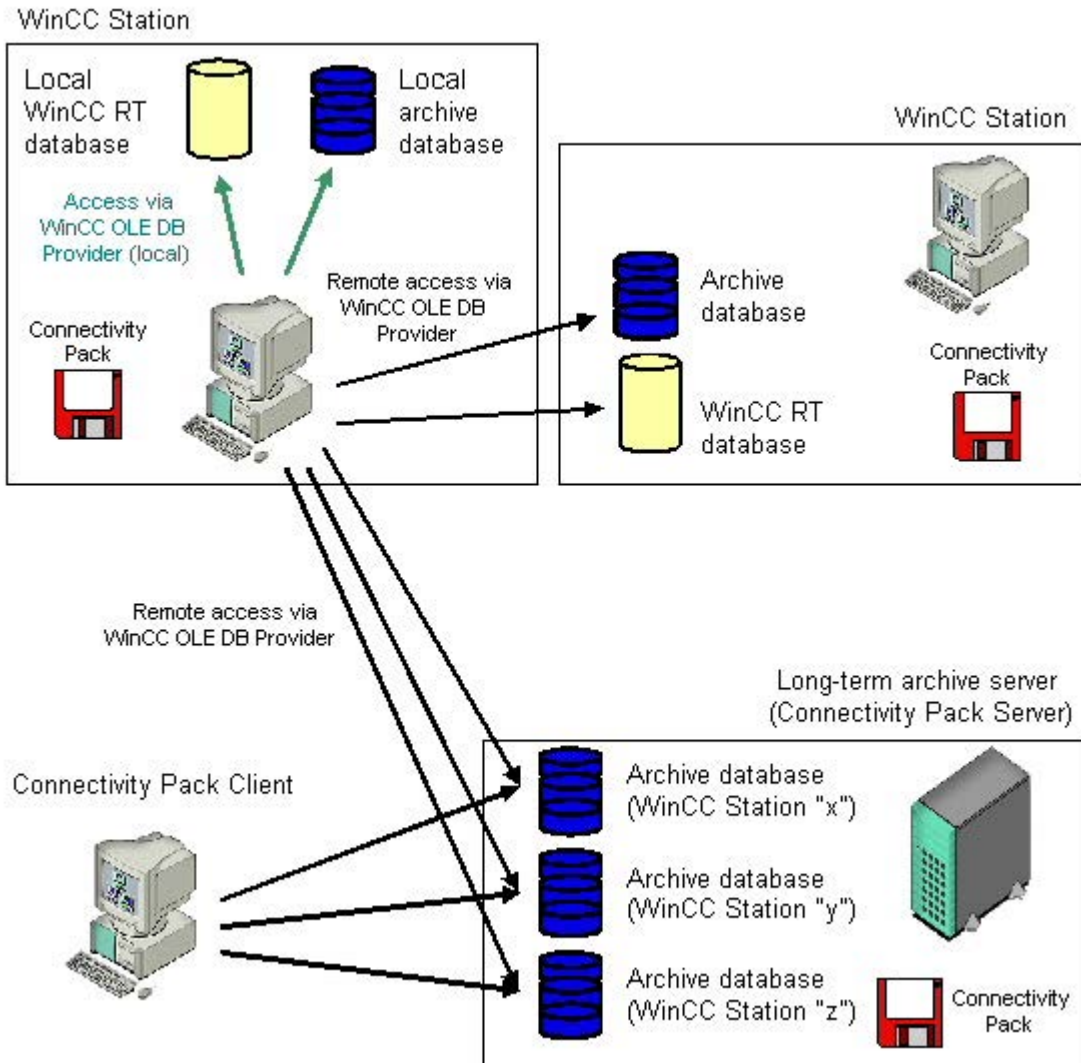
Principles

WinCC OLE DB Provider may be used to access WinCC databases while employing the Wizard "SQL Server Import/Export.

The Wizard "SQL Server Import/Export" enables data to be extracted from different sources and their export into other formats, e.g. in Excel table. Databases are linked using OLE DB, and access to WinCC databases using WinCC OLE-DB Provider. You can save the inquiry of

data in a DTSX-Package.
The DTSX-Packages can be bound in scripts, to obtain a time-controlled inquiry and transfer of data into the target format. Equally, tasks may be tied into packages, for example, in order to initiate a notification by mail following execution of the package.

Using WinCC computers, access to runtime and archive databases may be established locally or remotely. In the case of long-term archive servers, local or remote access is only possible to the archive databases since they have no runtime databases.

Software requirements

The WinCC station requires the following installations:

- WinCC Basic System

- A valid RT license for WinCC

- License for WinCC Option Connectivity Pack

For further information, refer to the chapter "Configure Access via the Wizard SQL Server Import/Export."

See also

Examples for Access Using OLE DB Provider (Page 196)

Licensing (Page 7)

Configure Access via the Wizard "SQL Server Import/Export" (Page 64)

3.3.8 Access Using OPC to WinCC Archives, Tags, and Messages

Introduction

OPC enables licensed access to online and archive data of WinCC. WinCC OPC-Servers provide WinCC data to the OPC client through the OPC software interface. As OPC client, any software can be implemented which is based on the respective OPC specification.

OPC DA

The WinCC OPC DA server makes the data from the WinCC project available to other applications. These applications may be running locally or on computers linked to the network environment. In this way WinCC tags can for example be exported to Microsoft Excel. The WinCC-OPC-DA server and its licensing are components of the WinCC base system.

OPC XML

Within a distributed system, WinCC clients have views of several WinCC servers. The WinCC OPC-XML server provides the OPC-XML client with the OPC process data as a web service. You can access the web service via the Internet using HTTP. The OPC XML client is no longer limited to the local network. In this way, OPC XML clients can access WinCC Runtime data via any platform as well as through an intranet or the Internet.

OPC HDA

Using the OPC HDA (Historical Data Access) server permits access to historical data of the WinCC archive system.

Installations without write access permit only reading and analyzing of WinCC archive data. Write access permits analyzing, adding, deleting, and updating of data.

An OPC HDA client may be used for analysis and evaluation of archive data and for process controlling of archives from different OPC HDA servers.

Note

OPC HDA does not permit access to message archives. Application permits access to process value archives only.

OPC A&E

The OPC A&E (Alarms & Events) server permits forwarding or acknowledging of WinCC messages.

An OPC A&E client, for example, may be used for analysis and joint archiving of alarms from different OPC A&E servers.

WinCC OPC-Servers in a Redundant System

In a redundant system, the WinCC servers monitor each other during runtime for early recognition of any server outage. The WinCC OPC-Servers make WinCC Runtime data available to the OPC client, using the OPC software interface. An OPC client with a simultaneous view of several WinCC-OPC-Servers can be used for centralized monitoring of various redundant systems.

As OPC client, any software can be implemented which is based on the respective OPC specification.

For additional information, please refer to chapter "OPC" - Open Connectivity.

Note

Error OPC_E_MAXEXCEEDED for archive access via OPC

If the OPC client requests more than 2,000 values during synchronous or asynchronous data reading, the request is rejected with the OPC_E_MAXEXCEEDED error message. This limit serves to limit the computer load and duration of the call.

This limit does not apply if the entire time range is read.

3.3.9 Transparent access to archived data

Introduction

The archiving of process values and messages is used to register, manage and archive process data from an industrial system. The registered process data are swapped out onto the central archive server "CAS" by the WinCC stations in regular intervals. The archived process data of a longer time period are therefore distributed to two archive databases.

The transparent access will ensure that the requested process data from the two archive databases are combined.

Operating principle

The following screen will show the principle of transparent access using an example of a user request for process values of the previous month:
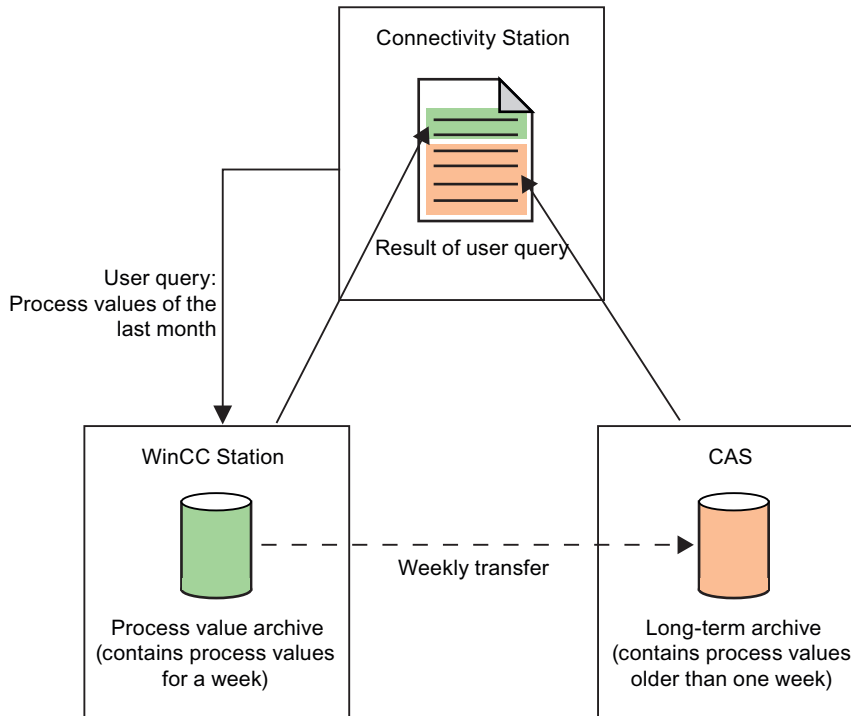
The result of the user query is shown to the user as though the process values stem from a data source.

Note

A Multiclient can also be used for transparent access instead of a Connectivity Station.

Transparent access in redundant systems

With redundant systems, the transparent access functions by the same principle, but with the following difference: If a server fails during a user query, the user query will automatically be rerouted to the redundant partner server.

Transparent access with OPC

With OPC, you will have transparent access to all archive databases of the WinCC stations:

OPC-Server	Server name
OPC DA	WinCCConnectivity.OPCDAServer
OPC HDA	WinCCConnectivity.OPCHDAServer.1
OPC A&E	WinCCConnectivity.OPCAEServer.1

Transparent access via OLE DB-Provider

Using OLE DB-Provider you can access process value archives in a transparent manner. Use the following syntax for transparent access for database link:

Data Source

```
<SYMBOLIC COMPUTER NAME>::\WinCC
```

Catalog

```
Name of the WinCC project
```

3.3.10 Functions of SQL Servers

Introduction

In the following you find a short description of important functions already implemented in Microsoft SQL Servers.

The technical documentation for the SQL Server 2014 is made available by Microsoft on the Internet:

● SQL Server 2014 documentation (https://msdn.microsoft.com/en-us/library/ms130214.aspx)

Functions

Wizard "SQL Server Import/Export"

With the "SQL Server Import/Export" Wizard you extract data which derive from different sources and which can transfer to one or more targets.

A description of use cases may be found in Chapters "Access Using WinCC OLE DB Provider" and "Configure Access via the Wizard "SQL Server Import/Export".

Jobs and Alerts

A job represents a series of operations executed in sequence by the SQL Server Agent. A job may consist of extensive functions, such as Transact SQL scripts, command line applications and ActiveX scripts. Jobs allow the execution of repetitive or time-controlled tasks. Through settings of displays, so-called "Alerts", a job may automatically inform the user of the execution status.

Backup

The "Backup" component of the SQL server provides important protection for critical data in SQL server databases.
This will prevent damage caused by memory media malfunctions, user errors or the permanent loss of a server.
Furthermore, the component can be useful for other application cases, such as the copying of

databases between different servers or the creation of a copy of a database via backup and the subsequent restore on a different computer.

Replication

The "Replication" component enables copying, distributing, and modifying of data within the corporate level. Therefore, the SQL server contains several methods and options for the design of replication, implementation, monitoring, and administration, and therefore provides the required functionality for the distribution of data and maintenance of data consistency.

Database Maintenance Plans

After creating and supplementing objects and data and using them, maintenance of a database may be necessary.
It is therefore important to create regular backups of the database or to create new indices to improve performance. These items should be taken into consideration during creation of the database in order to minimize the effect on users, and to minimize the required time and resources for such maintenance.
You can use a wizard and the "Database Maintenance Plans" component to create one or more maintenance schedules.

Linked Server

The Microsoft SQL Server allows creating a connection to OLE DB databases by using the "Linked Server". For example, implementation of a "Linked Server" offers the following advantages.

● Permits access to data sets from the OLE-DB databases as well as display in table format using Transact SQL instructions.

● Permits transmission of commands to OLE-DB data sources as well as display in table format of the subsequent data results using Transact SQL instructions.

A description of a use case on WinCC OLE DB Provider as "Linked Server" may be found in Chapter "WinCC / Connectivity Pack: Introduction".

See also

SQL Server 2014 documentation (https://msdn.microsoft.com/en-us/library/ms130214.aspx)

3.4   Access Via the OLE DB Provider

3.4.1   Access to Archive Data Using OLE DB Provider

Introduction

Using OLE DB, you have the following options for accessing WinCC archive data and for displaying these using an external interface.

Access using WinCC OLE DB Provider

WinCC OLE DB provides access to all WinCC archive data.

Depending on the configuration, process data of WinCC are stored in compressed form. WinCC OLE DB Provider permits transparent access even to these data.

Use the "SQL Server Import / Export Wizard" to take advantage of standard SQL queries. You can save the unzipped files to an intermediate database using the wizard; you access the database with standard SQL queries.

Access with Microsoft OLE DB

Microsoft OLE DB provides access to all WinCC user archives.

Note

Microsoft OLE DB is only tested and released for access to WinCC User Archives but not to alarm and process value archives.
Use the WinCC OLE DB Provider to access message and process value archives.

Configuration Options

For access to databases with WinCC OLE DB, you may write your own applications. For the communication with the WinCC OLE DB Provider, applications - created with, for example, Visual Basic, VBScript or VBA - use the ADO DB.

Note

Special characters in tag names

Please not that programming languages such as Visual Basic, VBScript or VBA only allow the following characters in the tag names: "A...Z", "a...z", "0...9" and "_".

In WinCC if you use special characters such as "," or ";" in the tag names then the script will be aborted with an error message. In such a case use the "Tag-ID" to access a tag with special characters in the script name.

The procedure in principle

1. For access to archive data, the computer must have WinCC Basic, Connectivity Pack Server or Connectivity Pack Client installed.

2. For swapped out archives, establish the connection between the SQL database and the swapped out archives with the WinCC Archive Connector.

   ### Note

   WinCC RT archives in directory "<Project Directory> \ ArchiveManager" and the associated subdirectories must not be connected to or disconnected from the Archive Connector since their connection to the SQL server is managed by the WinCC Basic system.

3. Establish the connection to the database, for example by using MS Excel or your own application. Define the desired selection criteria and read the archive data.

4. The query result, for example, may be displayed in MS Excel or be exported as a csv file.

See also

3.4.2 Bases of OLE DB

Introduction

Using the OLE DB interface and the associated database provider supplied by WinCC, you have access to process value and message archives.

OLE DB

OLE DB is an open standard for a fast access to different databases. It is irrelevant whether the database is relational or not.

The connection between the OLE DB level and the database is established through a database provider.

OLE DB interfaces and providers are offered from various manufacturers.

WinCC OLE DB Provider

Using WinCC OLE DB Provider, you may directly access WinCC archive data stored in the MS SQL server database. Depending on the configuration, process data of WinCC are stored in compressed form. WinCC OLE DB Provider permits transparent access even to these data.

Note

If WinCC closes a full archive and opens a new one, no data from the message and process value archives are read momentarily via the OLE DB Provider.

Microsoft OLE DB

Microsoft OLE DB only provides access to WinCC user archives.

As protection from unauthorized access using MS OLE DB, the administrator of the databases can take appropriate actions. Additional information may be found in Chapter "Security Settings for Access to SQL Databases Using MS OLE DB".

Note

Microsoft OLE DB is only tested and released for access to WinCC User Archives but not to alarm and process value archives.
Use the WinCC OLE DB Provider to access message and process value archives.

See also

Security Settings During Access to SQL Databases Using MS OLE DB (Page 72)

Access to Archive Data Using OLE DB Provider (Page 41)

Licensing (Page 7)

3.4.3   WinCC Archive Connector

Introduction

The WinCC "Archive Connector" is used for configuring the access to the archive database. The tool is an integral part of WinCC DataMonitor and Connectivity Pack. With the Archive Connector, already swapped out WinCC archives can be reconnected to an SQL Server. DataMonitor client or WinCC OLE DB provider can then access the archives.

Functions of the WinCC Archive Connector:

- Manual Connection: Local databases may be selected and connected to the local SQL server.

- Manual Disconnection: Connected databases may be selected and disconnected from the SQL server.

- Automatic Connection: Local directories can be selected in which WinCC archives have been exported. All the archives are automatically linked to the SQL servers which were added to the selected directories from the moment change monitoring was activated.

The Archive Connector can only be operated on a local SQL server and a license for WinCC DataMonitor or WinCC Connectivity Pack.

Once the configuration has been completed, the Archive Connector may be terminated.

Note

WinCC RT archives in directory "<Project Directory> \ ArchiveManager" and the associated subdirectories must not be connected to or disconnected from the Archive Connector since their connection to the SQL server is managed by the WinCC Basic system.

The path for the swapped out WinCC archives is set in WinCC with the Archive Configurator, e.g. of Tag Logging, not with the WinCC Archive Connector.

If access is to be made to swapped archives which are on interchangeable media such as tape or MOD drives, pay attention that the connection to these archives on this medium is disconnected using the Archive Connector before changing the medium in the drive. After changing the medium, the user should check the Archive Connector whether or not the archives on the new medium are connected.

Configuration of the WinCC Archive Connector should be accessible to a limited circle of people only. Therefore, access to the Tool should be protected using Windows user authorization "Administrators" or other Windows protective measures, such as storage in a protected directory.

Note

Use the Archive Connector to access the linked archives using the Connectivity Pack or DataMonitor.

The following objects do not give any access to the linked archives using Archive Connector:
- WinCC Alarm Control
- WinCC Online Trend Control
- WinCC Online Table Control
- WinCC Online Function Control

The "Configuration" Tab
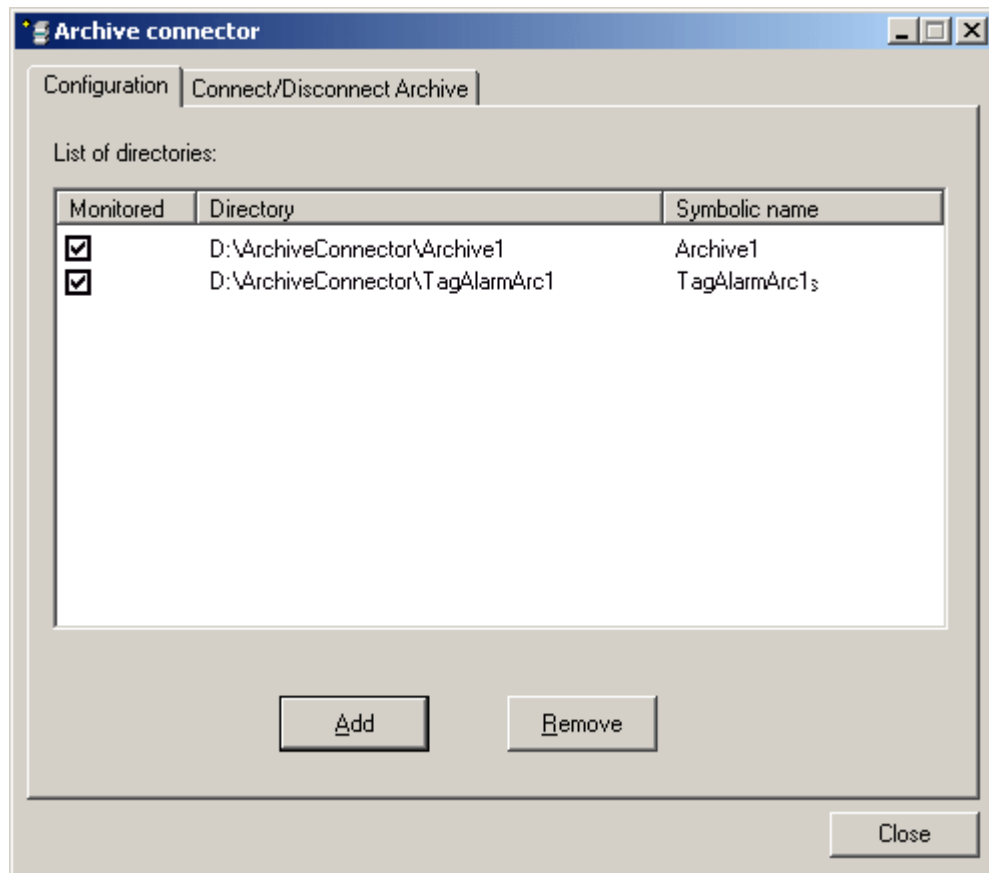
In the "Configuration" tab, archiving folders are displayed and managed that are to be accessed through the Web or the WinCC OLE DB Provider.

Via buttons, archiving folders can be added or removed. For each archiving folder, a symbolic, unique name has to be assigned during the configuration.

DataMonitor client or the WinCC OLE DB-Provider use the symbolic name to access the archive.

The name is also used for managing and connecting exported data from multiple computers or projects.

The symbolic names must only contain SQL-syntax-permissible characters.

By activating the corresponding checkbox, all archives added to the selected folder at the time of activation will automatically be connected to the SQL Server.

If you activate or deactivate monitoring, the changes will not be activated until you close the Archive Connector.

The "Connect/Disconnect Archive" Tab
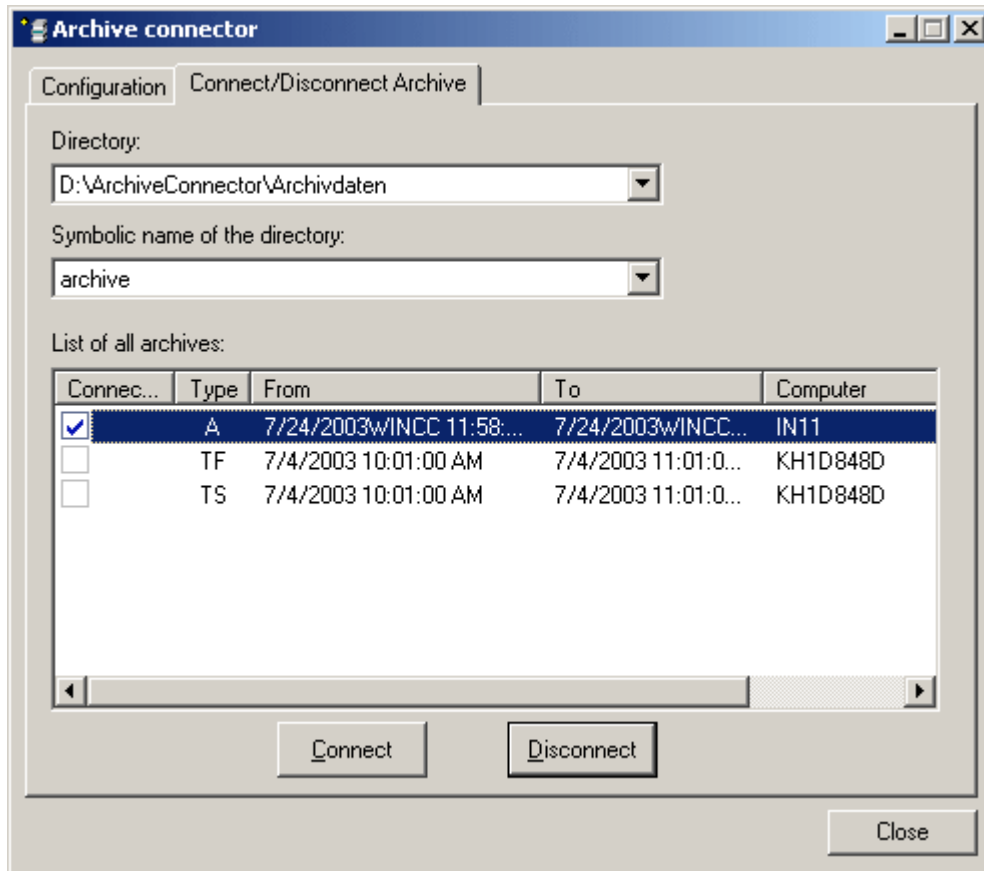
The "Connect/Disconnect Archive" tab lists all archives existing in the archiving directories.

The connection status of each archive is displayed. The connection to the archives can be established or terminated via buttons.

The archive type is shown in the "Type" field:

- "A" = Alarm Logging;
- "TF" = Tag Logging (Fast);
- "TS" = Tag Logging (Slow).

The columns "From" and "To" provide information on the local time zone.

Note

The connection of multiple, swapped-out archives to the SQL server may take several seconds.

It is not possible to connect a database file with the same name twice.

The WinCC Archive Connector connects finalized and backed up (swapped-out) archives to the SQL server. Archives not finalized are not supported.

The user interface language of the Archive Connector is based on the settings of the regional and language options in Windows.

Note

Archives created with SQL Server 2000 can only be connected if you remove the write protection of the archive. Archives that are once linked can no longer be linked using the Archive Connector of the Connectivity Pack under SQL Server 2000.

In order to connect swapped out archives on CD or DVD, copy the archives to a media where you will be able to remove the write protection.

3.4.4 Establishing the Connection to the Archive Database

Introduction

For ActiveX data objects (ADO), the connection between the application and the archive database is established by the connection object. An important parameter here is the ConnectionString. The ConnectionString contains all necessary information for access to the database using OLE DB Provider.

Structure of the ConnectionString

```
"Provider = Name of the OLE DB Provider; Catalog=Datebase name;Data
Source=Server name;"
```

Parameter	Description
Provider	Name of the OLE DB Provider: e.g. WinCCOLEDBProvider
Catalog	Names of the WinCC database With WinCC RT databases, you will use database names that end in "R." <Datenban-kname_R>. The database "CC_ExternalBrowsing" can also be used. If you have connected swapped out WinCC archives to the SQL Server via the WinCC Archive Connector, use their symbolic name. **Note** Enter the WinCC project name for "Catalog" for transparent access; for e.g.: "Cata-log=WinCC_Project_Name". **Note** If you access message archives or swapped out archives via "CC_ExternalBrowsing", this access may take several minutes.
Data Source	Server name Local: ".\WinCC" or "<Computer Name>\WinCC" Remote: "<Computer name>\WinCC" **Note** Enter the transparent access to the Central Archive Server and in case of redundant servers enter the following via the OLE DB-Provider for "Data Source": <Symbolic Computer Name>::\WinCC. **Note** Use the archive tag name to directly access an archive tag on the central archive server CAS. The central archive server CAS returns the CAS-ID and not the archive tag ID as ID: <SYMBOLIC COMPUTER NAME>\\<Achive_Var_Name>

Example Process Value and Message Archive:

In the following example, a connection object is created with subsequent opening of the connection to the WinCC database (process value and message archive).

```
Set conn = CreateObject("ADODB.Connection")

conn.open "Provider=WinCCOLEDBProvider.
1;Catalog=CC_OpenArch_03_05_27_14_11_46R;Data Source=.\WinCC"
```

Example User Archive:

In the following example, a connection object is created with subsequent opening of the connection to the WinCC user archive.

```
Set conn = CreateObject("ADODB.Connection")

conn.open "Provider=SQLOLEDB.1; Integrated Security=SSPI; Persist
Security Info=false; Initial Catalog=CC_OpenArch_03_05_27_14_11_46R;
Data Source=.\WinCC"
```

Note

In order to improve performance during local access, enter "<Computer Name>\WinCC" as the data source instead of ".\WinCC".

See also

Example: Configuring Access to Archive Data Using DataConnector Wizard (Page 198)

Example: Configuring the Access to Archive Data Using VB (Page 196)

Query for User Archives (Page 61)

Querying Alarm Message Archives (Page 57)

Querying Process Value Archives (Page 51)

3.4.5 Querying the Archive Data

3.4.5.1 Displaying Process Value Archives

Introduction

The query result is returned as the Recordset. In this chapter, the structure of Recordset for process value archives is described.

Recordset Structure

Field name	Type	Comments
ValueID	Integer 4 Bytes or Integer 8 Bytes	Unique identification of value. The length depends on the type of query.
TimeStamp	DateTime	Time Stamp
RealValue	Real 8 Bytes	Tag value
Quality	Integer 4 Bytes	QualityCode of value (e.g. "good" or "bad").
Flags	Integer 4 Bytes	Internal Control Parameter

See also

Querying the Archive Data (Page 49)

Establishing the Connection to the Archive Database (Page 47)

Access to Archive Data Using OLE DB Provider (Page 41)

Bases of OLE DB (Page 42)

3.4.5.2 Querying the Archive Data

Introduction

The queries are forwarded to the database by the command object. An important parameter, aside from "ConnectionString", is CommandText. The CommandText transmits the query. The result is returned as the Recordset.

Note

Time range for archive inquiries for message and process values

If the query for message or process value archives specifies a time range for which no messages or other values exist within the archives, no information message or other status display occurs. If this status is to be displayed, error handling must be implemented by the user.

A simple version of this error handling routine is described in the sample script under the topic "Example: Reading message archive data via the WinCC OLE DB Provider".

In the following examples, a command object each is generated and the query transmitted as CommandText.

In the following structure examples, CommandText also includes the ConnectionString whose structure is described under "Establishing Connection to Archive Database".

Structure of CommandText

Process Value Archives:

```
Set oRs = CreateObject("ADODB.Recordset")

Set oCom = CreateObject("ADODB.Command")

oCom.CommandType = 1

Set oCom.ActiveConnection = conn

oCom.CommandText = "TAG:R,'PVArchive\Tag1','0000-00-00
00:10:00.000','0000-00-00 00:00:00.000'"
```

Alarm Message Archives:

```
Set oRs = CreateObject("ADODB.Recordset")

Set oCom = CreateObject("ADODB.Command")

oCom.CommandType = 1

Set oCom.ActiveConnection = conn

oCom.CommandText = "ALARMVIEW:Select * FROM AlgViewEnu"
```

User archives

```
Set oRs = CreateObject("ADODB.Recordset")

Set oCom = CreateObject("ADODB.Command")

oCom.CommandType = 1

Set oCom.ActiveConnection = conn

oCom.CommandText = "SELECT * FROM UA#Test"
```

Specifying the RecordSet location

To specify the location of RecordSet for query of the archive data, you need to set the value "3" for the "CursorLocation" property, for example, "conn.CursorLocation = 3". The RecordSet is created on the client.

See also

Example: Reading Process Value Archive With WinCC OLE DB Provider and Visual Basic 6 (Page 206)

Displaying User Archives (Page 63)

Displaying Alarm Message Archives (Page 59)

Displaying Process Value Archives (Page 48)

Query for User Archives (Page 61)

Querying Alarm Message Archives (Page 57)

Querying Process Value Archives (Page 51)

Establishing the Connection to the Archive Database (Page 47)

3.4.5.3   Querying Process Value Archives

Principle

With the following query, a process value archive can be accessed. The data can be selected using filter criteria. The queries are forwarded to the database by the command object.

Note

The length of the ValueID can be different.

- For databases processed on a central archive server (CAS), the ValueID is 8 Bytes long and includes a server ID in the HI-DWORD area as well as the ValueID assigned by the respective server in the LO-DWORD area.
- For all other databases, the ValueID is 4 Bytes long and includes only the unique ValueID assigned by the WinCC server.

The 4-Bytes request via TAG:R is still available for compatibility. The 4-Byte ValueID returned is no longer unique in case of CAS databases.

Queries for process value archives are limited to a maximum of 20 tags, each with a maximum of 128 characters per tag.

Syntax

Note that the query may not contain any spaces.

Request of ValueIDs 8 Bytes long:

```
TAG_LLVID:R,<ValueID or
ValueName>,<TimeBegin>,<TimeEnd>[,<SQL_clause>][,<TimeStep>]
```

Request of ValueIDs 4 Bytes long:

```
TAG:R,<ValueID or ValueName>,<TimeBegin>,<TimeEnd>[,<SQL_clause>]
[,<TimeStep>]
```

Parameter

Parameter	Description
ValueID	Value ID from the database table
	Multiple names are possible, for e.g. "TAG:R,(ValueID_1;ValueID_2;ValueID_x),<TimeBegin>,<TimeEnd>"
ValueName	ValueName in the format 'ArchiveName\Value_Name'. The parameter <ValueName> must be enclosed in single quotes.
	Multiple names are possible, for e.g. "TAG:R,('ValueName_1';'ValueName_2';'ValueName_x'), <TimeBegin>,<TimeEnd>"
	Note
	Please not that programming languages such as Visual Basic, VBScript or VBA only allow the following characters in the tag names: "A...Z", "a...z", "0...9" and "_".
	In WinCC if you use special characters such as "," or ";" in the tag names then the script will be aborted with an error message. In such a case use the "Tag-ID" to access a tag with special characters in the script name.
TimeBegin	Start time in the format 'YYYY-MM-DD hh:mm:ss.msc'
	While using <TimeStep> you must specify <TimeBegin> as absolute time. A relative statement or "0000-00-00 00:00:00.000" are not permitted.
TimeEnd	End time in the format 'YYYY-MM-DD hh:mm:ss.msc'
SQL_Clause	Filter criterion in SQL syntax:
	[WHERE search_condition] [ORDER BY {order_expression [ASC|DESC] }]
	"ORDER BY" criterion can only be used with the given sort sequence "{order_expression [ASC|DESC] }".
	Example: The following query returns all values of the tags "ValueName_1" and "ValueName_2" which are below 50 or above 100. "TAG:R,('ValueName_1';'ValueName_2'),<TimeBegin>,<TimeEnd>, 'WHERE RealValue > 100 OR RealValue < 50'"
TimeStep	Values in the stated time interval are summarized, beginning with the starting time <TimeBegin>
	Format: 'TIMESTEP=x,y' x = Interval in seconds y = Aggregation type, defines the interval result
	The following values are possible for aggregation type:

Without interpolation	With interpolation	Description
1 (FIRST)	257 (FIRST_INTERPOLATED)	First value
2 (LAST)	258 (LAST_INTERPOLATED)	Last value
3 (MIN)	259 (MIN_INTERPOLATED)	Minimum value
4 (MAX)	260 (MAX_INTERPOLATED)	Maximum value
5 (AVG)	261 (AVG_INTERPOLATED)	Median value
6 (SUM)	262 (SUM_INTERPOLATED)	Sum
7 (COUNT)	263 (COUNT_INTERPOLATED)	Number of values

Without interpolation means: If no values are present in the interval, no interval result will be returned. With interpolation means: If no values are present in the interval, the value will be derived by linear interpolation from the results of the neighboring intervals that are not empty. No extrapolation is done.

Example: For TIMESTEP=60.257 for each interval of 60 seconds, the first value of this interval or - if there are no values in this interval - the linear, interpolated value from the first values of the neighboring intervals will be returned. "TAG:R,1,'2004-07-09 09:03:00.000','0000-00-00 00:10:00.000','TIMESTEP=60.257'"

Note

<TimeBegin> and <TimeEnd> must never both be "ZERO" = "0000-00-00 00:00:00.000".

In order to improve performance, use the parameter "ValueID" instead of "ValueName" during the query. The "ValueID" may be determined from the table "Archives".

Some applications cannot process the time in steps of 1 ms with process values which can lead to inaccuracies.
In the "Example: chapter you will find an example in the "SplitDateTimeAndMs" VB script to remove the milliseconds from the time stamp of process values. Reading Process Value Archive Using WinCC OLE DB Provider". The script is also implemented in the demo project "OpConPack".

Selection of an Absolute Time Interval

Reading from start time <TimeBegin> until the end time <TimeEnd> .

Example A1:

Reads the values of the ValueID 1 from start time 9:03 hours to end time 9:10 hours.

```
"TAG:R,1,'2004-07-09 09:03:00.000','2004-07-09 09:10:00.000'"
```

Selection of a Relative Time Interval

Reads from beginning of recording:

```
<TimeBegin> = '0000-00-00 00:00:00.000'
```

Reads until end of recording:

```
<TimeEnd> = '0000-00-00 00:00:00.000'
```

<TimeBegin> and <TimeEnd> should both not be "ZERO" = '0000-00-00 00:00:00.000'.

Note

Enter a relative period you want to query in a linked archive database using the following format:

● 0000-00-DD hh:mm:ss.msc

If you indicate the time frame in months, the content can be faulty, because a month can have 28 to 31 days.

Example B1:

Reads the absolute time from "TimeBegin" to end of recording, i.e. the last archived value.

```
<TimeBegin> = '2003-02-02 12:00:00.000', <TimeEnd> = '0000-00-00 00:00:00.000'
```

Example B2:

Reads the absolute time from "TimeBegin" for the next 10 seconds.

```
<TimeBegin> = '2003-02-02 12:00:00.000', <TimeEnd> = '0000-00-00
00:00:10.000'
```

Example B3:

Reads 10 seconds backward from the absolute time from "TimeEnd".

```
<TimeBegin> = '0000-00-00 00:00:10.000', <TimeEnd> = '2003-02-02
12:00:00.000'
```

Example B4:

Reads the values of the last hour starting from the time of the last archived value for multiple valueIDs (1;3;5;6).

```
"TAG:R,(1;3;5;6),'0000-00-00 01:00:00.000','0000-00-00
00:00:00.000'"
```

Example B5:

Reads the values of the last five minutes starting from the time of the last archived value for "TAG_2" tag from the "ArTags" archive.

```
"TAG:R,'ArTags\TAG_2','0000-00-00 00:05:00.000','0000-00-00
00:00:00.000'"
```

The following diagrams shows a possible result of this example. The query was implemented using the Connectivity Pack Demo Project.

Multiple Return Values to a Query Using a Filter on Tag Value

Example C1:

The following query also uses the <SQL_Clause> parameter and returns all tag values that have the ValueID "3" and "6" and are below 50 or above 100.

```
"TAG:R,(3;6),<TimeBegin>,<TimeEnd>,'WHERE RealValue > 100 OR
RealValue < 50'"
```

Query with parameter <TimeStep>

Example C2:

The following query uses the <TimeStep> parameter and returns all values of ValueID "1" - starting from start time "TimeBegin" till 5 minutes later in intervals of "60" seconds with the aggregation type "5" = "Average value without Interpolation".

```
"TAG:R,1,'2004-10-13 17:00:00.000','0000-00-00 00:05:00.000',
'TIMESTEP=60.5'"
```

The following diagram shows the query result. The left table displays the archive data which were archived in an archiving cycle of 30 seconds. The right table displays the query result. It determines the average between two archive values at "0" seconds and "30" seconds, displayed with the first time stamp of the averaging interval, i.e. second "0".

TIMESTEP = 60,5

ValueID	Datetime	RealValue	Quality
1	2004-10-13 17:00:00.000	3.0	801000
1	2004-10-13 17:00:30.000	4.0	801000
1	2004-10-13 17:01:00.000	2.0	801000
1	2004-10-13 17:01:30.000	4.0	801000
1	2004-10-13 17:02:00.000	4.0	801000
1	2004-10-13 17:02:30.000	1.0	801000
1	2004-10-13 17:03:00.000	3.0	801000
1	2004-10-13 17:03:30.000	3.0	801000
1	2004-10-13 17:04:00.000	1.0	801000
1	2004-10-13 17:04:30.000	0.0	801000
1	2004-10-13 17:05:00.000	3.0	801000

ValueID	Datetime	RealValue	Quality
1	2004-10-13 17:00:00.000	3.5	801000
1	2004-10-13 17:01:00.000	3.0	801000
1	2004-10-13 17:02:00.000	2.5	801000
1	2004-10-13 17:03:00.000	3.0	801000
1	2004-10-13 17:04:00.000	0.5	801000
1	2004-10-13 17:05:00.000	3.0	801000

Example C3:

The following query uses the <TimeStep> parameter and returns all values of ValueID "1" and "2" - starting from start time "TimeBegin" till 2 minutes later in intervals of "15" seconds with the aggregation type "261" = "Average value with linear Interpolation".

```
"TAG:R,(1;2),'2004-10-13 17:00:00.000','0000-00-00 00:02:00.000',
'TIMESTEP=15.261'"
```

The following diagram shows the query result. The left table displays the archive data which were archived in an archiving cycle of 30 seconds. The right table displays the query result. The archive values at "0" and "30" seconds are displayed in the query result unchanged with their time stamp. For second "15," the linear, interpolated value is formed of archive values at seconds "0" and "30". For the "45" second, the linear, interpolated value is taken from the archive values of "30" second of the same minute and the "0" second of the next minute.

TIMESTEP = 15, 261

ValueID	Datetime	RealValue	Quality
1	2004-10-13 17:00:00.000	3,0	801000
2	2004-10-13 17:00:00.000	12,0	801000
1	2004-10-13 17:00:30.000	4,0	801000
2	2004-10-13 17:00:30.000	14,0	801000
1	2004-10-13 17:01:00.000	2,0	801000
2	2004-10-13 17:01:00.000	16,0	801000
1	2004-10-13 17:01:30.000	4,0	801000
2	2004-10-13 17:01:30.000	17,0	801000
1	2004-10-13 17:02:00.000	4,0	801000
2	2004-10-13 17:02:00.000	14,0	801000
1	2004-10-13 17:02:30.000	1,0	801000
2	2004-10-13 17:02:30.000	13,0	801000
1	2004-10-13 17:03:00.000	3,0	801000
2	2004-10-13 17:03:00.000	13,0	801000

ValueID	Datetime	RealValue	Quality
1	2004-10-13 17:00:00.000	3,0	801000
1	2004-10-13 17:00:15.000	3,5	801000
1	2004-10-13 17:00:30.000	4,0	801000
1	2004-10-13 17:00:45.000	3,0	801000
1	2004-10-13 17:01:00.000	2,0	801000
1	2004-10-13 17:01:15.000	3,0	801000
1	2004-10-13 17:01:30.000	4,0	801000
1	2004-10-13 17:01:45.000	4,0	801000
1	2004-10-13 17:02:00.000	4,0	801000
2	2004-10-13 17:00:00.000	12,0	801000
2	2004-10-13 17:00:15.000	13,0	801000
2	2004-10-13 17:00:30.000	14,0	801000
2	2004-10-13 17:00:45.000	15,0	801000
2	2004-10-13 17:01:00.000	16,0	801000
2	2004-10-13 17:01:15.000	16,5	801000
2	2004-10-13 17:01:30.000	17,0	801000
2	2004-10-13 17:01:45.000	15,5	801000
2	2004-10-13 17:02:00.000	14,0	801000

See also

Example: Reading Process Value Archive With WinCC OLE DB Provider and Visual Basic 6 (Page 206)

Displaying Process Value Archives (Page 48)

3.4.5.4   Querying Alarm Message Archives

Introduction

With the following query, the message archive can be accessed. The data can be selected using filter criteria. The queries are forwarded to the database by the command object.

You will find information about status of messages in the WinCC Information System under "Working with WinCC > ANSI-C Function for Creation of Functions and Actions > ANSI-C Function descriptions > Appendix > Structure Definitions > Structure Definition MSG_RTDATA_STRUCT".

When querying message archives, the result is summarized by archive, but without sorting the queried archive segments. The filter condition needs to be extended accordingly if the segments are to be sorted, e.g., for the chronological sorting "ORDER BY DateTime ASC, MS ASC".

Syntax

```
ALARMVIEWEX:SELECT * FROM <ViewName>[WHERE <Condition>...., optional]
```

Parameter

Parameter	Description
ViewName	Name of the database table. The table has to be specified in the desired language. The "ViewName" for the five European language is e.g.:
	ALGVIEWEXDEU: German message archive data ALGVIEWEXENU: English message archive data ALGVIEWESP: Spanish message archive data ALGVIEWEXFRA: French message archive data ALGVIEWEXITA: Italian message archive data
	The "ViewName" for the Asian language is e.g.:
	ALGVIEWEXCHS: Chinese (simplified) message archive data ALGVIEWEXCHT: Chinese (traditional) message archive data ALGVIEWEXJPN: Japanese message archive data ALGVIEWEXKOR: Korean message archive data
	Note
	The languages that are installed in the WinCC base system or that are configured in the WinCC Text Library are supported. Information concerning the possible query-languages or the respective "ViewName" can be found in the SQL-Server in the linked alarm archives under "Views". All languages that are supported in the corresponding archive are shown here with their IDs, e.g. "ALGVIEWEXENU".
Condition	Filter criterion, e.g.: DateTime>'2003-06-01' AND DateTime<'2003-07-01' DateTime>'2003-06-01 17:30:00' MsgNr = 5 MsgNr in (4, 5) State = 2 With DateTime, only absolute time indications can be used.

Example 1:
Reads all entries of message number 5 that were recorded after July 5, 2003.

```
"ALARMVIEWEX:SELECT * FROM ALGVIEWEXENU WHERE MsgNr = 5 AND
DateTime>'2003-07-05'"
```

Example 2:
Reads all messages with a time stamp between July 3, 2003 and July 5, 2003.

```
"ALARMVIEWEX:SELECT * FROM ALGVIEWEXENU WHERE DateTime>'2003-07-03'
AND DateTime<'2003-07-05'"
```

The following picture shows a possible result of this example. The query was implemented using the Connectivity Pack Demo Project.

See also

Displaying Alarm Message Archives (Page 59)

Example: Reading Message Archive Data with the WinCC OLE DB Provider and Visual Basic 6 (Page 219)

3.4.5.5   Displaying Alarm Message Archives

Introduction

The query result is returned as the Recordset. In this chapter, the structure of the Recordset for alarm log archives is described.

You will find information about status of messages in the WinCC Information System under "Working with WinCC > ANSI-C Function for Creation of Functions and Actions > ANSI-C Function descriptions > Appendix > Structure Definitions > Structure Definition MSG_RTDATA_STRUCT".

Recordset Structure

Location	Field name	Type	Comments
1	MsgNo	Integer 4 Bytes	Message number
2	State	Small Integer 2 Bytes	Alarm Log Status
3	DateTime	DateTime 8 Bytes	Time stamp of the message (date/time without milliseconds)

Location	Field name	Type	Comments
4	Ms	Small Integer 2 Bytes	Time stamp of the message (milliseconds)
5	Instance	VarChar (255)	Instance Name of the Alarm Log
6	Flags1	Integer 4 Bytes	(only for internal use)
7	PValueUsed	Integer 4 Bytes	Process Values used
8 to 17	PValue1 to PValue10	Real 8 Bytes	Numerical Process Value 1 to 10
18 to 27	PText1 to PText10	VarChar (255)	Process Value Text 1 to 10
28	ComputerName	VarChar (255)	Name of computer
29	Application	VarChar (255)	Application Name
30	Comment	VarChar (255)	Comments
31	UserName	VarChar (255)	User name
32	Counter	Integer 4 Bytes	Running Alarm Message Counter
33	TimeDiff	Integer 4 Bytes	Time difference to "Came in" status
34	ClassName	VarChar (255)	Name of the message class
35	Typename	VarChar (255)	Name of the message type
36	Class	Small Integer 2 Bytes	Message class ID
37	Type	Small Integer 2 Bytes	Message type ID
38 to 47	Text1 to Text10	VarChar (255)	Message Text 1 to 10
48	AG_NR	Small Integer 2 Bytes	Number of the PLC
49	CPU_NR	Small Integer 2 Bytes	Number of the CPU
50	CrComeFore	Integer 4 Bytes	Foreground Color for the "Came in" Status
51	CrComeBack	Integer 4 Bytes	Background Color for the "Came in" Status
52	CrGoFore	Integer 4 Bytes	Foreground Color for the "Went out" Status
53	CrGoBack	Integer 4 Bytes	Background Color for the "Went out" Status
54	CrAckFore	Integer 4 Bytes	Foreground Color for the "Acknowledged" Status
55	CrAckBack	Integer 4 Bytes	Background Color for the "Acknowledged" Status
56	LocalID	Integer 4 Bytes	Location of the Alarm
57	Priority	Integer 4 Bytes	Priority
58	AP_type	Integer 4 Bytes	Loop in Alarm
59	AP_name	VarChar (255)	Loop-in-Alarm Function Name
60	AP_PAR	VarChar (255)	Loop-in-Alarm Screen
61	InfoText	VarChar (255)	Infotext
62	TxtCame	VarChar (255)	Text came in
63	TxtWent	VarChar (255)	Text went out
64	TxtCameNWent	VarChar (255)	Text came in and went out
65	TxtAck	VarChar (255)	Text acknowledged
66	AlarmTag	Integer 4 Bytes	Message tag

Location	Field name	Type	Comments
67	AckType	Small Integer 2 Bytes	Acknowledgment Type
68	Params	Integer 4 Bytes	Parameter
69	Servername	VarChar (255)	Servername

See also

Querying the Archive Data (Page 49)

Establishing the Connection to the Archive Database (Page 47)

Access to Archive Data Using OLE DB Provider (Page 41)

Bases of OLE DB (Page 42)

3.4.5.6   Query for User Archives

Introduction

With the following query, you may use MS OLE DB Provider to access WinCC user archives. Access may be read or write enabled in order to analyze the saved data and to modify and save same.

The data can be selected using filter criteria. The queries are forwarded to the database by the command object.

Note

Consider the following when accessing WinCC user archives via the MS OLE DB Provider:
- Ensure that the write access is not enabled simultaneously via the MS OLE DB Provider and WinCC. This prevents inconsistencies in the archives.
- Changes via MS OLE DB Provider will not be displayed in WinCC Runtime until the user archive table controls are selected by a picture change. The current data of the user archives are read again.
- User archives changed via MS OLE DB Provider are not synchronized in a redundant system.
- Note that WinCC updates can cause changes in the database scheme. The scheme can also be changed by the installation of hot fixes and service packs. In this case, you must adapt the read and write access accordingly.

Syntax

Reading of Values

```
SELECT * FROM UA#<ArchiveName>[WHERE <Condition>...., optional]
```

Writing of Values

```
UPDATE UA#<ArchiveName> SET UA#<ArchiveName>.<Column_n> = <Value>
[WHERE <Condition>...., optional]
```

Inserting a Data Set

```
INSERT INTO UA#<ArchiveName> (ID,<Column_1>,<Column_2>,<Column_n>)
VALUES (<ID_Value>, Value_1,Value_2,Value_n)
```

Deleting a Data Set

```
DELETE FROM UA#<ArchiveName> WHERE ID = <ID_Number>
```

Parameter

Parameter	Description
ArchiveName	Name of the user archive.
Condition	Filter criterion e.g.: LastAccess>'2004-06-01' AND LastAccess<'2004-07-01' DateTime>'2004-06-01 17:30:00' ID = 5 ID > 3

Example 1:
Reads all data in the user archive "Test".

```
SELECT * FROM UA#Test
```

Example 2:
Reads all data in the user archive "Test" that were changed between June 1, 2004 and July 1, 2004.

```
SELECT * FROM UA#Test WHERE LastAccess>'2004-06-01' AND
LastAccess<'2004-07-01'
```

Example 3:
Enters the value 'New_String' in the field F_STRING of the ID 3.

```
UPDATE UA#TEST SET F_STRING = 'New_String' WHERE ID = 3
```

Example 4:
Inserts a data set with the ID 100.

```
INSERT INTO UA#Test (ID,F_Integer,F_Float,F_Double,F_String) VALUES
(100.10,'10.0','AAAA')
```

Example 5:

Deletes the data set with the ID 100.

```
DELETE FROM UA#Test WHERE ID = 100
```

See also

Displaying User Archives (Page 63)

3.4.5.7   Displaying User Archives

Introduction

Each user archive consists of data fields with editable properties. Each data field has properties such as name, alias name, type, lengths, value etc. The representation of the data fields and properties in the Editor User Archives is done in lines and columns. Therefore, we are talking of rows instead of data fields and of columns instead of properties.

In the following, the user archive "Test" is described as a structure example. This user archive is included in the Connectivity Pack Demo Project "OPConPack" in directory "\Samples \Connectivity Pack\DemoProject."

Structure of User Archive "Test"

Field Name	Type	Comment
ID	Integer	Unique identification of Value.
F_Integer	Integer	Example for Value
F_Float	Float	Example for Value
F_Double	Double	Example for Value
F_String	String	Sample character sequence

See also

Querying the Archive Data (Page 49)

Establishing the Connection to the Archive Database (Page 47)

Access to Archive Data Using OLE DB Provider (Page 41)

Bases of OLE DB (Page 42)

3.4.5.8   Configure Access via the Wizard "SQL Server Import/Export"

Introduction

WinCC OLE DB Provider may be used to access WinCC databases while employing the Wizard "SQL Server Import/Export. You can save the unzipped files to an intermediate database using the wizard; you access the database with standard SQL queries.

● Using WinCC computers, access to runtime and archive databases may be established locally or remotely.

● In the case of long-term archive servers, local or remote access is only possible to the archive databases since they have no runtime databases.

Procedure

1. Start the "SQL Server Management Studio" and select the desired database.

2. In the shortcut menu of the database select "Tasks > Export Date...".
   The SQL Server Import/Export-Wizard opens.

3. Configure the data source.
   Click "Next". In the field Data source, select the entry WinCC OLE DB-Provider for Archives". Click the button "Properties...". The "Data Link Properties" dialog box opens.

4. Configure the correct Provider settings.
   In the field "Data Source" enter the following text as data source: ".\WinCC"The entry for "Location" remains empty.
   Under "Enter the initial catalog to use" either enter the desired Runtime database or the symbolic name, which was configured in "Archive Connector Tool". The correct spelling of the name may be found in "SQL Server Management Studio" in the "Databases" directory.
   Alternatively you can also enter the database "CC_ExternalBrowsing" for Runtime data and Archive data.
   Click the "Advanced" tab. For the Property "Connect timeout" select the desired time in seconds. In the property "Access permissions" only select the box "ReadWrite".
   Close the dialog by activating the "OK" button.

   Note

   In order to improve performance during local access, enter " <Computer Name>\WinCC" in the field "Data Source" instead of ".\WinCC".

5. Configure the data source.
   Click "Next". In the field "Destination", select the entry SQL Native Client" for example. The server name can be any SQL Server instance. The database name which you enter in the field "Database", can be any self-created target database.

   Note

   Leave the "Database" field empty. No target tables are then created.

6. Configure the query conditions.
   Click "Next". Select "Write a query to specify the data to transfer". Click "Next". Enter the desired query conditions. With the query "Tag:R,1,'0000-00-00 00:10:00.000','0000-00-00 00:00:00.000" of the ValueID "1", for example, the values of the last ten minutes of the archiving are read. Additional information on the syntax may be found in Chapter "Query for Process Value Archives".

7. End the Wizard and export the data.
   Click "Next" and on the last page of the Wizard click on "Finish". The Wizard executes the data export to the target database. If the data export was successful, the comprised data in the target database are saved in the newly created table"dbo.Query". You can change the table name. If you do not change the table name, data will be overwritten with a new export. New tables with names "Query1", "Query2" etc. are created by the wizard.

See also

3.4.5.9 Meeting prerequisites for using the Reporting Services

Introduction

You can use the Reporting Services of the SQL Server 2014 with WinCC. This makes it possible to provide reports created with Microsoft Visual Studio with archive data on the network.

Requirements

The use of the Reporting Services with WinCC requires the following other software prerequisites.

- Internet Information Services
- Reporting Services of the MS SQL Server 2014

Note

Take the installation steps in precisely the indicated order.

Installing Internet Information Services

Select the "Internet Information Services (IIS)" check box in the "Windows Features" dialog.

You can find additional information in the installation instructions and in the WinCC Installation Notes.

Installing Reporting Services of the MS SQL Server 2014

You install the Reporting Services from the WinCC DVD or from the WinCC setup path in the file system.

1. Select "Settings > Control Panel > Programs and Features".

2. Select "Microsoft SQL Server 2014" and click "Uninstall/change".

3. Select "Add" and the path "InstData > SQL > SQL2014STD > setup" in WinCC Setup.
   The Microsoft SQL Server Installation Wizard is opened. Follow the on-screen instructions.

4. Under "Installation type", select the option "Adding features to an existing SQL Server 2014 instance" and the instance "WINCC".
   The Management Tools and thus the SQL Server Data Tools have already been installed.

5. Activate "Reporting Services - Native" and follow the instructions.
   The Reporting Services are installed.

6. Start the Configuration Manager for Reporting Services and configure the Reporting Services.

Configuring the Internet Information Services

1. Open the Computer Management.

2. Under "Services and Applications", select the "Internet Information Services (IIS) Manager".

3. Open the feature "Authentication" and select "Edit" in the shortcut menu of "Anonymous authentication".

4. Select the option "Specific user" and enter the user name and password.
   The user name has the following format: <Domain or computer name>\<User>

Note

We recommend restarting the computer after completing the installation.

Result

This makes the prerequisites for using the Reporting Services. You can now create reports and provide them on the internet.

3.4.6 Analysis Functions for Messages and Process Values

3.4.6.1 Analysis Functions for Messages and Process Values

Introduction

Different analysis functions are available with WinCC for querying archived messages and process values.

The analysis is triggered by a query with parameters for different aggregate functions. Calculation of the aggregate function is performed on the Connectivity Pack server, and only the result is transferred to the client.

Additional information on CommandText and ConnectionString which are used in the following examples may be found under "Establishing Connection to Archive Database" and "Querying Archive Data".

Analysis Functions for Messages

The analysis query for alarm logs archives returns a specific recordset which contains configuration and runtime data for each message as well as results of the aggregate functions.

The returned recordset for analysis queries of alarm logs is not identical to the recordset of normal queries of message archives. Additional information may be found in Chapter "Display of Alarm Logs for Analysis Queries".

For each message, the following aggregate functions are calculated. The column descriptions of the result list are placed in parenthesis.

- Sum of message frequency ("FreqOfAlarm")

- Cumulative duration from "Message Incoming" until "Message Outgoing" ("CumDurationComeGo")

- Average duration from "Message Incoming" until "Message Outgoing" ("AvDurationComeGo")

- Cumulative duration from "Message Incoming" until initial acknowledgment ("CumDurationComeAckn1")

- Average duration from "Message Incoming" until initial acknowledgment ("AvDurationComeAckn1")

- Cumulative duration from "Message Incoming" until second acknowledgment ("CumDurationComeAckn2")

- Average duration from "Message Incoming" until second acknowledgment ("AvDurationComeAckn2")

- Cumulative duration from "Message Incoming" until "Message Incoming" ("CumDurationComeGo")

- Average duration from "Message Incoming" until "Message Incoming" ("AvDurationComeCome")

Syntax

For the calculation of aggregate functions for messages, the following command is issued to WinCC OLE DB Provider.

```
"AlarmHitView: SELECT * FROM <ViewName>[WHERE <Condition>]"
```

Here :
<ViewName> = Name of the database table in the required language, for e.g. ALGVIEWENU for English.
[WHERE <Condition>] = optional filter criterion as WHERE condition in the SQL syntax.

Additional information on the syntax may be found in Chapter "Query for Alarm Logs".

Example

The example provides results of the aggregate functions for all messages for the time range between 7/15/2004 12:00 p.m. and 12:15 p.m. from the "ALGVIEWENU" database.

ConnectionString:

```
"Provider=WinCCOLEDBProvider.
1;Catalog=CC_OpenArch_03_05_27_14_11_46R;Data Source=.\WinCC"
```

CommandText:

```
"AlarmHitView: SELECT * FROM ALGVIEWENU WHERE DateTime>'2004-07-15
12:00:00' AND DateTime<'2004-07-15 12:15:00'"
```

Analysis Functions for Process Values

The analysis of process values returns the result of an aggregate function. Only one aggregate function can be calculated in a query.

The following aggregate functions are available for process values.

- MIN (minimum)

- MAX (maximum)

- AVG (average)

- SUM (sum of all values)

- COUNT (count of process values)

- COUNTER (number of entries with value "1", e.g., query of binary tags)

- STDEV (statistical standard deviation)

- VAR (statistical variance)

Syntax

For the calculation of aggregate functions for process values, a query is issued to the MS SQL OLE DB Provider and the procedure "cp_TagStatistic" from database "SQL Server Master" is executed.

Note

The analysis functions for process values in transparent access function only with Connectivity Station on a client with own project.

The following parameters are transferred to the "cp_TagStatistic" procedure.

```
cp_TagStatistic @P1,@P2,@P3[,@P4]
```

Where:
"@P1" = database name (e.g. WinCC Runtime database or symbolic name of the directory with the swapped out archives). During transparent access, use the WinCC project name instead of the database name.
"@P2" = WinCC OLE DB Provider string for process values.
"@P3" = required aggregate function.
"@P4" = <Symbolic computer name>::\WinCC (required only during transparent access).

Additional information on the syntax of parameters "@P1" and "@P2" may be found in Chapter "Query for Process Value Archives".

Note

Analysis functions for process values with Asian archive tag names

If you use archive tag names with Asian character sets to calculate an analysis function, the request for Unicode character sets has to be adapted.

Add the prefix "N'" in front of both parameters.

Example: cp_TagStatistic N'TestDB',N'TAG:R,17,''2004-05-17 12:00:00'',''2004-05-17 13:00:00''','AVG'

Example

This query will return the average of process values in the time range between 5/17/2004 12:00 and 13:00 for ValueID "17" from database "TestDB".

ConnectionString:

```
"Provider=SQLOLEDB.1;Integrated Security=SSPI;Persist Security
Info=False;Initial Catalog=master ;Data Source=.\WinCC"
```

CommandText:

```
"cp_TagStatistic 'TestDB','TAG:R,17,''2004-05-17
12:00:00'',''2004-05-17 13:00:00''','AVG'"
```

Example of transparent access

This query delivers the average process value in the time range between 14.09.2006 10:00 hrs and 11:00 hrs for the ValueID "7" from the "WinCCProj".

ConnectionString:

```
"Provider=SQLOLEDB.1;Integrated Security=SSPI;Persist Security
Info=False;Initial Catalog=master ;Data Source=.\WinCC"
```

CommandText:

```
"cp_TagStatistic 'WinCCProj','TAG:R,7,''2006-09-14
10:00:00'',''2006-09-14 11:00:00''','AVG','Symb_WinCCProj::\WinCC'"
```

See also

Querying the Archive Data (Page 49)

Establishing the Connection to the Archive Database (Page 47)

Display of Message Archives for Analysis Queries (Page 70)

Use of OLE DB interface of the Connectivity Station (Page 235)

3.4.6.2 Display of Message Archives for Analysis Queries

Introduction

The analysis query for message archives returns a specific recordset which contains configuration and runtime data for each message as well as results of the aggregate functions. This Recordset is not identical to the Recordset of normal queries of message archives.

Recordset Structure for Analysis of Message Archives

Upon query of message archives using the analysis function "AlarmHitView", the result is returned as recordset with the following structure.

Location	Field name	Type	Comments
1	MsgNo	Integer 4 Bytes	Message number
2	State	Small Integer 2 Bytes	Alarm Log Status
3	DateTime	DateTime 8 Bytes	Time stamp of the message (date/time without milliseconds)
4	Ms	Small Integer 2 Bytes	Time stamp of the message (milliseconds)
5	Instance	VarChar (255)	Instance Name of the Alarm Log
6	Flags1	Integer 4 Bytes	(only for internal use)
7	Counter	Integer 4 Bytes	Running Alarm Message Counter
8	TimeDiff	Integer 4 Bytes	Time difference to "Came in" status
9	ClassName	VarChar (255)	Name of the message class.
10	Typename	VarChar (255)	Name of the message type.
11	Class	Small Integer 2 Bytes	Message class ID
12	Type	Small Integer 2 Bytes	Message type ID
13 to 22	Text1 to Text10	VarChar (255)	Message Text 1 to 10
23	AG_NR	Small Integer 2 Bytes	Number of the PLC
24	CPU_NR	Small Integer 2 Bytes	Number of the CPU
25	CrComeFore	Integer 4 Bytes	Foreground Color for the "Came in" Status
26	CrComeBack	Integer 4 Bytes	Background Color for the "Came in" Status
27	CrGoFore	Integer 4 Bytes	Foreground Color for the "Went out" Status
28	CrGoBack	Integer 4 Bytes	Background Color for the "Went out" Status
29	CrAckFore	Integer 4 Bytes	Foreground Color for the "Acknowledged" Status
30	CrAckBack	Integer 4 Bytes	Background Color for the "Acknowledged" Status
31	Priority	Integer 4 Bytes	Priority
32	AP_type	Integer 4 Bytes	Loop in Alarm
33	AP_name	VarChar (255)	Loop-in-Alarm Function Name

Location	Field name	Type	Comments
34	AP_PAR	VarChar (255)	Loop-in-Alarm Screen
35	InfoText	VarChar (255)	Infotext
36	TxtCame	VarChar (255)	Text came in
37	TxtWent	VarChar (255)	Text went out
38	TxtCameNWent	VarChar (255)	Text came in and went out
39	TxtAck	VarChar (255)	Text acknowledged
40	AckType	Small Integer 2 Bytes	Acknowledgment Type
41	FreqOfAlarm	Integer 4 Bytes	Sum of message frequency
42	CumDurationComeGo	Integer 4 Bytes	Cumulative duration from "Message Came In" until "Message Went Out"
43	AvDurationComeGo	Real 8 Bytes	Average duration from "Message Came In" until "Message Went Out"
44	CumDurationCo-meAckn1	Integer 4 Bytes	Cumulative duration from "Message Came In" until initial acknowledgment
45	AvDurationComeAckn1	Real 8 Bytes	Average duration from "Message Came In" until initial acknowledgment
46	CumDurationCo-meAckn2	Integer 4 Bytes	Cumulative duration from "Message Came In" until second acknowledgment
47	AvDurationComeAckn2	Real 8 Bytes	Average duration from "Message Came In" until second acknowledgment
48	CumDuration Come-Come	Integer 4 Bytes	Cumulative duration from "Message Came In" until "Message Came In"
49	AvDurationComeCome	Real 8 Bytes	Average duration from "Message Came In" until "Message Came In"

See also

Analysis Functions for Messages and Process Values (Page 66)

3.5 Security Settings During Access to SQL Databases Using MS OLE DB

Introduction

Using MS OLE DB, users may access SQL databases, such as WinCC User Archives, and may modify same. It is therefore possible for unauthorized users to do so. As protection from unauthorized access, the administrator must take suitable measures.

Principle

One option for access protection is to create a user or user group on the SQL server for access to SQL databases. This user or user group will then be assigned certain authorizations for access to SQL databases.

This may use local or global Windows user groups on the SQL server to organize such access authorizations in SQL.
Alternatively, Windows users can be transferred to the SQL server–either directly as Windows users or as individually defined SQL users.

Part of the security structure of an SQL server are the so-called "Server Roles". They are used to organize users into groups for administrative purposes, similar to Windows. "Server Roles" are used to assign server-wide security settings to a login or if there are no corresponding Windows user groups.

The technical documentation for the SQL Server 2014 is made available by Microsoft on the Internet:

- SQL Server 2014 documentation (https://msdn.microsoft.com/en-us/library/ms130214.aspx)

See also

Bases of OLE DB (Page 42)

SQL Server 2014 documentation (https://msdn.microsoft.com/en-us/library/ms130214.aspx)

3.6 Access vie OPC - Open Connectivity

3.6.1 OPC Channel

3.6.1.1 WinCC OPC Channel

Introduction

WinCC can be used as both an OPC server and as an OPC client. The OPC channel is the OPC client application of WinCC.

The OPC communication driver can be used as OPC DA client, OPC XML client, and OPC UA client. The documentation for the OPC UA client is available under "OPC UA channel".

The following OPC components are installed automatically:

- OPC communication driver
- OPC Item Manager

Possible Applications

WinCC as an OPC DA client

If WinCC is used as an OPC DA client, the OPC channel must be added to the WinCC project. A connection for data exchange is created in the WinCC project of the WinCC OPC DA client; this is used to handle access to the WinCC tags of the OPC DA server.

To simplify the process, the OPC Item Manager is used. A WinCC OPC DA client can access multiple OPC DA servers. This requires that a connection be created for each OPC server. In this way, the WinCC OPC DA client can be used as a central operation and monitoring station.
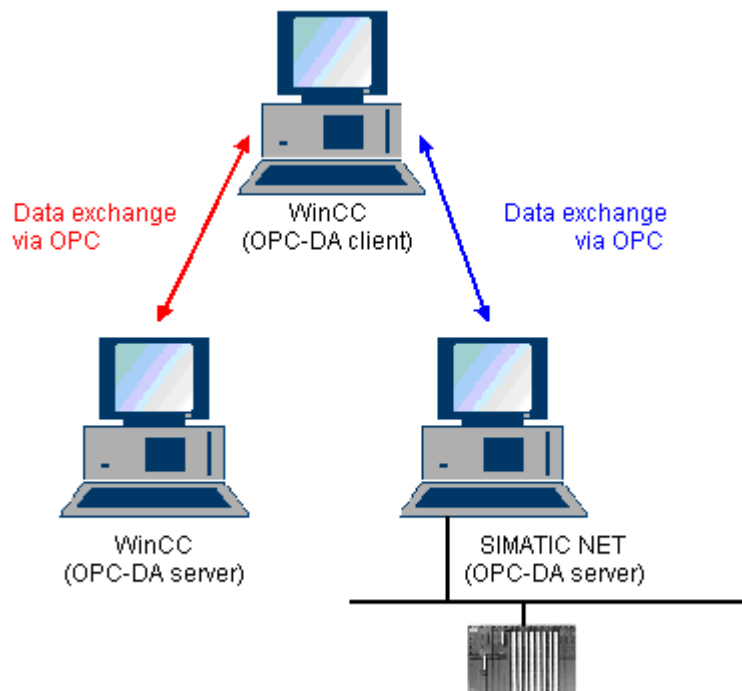
Note

The WinCC OPC channel establishes connections only to OPC servers which have the status "OPC_STATUS_RUNNING".

Note

"OPC" channel

Unicode is not supported for connection names. Make sure that you name all connections in the project in the same language. Open the Control Panel of your computer to set the code page of this language for use in programs that do not support Unicode.

3.6.1.2   OPC Item Manager

Introduction

A connection and a WinCC tag are configured in the WinCC project of the WinCC OPC client to enable access to tags of an OPC server. The OPC Item Manager simplifies this process for you. The OPC Item Manager is automatically installed with WinCC.

Note

"OPC" channel

Unicode is not supported for connection names. Make sure that you name all connections in the project in the same language. Open the Control Panel of your computer to set the code page of this language for use in programs that do not support Unicode.

Requirements

The following requirements must be met in order to use the OPC Item Manager for configuration:

- The OPC server is an OPC DA server or an OPC XML server.

- A tag is already configured on the OPC server.

- If WinCC is to be used as the OPC server the WinCC project of the WinCC OPC server must be enabled. If this is not the case, the OPC Item Manager cannot access the WinCC OPC server.

- It must be possible to access the computer of the OPC servers via the IP address or HTTP.

- The OPC server must support the browser functionality. If that is not the case, access to the tag of the OPC server must be configured manually.

Note

If you change language in the WinCC Explorer while the OPC Item Manager is open, no tags are displayed when you click the "Browse Server" button. Exit the OPC Item Manager before changing language.

Tasks of the OPC Item Manager

The OPC Item Manager assumes the following tasks:

- Select OPC server

- Creating a connection

- Tag selection

- Adding a tag

Selecting the OPC server

OPC DA server

The OPC Item Manager can be used to determine the name of the OPC DA server in the network. These OPC DA servers can run on the same computer or on different computers in the connected network environment. For further details, refer to "WinCC OPC DA client ".

OPC XML Server

The OPC Item Manager cannot be used to query the name the OPC XML server. The OPC XML server can be added using the "OPC Web Server" button. For further details, refer to "WinCC OPC XML client ".
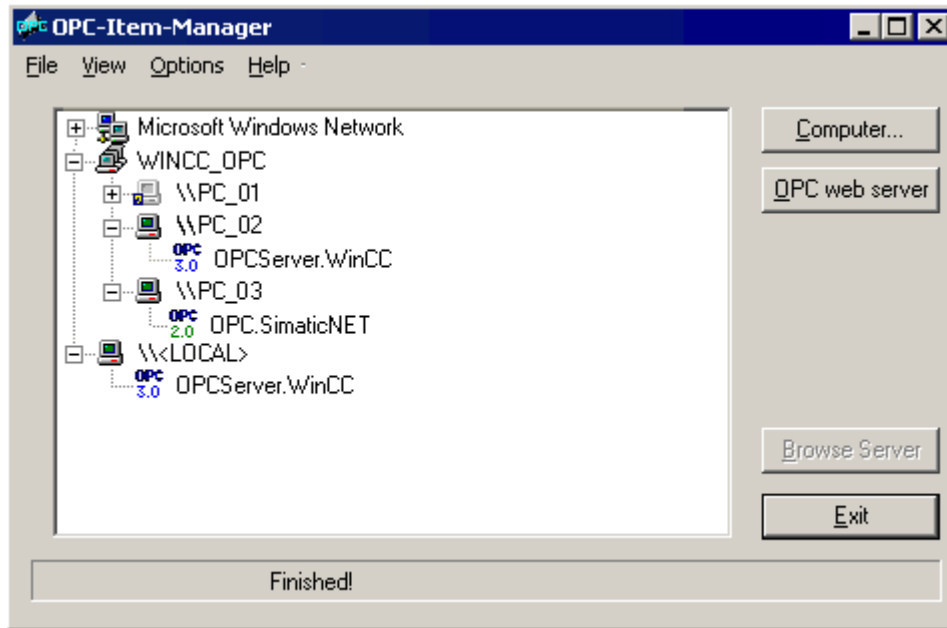
| Icons of the OPC Item Manager	Description
	A networked computer has not yet been searched for installed OPC DA servers.
	The computer was not found in the network or the computer could not be accessed.
	A networked computer has been searched for installed OPC DA servers.
OPC 3.0	A networked computer contains the OPC DA server designated with the OPC symbol. The number indicates which OPC DA specification of the WinCC OPC DA client is used.
\\<LOCAL>	Refers to the computer running the OPC Item Manager.
OPC http://	Name of the OPC XML server. The OPC XML server can be added using the "OPC Web Server" button.

Creating a connection

The OPC Item Manager configures all required settings when creating a connection. If a connection to the OPC server has already been created, this function is not available.

Tag selection

You may use the tag selection dialog to select one or more tags on the OPC server which the WinCC OPC client is to access. Filter criteria can be used to limit the choices in the tag selection dialog.

Adding a tag
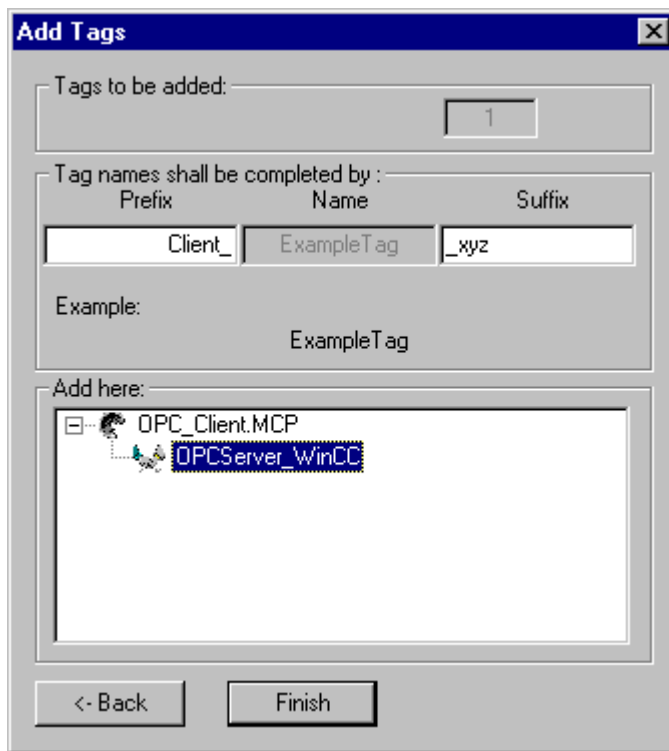
The names of the WinCC tags that access the tags of the OPC server can be set in the "Add Tags" dialog.

The WinCC tag name consists of the "prefix", "name" and "suffix". The "Name" field is preconfigured with the "ExampleTag" text. "ExampleTag" stands for the WinCC tag name of the WinCC OPC server.

You can assign a prefix or suffix to distinguish the WinCC tag name on the WinCC OPC client from the WinCC tag name on the WinCC OPC server. When configuring project monitoring, a prefix or suffix must be assigned.

The tag name may be assigned only once in a given WinCC project.

Example

The WinCC tag name on the WinCC OPC DA server is called "OPC_Server_Tag". The "Client_" value is entered in the prefix field and "_xyz" in the suffix field. In the WinCC project of the WinCC OPC DA client, the WinCC tag "Client_OPC_Server_Tag_xyz" is created.

If the tag name on the OPC server contains special characters, they are replaced by an underscore ("_"), because not all special characters occurring in tag names are supported by the OPC Item Manager.

Click "Finish" to add the WinCC tags to the WinCC project of the WinCC OPC DA client. The OPC Item Manager automatically sets the data type, the name and the address parameters for the WinCC tag.

See also

3.6.1.3　Overview of the Supported WinCC Data Types

The list below shows the data types that are supported by the WinCC OPC DA client and WinCC OPC DA server:

- Binary tag
- Signed 8-bit value
- Unsigned 8-bit value
- Signed 16-bit value
- Unsigned 16-bit value
- Signed 32-bit value
- Unsigned 32-bit value
- Floating-point number 32-bit IEEE 754
- Floating-point number 64-bit IEEE 754
- Text tag, 8-bit character set
- Text tag, 16-bit character set
- Raw data type
- Structure types
- Text reference
- Date/Time

Note

Structure types

For structure types, only the structure elements are supported, not the structure itself. However, the structure can be configured later. For more information, refer to the topic "Using structures on the WinCC OPC DA client."

Text reference

If a text tag is created with the OPC Item Manager, it is assigned a length of 160 characters. This length can be changed to any length.

See also

How to Use Structures on the WinCC OPC DA Client (Page 88)

3.6.1.4 WinCC OPC DA Client

Functionality of the WinCC OPC DA Client

Introduction

The OPC channel does not require a separate communication module. The OPC channel is an application which employs the OPC software interface to use an OPC DA server to access process data.

If WinCC is to be used as an OPC DA client, the OPC channel must be added to the WinCC project.

If a communication is established to a WinCC OPC DA server, the values of the WinCC tags are exchanged. To do this, a connection is set up in the WinCC project of the WinCC OPC DA client; it is used to handle access to the WinCC OPC DA server.

For the WinCC OPC DA client to access multiple OPC DA servers, a connection for each of the OPC DA servers must be set up in the WinCC project. For more information about troubleshooting channels and tags, refer to "Troubleshooting".

Note

The WinCC OPC channel establishes connections only to OPC servers which have the status "OPC_STATUS_RUNNING".

Note

"OPC" channel

Unicode is not supported for connection names. Make sure that you name all connections in the project in the same language. Open the Control Panel of your computer to set the code page of this language for use in programs that do not support Unicode.

Connection Monitoring

Three mechanisms are integrated for connection monitoring in the WinCC OPC-DA client. It is thus possible to take the best possible measures in the event of a network error or malfunction of an OPC DA server.

1. If the processing period for a DCOM activation exceeds warning value of 5 seconds, the tag is assigned the value "Addressing Error". If the processing period exceeds the cancellation value of 10 seconds, the connection to the OPC DA server is interrupted. This is displayed in the "Connection Status" dialog of the WinCC Explorers.

The OPC DA specification 3.00 is provided with the "Keep-Alive" feature. If the OPC DA server supports the OPC DA specifications 3.00, this feature is used. The feature causes the OPC DA server to automatically trigger cyclic updating (call OnDataChange) even if the tag values have not changed. If this regular updating is disabled, the WinCC OPC DA client terminates the connection.

The same behavior applies in the case of an OPC DA server which supports the OPC DA specifications 2.05a. In order to check the connection to the OPC DA server, the WinCC OPC DA client requests the status cyclically every 10 seconds. If this regular updating is disabled, the WinCC OPC DA client terminates the connection.

Generally, the WinCC OPC DA client terminates the connection to the OPC DA server when the connection is not capable of functioning. The WinCC OPC DA client attempts to re-establish the connection again, automatically, every 10 seconds.

See also

How to Use Structures on the WinCC OPC DA Client (Page 88)

Accessing a WinCC Tag without the OPC Item Manager (Page 86)

Configuring Access with the OPC Item Manager (Page 82)

Overview of the Supported WinCC Data Types (Page 78)

OPC Item Manager (Page 75)

OPC specifications and compatibility (Page 104)

Functionality of the WinCC OPC DA Server (Page 112)

How to Access a WinCC Tag with the OPC Item Manager

Introduction

When an OPC connection is made between WinCC and WinCC, data exchange occurs using WinCC tags. The WinCC OPC DA client uses an OPC connection to read the WinCC tag "OPC_Server_Tag" on the WinCC OPC DA server. To simplify the process, the OPC Item Manager is used.
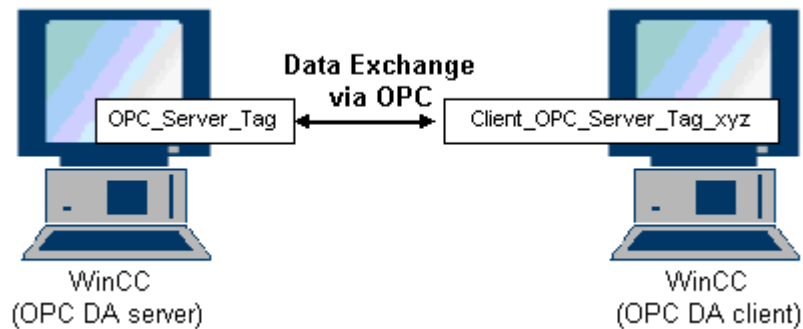
Requirements

- Two computers with WinCC projects.
- Both computers must be accessible via their IP addresses.

Configuration Steps

The following configurations are required in the WinCC project of the WinCC OPC DA client:

- Creation of a connection.
- Configuration of the "XMLClient_OPC_Var1_xyz" WinCC tag on the WinCC OPCXML client which accesses the WinCC tag of the WinCC OPC DA server.

See also

Configuring the OPC Channel on the WinCC OPC DA Client

Introduction

To use OPC for data exchange, the OPC channel must be set up in the WinCC project.

Procedure

1. Click the "Tag Management" icon in the navigation window of the WinCC Explorer on the WinCC OPC DA client.

2. Select "Add New Driver" from the "Tag Management" shortcut menu. The "Add New Driver" dialog is opened.

3. Select the "OPC.chn" driver and click the "Open" button. The channel is created and the communication driver is displayed in the tag management.

See also

Configuring Access with the OPC Item Manager (Page 82)

Configuring Access with the OPC Item Manager

Introduction

This section explains how to use the OPC Item Manager to configure access to the WinCC tag "OPC_Server_Tag" of the WinCC OPC DA server.

Requirements

- Configure an internal tag named "OPC_Server_Tag" of the data type "signed 16-bit value" in the WinCC project of the WinCC OPC DA server.

- Enable the WinCC project of the WinCC OPC DA server.

- Add the "OPC" channel to the WinCC project of the WinCC OPC DA client.
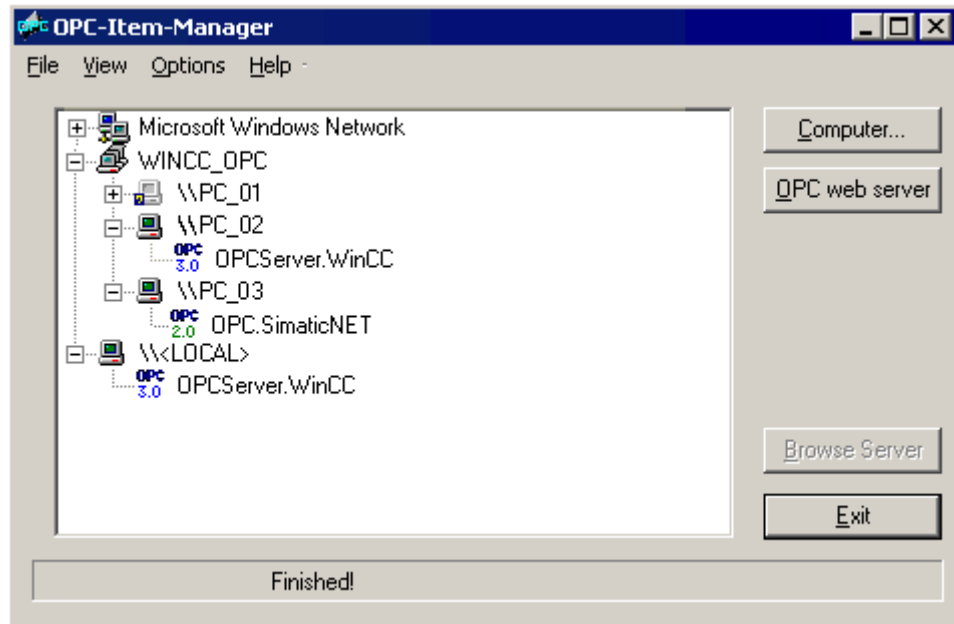

Note

"OPC" channel

Unicode is not supported for connection names. Make sure that you name all connections in the project in the same language. Open the Control Panel of your computer to set the code page of this language for use in programs that do not support Unicode.


Procedure

1. In the shortcut menu of the channel unit "OPC Groups(OPCHN Unit#1)" on the WinCC OPC DA client, select "System Parameters". The "OPC Item Manager" opens.


2. Choose the name of the computer to be used as the WinCC OPC DA server from the selection dialog.
   Select "OPCServer.WinCC" from the list displayed.

3. Click the "Browse Server" button.
   The "Filter criteria" dialog is opened.
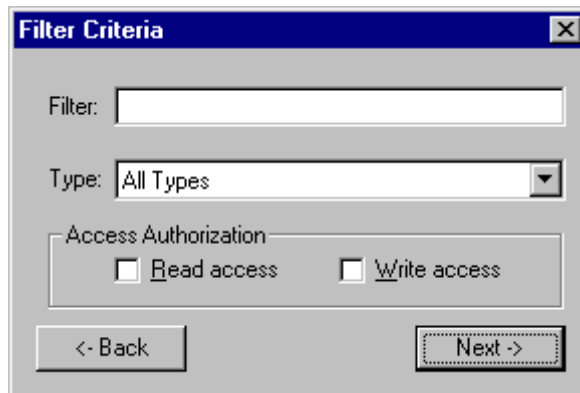
4. Click "Next".
   The "OPCServer.WinCC ..." dialog is opened.
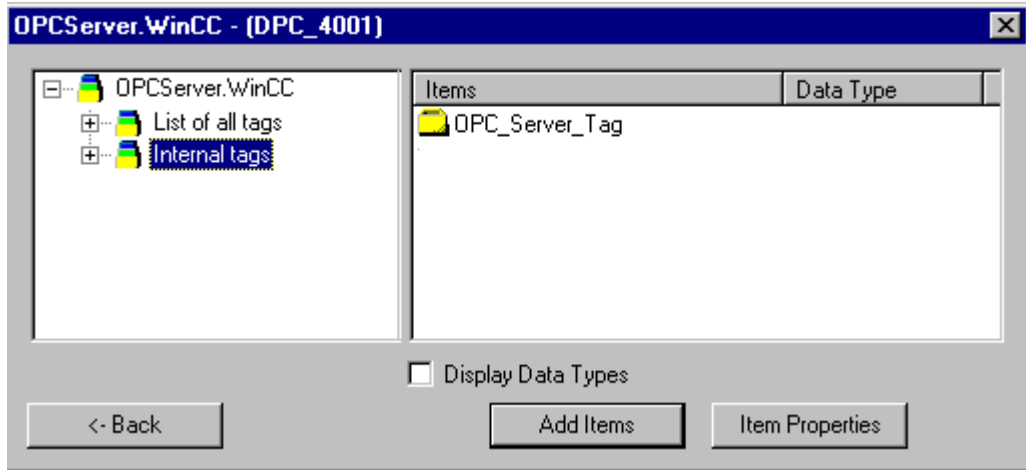
5. Select the WinCC tag "OPC_Server_Tag".
   Click the "Add Items" button.

6. If a connection to the WinCC OPC DA server already exists, continue with step 6.
   If a connection has not been created, a message will be displayed.
   Click on the "Yes" button. The "New Connection" dialog is opened.
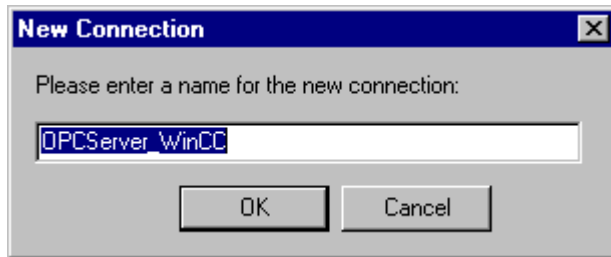
7. Enter "OPCServer_WinCC" as the name of the connection. Click "OK".
   The "Add Tags" dialog opens.
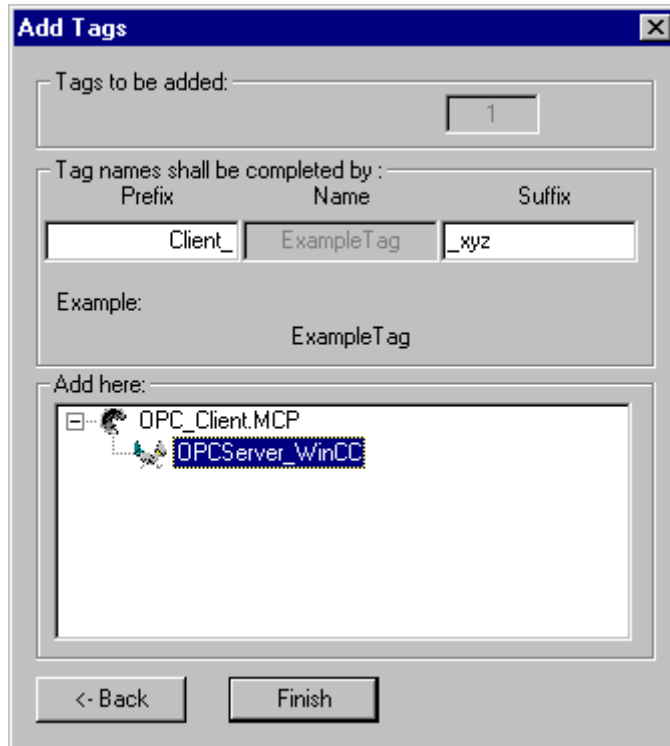
8. Enter the text "Client_" in the prefix field and the text "_xyz" in the suffix field.

9. Select connection "OPCServer_WinCC".
   Click "Finish".

10. Click the "Back" button in the "OPCServer.WinCC ..." dialog.
   Click "Exit" to close the OPC Item Manager.

See also

Configuring the OPC Channel on the WinCC OPC DA Client (Page 82)

Accessing a WinCC Tag without the OPC Item Manager

Introduction

OPC servers that do not support browser functionality require access to be configured manually. Configuration of WinCC tags on the WinCC OPC DA client is shown using an example of a WinCC-WinCC OPC connection.
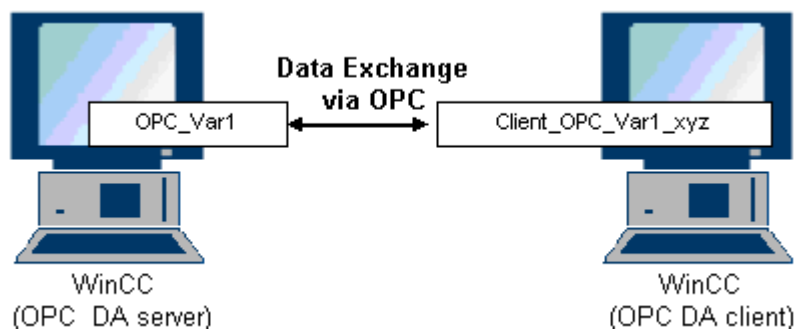
Note

To access a WinCC tag without the OPC Item Manager, the ItemID must be set manually. When addressing WinCC tags, the symbolic computer name (server prefix) can also be specified. The ItemID has the following syntax: Server prefix::WinCC tag. If the WinCC tag of the local WinCC project is addressed, the server prefix is omitted.

The following configurations are required in the WinCC project of the WinCC OPC DA client:

1. Selection of the "OPC_Var1" WinCC tag to be accessed.

2. Creation of a connection.

3. Configuration of the "Client_OPC_Var1_xyz" WinCC tag that accesses the WinCC tag of the WinCC OPC DA server.

Requirements

- Two computers with WinCC projects.

- Both computers must be accessible via their IP addresses.

- Configure an internal tag named "OPC_Var1" with data type "signed 16-bit value" in the WinCC project of the WinCC OPC DA server.

- Enable the WinCC project of the WinCC OPC DA server.

- Add the OPC channel to the WinCC project of the WinCC OPC DA client.

Note

"OPC" channel

Unicode is not supported for connection names. Make sure that you name all connections in the project in the same language. Open the Control Panel of your computer to set the code page of this language for use in programs that do not support Unicode.

Procedure

1. Select "New Connection" from the shortcut menu of the channel unit "OPC Groups(OPCHN Unit#1)" on the WinCC OPC DA client. The "Connection Properties" dialog is opened. Enter a name for the connection in the corresponding field.

2. Click the "Properties" button. A dialog with the connection name in its title is displayed.
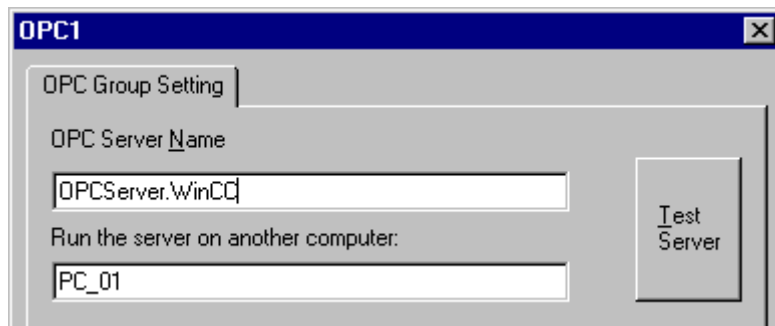
For connections to WinCC V 6, the entry in the "OPC Server Name" field must be "OPCServer.WinCC".

3. Enter the name of the computer to be used as the OPC DA server in the "Start Server on this Computer" field. Click "Test Server", to check the connection to the WinCC OPC DA server.

4. Select "New Tag" from the shortcut menu of the connection. The "Tag Properties" dialog opens.

5. Enter the name "Client_OPC_Var1_xyz" in the "Tag" field. Set the data type to "signed 16-bit".

6. In the "Tag Properties" dialog, click the "Select" button. The "Address Properties" dialog opens.
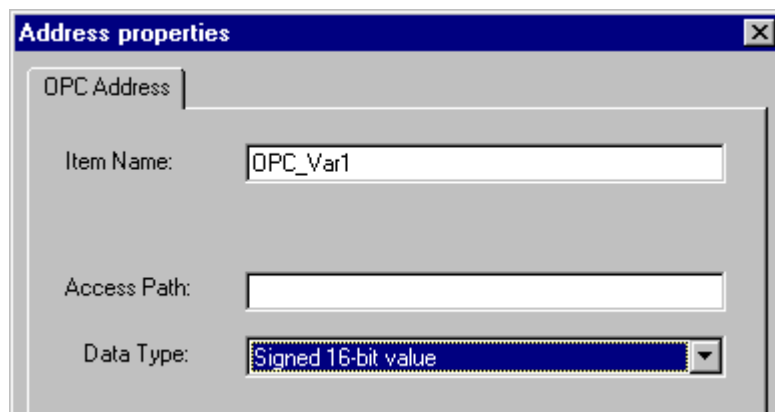
Enter the name of the WinCC tag of the WinCC OPC DA server in the "Item Name" field. Leave the entry in the "Access Path" field unchanged. Set the data type to "signed 16-bit".

7. Click "OK" to close all open dialogs.

Using Structures on a WinCC OPC DA Client

How to Use Structures on the WinCC OPC DA Client

Introduction

Structures are used to organize tags and tag types that form a logical unit. This allows them to be referenced using a single logical name.

Structures are not supported by the OPC DA specification. As a result, structures cannot be set up using the OPC Item Manager, only the individual tags in a structure. If you wish to use structures on the WinCC OPC DA client nonetheless, the data structure must be configured subsequently in the WinCC project of the WinCC OPC DA client in order to supply it with the relevant item names of the server tags.

Requirements

- Two computers with WinCC projects.
- Both computers must be accessible via their IP addresses.

Configuration steps

The following configuration steps are necessary to use structures on the WinCC OPC DA client:

- Configuring structures and structure tags on the WinCC OPC DA server
- Using structures on the WinCC OPC DA client in the WinCC project

See also

How to Configure Structures on the WinCC OPC DA Client (Page 90)

Configuring Structures and Structure Tags on the WinCC OPC DA Server (Page 89)

Configuring Structures and Structure Tags on the WinCC OPC DA Server

Introduction

In this section a structure and a structure tag is created in the WinCC project of the OPC DA server. This configuration is required for the OPC DA client to access the structure tag.

Procedure

1. Select "New Structure Type" from the structure types shortcut menu on the WinCC OPC DA server. The "Structure Properties" dialog is displayed.

2. Click "New Element" and create the internal tag "OPCServer_Struct" of data type SHORT.
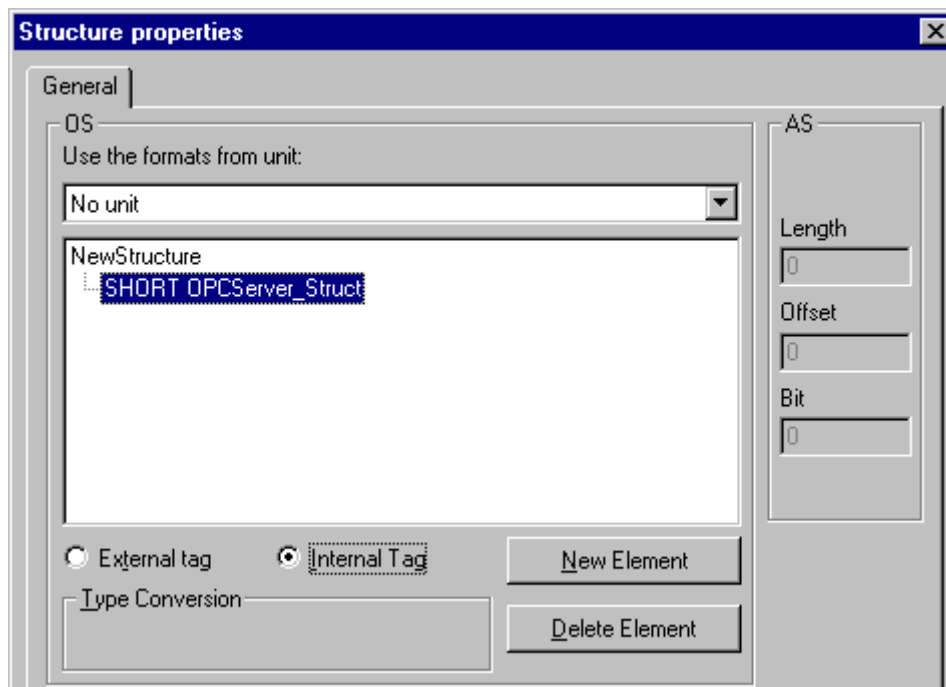
Click "OK" to close the dialog.

3. In the navigation window, click the plus sign in front of the icon for tag management. Select "New Tag" from the internal tag shortcut menu. Create a WinCC tag named "Var" with this structure type.

4. The data frame of the WinCC Explorer shows the single tag "Var" and the structure tag "Var.OPCServer_Struct".

5. Activate the WinCC project.

See also

How to Configure Structures on the WinCC OPC DA Client (Page 90)

How to Configure Structures on the WinCC OPC DA Client

Introduction

Structures are not supported by the OPC DA specification. As a result, structures cannot be set up using the OPC Item Manager. In this section, the structure already present in the WinCC project of the WinCC OPC DA server is configured for the WinCC project of the WinCC OPC DA client. A WinCC tag that accesses the existing structure tag on the WinCC OPC DA server is configured on the WinCC OPC DA client.

Requirements

- Create a structure and a structure tag named "Var.OPCServer_Struct" in the WinCC project of the WinCC OPC DA server.

- Enable the WinCC project of the WinCC OPC DA server.

- Add the OPC channel to the WinCC project of the WinCC OPC DA client.

Note

"OPC" channel

Unicode is not supported for connection names. Make sure that you name all connections in the project in the same language. Open the Control Panel of your computer to set the code page of this language for use in programs that do not support Unicode.

Procedure

1. Select "New Structure Type" from the structure types shortcut menu on the WinCC OPC DA client. The "Structure Properties" dialog is displayed.

2. Click the "New Element" button and set up an external tag. Name the element exactly as it is in the WinCC project of the OPC-DA server. Click "OK" to close the "Structure Properties" dialog.

3. If a connection to the OPC DA server already exists, continue with step 6.
   If no connection has been created, select "New Connection" from the shortcut menu of the channel unit "OPC". The "Connection Properties" dialog is opened. Enter a name for the connection in the corresponding field.

4. Click the "Properties" button. A dialog with the connection name in its title is displayed. For connections to WinCC V 6, the entry in the field "OPC Server Name" must be "OPCServer.WinCC".

5. Enter the name of the computer to be used as the WinCC OPC DA server in the field "Start Server on this Computer". Click "Test Server", to check the connection to the WinCC OPC DA server. Click "OK" to close the dialog.

6. Select "New Tag" from the shortcut menu of the connection. The "Tag Properties" dialog opens. Select the newly created structure type as the data type.

7. In the "Tag Properties" dialog, click the "Select" button. The "Address properties" dialog opens.
   In the "Item Name" field, enter the name "Var.OPCServer_Struct" for the structure tag of the WinCC OPC DA server. Leave the entry in the "Access Path" field unchanged.

8. Click "OK" to close all open dialogs.

See also

Configuring the OPC Channel on the WinCC OPC DA Client (Page 82)

Configuring Structures and Structure Tags on the WinCC OPC DA Server (Page 89)

Error Handling in the Event of Disturbed OPC DA Communication

Error Handling in the Event of Disturbed OPC Communication

Introduction

The procedure for communication testing is independent of how WinCC is used.

WinCC Used as the OPC DA Server

Use the channel diagnostics on the WinCC OPC DA client to determine whether a connection to the OPC DA server can be established. For more information regarding channel problem analysis, refer to "Troubleshooting".

WinCC Used as the OPC DA Client

Use the channel diagnostics on the WinCC OPC DA client to determine whether a connection to the OPC DA server can be established. For more information regarding channel problem analysis, refer to "Troubleshooting".

See also

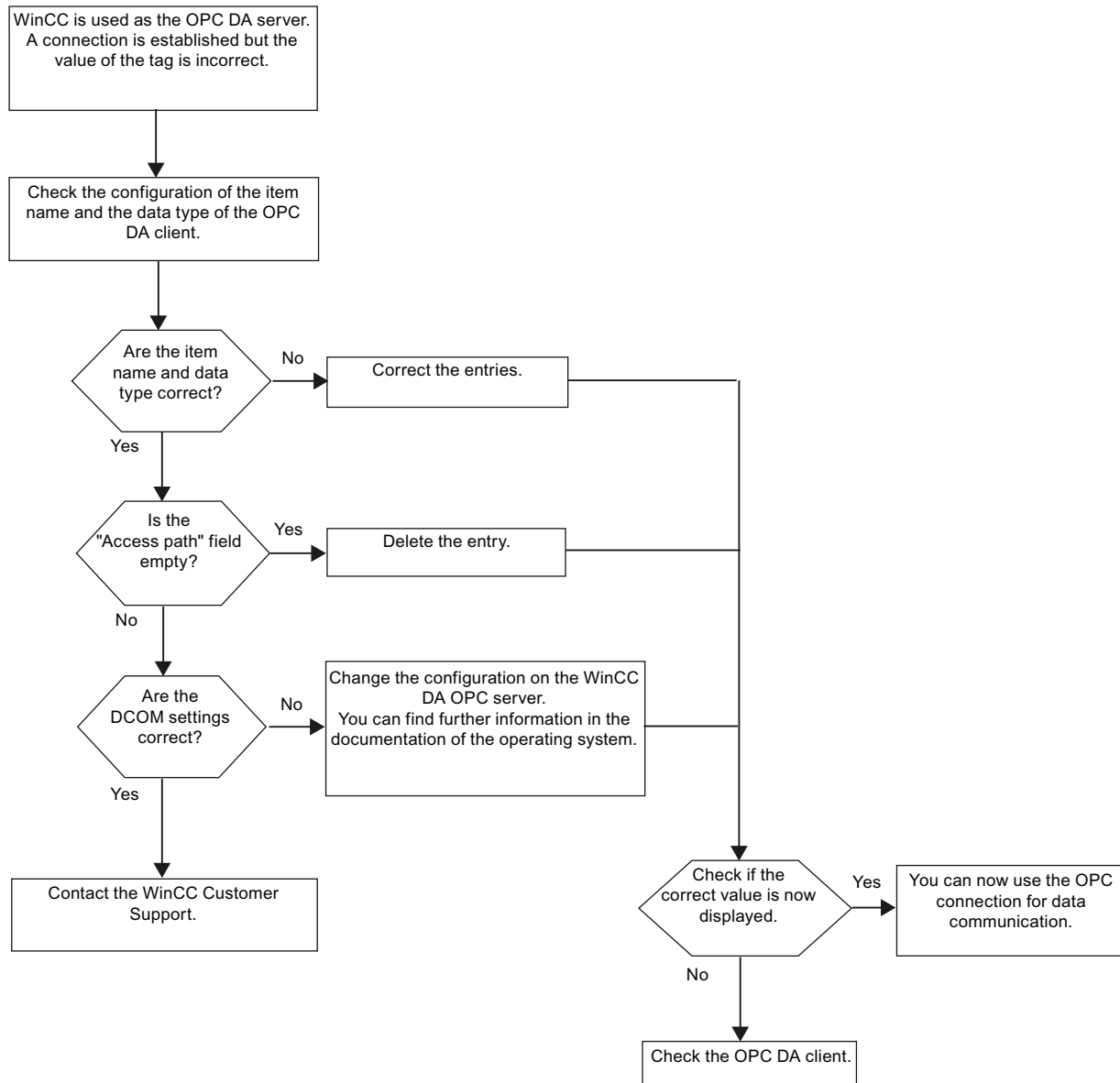WinCC is used as the OPC DA client, and the connection is not established. (Page 95)

WinCC is used as the OPC DA client, and the connection is established. (Page 94)

WinCC is used as the OPC DA server, and the connection is not established. (Page 93)
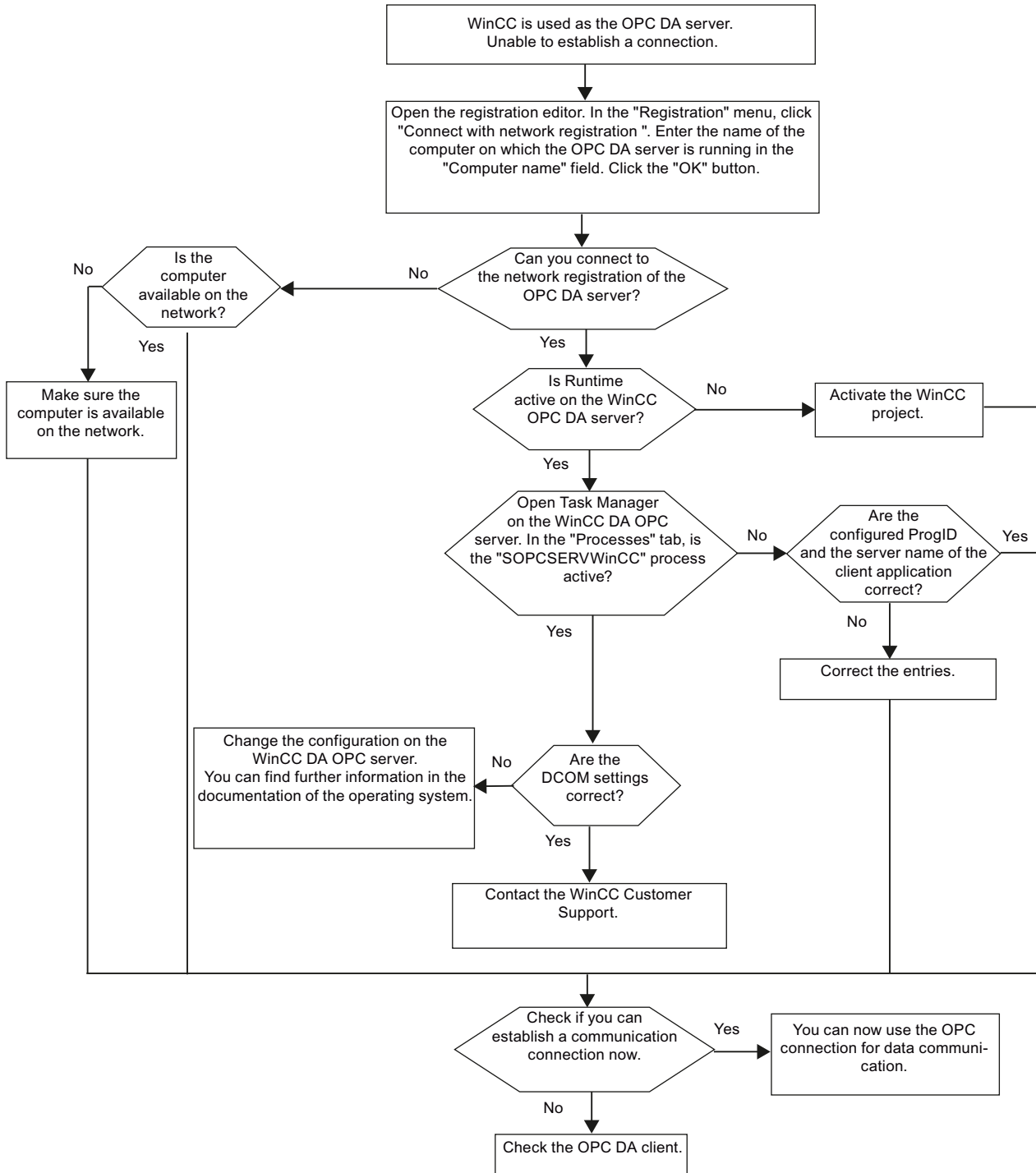
WinCC is used as the OPC DA server, and the connection is established successfully. (Page 92)

WinCC as OPC DA Server

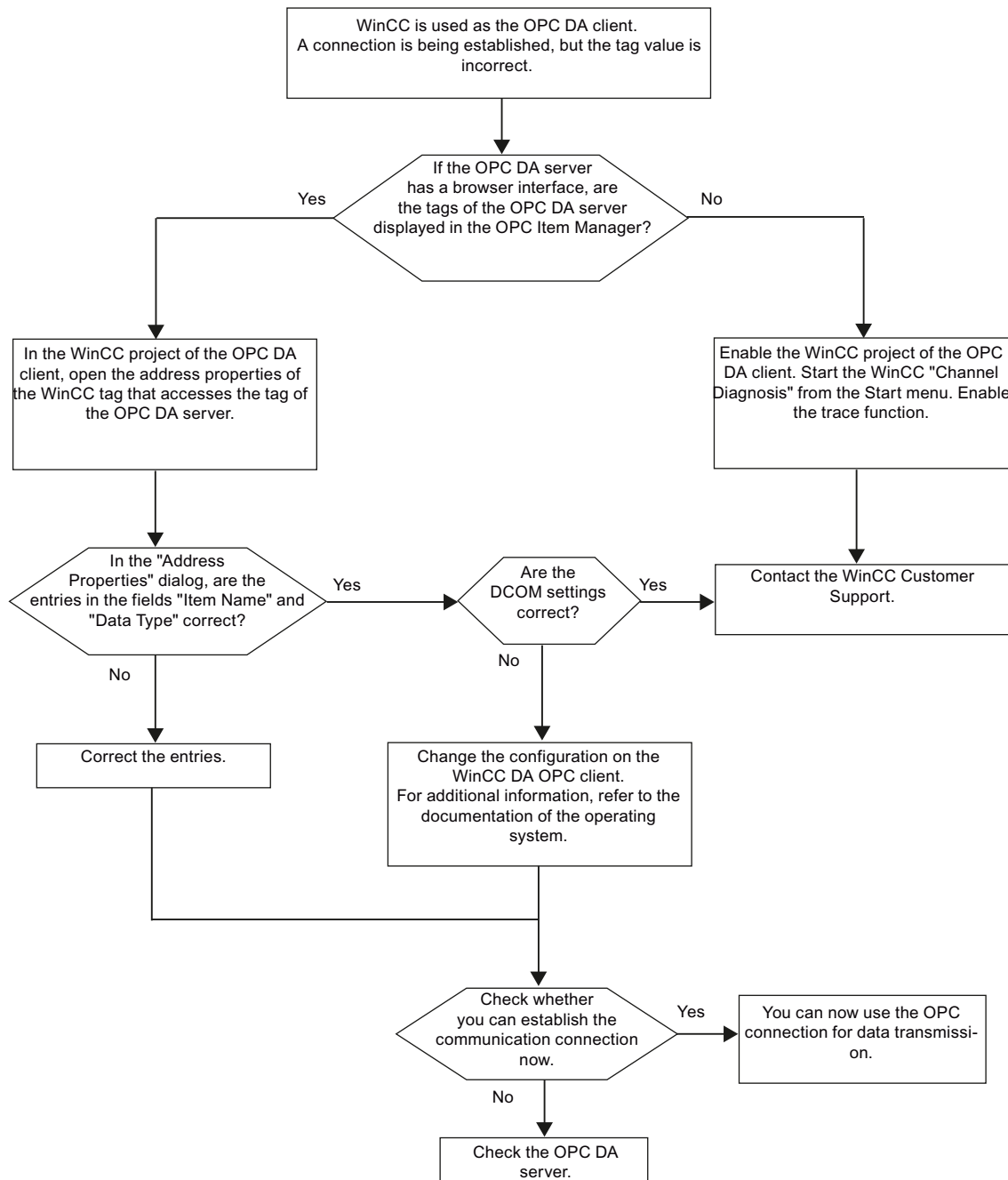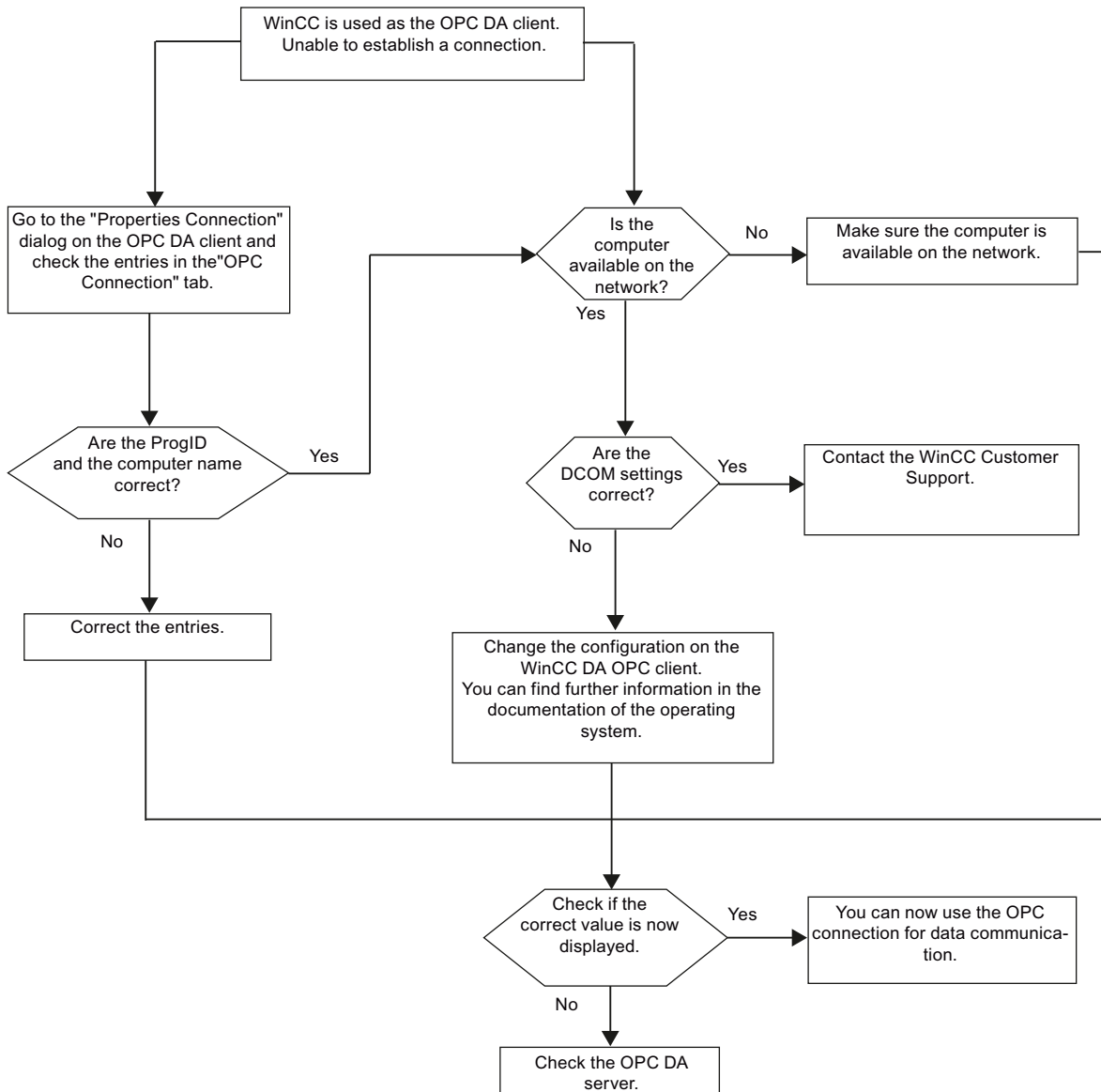## WinCC is used as the OPC DA server, and the connection is established successfully.

```
┌─────────────────────────────┐
│ WinCC is used as the OPC DA │
│ server. A connection is     │
│ established but the value   │
│ of the tag is incorrect.    │
└─────────────────────────────┘
             │
             ▼
┌─────────────────────────────┐
│ Check the configuration of  │
│ the item name and the data  │
│ type of the OPC DA client.  │
└─────────────────────────────┘
             │
             ▼
      ╱──────────────╲        No      ┌─────────────────────┐
     ╱ Are the item    ╲─────────────▶│ Correct the entries.│
     ╲ name and data   ╱              └─────────────────────┘
      ╲ type correct? ╱
         ╲────────╱
          │ Yes
          ▼
      ╱──────────────╲        Yes     ┌─────────────────────┐
     ╱    Is the       ╲─────────────▶│ Delete the entry.   │
     ╲ "Access path"   ╱              └─────────────────────┘
      ╲ field empty?  ╱
         ╲────────╱
          │ No
          ▼
      ╱──────────────╲        No      ┌────────────────────────────────┐
     ╱   Are the       ╲─────────────▶│ Change the configuration on    │
     ╲ DCOM settings   ╱              │ the WinCC DA OPC server.       │
      ╲  correct?     ╱               │ You can find further           │
         ╲────────╱                   │ information in the             │
          │ Yes                       │ documentation of the           │
          ▼                           │ operating system.              │
┌─────────────────────────┐           └────────────────────────────────┘
│ Contact the WinCC       │
│ Customer Support.       │           ╱──────────────╲   Yes  ┌──────────────────┐
└─────────────────────────┘          ╱  Check if the  ╲─────▶│ You can now use  │
                                      ╲ correct value  ╱      │ the OPC connection│
                                       ╲ is now       ╱       │ for data         │
                                        ╲ displayed? ╱        │ communication.   │
                                           ╲──────╱           └──────────────────┘
                                            │ No
                                            ▼
                                  ┌─────────────────────────┐
                                  │ Check the OPC DA client.│
                                  └─────────────────────────┘
```

WinCC is used as the OPC DA server, and the connection is not established.

```
┌─────────────────────────────────────┐
│  WinCC is used as the OPC DA server. │
│  Unable to establish a connection.   │
└─────────────────────────────────────┘
                  │
                  ▼
┌─────────────────────────────────────────────────────┐
│ Open the registration editor. In the "Registration"  │
│ menu, click "Connect with network registration ".    │
│ Enter the name of the computer on which the OPC DA    │
│ server is running in the "Computer name" field.       │
│ Click the "OK" button.                                │
└─────────────────────────────────────────────────────┘
                  │
                  ▼
```

Is the computer available on the network? — No → Make sure the computer is available on the network.

Can you connect to the network registration of the OPC DA server? — No → (Is the computer available on the network?) / Yes ↓

Is Runtime active on the WinCC OPC DA server? — No → Activate the WinCC project.

Yes ↓

Open Task Manager on the WinCC DA OPC server. In the "Processes" tab, is the "SOPCSERVWinCC" process active? — No → Are the configured ProgID and the server name of the client application correct? — Yes ↑ / No → Correct the entries.

Yes ↓

Are the DCOM settings correct? — No → Change the configuration on the WinCC DA OPC server. You can find further information in the documentation of the operating system.

Yes ↓

Contact the WinCC Customer Support.

Check if you can establish a communication connection now. — Yes → You can now use the OPC connection for data communication.

No ↓

Check the OPC DA client.

WinCC as OPC DA Client

WinCC is used as the OPC DA client, and the connection is established.

```
┌──────────────────────────────────┐
│ WinCC is used as the OPC DA client.│
│ A connection is being established, │
│   but the tag value is incorrect.  │
└──────────────────────────────────┘
```

If the OPC DA server has a browser interface, are the tags of the OPC DA server displayed in the OPC Item Manager?

Yes — In the WinCC project of the OPC DA client, open the address properties of the WinCC tag that accesses the tag of the OPC DA server.

No — Enable the WinCC project of the OPC DA client. Start the WinCC "Channel Diagnosis" from the Start menu. Enable the trace function.

In the "Address Properties" dialog, are the entries in the fields "Item Name" and "Data Type" correct?

Are the DCOM settings correct?

Yes — Contact the WinCC Customer Support.

No — Correct the entries.

No — Change the configuration on the WinCC DA OPC client. For additional information, refer to the documentation of the operating system.

Check whether you can establish the communication connection now.

Yes — You can now use the OPC connection for data transmission.

No — Check the OPC DA server.

WinCC is used as the OPC DA client, and the connection is not established.

```
                    ┌─────────────────────────────┐
                    │ WinCC is used as the OPC DA  │
                    │ client.                      │
                    │ Unable to establish a        │
                    │ connection.                  │
                    └─────────────────────────────┘
```

Go to the "Properties Connection" dialog on the OPC DA client and check the entries in the"OPC Connection" tab.

Is the computer available on the network? — No → Make sure the computer is available on the network.

Yes

Are the ProgID and the computer name correct? — Yes

No

Are the DCOM settings correct? — Yes → Contact the WinCC Customer Support.

No

Correct the entries.

Change the configuration on the WinCC DA OPC client.
You can find further information in the documentation of the operating system.

Check if the correct value is now displayed. — Yes → You can now use the OPC connection for data communication.

No

Check the OPC DA server.

3.6.1.5   WinCC OPC XML Client

Functionality of the WinCC OPC XML Client

Introduction

The OPC channel does not require a separate communication module. The OPC communication driver can be implemented as the OPC XML client.

In order to use WinCC as the WinCC OPC XML client, the OPC channel must be added to the WinCC project.

The WinCC OPC XML client provides the OPC XML server with the OPC process data as a web page. Access can be made to the web page via the Internet / Intranet using HTTP. When a WinCC OPC XML client requests data, the web service is automatically started by the web server.

In order that the WinCC OPC XML client can access several OPC XML servers, a connection must be made to each OPC XML server in the WinCC project.

If a communication is established to a WinCC OPC XML server, the values of the WinCC tags are exchanged. A connection is set up in the WinCC project of the WinCC OPC XML client via which access to the WinCC OPC XML server can be processed. The connection monitoring is not activated in the case of a WinCC OPC XML client.

NOTICE

Operation with multiple network adapters and activated TCP/IP

For operation with multiple network adapters and activated TCP/IP protocol, observe the information in sections "WinCC Release Notes/Notes on Operation/Network Technology and UPS" and "Configurations/Distributed Systems/System Behavior in Runtime/Special Features of Communication using the Server with Several Network Adapters".

Note

The WinCC OPC channel establishes connections only to OPC servers which have the status "OPC_STATUS_RUNNING".

Note

"OPC" channel

Unicode is not supported for connection names. Make sure that you name all connections in the project in the same language. Open the Control Panel of your computer to set the code page of this language for use in programs that do not support Unicode.

See also

Overview of the Supported WinCC Data Types (Page 78)

OPC Item Manager (Page 75)

OPC specifications and compatibility (Page 104)

Mode of Operation (Page 108)

How to Access a WinCC Tag with the OPC Item Manager

Introduction

When an OPC connection is made between WinCC and WinCC, the data is exchanged by means of WinCC tags. The WinCC OPC DA client uses an OPC connection to read the WinCC tag "OPC_Server_Tag" on the WinCC OPC XML server. To simplify the process, the OPC Item Manager is used.
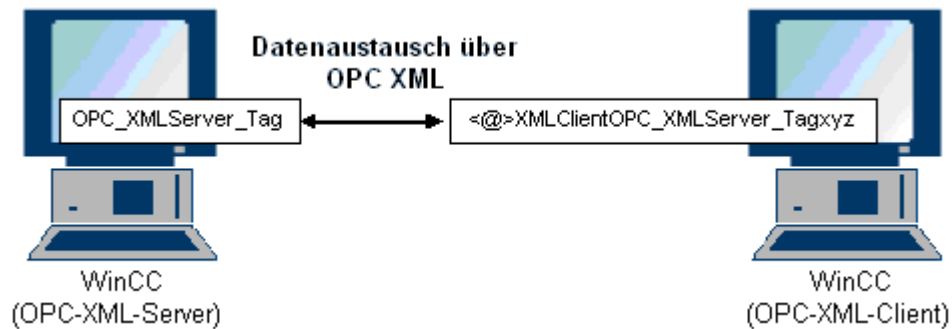
Requirements

- Two computers with WinCC projects.
- It must be possible to access both computers using HTTP.

Configuration Steps

The following configurations are required in the WinCC project of the WinCC OPC XML client:

See also

Configuring the OPC Channel on the WinCC OPC DA Client (Page 82)

Configuring Access with the OPC Item Manager (Page 97)

Configuring Access with the OPC Item Manager

Introduction

This section explains how to use the OPC Item Manager to configure access to the "OPC_XMLServer_Tag" WinCC tag of the WinCC OPC XML server.

Requirements

- Configure an internal tag named "OPC_XMLServer_Tag" of data type "signed 16-bit value" in the WinCC project of the WinCC OPC XML server.

- Activate the WinCC project of the WinCC OPC XML server.

- The OPC channel must be added to the WinCC project of the WinCC OPC XML client.

Note

"OPC" channel

Unicode is not supported for connection names. Make sure that you name all connections in the project in the same language. Open the Control Panel of your computer to set the code page of this language for use in programs that do not support Unicode.

Procedure

1. Select "System Parameters" from the shortcut menu of the channel unit "OPC Groups(OPCHN Unit#1)" on the WinCC OPC XML client. The "OPC Item Manager" opens.
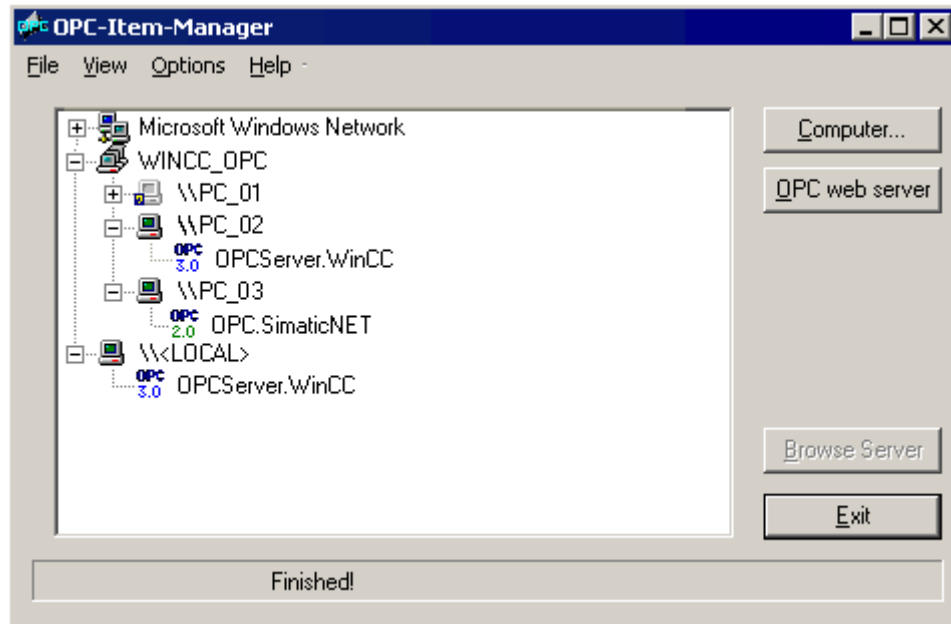
2. Click the "OPC Web Server" button. The "Add OPC Web Server" dialog is opened. Enter the URL of the WinCC OPC XML server in the "URL" field in following format: <http://<xxx>/ WinCC-OPC-XML/DAWebservice.asmx>. Replace xxx with either the IP address or the computer name on which the OPC XML web service is running.
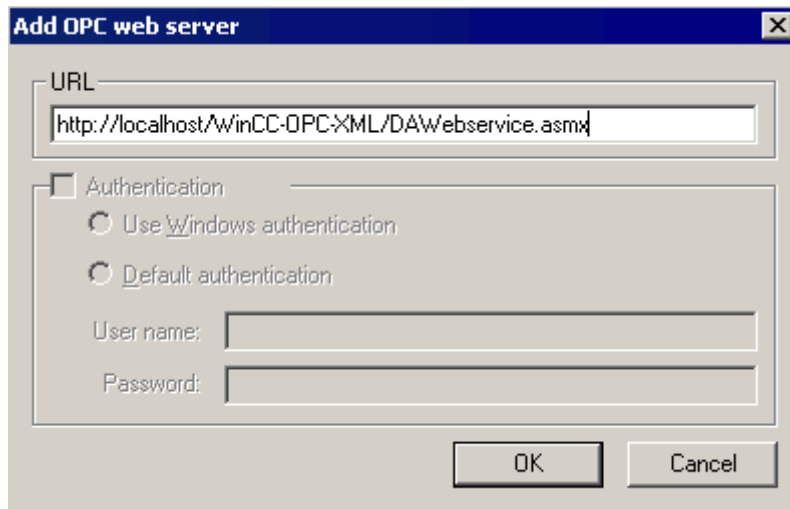
Click "OK" to close the dialog.

3. A list appears from which to select "/WinCC-OPC-XML/DAWebservice.asmx>". Click the "Browse Server" button. The "Filter criteria" dialog is opened.
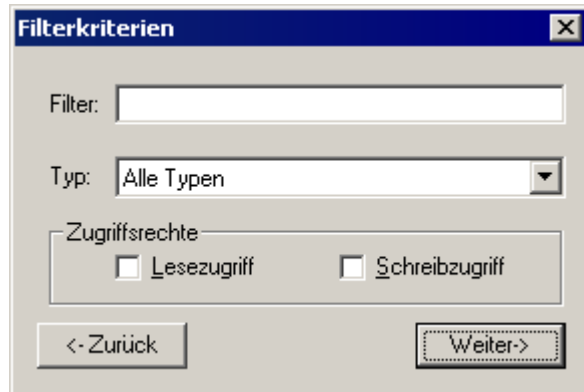
4. Click the "Next->" button in the "Filter Criteria" dialog. The "http:// ..." dialog is opened.
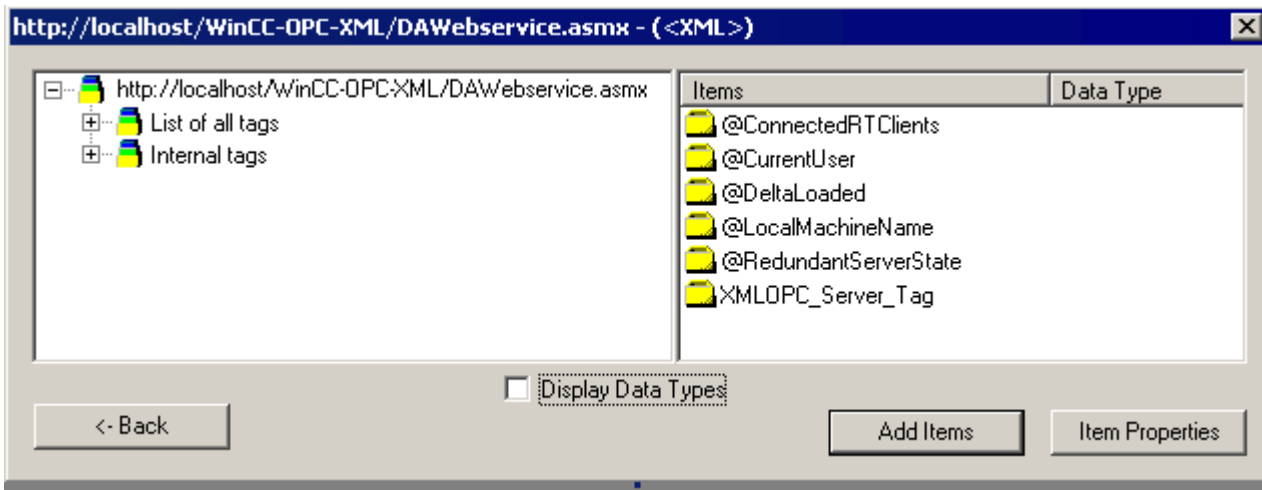
5. In the "http:// ..." dialog, select the WinCC tag "XMLOPC_Server_Tag". Click the "Add Items" button.

6. If a connection to the WinCC OPC XML server already exists, continue with step 7. If no connection has been configured, a corresponding message is output.
Click "Yes". The "New Connection" dialog is opened.

Enter the name "OPCXMLServer_WinCC" for the connection. Click "OK".

7. The "Add Tags" dialog opens.
   Enter the string "XMLClient_" in the prefix field, and "_xyz" in the suffix field. Select the
   "OPCXMLServer_WinCC" connection. Click "Finish".
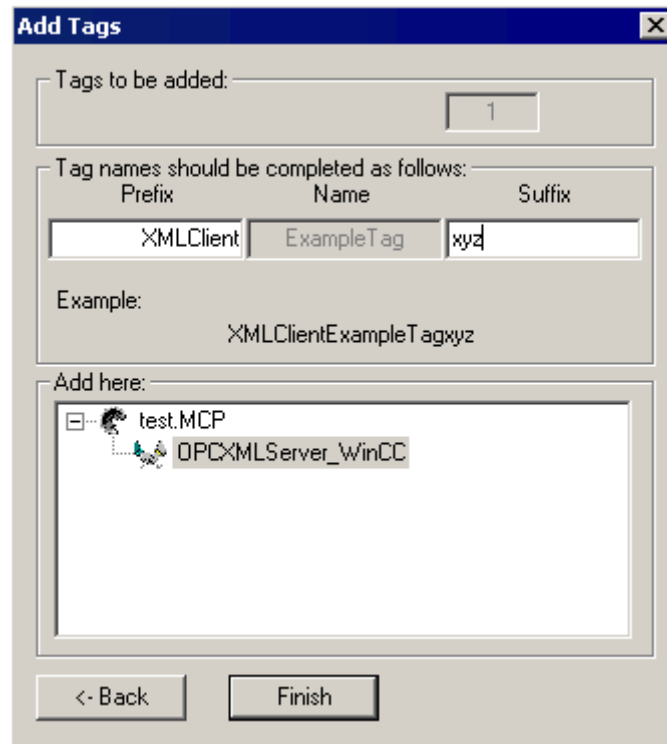
8. In the "http:// ..." dialog, click "<- Back". Click "Exit" to close the OPC Item Manager.

See also

Configuring the OPC Channel on the WinCC OPC DA Client (Page 82)

Accessing a WinCC Tag without the OPC Item Manager

Introduction

OPC servers that do not support browser functionality require access to be configured
manually. Configuration of WinCC tags on the WinCC OPC XML client is shown using an
example of a WinCC - WinCC OPC connection.

Note

To access a WinCC tag without the OPC Item Manager, the ItemID must be set manually.
When addressing WinCC tags, the symbolic computer name (server prefix) can also be
specified. The ItemID has the following syntax: server_prefix::<@>WinCC tag. If the WinCC
tag of the local WinCC project is addressed, the ItemID has the following syntax: <@>WinCC
tag.

Configuration Steps

The following configurations are required in the WinCC project of the WinCC OPC XML client:

1. Creation of a connection.

2. Configuring the "XMLClient_OPC_Var1_xyz" WinCC tag on the WinCC OPC XML client which accesses the WinCC tag of the WinCC OPC DA server.

Requirements

- Two computers with WinCC projects.

- It must be possible to access the computers using HTTP.

- Configure an internal tag named "XMLOPC_Server_Tag" with data type "signed 16-bit value" in the WinCC project of the WinCC OPC XML server.

- Enable the WinCC project of the WinCC OPC XML server.

- The OPC channel must be added to the WinCC project of the WinCC OPC XML client.

Note

When configuring external tags in the OPC channel, the preset values from WinCC in the type conversion field of the "Tag Properties" dialog must not be altered. The data type of the tag in the process is set in the data type field of the "Address Properties" dialog.

Procedure

1. Select "New Connection" from the shortcut menu of the channel unit "OPC Groups(OPCHN Unit#1)" on the WinCC OPC XML client. The "Connection Properties" dialog is opened. Enter a name for the connection in the corresponding field.

2. Click the "Properties" button. A dialog with the connection name in its title is displayed.
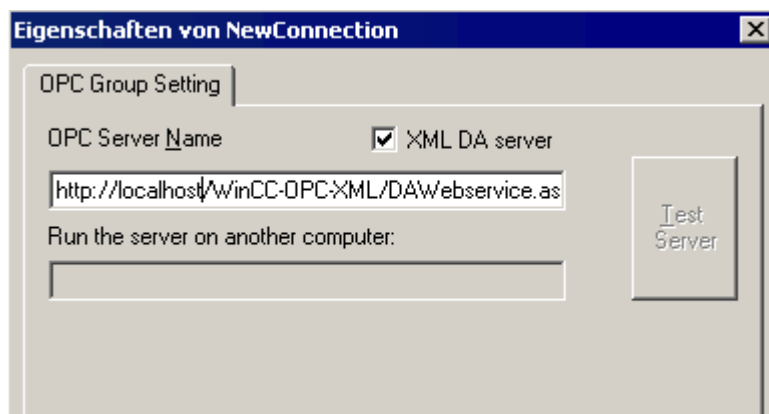
Select the "XML DA Server" check box. In the case of a connection to the WinCC OPC XML server, the "OPC Server Name" field must contain the URL of the WinCC OPC XML server. The URL has the following syntax: "http://<xxx>/WinCC-OPC-XML/ DAWebservice.asmx". Replace xxx with either the IP address or the computer name on which the OPC-XML web service is running.

3. Select "New Tag" from the shortcut menu of the connection. The "Tag Properties" dialog is opened.

4. Enter the name "XMLClient_OPC_Var1_xyz" in the "Tag" field. Set the data type to "signed 16-bit".

5. In the "Tag Properties" dialog, click the "Select" button. A dialog with the tag name in its title is displayed.
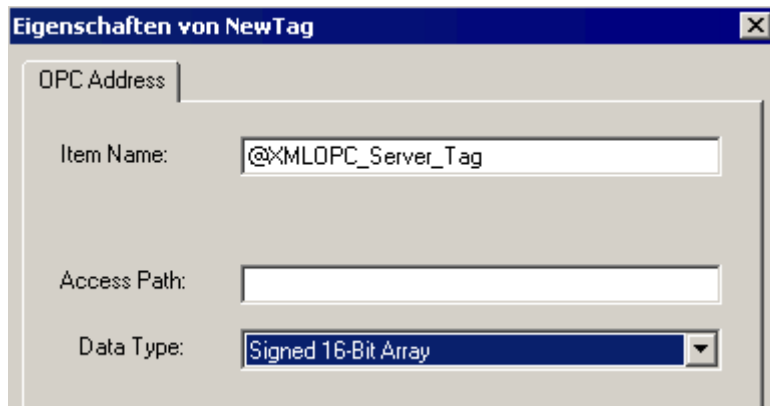
Enter the symbol "<@>" and the name of the WinCC tag of the WinCC OPC XML server in the "Item Name" field. Leave the entry in the "Access Path" field unchanged. Set the data type to "signed 16-bit".

6. Click "OK" to close all open dialogs.

3.6.2   OPC - Open Connectivity

3.6.2.1   OPC - Open Connectivity

Contents

The OPC standard software interface allows devices and applications from various manufacturers to be combined with one another in a uniform manner.

WinCC can be used as an OPC server or an OPC client. The "OPC" channel represents the OPC client application of WinCC.

This chapter describes

- the OPC servers of WinCC
- how to use OPC in WinCC
- how to set up various OPC DA links
- how to configure the access to the WinCC message system
- how the WinCC message system appears on the OPC A&E
- how to set up access to the WinCC archive system

3.6.2.2 Functionality of OPC

OPC is a standardized manufacturer-independent software interface for data exchange in automation engineering.

OPC interfaces allow the standard linking of devices and applications from different manufacturers.
OPC is based on the Windows COM (Component Object Model) and DCOM (Distributed Component Object Model) technologies.

OPC XML DA provides an additional software interface that is based on the XML, SOAP and HTTP Internet standards.

OPC UA (Unified Architecture) is the successor technology to OPC. OPC UA is platform-independent and supports different protocols as communication medium.

3.6.2.3 OPC specifications and compatibility

Overview

OPC specifies the interfaces for access to the following objects in WinCC:

- Process values (OPC Data Access 2.05a, 3.0; OPC XML Data Access 1.01; OPC UA 1.02)

- Archived process values (OPC Historical Data Access 1.20; OPC UA Historical Access 1.02)

- Chronological messages (OPC Historical Alarms and Events v1.10)

- Messages (OPC Alarms and Events 1.10; OPC UA Alarms and Conditions 1.02)

For more information about individual OPC specifications, refer to the OPC Foundation website.

Compatibility

Support of these specifications is regularly monitored by the "Compliance Test Tool" (CTT) of the OPC Foundation. Interoperability with OPC products from other manufacturers is guaranteed by participation in "OPC Interoperability Workshops".

The test results submitted are published on the OPC Foundation website. To view the results, enter the search term "OPC Self-Certified Products".

See also

www.opcfoundation.org (http://www.opcfoundation.org)

3.6.2.4 Using OPC in WinCC

Introduction

In WinCC, servers are available for the following OPC interfaces:

- OPC Data Access / OPC XML Data Access: Access to the WinCC body of data
- OPC Historical Data Access: Access to the WinCC archive system
- OPC Alarms&Events: Access to the WinCC message system
- OPC Unified Architecture: Access to the WinCC body of data and archive system

WinCC contains an OPC channel by default. The OPC channel can access the relevant OPC servers as client via OPC DA , OPC XML DA or OPC UA.

WinCC OPC communications concept

Data exchange between a WinCC OPC server and OPC client is completed via DCOM. After installation of WinCC, the DCOM settings of the WinCC OPC server are correctly configured.

If a WinCC OPC server or client communicates with an external OPC system, corresponding adaptations must be performed. The "Local access" and "Remote access" authorizations must be entered for the user in "DCOM/Workplace/COM Security/Access rights/Edit default" of User Administration on the client.

The OPC XML server of WinCC is implemented as a web service. This gives you access to your PC via the Internet. You therefore need to define appropriate access rights.

The following shows the WinCC OPC communication concept:
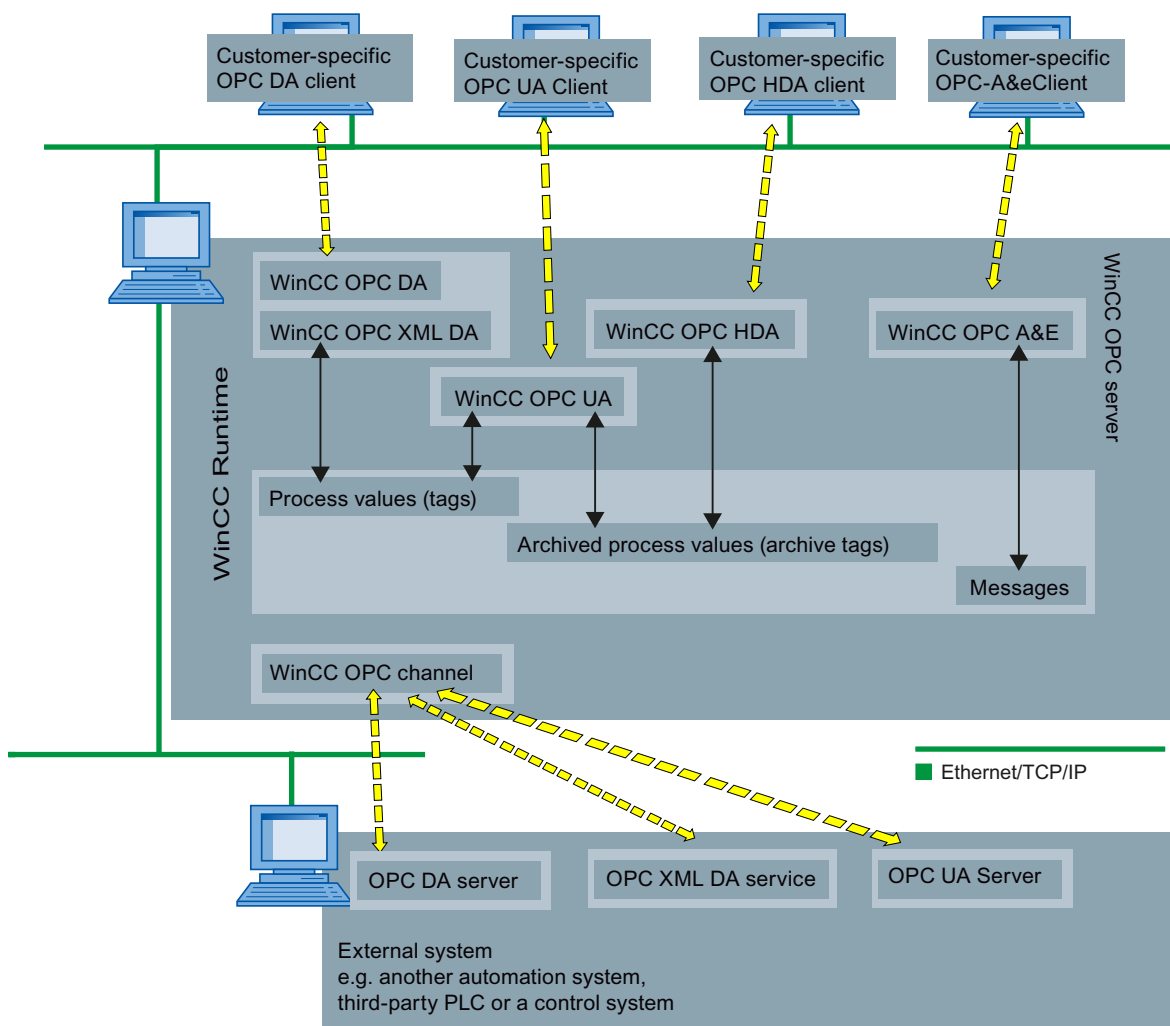
Licensing

OPC server	Licensing
WinCC OPC DA server	A valid RT license for WinCC
WinCC OPC XML DA Server	A valid RT license for WinCC
WinCC OPC UA Server	WinCC Option Connectivity Pack
WinCC OPC HDA server	
WinCC OPC A&E Server	

3.6.2.5 How to configure Windows for the use of WinCC OPC

Introduction

The OPC client and the OPC server are DCOM applications. A distributed DCOM application can only be run under the same user account. Therefore the OPC server must recognize the OPC client's user account and vice-versa. If the WinCC OPC servers are used with WinCC OPC clients, the correct configuration is already warranted by the installation.

Declaration of the user account, if an external OPC server or client is used

For additional information on the granting of user rights, refer to the Windows documentation.

Requirements

Log on as the administrator to both the WinCC OPC server and OPC client workstations to configure the user permissions.

Procedure using Windows 7 as an example

1. Go to "Control Panel > System and Security > Administrative Tools > Computer Management > Local Users and Groups".

2. In the "Users" shortcut menu, select "New User".
   In the "New User" dialog, enter the user account details of the communication partner. Click "Create" and close the dialog.

3. Click the "Users" icon. Double-click the relevant user. The "Properties" dialog for this user is displayed.

4. Click the "Member Of" tab. Click "Add". The "Select group" dialog is opened.

5. Add the group "Users".
   If you are on a computer that has WinCC installed, also add the group "SIMATIC HMI".
   Click "OK" to close all open dialogs.

How to adapt the Windows firewall settings

After installation of WinCC, the Windows firewall settings of the WinCC OPC servers are correctly configured.

If OPC clients access OPC servers in different subnets, you must adapt the configuration of the permitted network areas to the OPC servers.

3.6.2.6   WinCC OPC XML DA Server

Mode of Operation

Introduction

The OPC XML DA server from WinCC is realized as a web service of the Microsoft Internet Information Server (IIS).

The WinCC OPC XML DA server provides the OPC XML client with the OPC process data as a web page. The web page can be accessed via the Internet using HTTP. The address of the WinCC OPC XML DA Server is: <http://<xxx>/WinCC-OPC-XML/DAWebservice.asmx>"

The WinCC OPC XML DA server is not visible in WinCC. When an OPC XML client requests data, the Web service is automatically started by the Web server.

To establish successful OPC communication, the following must be observed:

- The WinCC project of the WinCC OPC XML DA server must be activated.

- The computer of the WinCC OPC XML DA server must be capable of being accessed via HTTP.

Licensing

In order to operate the WinCC OPC XML DA server, the following licenses must be installed on each WinCC computer implemented as an OPC XML server:

- A valid RT license for WinCC

- WinCC Option Connectivity Pack

Special features of tags of "String" type

If you use tags of "string" type that logically stand for floating point values, there can be problems when OPC clients want to write and read.

Description

An OPC client writes to a string tag and does not enter the new value in the form of a string but as float, double or decimal.

Problem

The comma that indicated the decimal value (in German) can be lost. This will result in a wrong value.

This also affects the read access to string tags if the read value is requested in the float, double or decimal format.

Remedy

Only use the respective floating point tags for the floating point values. Access string tags only in string format.

See also

Functionality of the WinCC OPC XML Client (Page 95)

Overview of the Supported WinCC Data Types (Page 78)

www.opcfoundation.org (http://www.opcfoundation.org)

Installation

Introduction

OPC XML enables access to the process tags via the Internet. In order to operate OPC XML, a number of additional software components must be installed.

Note

It is essential to observe the sequence of installation steps as described here. Otherwise, there might be problems during installation.

Requirement

- Installation of the Internet Information Server (IIS)
- Installed Microsoft .NET Framework V4.0 from the WinCC product DVD
- Installation of the WinCC OPC XML Server Using WinCC Setup

Installation of the Internet Information Server (IIS)

In Windows Server 2008 R2 / 2012 R2, configure the settings in Server Manager using the role "Webserver (IIS)" in the associated role services.

Select the following settings:

- Web Management Tools:
  - IIS Management Service
  - IIS Management Console
  - IIS Management Scripts and Tools
- WWW Services > Common HTTP Features or Shared HTTP Features:
  - Default Document
  - Static Content

- WWW Services > Application Development Features:
  - .NET Extensibility
  - ASP.NET
  - ISAPI Extensions
  - ISAPI Filters
- WWW Services > Security:
  - Request Filtering
  - Basic Authentication
  - Windows Authentication

Note

Always install Microsoft Internet Information Service (IIS) with ASP.NET

Always install ASP.NET when you install the Microsoft Internet Information Service (IIS).

Note

The web service of the WinCC OPC XML DA server communicates over port: 80 (HTTP).

Make sure that the firewall rule "WWW services (HTTP)" is selected and activated for the required network areas.

Installation of the WinCC OPC XML server

The WinCC OPC XML DA server can be selected during the installation of WinCC. For more information, refer to the WinCC Information System in the section "Installation Notes > Installing WinCC".

The following settings must be made during the installation:

- Create virtual directory "WinCC-OPC-XML"
- Define the access rights for the directory

Setting security settings with IIS

Introduction

The Internet Information Services make the PC accessible over the Internet. You therefore need to define appropriate access rights.

Note

If you have any questions or experience problems with the following settings, contact your intranet/Internet administrator.

Procedure using Windows 7 as an example

1. Go to "Control Panel > System and Security > Administrative Tools > Computer Management > Services and Applications > Internet Information Services (IIS) Manager".

2. Select the virtual directory "WinCC-OPC-XML".

3. Open the "Authentication" function in the function view.
   The list of installed authentication methods opens.

4. To enable anonymous access, activate "Anonymous authentication".

5. To enable authenticated access, activate "Windows authentication".

6. Close all open dialogs.

Note

Limitations and Risks

Note the limitations and risks indicated by Microsoft when setting the access options.

Testing the installation

Introduction

OPC XML-DA makes the OPC process data available as a web page. The web page can be accessed via the Internet using HTTP. The following section explains how to test the installation.

Procedure

1. Start Internet Explorer on the computer run as the WinCC OPC XML server.

2. Enter the URL "http://localhost/WinCC-OPC-XML/DAWebservice.asmx" in the address bar. Confirm your entry with <ENTER>.

3. When the OPC XML DA function requests appear, installation was successful.
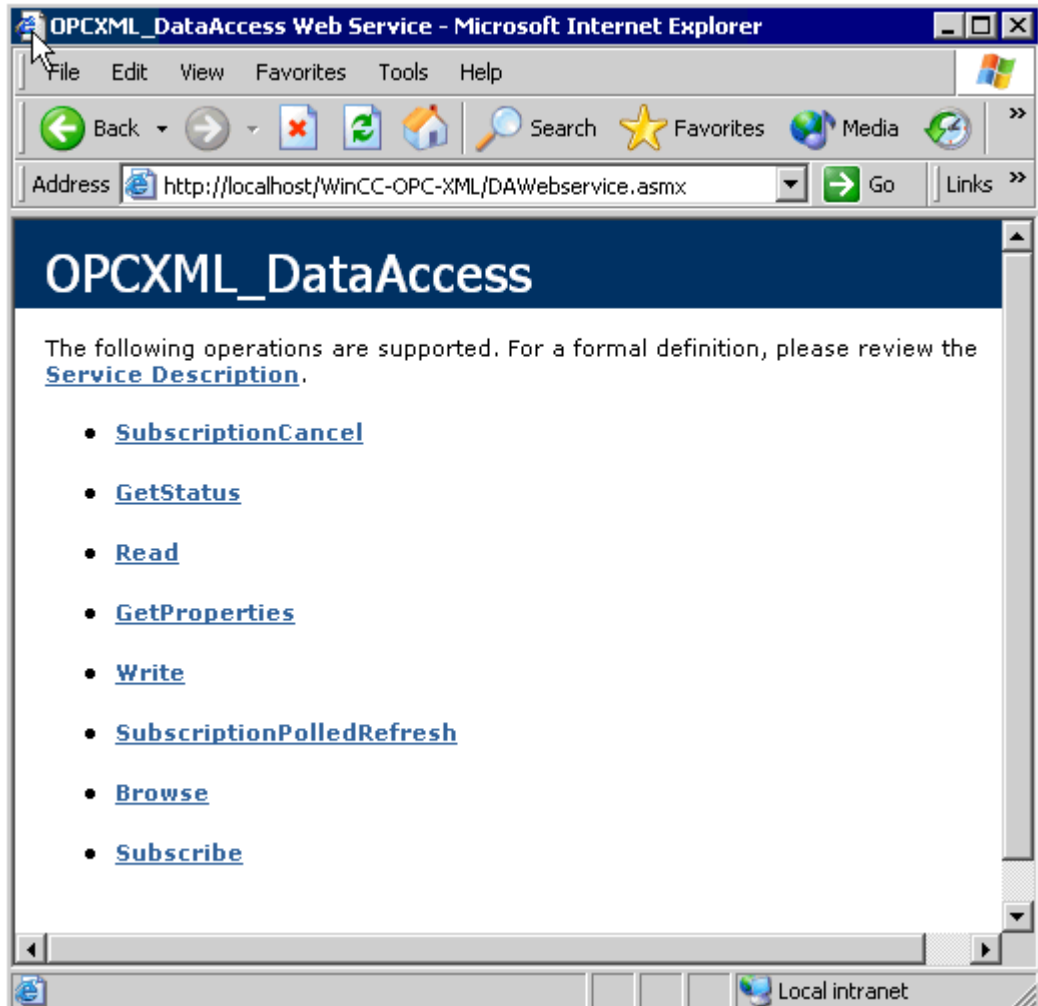
3.6.2.7   WinCC OPC DA server

Functionality of the WinCC OPC DA Server

Introduction

The WinCC OPC DA Server supports OPC Data Access specifications 2.05a and 3.00. This has been confirmed by the compliance test.

The WinCC OPC DA server is a DCOM application. This interface is used by the WinCC OPC DA server to make the required information about WinCC tag available to the WinCC client.

The WinCC OPC DA server is active, if the WinCC OPC DA client is accessing it via a connection. To establish successful OPC communication, the following must be observed:

- The WinCC project of the WinCC OPC DA server must be enabled.

- The computer on which the WinCC OPC DA server runs must be accessible via its IP address.

Installation

The WinCC OPC DA server can be selected during the installation of WinCC. After installation, the WinCC OPC DA server is immediately usable without any further configuration.

The WinCC OPC DA server can be implemented on a WinCC server or a WinCC client.

Notes on configuration

- You can assemble tags into tag groups for structuring in the WinCC project. The tags should not have the same name as the group.

- Each write request initiated in WinCC, for example via VBScript or the object "IO field", is always treated as a synchronous "Write" call. The "IOPCSyncIO::Write" interface is used by the WinCC OPC DA server for this. The asynchronous write mechanism is not implemented in the WinCC OPC DA channel.

Note

If the Internet options on a computer are set to automatically detect settings under "Connections -> LAN Settings", access to OPC DA via the web service will take significantly longer.

See also

www.opcfoundation.org (http://www.opcfoundation.org)

Using Multiple OPC DA Servers

Introduction

More than one OPC DA server may be installed on a computer, and any number may work in parallel.
In this way, the OPC DA server of WinCC and the OPC DA server of another (third-party) provider may be operated independently of one another on the same computer.

The WinCC OPC DA client can access the process data of the automation device via the OPC server of the third-party provider. The OPC DA client of Microsoft Excel can use the WinCC OPC DA server to access the WinCC data.
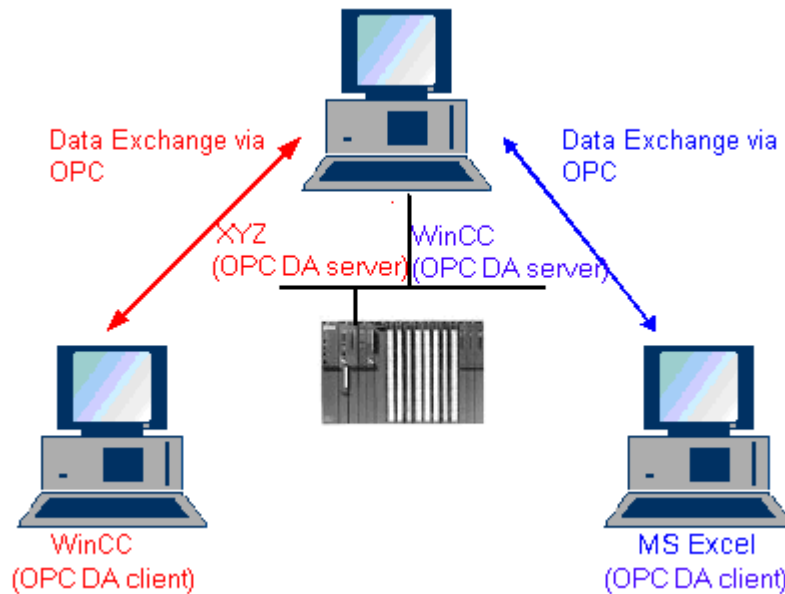
There are a number of OPC DA servers available from various manufacturers. Each of these OPC DA servers has a unique name (ProgID) for identification. OPC DA clients must use this name to address the OPC server.

The OPC Item Manager can be used to query the name of the OPC DA server. The OPC DA server of WinCC V 7 is named: "OPCServer.WinCC".

See also

Querying the OPC DA Server Name (Page 115)

Querying the OPC DA Server Name

Introduction

Multiple OPC DA servers can be installed on a single computer. The OPC Item Manager displays the names of the OPC DA servers available to the workstation in a selection window. These OPC DA servers can be run on the same computer or on computers in the network environment.

Requirement

Add the "OPC" channel to the WinCC project of the WinCC OPC DA client.

Procedure

1. In the shortcut menu of the channel unit "OPC Groups(OPCHN Unit#1)" on the WinCC OPC DA client, select "System Parameters". The "OPC Item Manager" is opened.

2. In the navigation window of the OPC Item Manager, select the name of the computer you wish to access.

3. The OPC Item Manager displays the names of the OPC DA servers that available to your computer in a selection window.
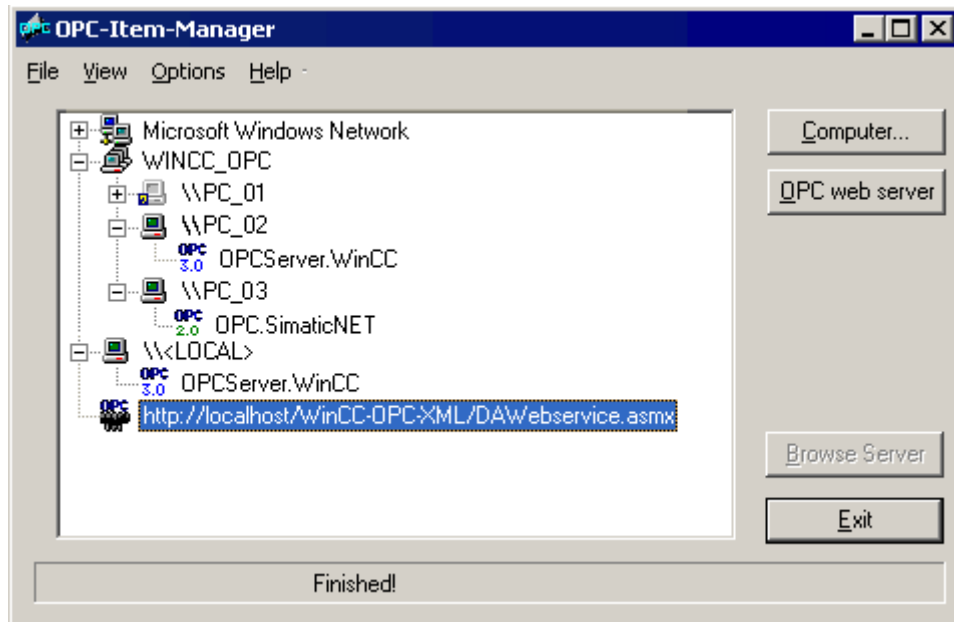
See also

OPC Item Manager (Page 75)

Examples of OPC DA Connections

WinCC - WinCC Connection

Example of WinCC to WinCC Connection

Introduction

When establishing a WinCC - WinCC connection, data are exchanged between the WinCC OPC DA server and client by means of the "OPC_Server_Tag" WinCC tag. The "Client_OPC_Server_Tag_xyz" WinCC tag on the client reads the "OPC_Server_Tag" WinCC tag on the server. If the value of the "OPC_Server_Tag" tag on the WinCC OPC server changes, the value of the "Client_OPC_Server_Tag_xyz" WinCC tag on the WinCC OPC DA client also changes. Changes on the client are also reflect on the server.

Tag values are displayed in I/O fields on both computers.
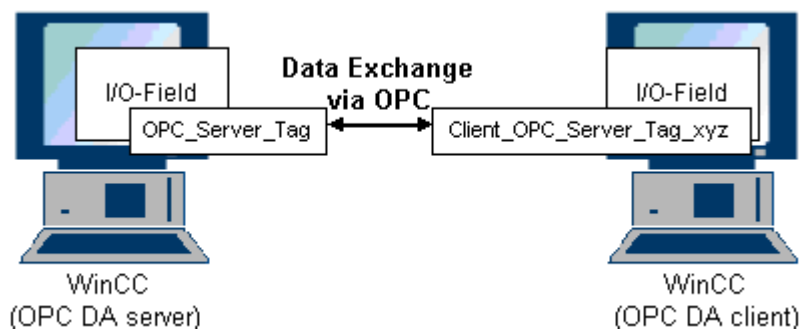
Requirements

- Two computers with WinCC projects.
- Both computers must be accessible via their IP addresses.

Configuration Procedure

The following configurations are required to establish a WinCC - WinCC connection:

1. Configuring a WinCC Project on a WinCC OPC DA Server
2. Configuring a WinCC Project on a WinCC OPC DA Client

See also

How to Configure a WinCC Project on a WinCC OPC DA Server

Introduction

In this section, a WinCC tag is created in the WinCC project of the WinCC OPC DA server and displayed in an I/O field.

Procedure

1. Select "New Tag" from the shortcut menu of the "Internal Tags" icon on the WinCC OPC DA server. Create a new tag called "OPC_Server_Tag" of the "signed 16-bit value" type.

2. Launch the Graphics Designer and open a new picture.

3. Add an I/O field to the picture. Select the "I/O field" object from the object list under "Smart Objects". The "I/O Field Configuration" dialog is opened.
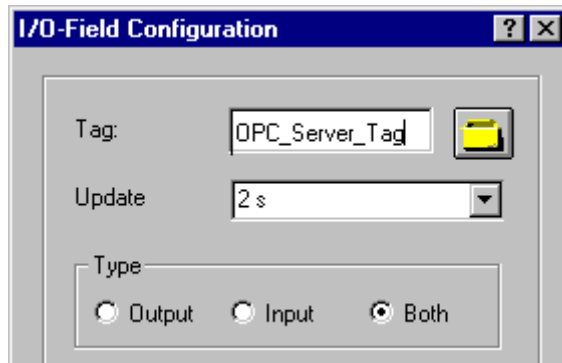
4. Enter the name "OPC_Server_Tag" in the "Tag" field.

5. Set the update to "2s" and the field type to "I/O field".

6. Click "OK" to close the dialog and save the picture.

7. Enable the WinCC project by clicking the "Activate" button in the Graphics Designer.

See also

Configuring the WinCC Project on the WinCC OPC DA Client (Page 117)

Configuring the WinCC Project on the WinCC OPC DA Client

Introduction

In this section, a WinCC tag is created on the WinCC OPC DA client, in order to read a WinCC tag on the WinCC OPC DA server. The tag value is displayed in an I/O field.

Requirements

- Add the "OPC" channel to the WinCC project of the WinCC OPC DA client.

- Configure an internal tag named "OPC_Server_Tag" of the data type "signed 16-bit value" in the WinCC project of the WinCC OPC DA server.

- Enable the WinCC project of the WinCC OPC DA server.

Procedure

1. In the shortcut menu of the channel unit "OPC Groups(OPCHN Unit#1)" on the WinCC OPC DA client, select "System Parameters". The OPC Item Manager is opened.

2. Choose the name of the computer to be used as the OPC DA server from the selection dialog. Select "OPCServer.WinCC" from the list. Click the "Browse Server" button. The "Filter Criteria" dialog is opened.

3. Click the "Next->" button in the "Filter Criteria" dialog. Select the "OPC_Server_Tag" tag in the "OPCServer.WinCC ..." dialog. Click the "Add Items" button.

4. If a connection to the OPC DA server already exists, continue with step 5.
   If no connection has been configured, a corresponding message is displayed.
   Click "Yes". The "New Connection" dialog is displayed.
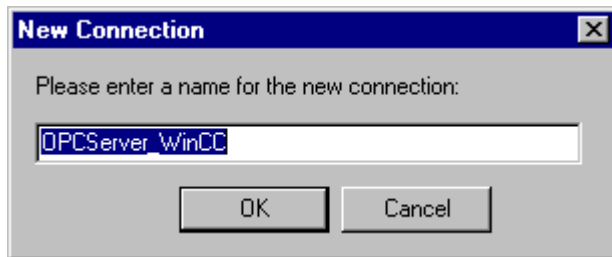
   Enter "OPCServer_WinCC" as the name of the connection. Click "OK".

5. The "Add Tags" dialog is displayed.
   Enter "Client_" in the prefix field and "_xyz" in the suffix field. Select connection "OPCServer_WinCC". Click "Finish".
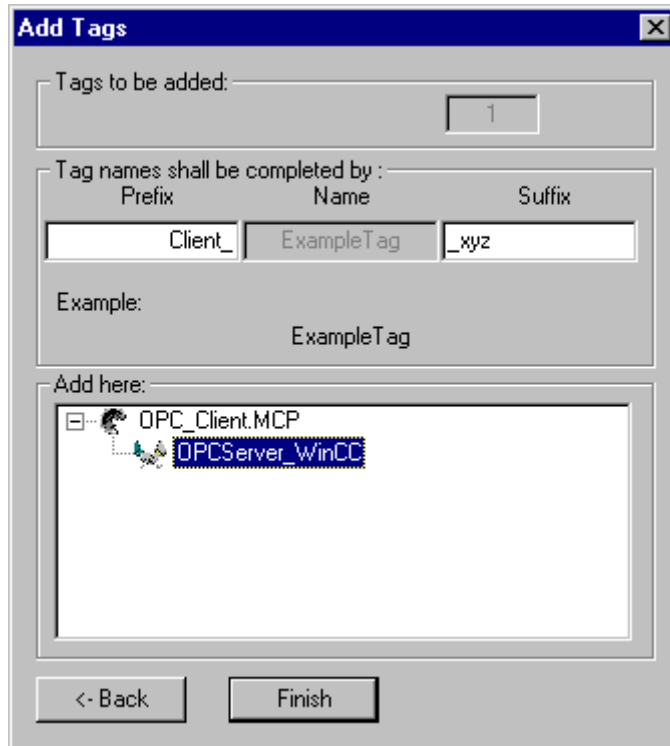
6. Click the "<- Back" button in the "OPCServer.WinCC ..." dialog. In the "OPC Item Manager", click "Exit" to close the OPC Item Manager.

7. Launch the Graphics Designer and open a new picture. Add an I/O field to the picture. Select the "I/O field" object from the object list under "Smart Objects". The "I/O Field Configuration" dialog is opened.

8. Enter the name "Client_OPC_Server_Tag_xyz" in the "Tag" field. Set the update to "2 s". Set the field type to "I/O field". Close the dialog and save the picture. Enable the WinCC project by clicking the "Activate" button in the Graphics Designer.

9. The value of the configured tags is displayed in the I/O field on both the WinCC OPC DA server and the client. Enter a new value in the I/O field on the WinCC OPC DA server. The new value is displayed in the I/O field on the WinCC OPC DA client.

See also

How to Configure a WinCC Project on a WinCC OPC DA Server (Page 117)

Configuring the OPC Channel on the WinCC OPC DA Client (Page 82)

WinCC - SIMATIC NET FMS OPC Server Connection

Example of WinCC - SIMATIC NET FMS OPC Server Connection

Introduction

During the installation of SIMATIC NET, you can select the OPC server to be installed. In the following example, a connection between WinCC and SIMATIC NET FMS OPC server is configured. Data from the automation device is made available to WinCC through the SIMATIC NET FMS OPC server.

In this example, WinCC is used as the WinCC OPC DA client. The OPC Item Manager displays the indexes of the object list configured for the automation device.

The current value of the tag is displayed in an I/O field. As soon as the value of the tags on the SIMATIC NET FMS OPC server changes, the new value is reflected on the process picture on the WinCC OPC DA client. Conversely, a value entered in the I/O field is sent to the automation device.
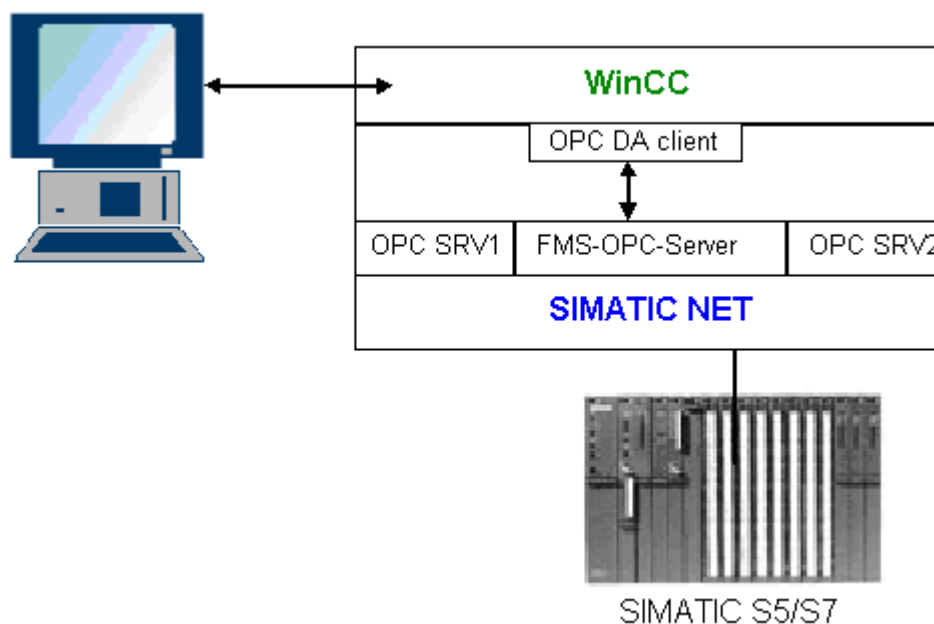
Requirements

- A computer with WinCC, SIMATIC NET software.
- A configured SIMATIC NET FMS OPC server. For additional information regarding the setup of SIMATIC NET S7 OPC servers refer to the SIMATIC NET documentation.

Configuration steps

The following configuration is required in the WinCC project of the WinCC OPC DA client:

1. Configuring a WinCC - SIMATIC NET FMS OPC server connection

Communication Manual

The communication manual contains additional information and extensive examples for the channel configuration. This manual is available for download on the Internet:

*   http://support.automation.siemens.com/

Search by item number:

*   A5E00391327

How to Configure the WinCC - SIMATIC NET FMS OPC Server Connection

Introduction

In this section, a WinCC tag that accesses an FMS index is configured in the WinCC project of the WinCC OPC DA client. The tag value is displayed in an I/O field.

Requirement

*   Add the "OPC" channel to the WinCC project of the WinCC OPC DA client.

Procedure

1. In the shortcut menu of the channel unit "OPC Groups(OPCHN Unit#1)" on the WinCC OPC DA client, select "System Parameters". The OPC Item Manager is opened.

2. Choose the name of the computer to be used as the OPC DA server from the selection dialog. Select "OPC.SIMATICNet" from the list.
    Click the "Browse Server" button. The "Filter Criteria" dialog is opened.

3. Click the "Next->" button in the "Filter Criteria" dialog. The "OPC.SIMATICNet.." dialog is opened. All FMS indexes configured are displayed in a selection list. Select an index. Click the "Add Items" button.

4. If a connection to the SIMATIC NET FMS OPC server already exists, continue with step 5.
   If no connection has been configured, a corresponding message is displayed.
   Click "Yes". The "New Connection" dialog is displayed.

   Enter "OPC_SlimaticNET" as the name of the connection. Click "OK".

5. The "Add Tags" dialog is opened.
   Enter "Client_" in the prefix field and "_xyz" in the suffix field. Select the connection "OPC_SimaticNET". Click "Finish".

6. Click the "<- Back" button in the "OPC.SIMATICNet .." dialog. In the "OPC Item Manager", click "Exit" to close the OPC Item Manager.

7. Launch the Graphics Designer and open a new picture. Add an I/O field to the picture. Select the "I/O field" object from the object list under "Smart Objects". The "I/O Field Configuration" dialog is opened.

8. Enter the name of the tags in the "Tag" field. Set the update to "2s". Set the field type to "I/O field".

9. Click "OK" to close the dialog and save the picture. Enable the WinCC project by clicking the "Activate" button in the Graphics Designer.

10. The current value of the FMS index is shown in the I/O field. The value is updated every two seconds. Enter a value in the I/O field. The changed value is passed to the automation device.

See also

Configuring the OPC Channel on the WinCC OPC DA Client (Page 82)

WinCC - SIMATIC NET S7-OPC Server Connection

Example of a WinCC - SIMATIC NET S7 OPC Server Connection

During the installation of SIMATIC NET, you can select the OPC server to be installed. In the following example, a WinCC - SIMATIC NET S7 OPC server is configured. Data from the automation device is made available to the WinCC client via the SIMATIC NET S7 OPC server.

The current value of the tag is displayed in an I/O field on the WinCC OPC client. As soon as the value of the tags on the SIMATIC NET S7 OPC server changes, the changed value is shown on the process picture. Conversely, a value entered in the I/O field is sent to the automation device.
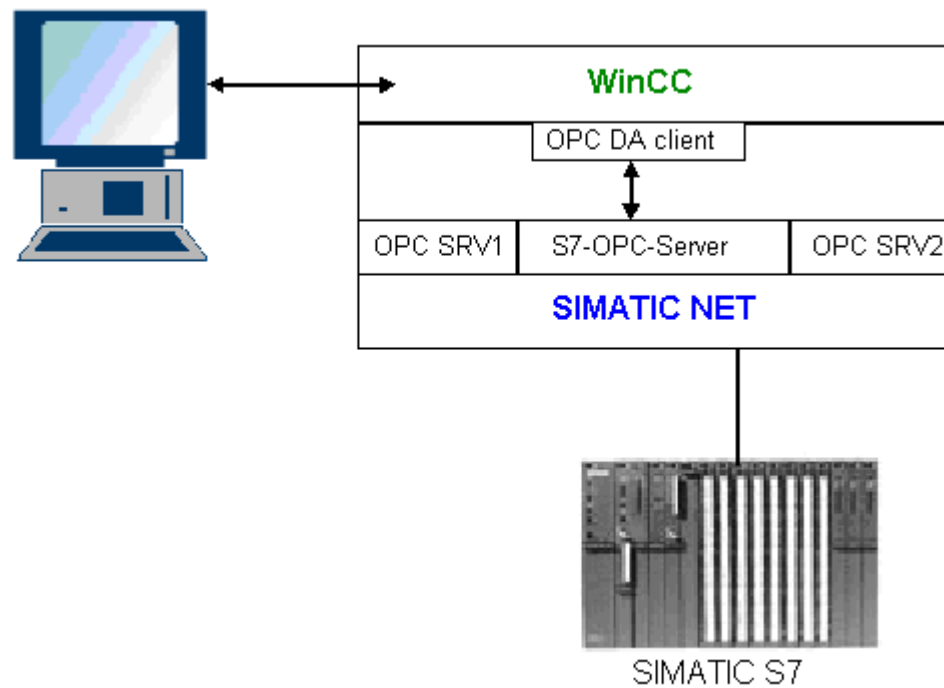
Requirements

- A computer with WinCC, SIMATIC NET software.

- A configured SIMATIC NET S7 OPC Server. For additional information regarding the setup of SIMATIC NET S7 OPC servers refer to the SIMATIC NET documentation.

Configuration steps

The following configurations are required to establish a WinCC - SIMATIC NET S7 OPC server connection:

1. Adding Tags to a SIMATIC NET S7 OPC Server

2. Configuring Access to the Tags on a SIMATIC NET S7 OPC Server

Communication Manual

The communication manual contains additional information and extensive examples for the channel configuration. This manual is available for download on the Internet:

- http://support.automation.siemens.com/

Search by item number:

- A5E00391327

Adding Tags to the SIMATIC NET S7 OPC Server

Introduction

In order for the OPC Item Manager to display the tags, they must be added to the address space of the SIMATIC NET S7 OPC server. The "OPC Scout" program is used for the configuration. OPC Scout is set up by the SIMATIC NET installer. For this example, the marker word "0" in the automation device is addressed.

Table of Parameters Used

Parameter	Value
Data type	W
Range byte	0
No. values	1
Item alias	MW0

Requirements

● Configure an S7 connection in the SIMATIC NET software. For more information, refer to the SIMATIC NET documentation.

Procedure

1. Open the "OPC Scout" via Start ➤ "Programs" ➤ "SimaticNet" ➤ "OPCServer" ➤ "OPCScout" .
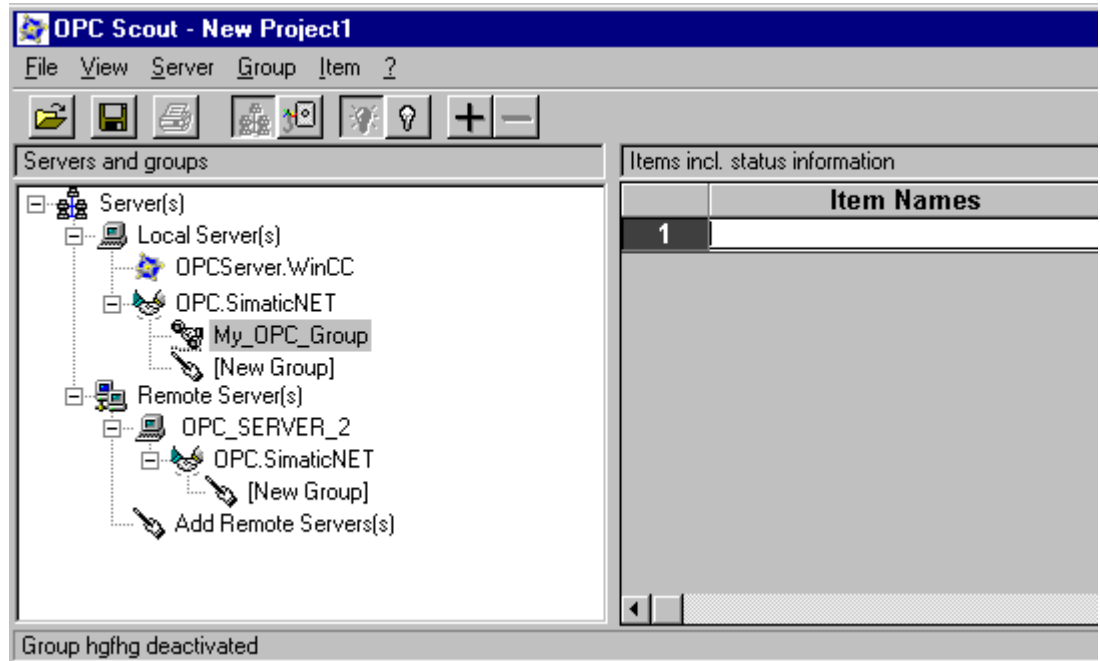
2. Select "OPC.SimaticNet" under "Local Server(s)". If the SIMATIC S7 OPC server is not run on the same computer, select "Add Remote Server(s)" in the "Server(s)" shortcut menu. Enter the name of the computer used as the OPC server in the "Add Remote Server(s)" dialog, then click "OK" to close the dialog.

3. Select "Connect" in the "OPC.SimaticNet" shortcut menu. The "Add Group" dialog is displayed. Enter a name for the group. Click "OK" to close the dialog.

4. Select "Add Item" from the shortcut menu of the added group. The "OPC Navigator" is opened.
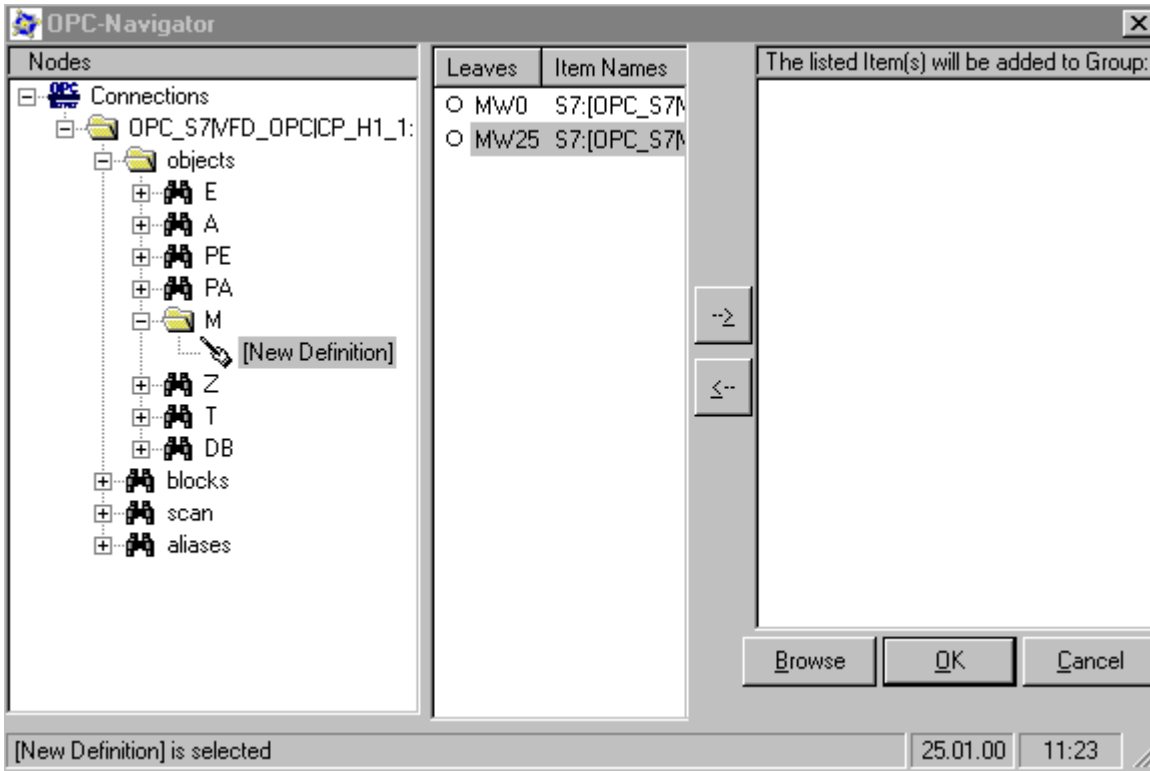
5. Select "M" (marker) under "Objects" in the "OPC Navigator". Double-click "(New Definition)" to open the "Define New Tag" dialog.

6. Enter the parameters from the table in the "Define New Tag" dialog.
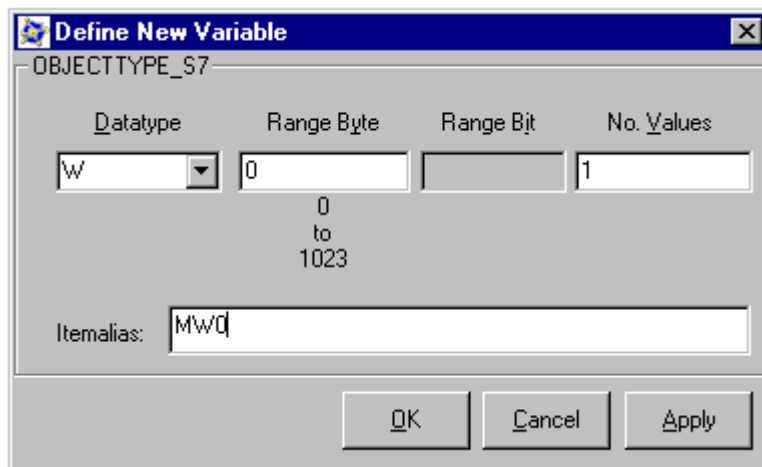
Click "OK" to close the "Define New Tag" dialog.

7. Mark the tag "MW0" in the "Leaves" area of the OPC Navigator. Click the "--> " button. Click "OK" in the OPC Navigator.

See also

Configuring Access to the Tags of the SIMATIC NET S7 OPC Server (Page 127)

Configuring Access to the Tags of the SIMATIC NET S7 OPC Server

Introduction

In this section, a WinCC tag is configured in the WinCC project of the WinCC OPC DA client. This tag accesses the tag "MW0" in the address space of the SIMATIC NET S7 OPC server. The tag value is displayed in an I/O field.

Requirements

- Create the tag "MW0" using the OPC Scout.
- Add the "OPC" channel to the WinCC project of the WinCC OPC DA client.

Procedure

1. Select "System Parameters" in the shortcut menu of "OPC Groups(OPCHN Unit#1)". The OPC Item Manager is opened.

2. Choose the name of the computer to be used as the OPC server from the selection dialog. Select "OPC.SIMATICNet" from the list.
   Click the "Browse Server" button. The "Filter Criteria" dialog is opened.

3. Click the "Next->" button in the "Filter Criteria" dialog. The "OPC.SIMATICNet.." dialog is opened. Select the "MW0" tag. Click the "Add Items" button.

4. If a connection to the SIMATIC NET FMS OPC server already exists, continue with step 5.
   If no connection has been configured, a corresponding message is displayed.
   Click "Yes". The "New Connection" dialog is displayed.

   Enter "OPC_SlimaticNET" as the name of the connection. Click "OK".

5. The "Add Tags" dialog is opened.
   Enter "Client_" in the prefix field and "_xyz" in the suffix field. Select the connection "OPC_SimaticNET". Click "Finish".

6. Click the "<- Back" button in the "OPC.SIMATICNet .." dialog. In the "OPC Item Manager", click "Exit" to close the OPC Item Manager.

7. Start Graphics Designer and open a picture. Add an I/O field to the picture. Select the "I/O field" object from the object list under "Smart Objects". The "I/O Field Configuration" dialog is opened.

8. Enter the name "Client_MW0_xyz" in the "Tag" field. Set the update to "2s". Set the field type to "I/O field".

9. Close the dialog and save the picture. Enable the WinCC project by clicking the "Activate" button in the Graphics Designer.

10. The I/O field on the WinCC OPC DA client displays the current value of the S7 tags. The value is updated every two seconds. Enter a value in the I/O field. The changed value is passed to the automation device.

See also

Adding Tags to the SIMATIC NET S7 OPC Server (Page 124)

Configuring the OPC Channel on the WinCC OPC DA Client (Page 82)

WinCC - Microsoft Excel Connection

Example of the WinCC - Microsoft Excel Connection

Introduction

In this example, an OPC DA client is created in Microsoft Excel using the Visual Basic Editor. The OPC DA client reads a WinCC tag in the WinCC project of the WinCC OPC DA server and writes the value into a cell. If a new value is entered in the cell, the value is passed to the WinCC OPC DA server.

A computer on which both WinCC and Microsoft Excel are installed is used for the connection.
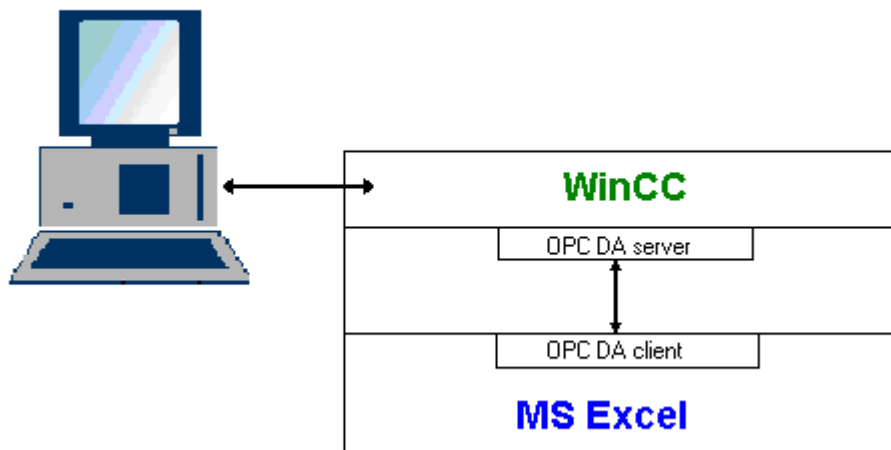
Configuration steps

The following configurations must be made in Microsoft Excel:

1. Creating an OPC DA client in Visual Basic Editor of Microsoft Excel

2. Configuring access to a WinCC tag in Microsoft Excel

See also

How to Configure the Access to a WinCC Tag in Microsoft Excel (Page 131)

Creating an OPC DA Client in Microsoft Excel (Page 129)

Creating an OPC DA Client in Microsoft Excel

Introduction

To use Microsoft Excel as an OPC DA client, a special script must be created in the Visual Basic Editor of Microsoft Excel.

Requirements

Basic knowledge of Visual Basic Editor in Microsoft Excel.

Procedure

1. Open Microsoft Excel with a new workbook.

2. In the "Tools" menu of the Visual Basic Editor, ➤ click "Macro". The Visual Basic Editor for Microsoft Excel is opened.

3. In the "Tools" menu of the Visual Basic Editor, select "References...". The "References - VBAProject" dialog is displayed. Locate entry "Siemens OPC DAAutomation 2.0" in the list of available references. Select the corresponding check box. Click "OK".

4. Copy the script shown below. This script is only available in the online help.

5. Open a new code window by double-clicking "Sheet1" in the project window of the Visual Basic Editor.

6. Paste the script into the code window.

7. Select "Save" from the "File" menu. Select "Close and Return to Microsoft Excel" from the "File" menu.

Example Script

```
Option Explicit
Option Base 1

Const ServerName = "OPCServer.WinCC"

Dim WithEvents MyOPCServer As OpcServer
Dim WithEvents MyOPCGroup As OPCGroup
Dim MyOPCGroupColl As OPCGroups
Dim MyOPCItemColl As OPCItems
Dim MyOPCItems As OPCItems
Dim MyOPCItem As OPCItem

Dim ClientHandles(1) As Long
Dim ServerHandles() As Long
Dim Values(1) As Variant
Dim Errors() As Long
Dim ItemIDs(1) As String
Dim GroupName As String
Dim NodeName As String

'--------------------------------------------------------------------
' Sub StartClient()
' Purpose: Connect to OPC_server, create group and add item
'--------------------------------------------------------------------
Sub StartClient()
  ' On Error GoTo ErrorHandler
  '----------- We freely can choose a ClientHandle and GroupName
  ClientHandles(1) = 1
  GroupName = "MyGroup"
  '----------- Get the ItemID from cell "A1"
  NodeName = Range("A1").Value
  ItemIDs(1) = Range("A2").Value
  '----------- Get an instance of the OPC-Server
  Set MyOPCServer = New OpcServer
  MyOPCServer.Connect ServerName, NodeName

  Set MyOPCGroupColl = MyOPCServer.OPCGroups
  '----------- Set the default active state for adding groups
  MyOPCGroupColl.DefaultGroupIsActive = True
  '----------- Add our group to the Collection
  Set MyOPCGroup = MyOPCGroupColl.Add(GroupName)

  Set MyOPCItemColl = MyOPCGroup.OPCItems
  '----------- Add one item, ServerHandles are returned
  MyOPCItemColl.AddItems 1, ItemIDs, ClientHandles, ServerHandles, Errors
  '----------- A group that is subscribed receives asynchronous notifications
  MyOPCGroup.IsSubscribed = True
  Exit Sub

ErrorHandler:
  MsgBox "Error: " & Err.Description, vbCritical, "ERROR"
End Sub

'--------------------------------------------------------------------
' Sub StopClient()
```

```
' Purpose: Release the objects and disconnect from the server
'-------------------------------------------------------------------
Sub StopClient()
  '----------- Release the Group and Server objects
  MyOPCGroupColl.RemoveAll
  '----------- Disconnect from the server and clean up
  MyOPCServer.Disconnect
  Set MyOPCItemColl = Nothing
  Set MyOPCGroup = Nothing
  Set MyOPCGroupColl = Nothing
  Set MyOPCServer = Nothing
End Sub


'-------------------------------------------------------------------
' Sub MyOPCGroup_DataChange()
' Purpose: This event is fired when a value, quality or timestamp in our Group has changed
'-------------------------------------------------------------------
'----------- If OPC-DA Automation 2.1 is installed, use:
Private Sub MyOPCGroup_DataChange(ByVal TransactionID As Long, ByVal NumItems As Long,
ClientHandles() As Long, ItemValues() As Variant, Qualities() As Long, TimeStamps() As
Date)
 '----------- Set the spreadsheet cell values to the values read
  Range("B2").Value = CStr(ItemValues(1))
  Range("C2").Value = Hex(Qualities(1))
  Range("D2").Value = CStr(TimeStamps(1))
End Sub


'-------------------------------------------------------------------
' Sub worksheet_change()
' Purpose: This event is fired when our worksheet changes, so we can write a new value
'-------------------------------------------------------------------
Private Sub worksheet_change(ByVal Selection As Range)
  '----------- Only if cell "B3" changes, write this value
  If Selection <> Range("B3") Then Exit Sub
  Values(1) = Selection.Cells.Value
  '----------- Write the new value in synchronous mode
  MyOPCGroup.SyncWrite 1, ServerHandles, Values, Errors
End Sub
```

See also

How to Configure a WinCC Project on a WinCC OPC DA Server (Page 117)

How to Configure the Access to a WinCC Tag in Microsoft Excel

Introduction
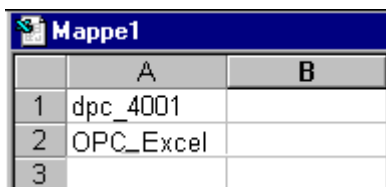
The Excel OPC DA client reads a WinCC tag of the WinCC OPC DA server and writes the value of the tag into a cell. In the WinCC project of the WinCC OPC DA server, the value of the tag is displayed in an I/O field. If the tag value in a cell is changed, this alters the value in the I/O field of the WinCC OPC DA server.

Requirements

- Configure an internal tag named "OPC_Excel" with data type "signed 16-bit value" in the WinCC project of the WinCC OPC DA server.

- Write the value of the "OPC_Excel" tag to an I/O field on the WinCC project of the WinCC OPC DA server.

- Enable the WinCC project of the WinCC OPC DA server.

Procedure

1. In Microsoft Excel, enter the name of the computer used as the OPC server in cell A1. In cell A2, enter the tag name "OPC_Excel".

	A	B
1	dpc_4001	
2	OPC_Excel	
3		

2. In the "Tools" menu in Excel, select "Macro" → "Macros". The "Macro" dialog is opened. Select the entry "Sheet1.StartClient" from the list of macros. Click "Run" to start the OPC client.

3. The value of the tag is written into cell B2, the quality code into C2 and the timestamp into D2.

4. Enter a new value in cell B3. The changed value is displayed in the I/O field on the WinCC OPC server.

5. In the "Tools" menu in Excel, select "Macro" → "Macros". The "Macro" dialog is opened. Select the entry "Sheet1.StopClient" from the list of macros. Click "Run" to stop the OPC client.

3.6.2.8   WinCC OPC HDA server

Functionality of the WinCC OPC HDA server

Introduction

The WinCC OPC HDA server is a DCOM application makings data needed from the archive system available to the OPC HDA client. Access the data using Item Handles. Read or write access is enabled. The data can also be analyzed.

The WinCC OPC HDA server supports the OPC Historical Data Access 1.20 specification. This has been confirmed by the compliance test.

The following chapter explains the design of the data structure, as well as the attributes, aggregates and functions supported by the WinCC OPC HDA server. This is not a detailed description, but rather a summary of the most important information. For more information, refer to the "OPC Historical Data Access 1.20" specification.

Installation

The WinCC OPC HDA server can be selected during the installation of WinCC. It is possible to select whether access is made to the WinCC archive system with or without write function . After installation, the WinCC OPC DA server is immediately available for use without any additional configuration.

In the case of installation without write access, the data in the WinCC archive system can only be read and analyzed. In the case of write access, data in the WinCC archive system can be analyzed, added, deleted and updated.

The WinCC OPC HDA server can be implemented on a WinCC server or a WinCC client.

Licensing

In order to operate the WinCC OPC HDA server, the following licenses must be installed on each WinCC computer implemented as an OPC HDA server:

● A valid RT license for WinCC

● WinCC Option Connectivity Pack

OPC HDA Client

All OPC HDA clients that conform to the OPC Historical Data Access 1.20 specification can access the WinCC OPC HDA server. You can also create the OPC HDA client yourself. By creating proprietary OPC HDA clients, most user-specific requirements can be met.

Examples of how an OPC HDA client can be used include:

● Analysis and evaluation of archived data

● Statistical process control of archives from different OPC HDA servers

To request for historical values using OPC HDA client, you need to take care of the following during configuration:

● Select a query cycle in such a way that the client can receive the requested data before the next query is sent. Too short cycles can lead to high time delays while receiving data.

● CPU load of the WinCC server depends on the number of tags per query.

Write access to cyclic archive with configured swapping out

In runtime, the data is modified in the cyclic archives on the WinCC server.

Changes are accepted into the swapped-out archive only when the data is changed almost immediately after being created.

If the concerned archive segment of the circulation archive has already been swapped out, then the change is not done subsequently in the swapped-out archive. Even the modified data is deleted when you delete the archive segment on the WinCC server.

See also

Quality codes (Page 139)

Data Structure of a WinCC OPC HDA Server (Page 134)

www.opcfoundation.org (http://www.opcfoundation.org)

Data Structure of a WinCC OPC HDA Server

Data Structure of a WinCC OPC HDA Server

Introduction

The data on the WinCC OPC HDA server are structured. The available data structures are listed below. This is not a detailed description, but rather a summary of the most important information. For more information, refer to the "OPC Historical Data Access 1.20" specification.

Data structure

	Description
Attributes	Provide additional quality characteristics for the raw data. Attributes include data type, specifications re. archiving, etc. For more information, see the overview of supported attributes.
Assemblies	Summarize raw data of a specified time interval. Aggregates include average value, minimum, maximum, etc. For more information, see overview of supported aggregates.
StartTime/End-Time	Set the beginning and end point for the time interval.
Bounding values	Values recorded at the beginning and end. If no bounding values are available, the values closest to these times are used as bounding values.
Raw data	Data from the WinCC archive system of a particular time interval. These data include a time stamp and quality rating.
Item handle	Unique assignment to a WinCC archive tag.
ItemID	Unique identifier of the WinCC archive tag. The ItemID can be used to get an item handle.

See also

Overview of the supported functions (Page 136)

Time Format of a WinCC OPC HDA Server (Page 137)

Overview of the supported attributes (Page 135)

Overview of the supported assemblies (Page 135)

www.opcfoundation.org (http://www.opcfoundation.org)

Overview of the supported attributes

Introduction

The following table contains the attributes supported by the WinCC OPC HDA server. For more information, refer to the "OPC Historical Data Access 1.20" specification.

Attributes

Attribute	Attribute ID	Description
ItemID	OPCHDA_ITEMID	Indicates the WinCC archive tag to be accessed.
Item data type	OPCHDA_DATA_TYPE	Indicates the data type of the WinCC archive tag.
Description	OPCHDA_DESCRIP-TION	Returns a description of the WinCC archive tag. The description is defined in the WinCC Tag Logging.
Engineering units	OPCHDA_ENG_UNITS	Sets the display of measurement units. The labeling is defined in the WinCC Tag Logging.

See also

Data Structure of a WinCC OPC HDA Server (Page 134)

www.opcfoundation.org (http://www.opcfoundation.org)

Overview of the supported assemblies

Introduction

The following table lists the aggregates supported by the WinCC OPC HDA server. For more information, refer to the "OPC Historical Data Access 1.20" specification.

Assemblies

Assembly	Description
OPCHDA_COUNT	Returns the raw data count for the specified time interval.
OPCHDA_START	Returns the initial value of the raw data at the beginning of the time interval.
OPCHDA_END	Returns the final value of the raw data at the end of the time interval.
OPCHDA_AVERAGE	Returns the average value of the raw data for the specified time interval.
OPCHDA_TIMEAVERAGE	Returns the time-weighted average of the raw data for the specified time interval.
OPCHDA_TOTAL	Returns the sum total value for the specified time interval.
OPCHDA_STDEV	Returns the standard deviation of the raw data for the specified time interval.

Assembly	Description
OPCHDA_MINIMUMACTUAL-TIME	Returns the minimum value of the raw data and its time stamp for the specified time interval.
OPCHDA_MINIMUM	Returns the minimum value of the raw data for the specified interval.
OPCHDA_MAXIMUMACTUAL-TIME	Returns the maximum value of the raw data and its time stamp for the specified time interval.
OPCHDA_MAXIMUM	Returns the maximum value of the raw data for the specified interval.
OPCHDA_DELTA	Returns the difference between the first and last value in the raw data for the specified time interval.
OPCHDA_REGSLOPE	Returns the slope of the regression line of the raw data for the specified time interval.
OPCHDA_REGCONST	Returns the regression value of the raw data at the starting point.
OPCHDA_REGDEV	Returns the standard deviation of the regression of the raw data in the specified time interval.
OPCHDA_VARIANCE	Returns the variance of the raw data for the specified time interval.
OPCHDA_RANGE	Returns the difference between OPCHDA_MAXIMUM and OPCHDA_MINIMUM of the raw data for the specified time interval.
OPCHDA_DURATIONGOOD	Returns the period of time in which the quality of the raw data was good. The period is indicated in seconds.
OPCHDA_DURATIONBAD	Returns the period of time in which the quality of the raw data was bad. The period is indicated in seconds.
OPCHDA_PERCENTGOOD	Returns the percentage of the raw data of good quality.
OPCHDA_PERCENTBAD	Returns the percentage of the raw data of bad quality.
OPCHDA_WORSTQUALITY	Returns the worst quality of the raw data for the specified time interval.

See also

Data Structure of a WinCC OPC HDA Server (Page 134)

Functionality of the WinCC OPC HDA server (Page 132)

www.opcfoundation.org (http://www.opcfoundation.org)

Overview of the supported functions

Introduction

The following tables list the functions supported by the WinCC OPC HDA server. These functions can be used by the OPC HDA client for data exchange. For more information, refer to the "OPC Historical Data Access 1.20" specification.

Read

Function	Description
ReadRaw	Returns the raw data, its quality and time stamp for the specified time interval.
ReadProcessed	Returns the calculated value, the quality of the value and the time stamp for the specified time interval. The calculated value is determined by the selected aggregate.
ReadAtTime	Returns the raw data, its quality and time stamp for a particular time interval. If no value is available, the value for this point is interpolated.
ReadAttribute	Returns the item attributes and time stamp for the specified time interval.

See also

Functionality of the WinCC OPC HDA server (Page 132)

www.opcfoundation.org (http://www.opcfoundation.org)

Time Format of a WinCC OPC HDA Server

Introduction

The time interval is specified on the WinCC OPC HDA server by setting the starting and ending times. The specified time interval determines the observation period for the historical data. When specifying the times, certain formats must be maintained.

The following options are available for the specification of times:

● Absolute based on UTC

● Relative to the local time of the server

Absolute Value According to UTC

By default, the WinCC OPC HDA server uses the coordinated world time (UTC) as its time base. This time corresponds to the Greenwich Mean Time (Central European Time minus an hour).

Time format

YYYY/MM/DD hh:mm:ss.msmsms

Parameters

YYYY = year

MM = month

DD = day

hh = hours

mm = minutes

ss = seconds

ms = milliseconds

Input example

2002/06/10 09:27:30.000

Specification of Time Relative to Local Time

For this option, the time is entered relative to the local time of the server. The local time zone is set on the computer's "Date/Time" control panel.

Time format

keyword +/-offset1 +/-offset(n)

The offset is the deviation from the local time of the server.

Keywords

NOW = current local time on the server

SECOND = current second

MINUTE = current minute

HOUR = current hour

DAY = current day

WEEK = current week

MONTH = current month

YEAR = current year

Offset

+/-S = deviation in seconds

+/-M = deviation in minutes

+/-H = deviation in hours

+/-D = deviation in days

+/-W = deviation in weeks

+/-MO = deviation in months

+/-Y = deviation in years

Example:

DAY - 1D = previous day

DAY-1D + 7H30 = previous day at 7:30

MO-1D+5H = last day of the previous month at 5:00.

NOW-1H15M = one hour and 15 minutes ago

YEAR+3MO= April of this year

See also

Functionality of the WinCC OPC HDA server (Page 132)

www.opcfoundation.org (http://www.opcfoundation.org)

Quality codes

Introduction

Quality codes are used to evaluate the status and quality of the raw data. The quality codes for OPC are described under "6.8 OPC Quality flags" of the "Data Access Custom Interface Standard Version 3.00" specifications.

Quality Codes of the WinCC OPC HDA Server

Code	OPC	Description	Quality
0x00040000	OPCHDA_RAW	Indicates the quality of raw data transmission.	GOOD BAD UNCERTAIN
0x00080000	OPCHDA_CALCULA-TED	Indicates the quality of calculated data transmission.	GOOD BAD UNCERTAIN
0x00100000	OPCHDA_NOBOUND	No bounding values were found at the starting or ending point.	BAD
0x00200000	OPCHDA_NODATA	No raw data were found for the specified time interval.	BAD
0x00400000	OPCHDA_DATALOST	The raw data in the selected interval were not completely archived.	BAD

See also

www.opcfoundation.org (http://www.opcfoundation.org)

Supported Write-Accesses

Introduction

The following table shows the write accesses supported by the WinCC OPC HDA server.

Table element:

	Description
Cyclic archive	The process values to be archived are stored in a cyclic archive. The cyclic archive consists of a configurable number of data buffers. The size and a period of time (e.g. in days) for the data buffer are defined. If all data buffers are full, the process data in the first data buffer is overwritten.
Cyclic archive after swapping	In order to protect process data in the data buffers from being overwritten process, it can be swapped (exported).
☺	Supported by WinCC.
☹	Not supported by WinCC.

Write Accesses

Adding process values later

Cyclic archive	Cyclic archive after swapping	Supported by WinCC	Description
Yes	No	☺	When the time period is contained in the cyclic archive, a process value can be added later.
Yes	Yes	☹	The data buffer of the corresponding time period is swapped to an archive backup. Process values cannot be added later to an archive backup.
No	No	☹	The cyclic archive is not available. The process value cannot be stored.
No	Yes	☹	The cyclic archive is not available. The process value cannot be stored.

Adding process values in Runtime

Cyclic archive	Cyclic archive after swapping	Supported by WinCC	Description
Yes	No	☺	The process value is added in the data buffer currently valid for the cyclic archive.

Inserting future process values

Cyclic archive	Cyclic archive after swapping	Supported by WinCC	Description
YES	No	☹	During write access, no values can be added in the future.
No	No	☹	With write access, no values can be added in the future.

Deleting process values

Cyclic archive	Cyclic archive after swapping	Supported by WinCC	Description
Yes	No	☺	When the time period is contained in the cyclic archive, a process value can be deleted.
Yes	Yes	☹	The data buffer of the corresponding time period is swapped to an archive backup. Process values can be deleted from an archive backup.
No	No	☹	The cyclic archive is not available. The process value cannot be stored.
No	Yes	☹	The cyclic archive is not available. The process value cannot be stored.

Editing process values

Cyclic archive	Cyclic archive after swapping	Supported by WinCC	Description
Yes	No	☺	When the time period is contained in the cyclic archive, a process value can be edited.
Yes	Yes	☹	The data buffer of the corresponding time period is swapped to an archive backup. Process values cannot be edited in an archive backup.
No	No	☹	The cyclic archive is not available. The process value cannot be stored.
No	Yes	☹	The cyclic archive is not available. The process value cannot be stored.

Example of an OPC HDA Connection

Example of an OPC HDA Connection

Introduction

In the example below, a connection between WinCC and the OPC HDA client is configured. Data from the WinCC archive system are made available via the WinCC OPC HDA server. The OPC HDA client accesses the data via item handles. To simplify the configuration process, the OPC HDA browser is used.

The OPC HDA client from the OPC Foundation is used. All OPC HDA clients conforming to the OPC Historical Data Access 1.20 specification can access the WinCC OPC HDA server.

Requirements

- Create an internal tag named "OPC_HDA" with data type "unsigned 16-bit value" in the WinCC project of the WinCC OPC HDA server.

- Create a process value archive called "HDA_ProcessValueArchive" in the WinCC archive system.

- Create an WinCC archive tag called "OPC_HDA_Tag" in the "HDA_ProcessValueArchive" process value archive. Link the WinCC archive tag to the internal tag "OPC_HDA".

- In the Runtime list, launch Tag Logging Runtime and disable Graphics Runtime.

- Launch the WinCC project of the WinCC OPC HDA server.

Configuration steps

The following configurations are required to connect WinCC to the OPC HDA client:

1. Configuring access to a WinCC archive tag using the HDA server browser

2. Reading values from the WinCC archive tags

See also

How to Configure Access to a WinCC Archive Tag Using the HDA Server Browser (Page 144)

HDA server browser (Page 143)

Reading Values of WinCC Archive Tags (Page 145)

HDA server browser

Introduction

The OPC HDA client accesses the tag values via item handles. For ease of configuration, the WinCC OPC HDA server supports the browser functionality. The OPC HDA client can use the HDA server browser to search the address space of the WinCC OPC HDA server. The data are listed hierarchically by process value archive.
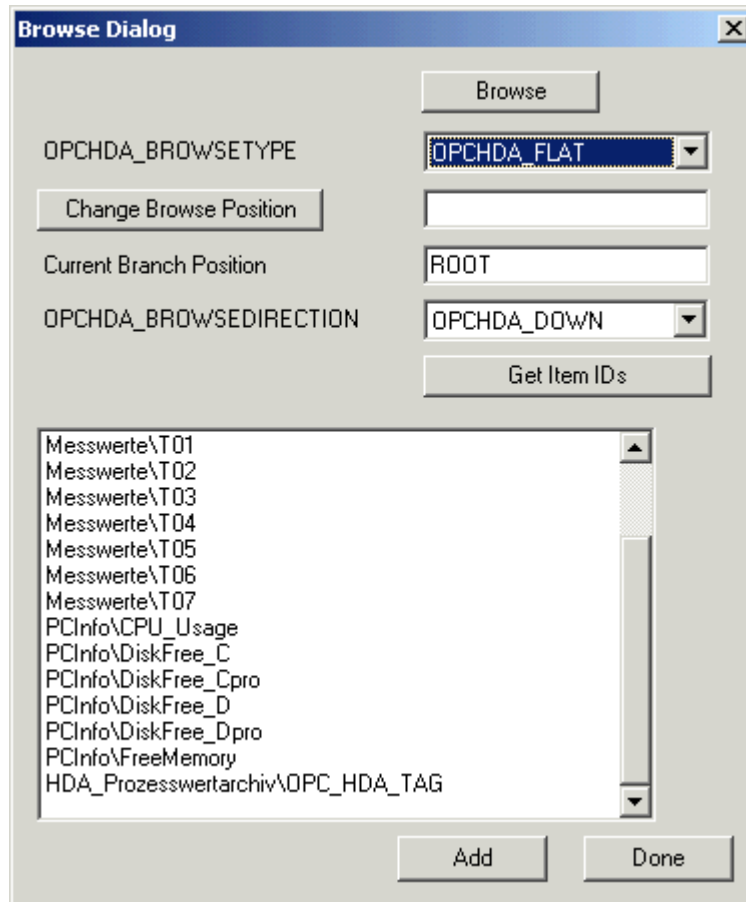
Note

Access to a WinCC archive tag without the HDA server browser requires manual configuration of the item ID.

When addressing WinCC archive tags, the computer name (server prefix) is included in the path. The ItemID has the following syntax: Server-prefix::process_value_archive \WinCC_archive_tag.

See also

How to Configure Access to a WinCC Archive Tag Using the HDA Server Browser (Page 144)

www.opcfoundation.org (http://www.opcfoundation.org)

How to Configure Access to a WinCC Archive Tag Using the HDA Server Browser

Introduction

In this section, the OPC HDA client is used to access a WinCC archive tag. The OPC HDA client from the OPC Foundation is used. The HDA server browser is used to configure access.

Note

The OPC HDA client described here is the demo client from the OPC Foundation. The source code for it is found on the Internet at http://www.opcfoundation.org.

Procedure

1. Copy the "SampleClientHDA.exe" file from the folder "Siemens\WinCC\documents\english" to a folder of your choice.

2. Double-click the "SampleClientHDA.exe" file. The HDA client program is started.

3. In the "Server Name" area, select entry "OPCServerHDA.WinCC.1". Click "Connect". Confirm the next dialog.

4. Click "Browse" in the HDA client. The "Browse Dialog" dialog is opened. Select "OPCHDA_FLAT" in the "OPCHDA_BROWSETYPE" field.
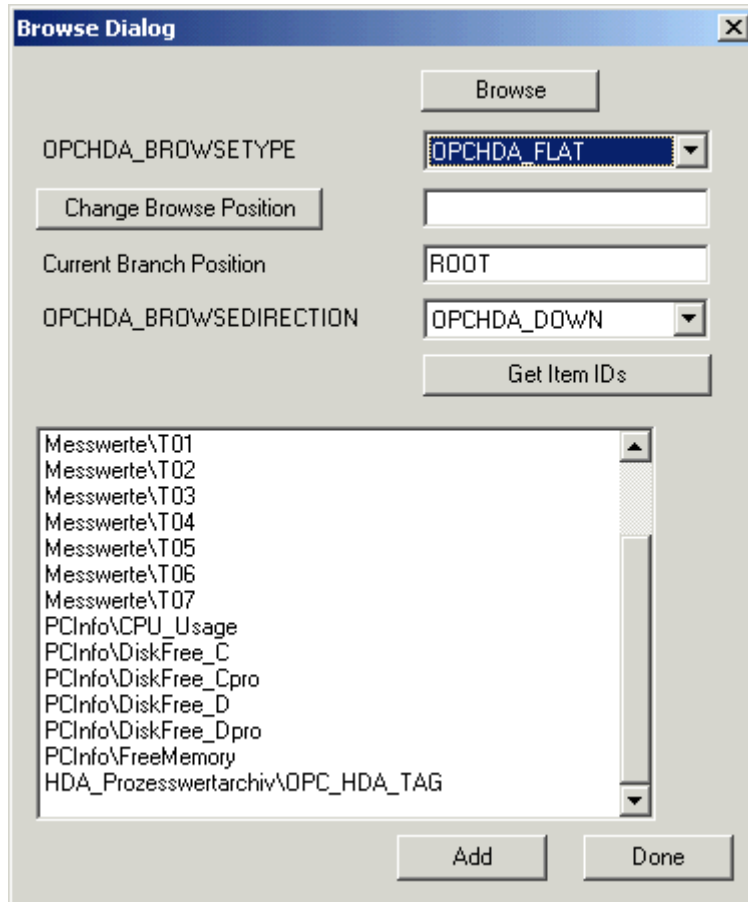
5. In the selection window, select entry "HDA_ProcessValueArchive_HDA_TAG". Click "Add" and then "Done" to close the dialog.

For more information, refer to http://www.opcfoundation.org.

See also

Reading Values of WinCC Archive Tags (Page 145)

www.opcfoundation.org (http://www.opcfoundation.org)

Reading Values of WinCC Archive Tags

Introduction

This section explains how you can access and read WinCC archive tags.

Requirement

- The OPC HDA client must be running.

Procedure

1. Click "Show Items" in the HDA client.

2. Click "Get Item Handles" in the HDA client.

3. Double-click "HDA_ProcessValueArchive_HDA_Tag" in the selection field "Value" selection field.

4. Enter "NOW-10S" in the "Start Time" field. Enter "NOW" in the "End Time" field.
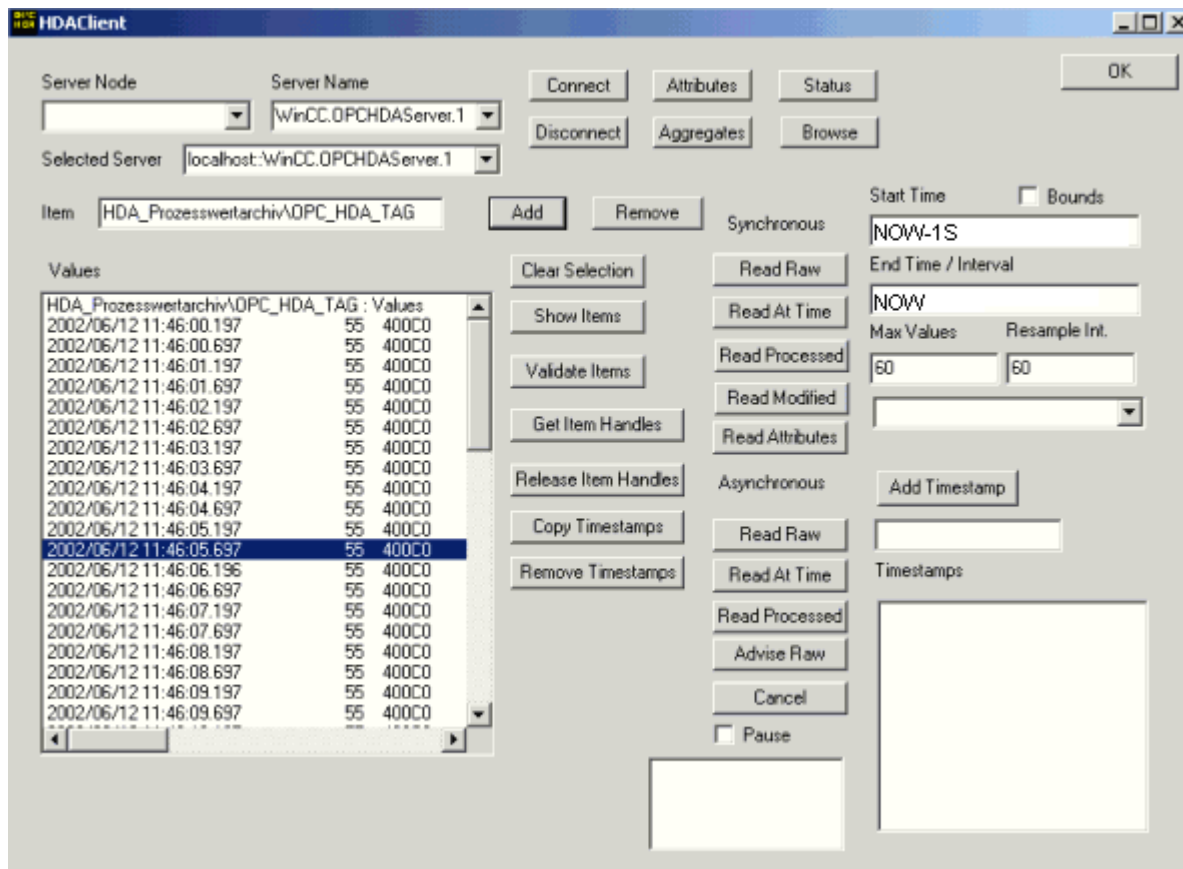
5. Click "Read Raw". The values, their quality codes and time stamps are shown in the "Values" selection field.

Special features of the OPC HDA server in WinCC for acyclic logging

Introduction

Tag logging is performed in WinCC cyclically or acyclically. The WinCC OPC HDA server works differently depending on the logging method for tags:

- For all cyclically logged values, the OPC HDA server operates in conformity to the HDA specification of the OPC foundation. The OPC aggregates are linearly interpolated.

- Acyclically logged tags are not included in the HDA specification of the OPC Foundation. The OPC aggregates are interpolated incrementally. Especially when a tag experiences no change for a long period of time, no data is available during a time period. The following should be taken into consideration to nevertheless obtain valid data.

Note

The OPC HDA server is not OPC-compliant for acyclically logged tags. The HDA specification of the OPC Foundation does not recognize acyclically logged tags and, therefore, no archive server can handle acyclically logged tags. The supported aggregates are calculated in conformity to the OPC HDA specification. No non-explicitly called functions are supported.

Note

If write access to process value archives is enabled, no future values may be added.

Configuration of acyclically logged tags

For the configuration of acyclically logged tags, the "Archive after segment change" setting needs to be enabled for the tags. This enters the most recent valid value in the the new log when a segment changes.

Supported aggregates of the WinCC OPC HDA server for acyclically logged tags

The OPC HDA server supports the following aggregates:

- OPCHDA_MINIMUM
- OPCHDA_MAXIMUM
- OPCHDA_AVERAGE
- OPCHDA_END
- OPCHDA_INTERPOLATIVE
- OPCHDA_TIMEAVERAGE
- OPCHDA_TOTAL
- OPCHDA_DURATIONGOOD
- OPCHDA_PERCENTGOOD

Supported functions of the WinCC OPC HDA server for acyclically logged tags

- ReadRaw with "boundings" only. ReadRaw for a tag must always be performed with "boundings", in order to find the last real stored value for an area without logged value change.

- ReadProcessed

- DeleteRaw

- DeleteAtTime

- Insert

- InsertReplace

- Replace

Calculating the aggregates for acyclically logged tags

Calculation of the aggregates is based on the extended "RawData" data record, which contains virtual data points for the calculation in addition to real stored values. The WinCC OPC HDA server prepares the contained "RawData" corresponding to the requirements of the "ReadProcessed". The virtual data points needed for the calculation are formed from the bordering real data points. The following significant points are included for the virtual data points:

- Value for the "StartTime"

- Value for the "EndTime"

- Value for interval limits

Example

The values for "00:59:00", "01:02:00" and "01:03:00" are stored for an acyclical tag logging tags. An OPC HDA client postulates with "ReadProcessed" an aggregate with the following parameters:

- StartTime = 01:00:00

- EndTime = 01:04:00

- Interval = 00:02:00

Note

The time period is always 1 µs less than the time stamp at the limit for the calculation when generating virtual values at limits ("EndTime"/"Interval").

A delta of 1 seconds is used in the following table to provide a better overview. The following graphic illustrates the example.

The OPC server uses the following "RawData" for the calculation of the aggregate:

Number	Time stamp	Real stored values	Generated virtual values
1	00:59:00	1.00	
2	01:00:00		1.00

Number	Time stamp	Real stored values	Generated virtual values
3	01:01:59		1.00
4	01:02:00	2.00	
5	01:02:59		2.00
6	01:03:00	3.00	
7	01:03:59		3.00

● real values

○ virtual values   (1 interval start, 2 interval end, 3 value change)
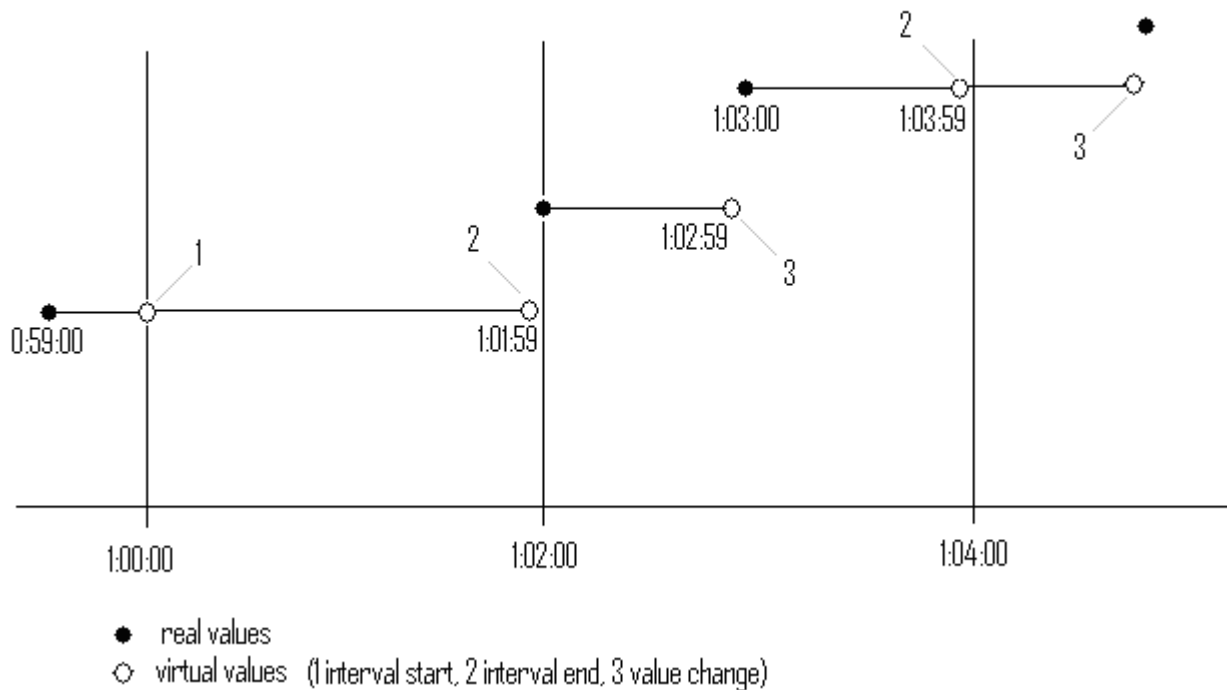
3.6.2.9 WinCC OPC A&E Server

Functionality of the WinCC OPC A&E server

Introduction

The WinCC OPC A&E server is a DCOM application. The OPC A&E client is kept informed of status changes for WinCC messages by means of subscriptions. The OPC A&E client can apply a filter to the subscription. This filter determines which messages and attributes are displayed.

The WinCC OPC A&E server supports the specification OPC Alarm&Event 1.10. This has been confirmed by the compliance test.

The following chapter explains the display of the WinCC message system on OPC A&E, as well as the attributes supported by the WinCC OPC A&E server. This is not a detailed

description, but rather a summary of the most important information. For more information, refer to the "OPC Alarms & Events 1.10" specification.

Installation

The WinCC OPC A&E server can be selected during the installation of WinCC. After installation, the WinCC OPC A&E server is immediately available for use without any additional configuration.

The WinCC OPC A&E server can be implemented on a WinCC server and a WinCC client.

Licensing

In order to operate the WinCC OPC A&E server, the following licenses must be installed on each WinCC server implemented as an OPC A&E server:

- A valid RT license for WinCC
- WinCC Option Connectivity Pack

Server types

The WinCC OPC A&E server supports conditional events and simple events. In addition, there are tracking events.

Condition-related event server

With a condition-related event server, the event is associated with a condition. A condition might, for example, be a limit value violation of a tag. A message is generated in WinCC as soon as the bounding value is exceeded. This message is shown as an alarm in OPC A&E.

Simple event server

Simple events are messages that inform the OPC A&E client about events. Simple events include, for example, starting or exiting programs.

Note

Note the following when using redundant systems:

Simple events interconnected to internal tags are sent twice when tags are updated.

The first message is triggered by the master, the second by the standby.

Tracking event server

If a change in a process occurs, the OPC A&E client receives a message. Such a change might for example be a regulator adjustment.

OPC A&E client

All OPC A&E clients conforming to the OPC Alarms & Events 1.10 specification can access the WinCC OPC A&E server. You can also create the OPC A&E client yourself. By creating proprietary OPC clients, most user-specific requirements can be met. An OPC A&E client can, for example, be used for the analysis and common archiving of alarms from multiple OPC A&E servers.

See also

Quality Codes for OPC A&E (Page 157)

Mapping of the WinCC Message System on OPC A&E (Page 151)

www.opcfoundation.org (http://www.opcfoundation.org)

Mapping of the WinCC Message System on OPC A&E

Mapping of the WinCC Message System on OPC A&E

Introduction

During the configuration of the WinCC message system, settings are made to determine which process events generate a message. This message is shown as an alarm in OPC A&E. The table below lists the most important parameters of the alarm. It also describes how the information is made available by the WinCC message system. For more information, refer to "Alarm Structure".

Overview

OPC	WinCC message system
Source	Indicates the source of the message. The source has the format "<server pre-fix>::@LOCALMACHINE::".
Time	Issues a time stamp for received, sent and acknowledged messages. Issues a time stamp in UTC (Universal Time Coordinated).
Type	Indicates whether the event is a simple, tracking or condition-related event. WinCC - POC A&E server supports simple, condition-related and tracking events.
Severity	Indicates the priority of the WinCC message.
EventCategory	Returns the category of the message. For more information on this topic, refer to "Displaying Message Classes and Types".
Message	Indicates the message text of the corresponding message number.
ConditionName	Indicates the message number.
ChangeMask	Indicates the changed status of the message. For more information, refer to "Acknowledgement Theory".
NewState	Returns the message status. For more information, refer to "Acknowledgement Theory".

OPC	WinCC message system
ConditionQuality	Returns the quality of the message. For more information, refer to "Quality Codes".
AckRequired	Indicates whether the message requires acknowledgement (receipt).
ActiveTime	Returns the time stamp for received messages.
EventAttribute	Lists the attributes required for the respective message. For more information, refer to "Attributes of the WinCC Message System".
Quality	Returns the quality code of the message.
Cookie	Returns the cookie from the OPC A&E server. The cookie corresponds to the message number in the WinCC alarm system

See also

Acknowledgement theory (Page 155)

Attributes of the WinCC Message System (Page 153)

Mapping the WinCC message classes and message types (Page 152)

Mapping the WinCC message classes and message types

Introduction

The WinCC message system informs the user of disturbances and operating conditions in the process. A WinCC message always belongs to a specific message class and message type that is related to the event category.

The mapping of the WinCC message system on OPC is configured via the "CcAeProvider.ini" file.

Event Category

An event category is created on the WinCC OPC A&E server for every combination of a message class and type.

An event category is determined by a category ID and a descriptive "Category Description". The category ID is composed of the WinCC internal IDs for the message class and the message type; the category description is composed of the message class and message type.

Note

If the OPC A&E server is run on a WinCC client of a connectivity station, the OS servers linked to it must have an identical configuration of message classes and message types. If this is not the case, the OPC client used must access the OS server directly.

The names of the message classes and message types can be ascertained exactly via the alarm attributes "CLASSNAME" and "TYPENAME".

Mapping the WinCC message priority

Introduction

The priority of WinCC messages is displayed by the OPC server to the attribute "Severity".

When configuring alarms in the WinCC messaging system, you can configure a priority between 0 and 16. The OPC A&E specification defines a value range from 1 to 1000 for the severity where 1 stands for the lowest and 1000 for the highest severity.

Therefore, the values of the WinCC priority are suitably displayed to the OPC severity. In the standard mapping, the WinCC priority 0 becomes OPC severity 1. All other priority values are interpolated in a linear manner up to severity 1000. Other priority mapping rules can be configured in the CcAeProvider.ini file.

Attributes of the WinCC Message System

Introduction

The following table lists the OPC attributes of the WinCC message system. The attributes are configured in the WinCC message system. Some attributes are intended for internal use in WinCC only and are therefore not relevant to an OPC A&E client. These attributes are not listed.

Attributes

OPC attributes	WinCC message system	Data type
CLASSNAME	Returns the message class name.	VT_BSTR
TYPENAME	Returns the message type name.	VT_BSTR
FORECOLOR	Returns the text color for the display of received, sent and acknowledged messages.	VT_I4
BACKCOLOR	Returns the background color for the display of received, sent and acknowledged messages.	VT_I4
FLASHCOLOR	Returns the flashing color.	VT_I4
FLAGS	Indicates whether the message requires acknowledgment (receipt).	VT_I4
TEXT01	Returns the content of UserTextBlock01.	VT_BSTR
TEXT02	Returns the content of UserTextBlock02.	VT_BSTR
TEXT03	Returns the content of UserTextBlock03.	VT_BSTR
TEXT04	Returns the content of UserTextBlock04.	VT_BSTR
TEXT05	Returns the content of UserTextBlock05.	VT_BSTR
TEXT06	Returns the content of UserTextBlock06.	VT_BSTR
TEXT07	Returns the content of UserTextBlock07.	VT_BSTR
TEXT08	Returns the content of UserTextBlock08.	VT_BSTR
TEXT09	Returns the content of UserTextBlock09.	VT_BSTR
TEXT10	Returns the content of UserTextBlock10.	VT_BSTR

OPC attributes	WinCC message system	Data type
PROCESSVAL-UE01	Returns the content of ProcessValueBlock01.	VT_VARIANT
PROCESSVAL-UE02	Returns the content of ProcessValueBlock02.	VT_VARIANT
PROCESSVAL-UE03	Returns the content of ProcessValueBlock03.	VT_VARIANT
PROCESSVAL-UE04	Returns the content of ProcessValueBlock04.	VT_VARIANT
PROCESSVAL-UE05	Returns the content of ProcessValueBlock05.	VT_VARIANT
PROCESSVAL-UE06	Returns the content of ProcessValueBlock06.	VT_VARIANT
PROCESSVAL-UE07	Returns the content of ProcessValueBlock07.	VT_VARIANT
PROCESSVAL-UE08	Returns the content of ProcessValueBlock08.	VT_VARIANT
PROCESSVAL-UE09	Returns the content of ProcessValueBlock09.	VT_VARIANT
PROCESSVAL-UE10	Returns the content of ProcessValueBlock10.	VT_VARIANT
STATETEXT	Returns the status message.	VT_BSTR
INFOTEXT	Returns the information text for the message.	VT_BSTR
LOOPINALARM	States if LoopInAlarm has been configured.	VT_I4
CLASSID	Returns the message class ID.	VT_I4
TYPEID	Returns the message type ID.	VT_I4
MODIFYSTATE	Outputs the value of the status tag of the message.	VT_I4
AGNR	Returns the number of the automation device that generated the message.	VT_I2
CPUNR	Returns the number of the CPU that generated the message.	VT_I2
DURATION	Indicates the period of time between message received, sent and acknowledged.	VT_I4
COUNTER	Outputs the number of messages after the start of Runtime.	VT_I4
QUITSTATE-TEXT	Indicates whether the message has been acknowledged.	VT_BSTR
QUITCOUNT	Outputs the number of active, unacknowledged messages.	VT_I4
PARAMETER	Outputs the message parameter. (image of the message configuration).	VT_BSTR
BLOCKINFO	Returns the current content of the message block.	VT_BSTR
ALARMCOUNT	Outputs the number of messages pending.	VT_I4
LOCKCOUNT	Outputs the number of locked messages.	VT_I4
PRIORITY	Indicates the configured priority of the message.	VT_I4
APPLICATION	Outputs the application which triggered the message.	VT_BSTR
COMPUTER	Outputs the name of the computer which processed the message.	VT_BSTR
USER	Outputs the name of the user who processed the message.	VT_BSTR
COMMENT	Outputs the message comment.	VT_BSTR

Acknowledgement theory

Introduction

For WinCC, the acknowledgment philosophy is how a message is displayed and processed from "came in" to "went out". On the WinCC OPC A&E server, this message status is managed in parameters "ChangeMask" and "NewState".

Conditional, Simple and Tracking Events

Typically, messages from the WinCC system are sent to the client as conditional events. In order for a message to be treated as a simple event, the following conditions must be met during configuration of the message class:

- "Acknowledgment Came In" is not activated.

- "Message Without Status Went Out" is activated.

Depending on the mapping configuration, the messages of the message class "System without Acknowledgement" and of the message type "Operations message" are transferred as OPC Tracking Events.

ChangeMask

The "ChangeMask" parameter keeps track of where the message status was changed.

Parameter values:

- OPC_CHANGE_ACTIVE_STATE

- OPC_CHANGE_ENABLE_STATE

- OPC_CHANGE_ACK_STATE

NewState

The "NewState" parameter indicates the message status after a change.

Parameter values:

- OPC_CONDITION_ACTIVE

- OPC_CONDITION_ENABLED

- OPC_CONDITION_ACKED

Overview

WinCC	NewState	ChangeState
Received message	OPC_CONDITION_ACTIVE OPC_CONDITION_ENABLED	OPC_CHANGE_AC-TIVE_STATE
Sent message with receipt	OPC_CONDITION_ACTIVE OPC_CONDITION_ENABLED	OPC_CHANGE_AC-TIVE_STATE
Sent message without receipt	OPC_CONDITION_ENABLED	OPC_CHANGE_AC-TIVE_STATE
Acknowledged messages (message pending)	OPC_CONDITION_ACTIVE OPC_CONDITION_ACKED OPC_CONDITION_ENABLED	OPC_CHANGE_ACK_STATE
Acknowledged messages (message no longer pending)	OPC_CONDITION_ACTIVE OPC_CONDITION_ENABLED	OPC_CHANGE_ACK_STATE
Locked message	-------------------------------------	OPC_CHANGE_ENA-BLED_STATE
Unlocked message	OPC_CONDITION_ENABLED	OPC_CHANGE_ENA-BLED_STATE
Received, acknowledged message	OPC_CONDITION_ACTIVE OPC_CONDITION_ACKED OPC_CONDITION_ENABLED	OPC_CHANGE_AC-TIVE_STATE
Received, sent message with receipt	OPC_CONDITION_ACTIVE OPC_CONDITION_ENABLED	OPC_CHANGE_ACK_STATE
Received, sent message without receipt	OPC_CONDITION_ENABLED	OPC_CHANGE_ACK_STATE
Message acknowledged by the system (message pending)	OPC_CONDITION_ACTIVE OPC_CONDITION_ACKED OPC_CONDITION_ENABLED	OPC_CHANGE_ACK_STATE
Message acknowledged by the system (message no longer pending)	OPC_CONDITION_ACTIVE OPC_CONDITION_ENABLED	OPC_CHANGE_ACK_STATE
Emergency-acknowledged message (message pending)	OPC_CONDITION_ACTIVE OPC_CONDITION_ACKED OPC_CONDITION_ENABLED	OPC_CHANGE_ACK_STATE
Emergency-acknowledged message (message no longer pending)	OPC_CONDITION_ACTIVE OPC_CONDITION_ENABLED	OPC_CHANGE_ACK_STATE

See also

www.opcfoundation.org (http://www.opcfoundation.org)

Quality Codes for OPC A&E

Introduction

Quality codes are used to evaluate the status and quality of a message. The quality codes for OPC are described under "6.8 OPC Quality flags" of the "Data Access Custom Interface Standard Version 3.00" specifications.

Quality codes

Code	Quality	Status
0xC0	OPC_GOOD	OK
0x40	OPC_UNCERTAIN	Returned in cases of uncertainty, e.g. in the event of delayed acknowledgement (receipt).
0x00	OPC_BAD	Returned if the connection to the source is interrupted.

Example of an OPC A&E Connection

Introduction

In the example below, a connection between WinCC and an OPC A&E client is configured. Data from the WinCC message system are made available via the WinCC OPC A&E server.

The OPC A&E client is kept informed of status changes of WinCC messages by means of a subscription.

All OPC A&E clients conforming to the OPC Alarms&Events 1.10 specifications can access the WinCC OPC A&E server.

Configuration Step

The following configurations are required for connection between WinCC and the OPC A&E client:

1. Configuring access to the WinCC message system

See also

How to Configure Access to the WinCC Message System (Page 158)

www.opcfoundation.org (http://www.opcfoundation.org)

How to Configure Access to the WinCC Message System

Introduction

In this section, the OPC A&E client of the OPC foundation accesses the WinCC message system.

Note

The OPC A&E client described here is the demo client from the OPC Foundation. The source code for it is found on the Internet at http://www.opcfoundation.org.

Requirement

- Create several internal tags of the "binary" data type in the WinCC project of the WinCC OPC A&E server.

- Configure the WinCC message system in the WinCC project of the WinCC OPC A&E server. Link the messages to the internal tags.

- Configure a picture with the Graphics Designer. Add the WinCC alarm control and an I/O field to the picture. Link the message tags to the graphic objects.

- Enable the "Alarm Logging Runtime" in the start list.

- Enable the WinCC project of the WinCC OPC A&E server.

Procedure

1. Copy the "SampleClientAE.exe" file from the folder "Siemens\WinCC\documents\english" to a folder of your choice. This application is only available in the online help.

2. Select "OPC" >"Connect..." in the menu bar. Select "OPC.WinCC-AlarmsEvent" in the "OPC Alarm Server" dialog. Click "OK" to close the dialog.

3. Select "OPC" >"Event Subscription..." from the menu bar. The "Event Subscription" dialog is opened.

4. Select the check box labeled "Active" in the dialog. Enter "1000" in the "Buffer Time" and "Max Size" fields. Click "OK" to close the "Event Subscription" dialog.
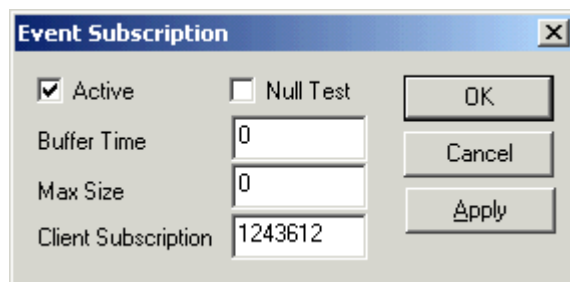
5. The messages from the WinCC message system are displayed in the OPC Event Sample Client.
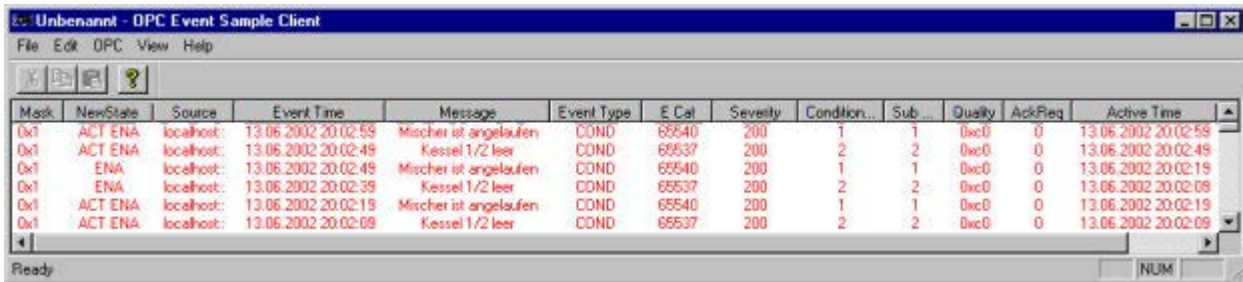
6. Select "OPC" >"Filter" from the menu bar. The "Filter" dialog is opened. Select a category from the "Event Category" field. Click "OK" to close the "Filter" dialog.

7. The messages meeting the filter criteria are displayed in the OPC Event Sample Client.

"Buffer Time" and "Max Size" Parameters

According to OPC specification, the "Buffer Time" and "Max Size" parameters are configured in WinCC as follows:

OPC Client demands return value	WinCC uses
Buffer time < 100 OPC_S_INVALIDBUFFERTIME	Revised buffer time = 100
100 <= buffer time <= 600000 S_OK	Revised buffer time = buffer time
Buffer time > 600000 OPC_S_INVALIDBUFFERTIME	Revised buffer time = 600000
Max size = 0 OPC_S_INVALIDMAXSIZE	Revised max size = 1000
0 < max size < 10 OPC_S_INVALIDMAXSIZE	Revised max size = 10
10 <= max size <= 1000 S_OK	Revised max size = max size
Max Size = 1000 OPC_S_INVALIDMAXSIZE	Revised max size = 1000

Parameters may be set while creating a subscription. However, you cannot change an existing subscription using SetState() after the fact.

For more information, refer to http://www.opcfoundation.org.

See also

www.opcfoundation.org (http://www.opcfoundation.org)

OPC A&E server with hierarchical access

Functionality of the OPC A&E server

Introduction

The OPC-A&E server uses DCOM services for transferring messages between OPC-capable applications. The OPC A&E server supports the specification OPC Alarm&Event 1.10.

The following chapter explains the mapping of the WinCC message system on OPC A&E with hierarchical access and the attributes supported by the OPC A&E server. This documentation includes an overview of the specific information. For more information, refer to the "OPC Alarms & Events 1.10" specification.

Principle of operation

The OPC-A&E client receives WinCC messages via subscription. You can use the subscription filter to reduce the number of events that will be transferred with a subscription. The OPC-A&E client can be set for every event category that displays message attributes.

Installation

The WinCC OPC A&E server can be selected during the installation of WinCC. After installation, the WinCC OPC A&E server is immediately available for use without any additional configuration.

The WinCC OPC A&E server can be implemented on a WinCC server and a WinCC client.

Licensing

In order to operate the WinCC OPC A&E server, the following licenses must be installed on each WinCC server implemented as an OPC A&E server:

- A valid RT license for WinCC
- WinCC Option Connectivity Pack

Event types

The OPC-A&E server with hierarchical access supports conditional events, simple events and tracking events.

Condition related events

With a condition related event, the event is associated with a condition. A condition might, for example, be a limit value violation of a tag. This limit violation generates a message that is shown as an alarm with OPC A&E.

Simple events

Simple events are messages that inform the OPC A&E client about events. Simple events include, for example, starting or exiting programs.

Note

Note the following when using redundant systems:

Simple events interconnected to internal tags are sent twice when tags are updated.

The first message is triggered by the master, the second by the standby.

Tracking events

A tracking event is sent with a operator input message to the OPC A&E client. An operator input message is triggered by manual intervention in the process.

OPC A&E client

All OPC A&E clients conforming to the OPC Alarms & Events 1.10 specification can access the OPC A&E server. You can also create the OPC A&E client yourself. By creating proprietary OPC clients, most user-specific requirements can be met. An OPC A&E client, for example, may be used for analysis and joint archiving of alarms from different OPC A&E servers. The acknowledgment of archived messages is not possible; only current alarms and events can be acknowledged.

If you are using the OPC A&E with hierarchical access and want to use all functions, you may need to adapt the OPC A&E client currently used.

Note
Documentation on OPC

You can find additional information on OPC in the Chapter "Interfaces > OPC - OLE for Process Control".

Differences between OPC A&E and OPC A&E with hierarchical access

Displaying messages with OPC A&E

The OPC A&E server supports "conditional events" and "simple events" for accessing the message system. With "conditional events", the message numbers are shown for each source. Since an WinCC server can hold many more message numbers, it is difficult to maintain an overview of the messages.

The following figure shows an example of the display in an OPC browser:

```
☐  Area and Source Browser of AE2\\LOCAL\OPCServerAE.WinCC.1
   ☐  @LOCALMACHINE::
      ☐  @LOCALMACHINE::localhost::
            1
            11
            2
            12
            3
            7
            4
            1003087
            1012217
            5
```
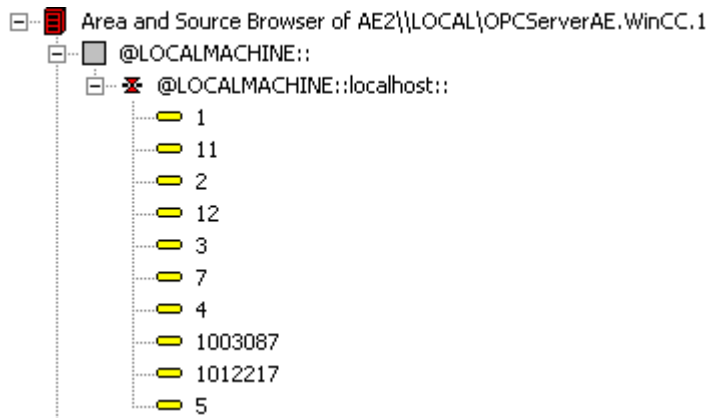
Displaying the messages with OPC A&E and hierarchical access

The OPC A&E server with hierarchical access supports the event types, conditional events, simple events and tracking events.

The user text block 2 determines the source of the messages for "conditional events". With the default setting, user text block 2 corresponds to the fault location. In order to present messages hierarchically, they must be combined in user-defined group messages in alarm logging messages. The structure of group messages is determined by the areas in OPC A&E.

Tracking events occur when operator input messages are triggered in the system.

The following figure shows an example of the display of conditional events in an OPC browser. The "Condition" is shown in addition to "Area" and "Source":

```
☐  Area and Source Browser of AE1\\LOCAL\OPCServerAE.WinCC.1
   ☐  @LOCALMACHINE::
      ☐  @LOCALMACHINE::Plant_1
         ☐  @LOCALMACHINE::Plant_1\Boiler 1
            ☐  @LOCALMACHINE::Plant_1\Boiler 1\1
                  Warning
            ☐  @LOCALMACHINE::Plant_1\Boiler 1\2
                  Alarm
            ☐  @LOCALMACHINE::Plant_1\Boiler 1\3
                  Fault
      ☐  @LOCALMACHINE::Plant_2
         ☐  @LOCALMACHINE::Plant_2\Boiler 2
            ☐  @LOCALMACHINE::Plant_2\Boiler 2\4
            ☐  @LOCALMACHINE::Plant_2\Boiler 2\5
      ☒  @LOCALMACHINE::10
      ☒  @LOCALMACHINE::1000000
      ☒  @LOCALMACHINE::1000001
      ☒  @LOCALMACHINE::1000002
```

Switching to OPC A&E with hierarchical access

Use an OPC A&E server with hierarchical access when creating a new project.

In an existing project, the OPC A&E server can be used as before or be converted for hierarchical access. The conversion can be undone again without any loss of data.

1. Copy the "CcAeProvider.ini" file into the project folder. The file is located in the WinCC installation path in the folder "OPC\AlarmEvent\Hierarchical-Access".

2. Update the clients or perform a complete download for the OS servers.

Mapping the WinCC Message System on OPC A&E

Mapping the WinCC message system

Introduction

The WinCC message system resulting from the configuration defines which event in the process will generate a message. This message is shown as an event notification in OPC A&E.

Mapping the WinCC message system on OPC A&E with hierarchical access

The OPC source of the WinCC user text block "2" and the OPC message of WinCC user text block "1" are used in WinCC as a default setting for mapping the WinCC message systems.

Overview

The following table shows the most important attributes of the event notifications and the respective information from the WinCC message system.

The events that use the configured attributes are shown in the third column of the table:

- "S" means a simple event
- "C" means a conditional event
- "T" means a tracking event

OPC	WinCC message system	Event type
Area	The structure of the group messages determine the areas in OPC A&E. If there is no group message configured for the message, only the OPC area corresponding to the server prefix is available.	S, C, T
Source	Indicates the source of a message. The source has the format "<server prefix>::Area \user text block 2". The server prefix of a local computer is "@LOCALMACHINE". The server prefix always shows the top Areas in the hierarchy of the server.	S, C, T
Time	Issues a time stamp for received, sent and acknowledged messages. Issues a time stamp in UTC (Universal Time Coordinated).	S, C, T
Type	Indicates whether the event is a simple, tracking or conditional event.	S, C, T
Severity	Returns the priority of the message.	S, C, T
EventCategory	Indicates the message class. "Event Category" is made up of the "CategoryID" and the "Category Description". "CategoryID" corresponds to the internal ID of the message class. "Category Description" corresponds to the name of the message class.	S, C, T
Message	Indicates the message text of the corresponding message number.	S, C, T

OPC	WinCC message system	Event type
Condition	Indicates the message type.	C
Sub-condition	Corresponds with the "Condition" parameter.	C
ChangeMask	Specifies the change of the condition. For more information, refer to "Acknowledgment Theory".	C
NewState	Indicates the current status of the condition. For more information, refer to "Acknowledgment Theory".	C
ConditionQuality	Returns the quality of the message. For more information, refer to "Quality codes".	C
AckRequired	Indicates whether the message requires acknowledgment.	C
EventAttribute	Lists the attributes required for the respective message. For more information, refer to "Attributes of the WinCC message system".	C
Quality	Returns the quality code of the message.	C
Cookie	Does not include any usable information for the client	C
ActorID	Indicates which user acknowledged the message.	T

Note

If text without wild cards are specified as a filter for the area, only the messages of the area are returned. If you want to include sources that are located in areas outside the specified area, you need to use wild cards.

Note

The message classes and message types **must** be configured identically on the connected OS servers, if you run the OPC A&E server as follows:

● On a WinCC Client

● On a Connectivity station

If the OS server is not configured identically, the employed OPC client must access the respective OS server directly.

Mapping the message priority

Introduction

The priority of messages is mapped by the OPC A&E server to the attribute "Severity".

When configuring alarms in the messaging system, you can configure a priority between "0" and "16". The OPC A&E specification defines a value range of "1" to "1000" for the severity. In this case, "1" stands for the lowest and "1000" for the highest severity.

Therefore, the values of the priority are suitably displayed to the OPC severity. In the standard mapping, priority "0" is assigned to OPC severity "1" and priority "16" to OPC severity "1000". All other priority values are interpolated linearly between "0" and "1000".

Attributes of the WinCC Message System

Introduction

The following table lists the OPC attributes of the WinCC message system. The attributes are configured in the WinCC message system. Some attributes are intended for internal use in WinCC only and are therefore not relevant to an OPC A&E client. These attributes are not contained in the table.

Attributes

OPC attributes	WinCC message system	Data type
CLASSNAME	Outputs the message class name.	VT_BSTR
TYPENAME	Outputs the message type name.	VT_BSTR
FORECOLOR	Outputs the text color for activated, deactivated and acknowledged messages.	VT_I4
BACKCOLOR	Outputs the background color for activated, deactivated and acknowledged messages.	VT_I4
FLASHCOLOR	Outputs the flash color.	VT_I4
FLAGS	Indicates mandatory message acknowledgment	VT_I4
TEXT01	Outputs the content of UserTextBlock01.	VT_BSTR
TEXT02	Outputs the content of UserTextBlock02.	VT_BSTR
TEXT03	Outputs the content of UserTextBlock03.	VT_BSTR
TEXT04	Outputs the content of UserTextBlock04.	VT_BSTR
TEXT05	Outputs the content of UserTextBlock05.	VT_BSTR
TEXT06	Outputs the content of UserTextBlock06.	VT_BSTR
TEXT07	Outputs the content of UserTextBlock07.	VT_BSTR
TEXT08	Outputs the content of UserTextBlock08.	VT_BSTR
TEXT09	Outputs the content of UserTextBlock09.	VT_BSTR
TEXT10	Outputs the content of UserTextBlock10.	VT_BSTR
PROCESSVALUE01	Outputs the content of ProcessValueBlock01.	VT_VARIANT
PROCESSVALUE02	Outputs the content of ProcessValueBlock02.	VT_VARIANT
PROCESSVALUE03	Outputs the content of ProcessValueBlock03.	VT_VARIANT
PROCESSVALUE04	Outputs the content of ProcessValueBlock04.	VT_VARIANT
PROCESSVALUE05	Outputs the content of ProcessValueBlock05.	VT_VARIANT
PROCESSVALUE06	Outputs the content of ProcessValueBlock06.	VT_VARIANT
PROCESSVALUE07	Outputs the content of ProcessValueBlock07.	VT_VARIANT
PROCESSVALUE08	Outputs the content of ProcessValueBlock08.	VT_VARIANT
PROCESSVALUE09	Outputs the content of ProcessValueBlock09.	VT_VARIANT
PROCESSVALUE10	Outputs the content of ProcessValueBlock10.	VT_VARIANT
STATETEXT	Outputs the status message.	VT_BSTR
INFOTEXT	Outputs the message infotext.	VT_BSTR
LOOPINALARM	Indicates whether LoopInAlarm was configured.	VT_I4
CLASSID	Outputs the message class ID.	VT_I4
TYPEID	Outputs the message type ID.	VT_I4

OPC attributes	WinCC message system	Data type
MODIFYSTATE	Outputs the value of the status tag of the message.	VT_I4
AGNR	Outputs the number of the AS that generated the message.	VT_I2
CPUNR	Outputs the number of the CPU that generated the message.	VT_I2
DURATION	Outputs the interval between the activation, deactivation and acknowledgment of a message.	VT_I4
COUNTER	Outputs the number of messages after the start of Runtime.	VT_I4
QUITSTATETEXT	Indicates whether the message has been acknowledged.	VT_BSTR
QUITCOUNT	Outputs the number of active, unacknowledged messages.	VT_I4
PARAMETER	Outputs the message parameter. (image of the message configuration).	VT_BSTR
BLOCKINFO	Outputs the current content of the message block.	VT_BSTR
ALARMCOUNT	Outputs the number of messages pending.	VT_I4
LOCKCOUNT	Outputs the number of locked messages.	VT_I4
PRIORITY	Indicates the message priority configured.	VT_I4
APPLICATION	Outputs the application which triggered the message.	VT_BSTR
COMPUTER	Outputs the name of the computer which processed the message.	VT_BSTR
USER	Outputs the name of the user who processed the message.	VT_BSTR
COMMENT	Outputs the message comment.	VT_BSTR
HIDDEN-COUNT	Outputs the number of hidden messages.	VT_I4
BIG COUNTER	Outputs the number of messages after the start of Runtime.	VT_CY
OS-HIDDEN	Outputs the hidden status of the message.	VT_BOOL
OS-EVENTID	Outputs the message ID configured for the message.	VT_I4

Acknowledgement Theory

Introduction

The acknowledgment policy in WinCC is how a message from "came in" to "went out" is displayed and processed . On the OPC A&E server, this message status is displayed in the "ChangeMask" and "NewState" parameters.

Conditional events, simple events and tracking events

Messages from the system are sent to the client as conditional events with acknowledgment.

In order for a message to be handled as a simple event, the message class of the message must meet the following conditions:

- "Acknowledgment came in" is not activated.

- "Message without status went out" is activated.

In WinCC, messages of message class "System, does not require acknowledgment" with "Operator input message" message type are transferred as tracking events.

Note

Messages with "System, does not require acknowledgment" message class and "Process control system" message type are transferred as simple events with the "System message" event category.

ChangeMask

The "ChangeMask" parameter keeps track of where the message status was changed.

Parameter values:

- OPC_CHANGE_ACTIVE_STATE
- OPC_CHANGE_ENABLE_STATE
- OPC_CHANGE_ACK_STATE

NewState

The "NewState" parameter indicates the message status after a change.

Parameter values:

- OPC_CONDITION_ACTIVE
- OPC_CONDITION_ENABLED
- OPC_CONDITION_ACKED

Overview

WinCC	NewState	ChangeState
Received message	OPC_CONDITION_ACTIVE OPC_CONDITION_ENABLED	OPC_CHANGE_ACTIVE_STATE
Went out message with acknowledgment	OPC_CONDITION_ACTIVE OPC_CONDITION_ENABLED	OPC_CHANGE_ACTIVE_STATE
Went out message without acknowledgment	OPC_CONDITION_ENABLED	OPC_CHANGE_ACTIVE_STATE
Acknowledged messages (message pending)	OPC_CONDITION_ACTIVE OPC_CONDITION_ACKED OPC_CONDITION_ENABLED	OPC_CHANGE_ACK_STATE
Acknowledged messages (message no longer pending)	OPC_CONDITION_ACTIVE OPC_CONDITION_ENABLED	OPC_CHANGE_ACK_STATE
Locked message	-------------------------------------	OPC_CHANGE_ENABLED_STATE
Unlocked message	OPC_CONDITION_ENABLED	OPC_CHANGE_ENABLED_STATE

WinCC	NewState	ChangeState
Came in, acknowledged message	OPC_CONDITION_ACTIVE OPC_CONDITION_ACKED OPC_CONDITION_ENABLED	OPC_CHANGE_AC- TIVE_STATE
Came in, went out message with acknowledgment	OPC_CONDITION_ACTIVE OPC_CONDITION_ENABLED	OPC_CHANGE_ACK_STATE
Came in, went out message without acknowledgment	OPC_CONDITION_ENABLED	OPC_CHANGE_ACK_STATE
Message acknowledged by the system (message pending)	OPC_CONDITION_ACTIVE OPC_CONDITION_ACKED OPC_CONDITION_ENABLED	OPC_CHANGE_ACK_STATE
Message acknowledged by the system (message no longer pending)	OPC_CONDITION_ACTIVE OPC_CONDITION_ENABLED	OPC_CHANGE_ACK_STATE
Emergency-acknowledged message (message pending)	OPC_CONDITION_ACTIVE OPC_CONDITION_ACKED OPC_CONDITION_ENABLED	OPC_CHANGE_ACK_STATE
Emergency-acknowledged message (message no longer pending)	OPC_CONDITION_ACTIVE OPC_CONDITION_ENABLED	OPC_CHANGE_ACK_STATE

Note

Historical alarms and events are not acknowledged. The OPC A&E historical events interface only has read access.

Quality Codes for OPC A&E

Introduction

Quality codes are used to evaluate the status and quality of a message. The quality codes for OPC are described under "6.8 OPC Quality flags" of the "Data Access Custom Interface Standard Version 3.00" specifications.

Quality codes

Code	Quality	Status
0xC0	OPC_GOOD	OK
0x40	OPC_UNCERTAIN	Returned in cases of uncertainty, for example in the event of delayed acknowledgment (receipt).
0x00	OPC_BAD	Returned if the connection to the source is interrupted.

Reading archived messages

Accessing archived events

Introduction

You can access the archived messages via the OPC A&E server using an OPC client. Two methods are supported for accessing archived messages:

● Output archived messages from a time period in the past

● Output archived messages from a time period in the past without mentioning end of period. After the output of archived messages, all other newly generated messages are automatically sent to the OPC client.

Note

After reading archived messages, you cannot use the returned "ActiveTime" of a message for acknowledging the message or tracing transitions of the message. To ensure this, the OPC A&E client must check the "EventType" of a message with the extra flag "OPC_HAE_HISTORICAL_EVENTFLAG". The "ActiveTime" is incorrect on archived messages. You can find information on the additional flag under "Identifying archived messages".

Querying the "Historic Alarms and Events" functionalities

In addition to the standard filters, the following filters are offered with the expanded OPC A&E server of WinCC:

Filter	Filter Values	Description
OPC_HAE_FILTER_BY_TIMEFRAME	0x80000000	Matches "ReadRaw" function for OPC historical data access
OPC_HAE_FILTER_BY_STARTTIME	0x40000000	Matches "AdviseRaw" function for OPC historical data access

Source filter and historical alarm request

To request the archive messages, the OPC client must support the "SetFilter" to a subscription functionality. The OPC server will also send archived messages if you also insert keyword "OPCHAEServer" the array of the "Source Filter" of a subscription. In addition to this keyword, you can use other parameters to define which messages are to be read:

● Method

● Time period

● With or without limits

The lists of sources that are assigned in the filter can include other source names besides the "OPCHAEServer" source. In such a case, the subscription delivers only the historic events of the given sources. The sequence of the source names is inconsequential.

After configuring the source filter, the selected time period can be called up from the client with a "Refresh" call.

Syntax for accessing archived messages using OPC

Syntax

```
OPCHAEServer hMode=(read|advise) htStartTime=szTime
[hEndTime=szTime] [bBounds=(TRUE|FALSE)]
```

Parameter

hMode = [read|advise]

This parameter is required. Defines how the archived messages and events are to be read.

Read: Outputs archived messages and events of a definite period from the past (comparable to ReadRaw in case of OPC Historical Data Access).

The following is an example for setting a filter for reading over the last 30 minutes:

```
OPCHAEServer hMode=read htStartTime=NOW-30M bBounds=TRUE
```

Advise: Outputs archived messages and events from a definite period, After receiving all archived messages, new messages are sent in the same way as in the case of an active subscription (comparable to AdviseRaw in case of OPC historical data access).

In the following example, the messages of the last 30 minutes are read (subscription must be active):

```
OPCHAEServer hMode=advise htStartTime=NOW-30M
```

Note

The following notation is supported for parameters "htStartTime" and "htEndTime":

- Relative notations, for example NOW
- Symbolic values, for example NOW, YEAR, MONTH
- Specification of absolute UTC data/time values according to XML notation:
  2006-09-01T10:00:00.000Z

Using the symbolic notation corresponds to the syntax from OPC historical data access.

---

htStartTime =

This parameter is required. Defines the time from when the messages and events are to be read from the archive.

htEndTime =

This parameter is optional. Defines the time up to which the messages and events are to be read from the archive. With "hMode = read", the default setting "NOW" is used.

bBounds = [TRUE|FALSE]

This parameter is optional. Defines how messages close to the start and end time are to be handled. The function is identical to OPC historical data access.

bBounds=FALSE:

- The time stamp of the first transferred message >= htStartTime
- The time stamp of the last transferred message >= htEndTime

bBounds=TRUE:

- The time stamp of the first transferred message <= htStartTime
- The time stamp of the last transferred message >= hEndTime

Default setting is FALSE.

Read methods for archived messages

Introduction

You can use one of the two read modes to read archived messages:

- Read
- Advise

"Read" mode

"Read" mode is used to read archived messages from a defined period in the past. The sequence of read messages is always read from the alarms in chronological sequence in reference to each OS server. By setting the start and end time, you can specify whether the last message is to be read first or last. If the start time is earlier than the end time, the last message is last in the output.

To use the "read" mode, you need to run the following functions on the subscription:

1. SetFilter
2. Refresh

"SetFilter" during "Refresh" will be rejected. Activating the subscription during "Refresh" does not have any effect on refresh.

The historic events continue to be transferred with the Refresh flag.

The newly generated events are transferred according to the standard reaction of an active subscription:

- Taking into account the set filter values with the exception of "historic" source "OPCHAEServer"
- Without the Refresh flag

The client can therefore distinguish between the received events based on the Refresh flag. An event package never contains historic and new events at the same time.

- Event packages with Refresh flag only contain historic events. These events can also be in queue.

- Event packages without the Refresh flag only contain newly generated events.

"Advise" mode

"Advise" mode is used to read archived messages from a defined period onwards in the past. After reading all archived messages, new messages are sent in the same way as for an active subscription. The archived messages are transferred in chronological sequence in reference to each OS server: The archived messages from a start time onwards are transmitted. Thereafter, the newly archived messages transferred.

Note that you should not define an end time for "advise".

An active subscription is used for "advise" mode. If you run the "SetFilter" function on an active subscription, the historical alarms are transferred immediately.

If you run "SetFilter" function on an inactive subscription, the archived messages are only sent after activating the subscription. If you want to use "advise" read mode with an inactive subscription, proceed as follows:

1. SetFilter

2. Set subscription to active using SetState

The transmission is interrupted if you deactivate the subscription.

The transmission is ended if you set the subscription to "inactive". "SetFilter" is rejected when the subscription is active.

A "Refresh" on an active "historic" subscription in the "advise" mode functions in the same way as for a standard subscription:

All queued condition related events are transferred to packages with Refresh flag. The last package also contains an additional flag "Last Refresh".

A "Refresh" call has no influence on reading historical alarms in "advise" mode.

Identifying archived messages

General procedure

Archived messages are distinguished using an additional flag in EventType. This flag is linked to the real EventType via a OR link.

Name	EventType	EventType (archived message)
OPC_SIMPLE_EVENT	0x01	0x81
OPC_CONDITION_EVENT	0x04	0x84
OPC_TRACKING_EVENT	0x02	0x82
OPC_HAE_HISTORICAL_EVENTFLAG		0x80

Examples

Example 1

The following source filter is used to output archived messages and events of the last 30 minutes in "read" mode. The oldest message for each OS server is output as the first one. The low limit value is also sent.

```
OPCHAEServer hMode=read htStartTime=NOW-30M bBounds=TRUE
```

Example 2

The following source filter is used to output archived events on September 1, 2006 from 10:00 to 12:00 hours in "read" mode. The newest message for each OS server is output as the first one. The limits for this time period are also sent.

```
OPCHAEServer hMode=read htStartTime=2006-09-01T12:00:00.000Z
htEndTime=2006-09-01T10:00:00.000Z bBounds=TRUE
```

Example 3

The following source filter is used to output archived messages and events of the last 30 minutes in "advise" mode. After reading the archived messages, newly generated messages are sent in the same way as for an active subscription.

```
OPCHAEServer hmode=advise htStartTime=NOW-30M
```

3.6.2.10   WinCC OPC UA Server

Principle of operation the WinCC OPC UA Server

How it works

The WinCC OPC UA Server provides the following values:

- Process values
- Values from tag archives
- WinCC messages

The WinCC OPC UA server is installed as Windows service and started automatically. The WinCC OPC UA server supports only the "UA-TCP UA-SC UA Binary" communication profile. The used port number is adjustable.

Supported specifications

OPC Unified Architecture is a specification for the transmission of process values, archive data and messages. The WinCC OPC UA server supports OPC UA Specification 1.02. For additional information about supported UA functions, refer to "Supported OPC UA services and profiles (Page 181)".

Installation

After WinCC is installed, the WinCC OPC UA server can be used immediately without the need for any further configuration.
The WinCC OPC UA server can be used on a WinCC server or a WinCC client.

URL of the WinCC OPC UA server

You access the WinCC OPC UA server via the following URL:

* "opc.tcp://[HostName]:[Port]"

Parameter	Description
HostName	Placeholder for the computer name. Is used automatically
Port	Port number. The default setting is "4862".

Discovery Server

The "Discovery Server" is available by the OPC foundation. The "Discovery Server" is by default installed on the HMI device as Windows service.

On the "Discovery Server" via OPC UA server UA clients information is available that is registered on the "Discovery Server".

Depending on the configuration, the WinCC OPC UA server registers on no, on one or on multiple configured and available "Discovery servers" upon runtime startup. Registration is then repeated cyclically. If you end Runtime, the WinCC OPC UA server is automatically logged off from the "Discovery server".

Supported languages in the WinCC address area

The WinCC OPC A&E Server supports the WinCC address area in the following languages:

* German

* English

* French

* Italian

* Spanish

Security concept of OPC UA

Introduction

The OPC UA security concept is based largely on:

* Authentication and authorization of applications and users involved

* Ensuring the integrity and confidentiality of messages exchanged between the applications

Certificates

Certificates are the method used for authentication of the OPC UA applications. Each application has its own instance certificate with which it identifies itself in the public key infrastructure.

The certificates used by the WINCC OPC UA server are stored in the settings in the "OpcUaServerWinCC.xml" configuration file:
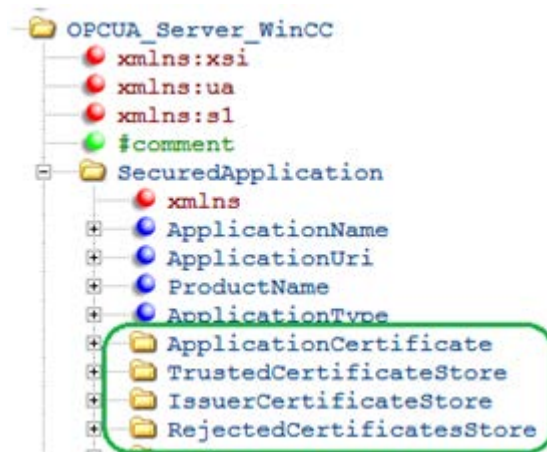
Instance certificate of the WinCC OPC UA Server

For secure operation, each WinCC OPC UA server requires its own instance certificate with a private key. The certificate is only valid on the corresponding computer and may only be used by the WINCC OPC UA server installed on that computer.

When the server is installed, a self-signed instance certificate for the server is generated and stored both in the server certificate folder and in the certificate memory of the operating system.

The private key for the certificate is only stored in the certificate folder. You must restrict access to the folder with the private key to:

- the server itself
- the system administrator

NOTICE

Access to the folder with the private key

For security reasons, no other users or applications apart from the server and the system administrator may have access to the private key of the WINCC OPC UA server.

The instance certificate generated upon installation and the corresponding private key can be replaced by the administrator of the system. In accordance with the applicable security concept for the system, the new instance certificate can be either self-signed or issued by a certification authority.

The storage location for the instance certificate of the WinCC OPC UA server is defined in the settings for the server configuration file. If necessary, the storage location can be changed by the system administration:

Parameter	Value	Meaning
StoreType	Directory	Type of certificate storage. The storage location must be "Directory".
StorePath	[ApplicationPath]\PKI\WINCC-OPC-UA-Server	The certificate and the private key are stored under this folder.

Example of instance certificate configuration

```
ApplicationCertificate
  StoreType          Directory
  StorePath          [ApplicationPath]\PKI\WINCC-OPC-UA-Server
  SubjectName        Siemens OPC UA Server for WinCC
```
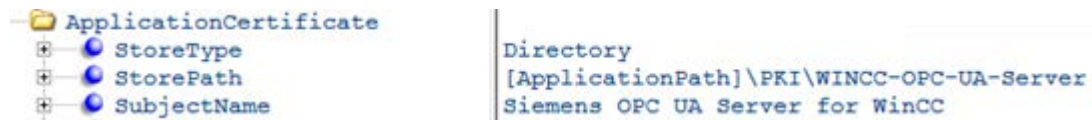
In this case, the instance certificate of the server is stored in the "…PKI\WINCC-OPC-UA-Server\Certs" directory and the private key in the "…PKI\WINCC-OPC-UA-Server\Private" directory.

Trusted client certificates

The WinCC OPC UA server supports secure communication with trusted clients only. A client is trusted:

- If the client has a valid self-signed certificate which is stored in the trusted certificates certificate memory of the WinCC OPC UA server

- or if the valid client certificate was issued by a certification authority. The valid certificate from the certification authority must be located in the trusted certificates certificate memory of the WinCC OPC UA server. In this case, only the certificate from the certification authority is required. The client instance certificate does not need to be located in the trusted certificates certificate memory.

You specify storage settings for trusted certificates using the WINCC OPC UA server configuration file:

Parameter	Meaning
StoreType	Type of certificate storage. The storage location can be either "Directory" or "Windows".
StorePath	The certificates of trusted clients are stored under this folder.

Example of configuration with "Directory" storage

```
TrustedCertificateStore
  StoreType          Directory
  StorePath          [ApplicationPath]\PKI\TrustList
```
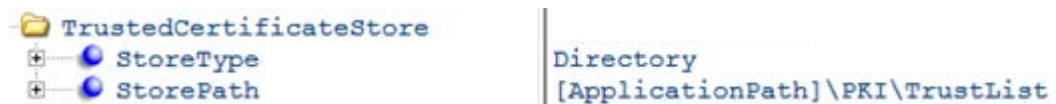
In this case, the WINCC OPC UA server trusts all clients whose instance certificates are located in the "…PKI\TrustList\Certs" folder.

Example of configuration with "Windows" storage

```
TrustedCertificateStore
   StoreType              Windows
   StorePath              UA Applications
```

For this storage option, the instance certificates of the clients must be located in the certificate memory of the operating system under "<Local computer>\UA applications".

Certificates from certification authorities that are required for verifying a client certificate chain are stored in the certificate memory of the certification authorities. Here too, you specify storage settings using the WINCC OPC UA server configuration file:

Parameter	Meaning
StoreType	Type of certificate storage. The storage location can be either "Directory" or "Windows".
StorePath	The certificates of trusted certification authorities are stored under this folder.

Note

Certificates from the memory of the certification authorities are not automatically trusted.

For a certification authority to be trusted, its certificate must be located in the memory for trusted certificates.

Example of configuration with "Directory" storage

```
IssuerCertificateStore
   StoreType              Directory
   StorePath              [ApplicationPath]\PKI\CA
```

The certificates of trusted certification authorities are in this case located in the "…\PKI\CA \Certs" folder.

Example of configuration with "Windows" storage

```
IssuerCertificateStore
   StoreType              Windows
```

The "StorePath" parameter is not relevant. The certificates from certification authorities must be stored in the Windows certificate memory in accordance with the operating system requirements.

Certificates are trusted if they are located in one of these two locations:

- <Local computer>\Trusted root certification authorities
- <Local computer>\Third-party root certification authorities

---

Note

Important for storage

● The storage location for the server certificate must be "Directory".

● The two storage locations for trusted client certificates and for certificates from certification authorities must have the same StoreType, i.e. both must either be "Directory" or "Windows".

Client certificates not accepted

If a UA client accesses the WINCC OPC UA server without a trusted certificate, the WINCC OPC UA server does not allow secure communication and copies the client certificate to the folder for rejected certificates.

You specify storage settings for rejected certificates using the WINCC OPC UA server configuration file, for example

```
RejectedCertificatesStore
  StoreType          Directory
  StorePath          [ApplicationPath]\PKI\WINCC-OPC-UA-Server\Rejected
```
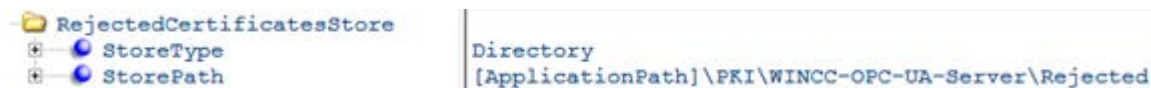
Note

Here too, only the StoreType "Directory" is supported.

To enable secured communication with this client, you will have to move the rejected certificate to the certificate memory for trusted certificates.

Configuring the security mechanisms

Introduction

The following is ensured at the communication level:

● UA application authenticity

● The confidentiality of messages exchanged

● The integrity of messages exchanged

The security mechanisms used, for example algorithms for encrypting and signing, are set in standardized security policies.

The security policies supported by the WinCC OPC UA server are set using the server configuration file in "ServerConfiguration" and "SecuredApplication".

ServerConfiguration

The XML element "SecurityPolicies" under "ServerConfiguration" contains the list of all available "Security Profile" and "Message Security Mode" combinations for the server.

Security Profile	Message Security Mode	Description
http://opcfoundation.org/UA/SecurityPolicy#None	None	Unsecured communication
http://opcfoundation.org/UA/SecurityPolicy#Basic128Rsa15	Sign or SignAndEncrypt	Secure communication, signed or encrypted and signed messages
http://opcfoundation.org/UA/SecurityPolicy#Basic256	Sign or SignAndEncrypt	Secure communication, signed or encrypted and signed messages

Note

Ensuring secure communication

Secure communication requires instance certificates for server and client and a correctly configured certificate memory.

Example of a configuration file with maximum functional scope

SecuredApplication

In accordance with the OPC UA specification, the security mechanisms and explicitly enabled and disabled with the "SecurityProfileUris" element under "SecuredApplication".

The diagram below shows a SecuredApplication in which unsecured communication is disabled:

The WinCC OPC UA server therefore supports the two security strategies "Basic128Rsa15" and "Basic256" in runtime. With "Message Security Modes Sign" and "SignAndEncrypt", but not unsecured communication. When communication is established, the UA clients select the required Policy from this list.

User identity

As well as the security mechanisms for the communication level, the WINCC OPC UA server also supports user authentication for the client applications using UserTokenPolicy "UserName". The client application must provide a valid combination of user name and password when communication is established. The WinCC OPC UA server verifies the combination in the user management of the operating system.

The UserTokenPolicy is set in the configuration file of the WINCC OPC UA server.

With this configuration, the WINCC OPC UA server supports both anonymous users and the Policy "UserName".

Supported OPC UA services and profiles

OPC UA services

The WinCC OPC A&E Server supports the following described functionality.

The following table sets out the functionality supported by OPC UA server 1.0.2:

OPC UA Service Sets	Services	Comment
Discovery Service Set	FindServers GetEndpoints	-
Secure Channel Service Session Service Set	All	-
View Service Set	Browse BrowseNext RegisterNodes UnregisterNodes	Detection of WinCC data mapped: Process values and archived data
Attribute Service Set	Read Write HistoryRead HistoryUpdate*)	only WinCC tags only WinCC tags Only archived tags Only archived tags
Subscription Service Set	CreateSubscription SetPublishingMode Publish RePublish DeleteSubscription	
MonitoredItem Service Set	CreateMonitoredItems SetMonitoringMode DeleteMonitoredItems	Only "Value" attribute of WinCC tags .EventNotifier upon access to WinCC messages
Method Service Set	Call	Acknowledge ConditionRefresh
*): With restrictions, see "Supported Write-Accesses (Page 139)"		

OPC UA profile and Conformance Units

The WinCC OPC UA server supports the following OPC UA profiles 1.02 without restrictions:

- 6.5.3 Base Server Behavior Facet
- 6.5.12 Standard Event Subscription Server Facet
- 6.5.14 A & C Base Condition Server Facet
- 6.5.24 Method Server Facet
- 6.5.30 Historical Raw Data Server Facet
- 6.5.36 Historical Data Update Server Facet

- 6.5.37 Historical Data Insert Server Facet

- 6.5.38 Historical Data Delete Server Facet

- 6.5.107 UA TCP UA SC UA Binary

- 6.5.125 SecurityPolicy - Basic256

- 6.5.124 SecurityPolicy - Basic128Rsa15

- 6.5.123 SecurityPolicy - None

The WinCC OPC A&E Server supports the following OPC UA profiles shown in the following table, however with restrictions:

Profile	"Group"	Not supported "Conformance Unit"
6.5.8 Standard DataChange Subscription Server Facet	Monitored Item Services	ModifyMonitoredItems DeadBand Filter Monitor MinQueueSize_02
6.5.9 Enhanced DataChange Subscription Server Facet	Monitored Item Services	Monitor MinQueueSize_05
6.5.25 Core Server Facet	Attribute Services	Attribute Write Index
6.5.26 Data Access Server Facet	Data Access	Data Access Analog Data Access Multistate Data Access PercentDeadBand Data Access Semantic Changes Data Access Two State
6.5.35 Standard UA Server	Attribute Services	Attribute Write StatusCode & TimeStamp
6.5.47 Standard UA Server Profile	Attribute Services	Attribute Write StatusCode & Timestamp

Name area of the WinCC OPC UA server

Introduction

The WinCC OPC UA server provides OPC UA clients with a hierarchical name area and access to the following runtime data:

- Process values (WinCC tags and WinCC tag groups)

- Data log inclusive logging tags

- WinCC messages

The name area of the WinCC OPC UA server is attached in the "Objects" default folder.

The following screen shows the name area of the WinCC OPC UA server of an active WinCC project on the local PC ("@LOCALMACHINE::"):
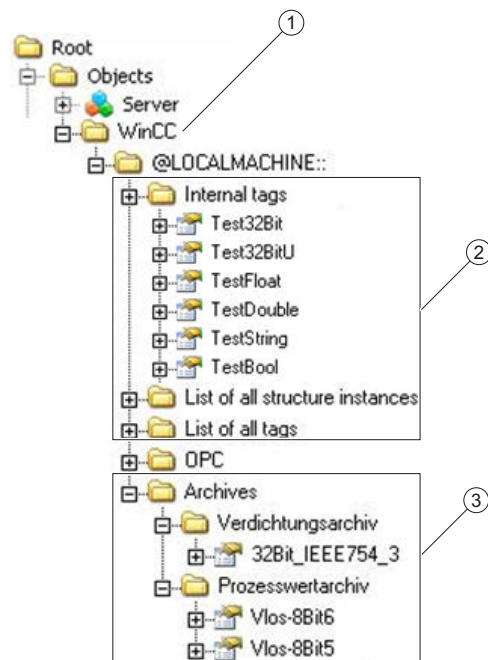
①   Start node of the specific name area of WinCC.

②   Display of the WinCC tags; the structure corresponds to the structure of the tags in WinCC.

③   Display of the data log

Display of the WinCC tags

Tag groups, communication drivers and connections are displayed by OPC UA objects of the "FolderType" type. Each of these folders has references of the "Organizes" type to the subordinate objects and tags.

Internal and external WinCC tags are displayed by OPC UA tags of the "DataItemType" type. If a WinCC tag is additionally logged, the displayed OPC UA tag has additionally a reference of the "HasHistoricalConfiguration" type for a log configuration. The "Historizing" and "AccessLevel" attributes are respectively set.

The following table shows the most important attributes of the OPC UA tags that represent a WinCC tag. You can find the complete list of attributes in the "OPC UA Part 3 - Address Space Model 1.02 Specification" document under "5.6":

Attribute	Description	Comment
NodeId	Unique designation of the WinCC tag	-
BrowseName	WinCC tag name	-
DisplayName	WinCC tag name	-
Value	Tag value and status	-
DataType	OPC UA data type that corresponds to the WinCC tag type, for example: • Int32; signed 32 bit value • UInt32; unsigned 32 bit value	-

Attribute	Description	Comment
AccessLevel	"CurrentRead" / "CurrentWrite" "HistoryRead" / "HistoryWrite"	correspondingly to the WinCC tag configuration
ValueRank	Always "Scalar"	-

Display of the logging tags

Process values and compressed logs are displayed by OPC UA objects of the "FolderType" type. Each of these folders has references of the "Organizes" type to the related logging tags.

Logging tags from process value or compressed logs are displayed by OPC UA tags of the "BaseDateVariableType" type. A logging tag always has a reference of the "HasHistoricalConfiguration" type for a log configuration.

The following table shows the most important attributes of the OPC UA tags that represent a WinCC logging tag. You can find the complete list of attributes in the "OPC UA Part 3 - Address Space Model 1.01 Specification" document under "5.6":

Attribute	Description	Comment
NodeId	Unique designation of a logging tag	-
BrowseName	Name of the archive tag	-
DisplayName	Name of the archive tag	-
Description	Node description	-
Value	Not available	For a logging tag, this attribute cannot be read nor changed.
DataType	OPC UA data type that corresponds to the WinCC tag type, for example: • Double; 64-bit floating point number • UInt32; unsigned 32 bit value	-
AccessLevel	"HistoryRead" / "HistoryWrite"	-
ValueRank	Always "Scalar"	-

Access to WinCC messages

The start node of the WinCC name area is an Event Notifier which allows the OPC UA clients to receive status changes for WinCC messages in runtime via Subscriptions .

OPC UA Data Access

Internal and external WinCC tags are displayed by OPC UA tags of the "DataItemType" type. Other DataAccess tag types as "AnalogItem" or "DiscreteType" are not supported.

The WinCC OPC A&E Server supports the reading access on the OPC UA tag attributes as "DataType" or "AccessLevel". Writing access and subscriptions are only supported for the "Value" attribute.

OPC UA Log Access

Introduction

"OPC Historical Access" enables access to archives and includes the "Historical Data" and "Historical Events" services. The WinCC OPC UA server supports only the "Historical Data" service.

The WinCC OPC UA Server offers the OPC clients access to the raw data of tag archives via "Services".

● HistoryRead (READRAW)

● HistoryUpdate (INSERTDATA, REPLACEDATA, UPDATEDATA, DELETE_RAW)

You can read and limitedly write with an OPC UA client the values of archive tags in the tag archives. Depending on the configuration of the tag archive, the archive tag can contain either raw data or already processed process values.

Characteristics of archive tags

A process tag in WinCC can be located in multiple tag archives. In this case the process tag is linked to one of the corresponding archive tags.

Properties / Properties of archive configurations

The following table shows the Properties of an OPC UA tag configuration of the "HistoricalConfigurationType" type: In the "Description" property, the archive tag comment configured in WinCC is displayed. You can find the complete list of properties in the "OPC UA Part 11 - Historical Access 1.02 Specification" document under "5.2.2":

Property	Description / Value	Comment
Definition	WinCC process tag name	For a process value archive
Stepped	True	-

The following optional Properties are not supported:

● MaxTimeInterval

● MinTimeInterval

● ExceptionDeviation

● ExceptionDeviationFormat

Limitations for Service "HistoryUpdate"

You can use the Service "HistoryUpdate" only on process value archives.

The following table lists the functions supported by the WinCC OPC UA server: Which functions are supported depends on the configuration of the WinCC OPC UA server as well as the

process value archive configuration. You will find additional information in the "OPC UA Part 11 - Historical Access 1.00 Specification" document under "§5.5":

Service	Function	Description
HistoryUpdate	INSERTDATA	Insert new archive values
	REPLACEDATA	Replace existing archive values
	UPDATEDATA	Replace of insert archive values
	DELETE_RAW	Delete archive values

OPC UA alarm & conditions

Introduction

The OPC UA server provides access to the messages of the WinCC message system as of WinCC 7.3.

The OPC UA server forwards WinCC message status changes to OPC UA clients with WinCC-Event-Notifications via Subscriptions and Monitored Event Items but does not maintain a Condition instance in its name area. The Event Notifier node to be used is the start node of the WinCC name area. The UA client can filter the messages and define the list of message attributes returned.

The OPC UA server supports the "OPC UA Alarms & Conditions 1.02" specification.

The following section outlines the mapping of the WinCC message system to OPC UA. You can find additional information in the specification in "Part 9: Alarms and Conditions 1.02 Specification".

WinCC message system mapping to UA event types

WinCC messages are mapped to the following OPC UA event types:

WinCCEventType

This type is based on "BaseEventType" and maps "simple" WinCC messages with the following acknowledgment theory:

- "Message without status went out" is activated
- "Acknowledgment came in" is not activated

Examples of this type of message are starting and stopping motors.

WinCCAlarmConditionType

This type is based on "AlarmConditionType" and maps all messages which cannot be mapped on WinCCEventType, for example acknowledgeable messages and messages with the status "came in" and "went out".

The event for messages of the "WinCCAlarmConditionType" type is linked to a condition. For example, WinCC generates a message as soon as a tag limit is violated. This message in OPC UA is equivalent to an Alarm Condition.

WinCC message attributes

The two Event types add WinCC-specific message attributes to the basic type. The attributes are mapped 1:1 as UA Event Properties and are described in more detail in "Attributes of the WinCC message system".

Message class and message type

The WinCC message system informs the user of disturbances and operating conditions in the process. A WinCC message always belongs to a specific message class and message type, which are specified in the "CLASSID", "TYPEID", "CLASSNAME" and "TYPENAME" attributes of the corresponding UA Events.

Priority

When configuring messages in the WinCC message system, you can configure a priority of between "0" and "16". The OPC UA specification defines a value range of "1" to "1000" for the Severity. "1" stands for the lowest and "1000" for the highest Severity.

The values of the priority must therefore be suitably mapped to the OPC severity. In standard mapping, a priority of "0" is assigned to OPC-Severity "1" and a priority of "16" to OPC-Severity "1000". All other values are interpolated linearly between "0" and "1000".

OPC UA mapping rules

During the configuration of the WinCC message system, settings are made to determine which process events generate a message. This message is generally shown as an Event in OPC UA.

The following table shows the most important Properties of an Events and how the WinCC message system provides the information.

OPC UA property	Mapping in the WinCC message system
For all event types:	
EventID	Unique message designation
EventType	Event type: Node ID of the WinCCAlarmConditionType node or WinCCEventType node
SourceNode	Irrelevant
SourceName	Indicates the source of the message. Mapping is described in more detail below.
Message	Message text for the corresponding message number.
Time	Time of the event. The time stamp is given in UTC
Severity	Priority of the WinCC message
Only with WinCCAlarmConditionType:	
ConditionName	Set text that is output as well as the message. The text output depends on the mapping rule set: • "Mode 1" and "Mode 2": Message number • "Mode 3": Message class, for example "Process control message"
Quality	Returns the quality of the message

OPC UA property	Mapping in the WinCC message system
ConditionClassId	Node ID of the "ProcessConditionClassType" node
ConditionClassName	"ProcessConditionClassType"
Retain	"TRUE" with pending messages
NodeId	ConditionId: unique designation for a UA-Condition, for example an alarm. Required for acknowledgment, even if no Condition instances are supported
EnabledState	"TRUE" is the message has been enabled
ActiveState/Id	"TRUE" is the message has come in
AckedState/Id	"TRUE" is the message has been acknowledged
ClientUserId	Indicates the user that is logged on

Note

The following OPC UA Condition and Alarm Properties are not supported by the OPC UA server:

- BranchId
- LastSeverity
- InputNode
- ConfirmedState
- SuppressedState
- ShelvingState
- SuppressedOrShelved
- MaxTimeShelved

Message statuses / acknowledgment statuses

The following table shows WinCC message status mapping to the corresponding WinCCAlarmConditionType - Properties:

Message status	EnabledState/Id	ActiveState/Id	AckedState/Id
Locked message	FALSE	-	-
Enabled message	TRUE		
Received message	TRUE	TRUE	FALSE
Sent message with acknowledgment	TRUE	FALSE	TRUE
Sent message without acknowledgment	TRUE	FALSE	FALSE
Acknowledged messages (message pending)	TRUE	TRUE	TRUE
Acknowledged messages (message no longer pending)	TRUE	FALSE	TRUE
Received, acknowledged message	TRUE	TRUE	TRUE
Received, sent message with acknowledgment	TRUE	FALSE	TRUE

Message status	EnabledState/Id	ActiveState/Id	AckedState/Id
Received, sent message without acknowledgment	TRUE	FALSE	FALSE
Message acknowledged by the system (message pending)	TRUE	TRUE	TRUE
Message acknowledged by the system (message no longer pending)	TRUE	FALSE	TRUE
Emergency-acknowledged message (message pending)	TRUE	TRUE	TRUE
Emergency-acknowledged message (message no longer pending)	TRUE	FALSE	TRUE

Settings for mapping the WinCC message system

The configuration of the OPC UA server also applies to the OPC UA server as regards the mapping of the Properties "SourceName" and "Message" of a message.

- With OPC A&E server with hierarchical access:

SourceName	Indicates the source of a message. The Source has the format "<Server prefix>::Area\UserTextBlock 2". The server prefix of the local computer is "@LO-CALMACHINE".
Message	Returns the message text of the corresponding message number

- With OPC A&E server without hierarchical access:

SourceName	Indicates the source of a message. The Source has the format "<Server prefix>::localhost::". The server prefix of the local computer is "@LOCALMA-CHINE".
Message	Returns the message text of the corresponding message number

Alarm groups

In WinCC 7.3, the WinCC alarm groups are not displayed in the name area.

Supported event methods

Acknowledgment

A WinCC message is acknowledged using the "Acknowledge" method of the "AcknowledgeableConditionType" node in the standard OPC UA info model.

Only messages of the "WinCCAlarmConditionType" type can be acknowledged.

ConditionRefresh

Messages still pending are established using the "ConditionRefresh" method of the "ConditionType" node in the standard OPC UA info model.

Filters

The OPC UA client can defined a filter for Monitored Event Items .

The following operators are, however, not supported by the OPC UA server:

- FilterOperator_Cast
- FilterOperator_BitwiseAnd
- FilterOperator_BitwiseOr
- FilterOperator_RelatedTo
- FilterOperator_InView

See also

Attributes of the WinCC message system

Overview

The following table lists the configurable attributes of the WinCC message system. The attributes are mapped 1:1 as UA Event Properties .

WinCC message attribute	Meaning	Data type
CLASSNAME	Name of message class	String
TYPENAME	Name of message type	String
FORECOLOR	Foreground color for incoming, outgoing and ac-knowledged messages.	Int32
BACKCOLOR	Background color for incoming, outgoing and ac-knowledged messages.	Int32
FLASHCOLOR	Flash color	Int32
FLAGS	Indicates mandatory message acknowledgment	Int32
TEXT01…TEXT10	Content of user text block #1....#10	String
PROCESSVALUE01…PROCESSVALUE10	Content of process value block #1....#10	
STATETEXT	Status message	String
INFOTEXT	Information text for the message	String
LOOPINALARM	Indicates whether LoopInAlarm was configured	Int32
CLASSID	Message class ID	Int32
TYPEID	Message type ID	Int32
MODIFYSTATE	Value of message status tag	Int32
AGNR	Outputs the number of the automation system that generated the message	Int16
CPUNR	Outputs the number of the CPU that generated the message	Int16

WinCC message attribute	Meaning	Data type
DURATION	Outputs the time period between the incoming state, outgoing state and acknowledgment of a message	Int32
COUNTER	Number of messages after the start of runtime	Int32
QUITSTATETEXT	Indicates whether the message has been acknowledged	String
QUITCOUNT	Number of open, unacknowledged messages	Int32
PARAMETER	Configuration parameter of the message	Int32
BLOCKINFO	Current content of the message block	String
ALARMCOUNT	Number of pending messages	Int32
LOCKCOUNT	Number of locked messages	Int32
PRIORITY	Priority of the message	Int32
APPLICATION	Outputs the application which triggered the message	String
COMPUTER	Outputs the name of the computer which processed the message	String
USER	Outputs the name of the user who processed the message	String
COMMENT	Message comment	String
HIDDEN-COUNT	Number of hidden messages	Int32
OS-HIDDEN	Indicates that the message is hidden	Boolean
OS_EVENTID	WinCC message number	Int32
BIG_COUNTER	Message counter	Int64

See also

OPC UA alarm & conditions (Page 186)

Configuring the WinCC OPC UA server

Configuration file

Introduction

The WinCC OPC UA server is configured using the configuration file "OPCUAServerWinCC.xml". This chapter describes the layout of the configuration file. The chapter "How to configure the OPC UA server (Page 193)" describes how you configure the WinCC OPC UA server.

File location

The project-specific configuration file "OPCUAServerWinCC.xml" is stored in the WinCC project folder under:

"<WinCC project folder>\OPC\UAServer"

Layout

The configuration file is broken down into multiple sections.

Section <Secured Application>

In this section, the OPC UA application security is set in compliance with OPC UA Specification / Part 6 / § "Security Settings Management".

`<Secured Application>`	

`<BaseAddresses>`
`<...></...>`
`</BaseAddresses>.`
	Configuration of the URL of the WinCC OPC UA server.
	For additional information about the URL, refer to "Security concept of OPC UA (Page 174)".

`<SecurityProfileUris>`
`<SecurityProfile>`
`<...></...>`
`</SecurityProfile>`
`...`
`</SecurityProfileUris>`
	Configuration of the supported security policies
	Use the "none" setting only for test and diagnostics purposes
	For more information about security policies, refer to "Security concept of OPC UA (Page 174)".

`<ApplicationCertificate>`
`<TrustedCertificateStore>`
`<TrustedCertificates>`
`<...>`
	Revision of the default certificate configuration according to OPC UA Specification / Part 6.
	(optional)

`</Secured Application>`	

Section <Server Configuration>

In this section you can set further server-specific parameters.

`<Server Configuration>`	

`<SecurityPolicies>`
`<SecurityPolicy>`
`<...></...>`
`</SecurityPolicy>`
`...`
`</SecurityPolicies>`
	Configuration of the message security modes.
	Use the "none" setting only for test and diagnostics purposes
	For more information about message security modes, refer to "Security concept of OPC UA (Page 174)".

`<UserTokenPolicies>`
`<UserTokenPolicy>`
`<...></...>`
`</UserTokenPolicy>`
`...`
`</UserTokenPolicies>`
	Configuration of user identification
	Use the "Anonymous" setting only for test and diagnostics purposes
	For more information about message security modes, refer to "Security concept of OPC UA (Page 174)".

`<FastInsert>`
`<Users>`
`<...></...>`
`</Users>`
`<Clients>`
`<...></...>`
`<Clients>`
`</FastInsert>`
	Configuration of the optimized WinCC archive write access

`<Server Configuration`	

How to configure the OPC UA server

Requirement

A WinCC project·has been created.

Opening the configuration file

1. Open Windows Explorer.·Navigate to the directory "<WinCC project folder>OPC \UAServer".

2. Open the "OPCUAServerWinCC.xml" configuration file. For more information, refer to "Configuration file (Page 191)"

Changing the port number of the WinCC OPC UA server

1. If necessary, change the port number 4862 under `<BaseAdresses>`.
   Do not use a port number that is already assigned to another application.
   The parameter [HostName] is the placeholder for the computer name and is determined during runtime.
   Example:
   ```
   <BaseAdresses>
   <ua:String>opc.tcp://[HostName]:5210</ua:String>
   <BaseAdresses>
   ```

Specifying security settings

1. Specify the security settings for communication.·For additional information, refer to "Security concept of OPC UA (Page 174)"

2. Under `<SecurityProfileUris>`, you configure the supported "Security Policies".

   – Enable the setting with "`true`".

   – Disable the setting with "`false`".
   Example:
   ```
   <SecurityProfile>
      <ProfileUri>http://opcfoundation.org/UA/SecurityPolicy#None</
   ProfileUri>
      <Enabled>false</Enabled>
   </SecurityProfile>
   ```

3. Under `<SecurityPolicies>`, you configure the associated "Message·security·modes".
   To deactivate a setting, delete the entire entry `<SecurityPolicy>... </Security Policy>`.
   Example:
   ```
   <SecurityPolicy>
      <ProfileUri>http://opcfoundation.org/UA/SecurityPolicy#None</
   ProfileUri>
      <MessageSecurityModes>None</MessageSecurityModes>
   </SecurityPolicy>
   ```

Note

Unsecured communication between client and server

Use the "none" setting only for test and diagnostics purposes.

For secure client/server communication·in production mode, you need to use at least the following settings:

- SecurityPolicy:·Basic128Rsa15
  Message·Security·Mode:·Sign

Specifying user identification

1. Specify the user identification for setting up the connection under `<UserTokenPolicies>`. For more information, refer to "Security concept of OPC UA (Page 174)"
   To deactivate a setting, delete the entire entry.
   Example
   ```
   <UserTokenPolicy>
   <TokenType>Anonymous</TokenType>
   </UserTokenPolicy>
   ```

Configuring optimized WinCC archive write access

1. If necessary, configure optimized WinCC archive write access under **<**`FastInsert`**>**.

   - Set "`true`" to activate the optimized write access to WinCC archives for all OPC UA clients.

   - Set "`false`" to set optimized WinCC archive write access for specific Windows users or OPC UA clients.
     You specify the Windows users under `<Users>`.
     You specify the OPC UA clients under `<Clients>`. Use the "Common Name" that is entered in the client certificate as `ClientName`.
     Example:
     ```
     <EnabledByDefault>false</EnabledByDefault>
     <Users>
       <User>domain\user1</User>
     </Users>
     <Clients>
       <Client>ClientName1</Client>
     </Clients>
     ```

3.6.2.11   Trace

Introduction

The "Trace" function can be used to log tag values and function calls for purposes of testing and error analysis.

The entries are stored in a trace file. The trace shows the step-by-step progress of the establishment of the connection, thus making it easier to identify the source of a connection problem.

Settings

Trace output must be set in the registry of the operating system. For more information, refer to the SIMATIC Customer Support.

3.7 Examples for Access Using OLE DB Provider

3.7.1 Examples for Access Using OLE DB Provider

Overview

The following examples demonstrate different ways of displaying and analyzing archive data.

See also

Example: Reading Message Archive Data with the WinCC OLE DB Provider and Visual Basic 6 (Page 219)

Example: Reading Process Value Archive With WinCC OLE DB Provider and Visual Basic 6 (Page 206)

Example: Configuring Access to Archive Data Using DataConnector Wizard (Page 198)

Example: Configuring the Access to Archive Data Using VB (Page 196)

Example: Reading Message Archive Data With WinCC OLE DB Provider and Visual Basic.NET (Page 223)

Example: Reading Process Value Archive With WinCC OLE DB Provider and Visual Basic.NET (Page 209)

3.7.2 Example: Configuring the Access to Archive Data Using VB

Introduction

The following example shows how to configure a tabular display with Microsoft controls. You may also use other controls or program your own.

Requirements

Archive files are local on the computer and must be connected to the SQL server, e.g., using the WinCC Archive Connector.

Procedure

1. In Visual Basic Editor, create a new form that you want to use for displaying the archive data.

2. In Visual Basic Editor, select the menu commands "Project > Components".

3. Activate the controls that you want to use, e.g. an "MS Data Grid Control" and an "MS ADO Data Control".
   The related symbols are displayed in the toolbox.

4. In your form, create an "MS Data Grid Control" for tabular display of archive data, and an "MS ADO Data Control" for navigation within the tabular display.

5. Mark the MS Data Grid Control and select the entry "Adoc1" in the property window under "DataSource" in order to link the two controls.

6. Mark the MS ADO Data Control and click the button "..." in the Property window under "Connection String".
   This opens the "Property pages" dialog.
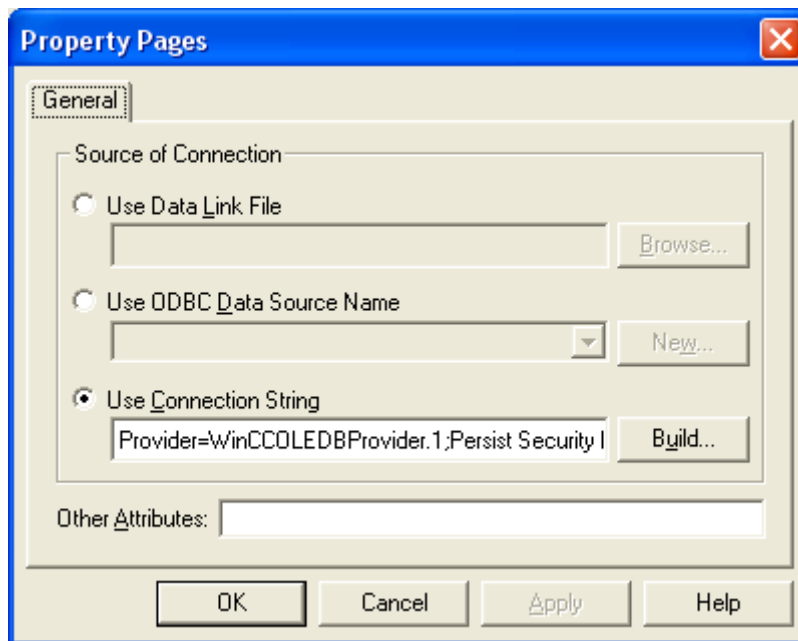
7. Click on the "Create..." button next to the entry "Use Connection Character Sequence".
   The "Data Link Properties" dialog opens.

8. In the "Provider" tab, select "WinCC OLE DB Provider for Archives" and click on "Next".

9. In the "Connection" tab, enter the data source in the "DataSource" box: <Computer name>\WinCC.
   Test the connection by clicking on the button "Test Connection".
   Select the Extended tab. After that, switch to the "All" tab without further changes. This step is necessary to correctly set all parameters for the subsequently created connection character set.

10. In the "All" tab, enter the name of the WinCC database in the "Catalog" box. The database name can be found in the SQL Enterprise Manager at "SQL Server Group" > "<Computer Name>\WinCC" > "Databases" > "<Database name_R>".
   If the project is active, only use database names that end with "R".
   If you have connected exported WinCC archives to the SQL Server via the WinCC Archive Connector, use the symbolic name of the database or export directory.
   Confirm your settings with "OK".

11. Mark the MS ADO Data Control and click the button "..." in the Property window under "RecordSource". This opens the "Property pages" dialog.
Select the setting "1 - adCmdText" for the command type and enter a valid statement such as TAG:R,1,'0000-00-00 00:10:00.000','0000-00-00 00:00:00.000' in the "Command text (SQL)" box.
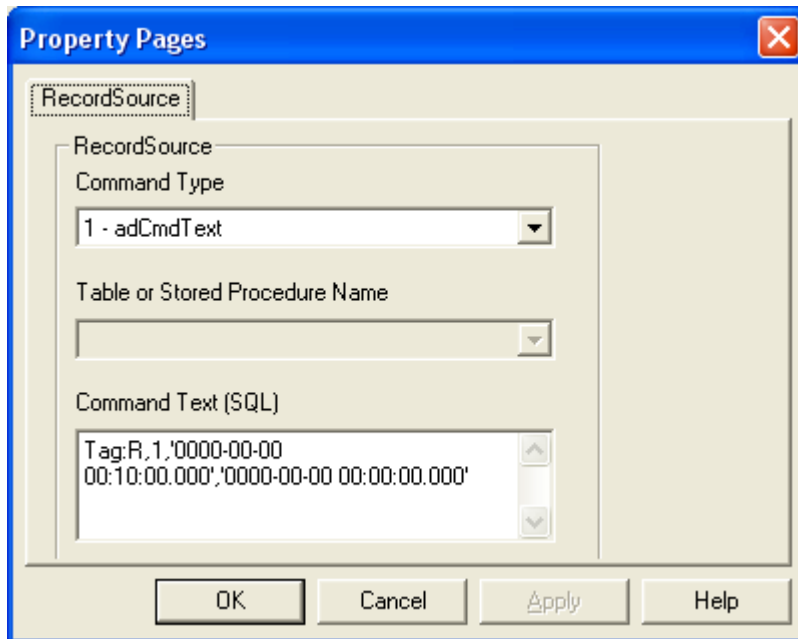
12. Confirm your entries with "OK" and start Visual Basic Runtime.

3.7.3 Example: Configuring Access to Archive Data Using DataConnector Wizard

Introduction

The following example shows how to configure a tabular display of process values using the DataConnector Wizard in WinCC Graphics Designer.

Alternatively, you may also use the DataConnector Wizard to configure the display of messages or graphical display of process values.

Requirements

- WinCC Basic system and Connectivity Pack are installed.
- Archive files are connected to the desired SQL server, e.g., using WinCC Archive Connector.

Procedure

1. Open Graphics Designer and select the entry "Create New Picture" in the "DataConnector" menu. A new process picture opens and the dialog "DataConnector - Select Object" is displayed.

2. For this example, select the option "Display Tag Values in Table Form" and then click the "Continue" button.
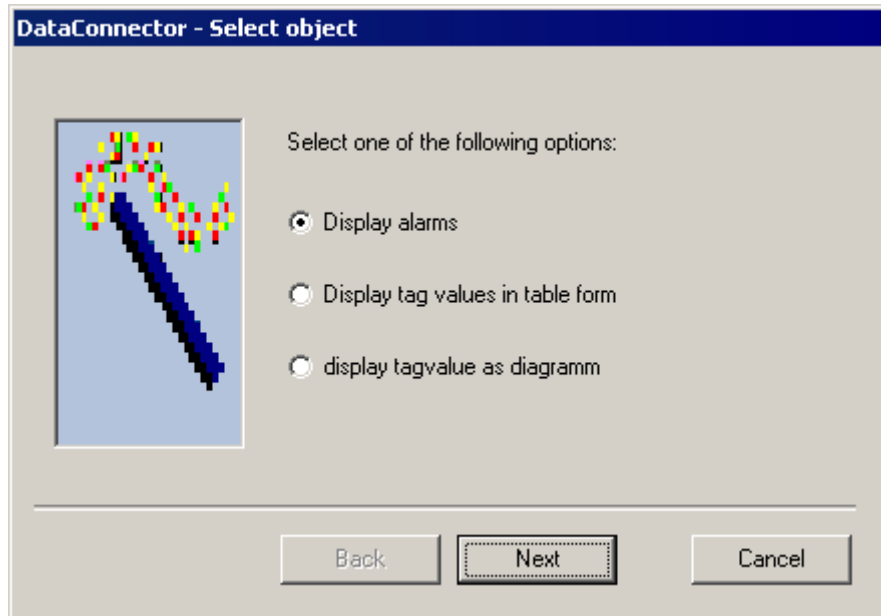
3. The dialog "DataConnector - Connection Properties" opens.
   Enter the name of the server in the "Server" field that contains the desired interlinked databases. The name of the local computer is prescribed.
   Select the desired database in the "Database" field. The currently connected databases of the selected server are available.
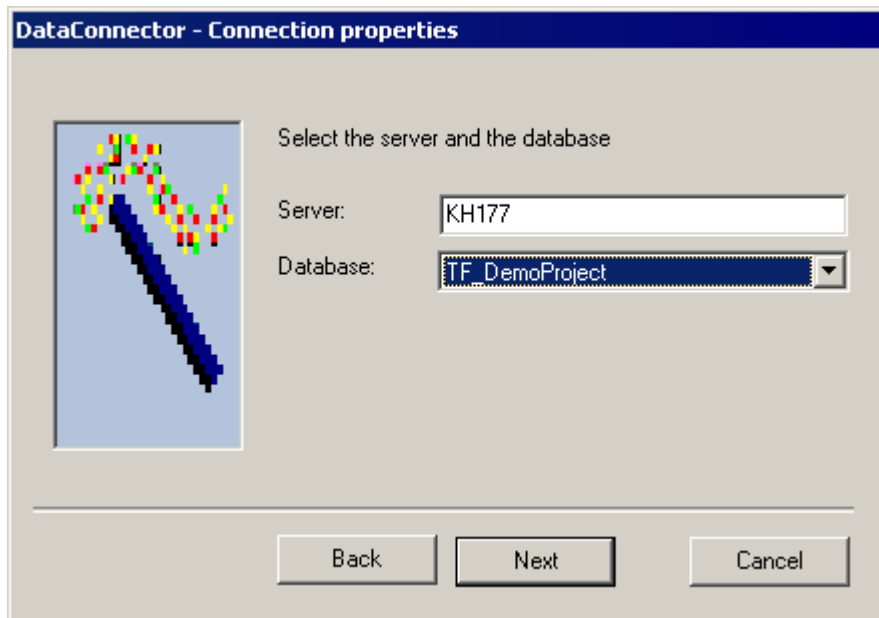
Click "Continue".

4. The dialog "DataConnector - Time window" will open.
Select the desired time frame from which the data should be displayed, e.g. "Relative time window". Prescribed is a time window for the previous hour. Change the specifications as needed, e.g., in the field "Starting point forward" to the value "0000-00-00 01:00:00" and in the field "Duration" to the value "0000-00-00 01:00:00" in order to display the previous hour. The value in the "Duration" field cannot be larger than the value in field "Starting point forward".
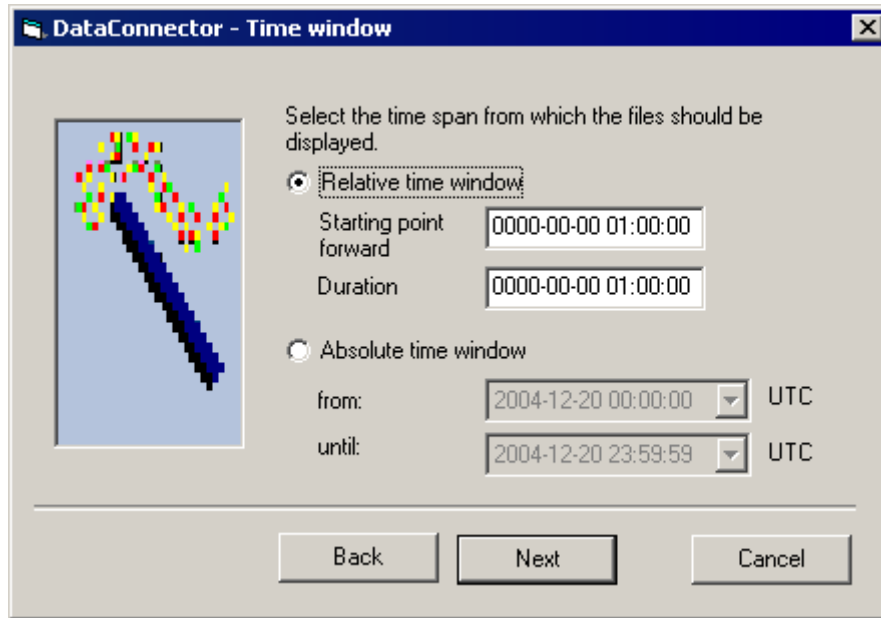
Click "Continue".

5. The dialog "DataConnector - Select Archive Tag" opens.
   Select at least one archive tag.
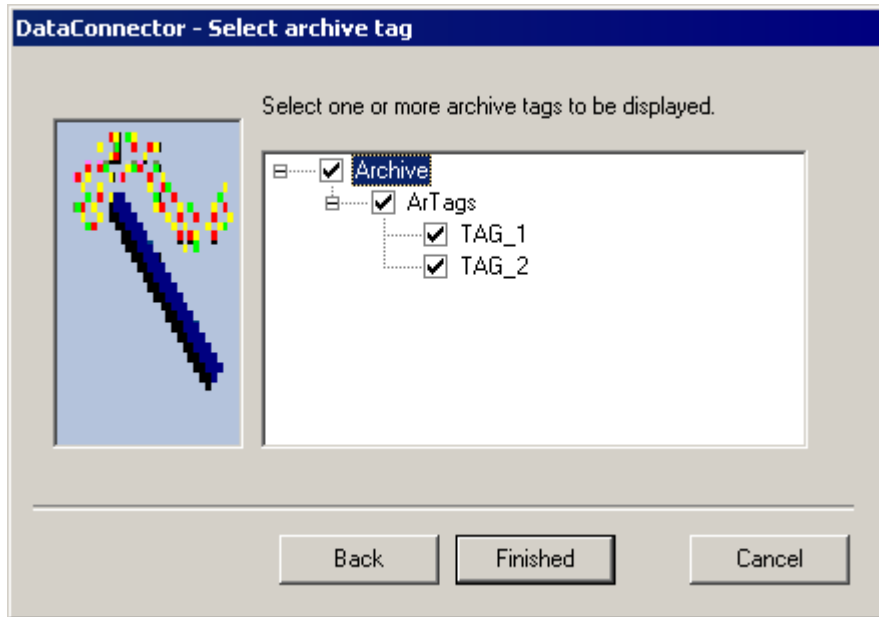
Click on the "Finish" button.

6. The DataConnector Wizard will insert several elements into the opened process picture.
   The selected server, the database and the time frame are displayed in the static text fields at the top.
   Next to them there will be a text with the selected archive tags and the selection field for the archive tag.
   As per the selection "Display tag values as tables", a data grid control, an ADO data control and a button are inserted below them.
   Save the process screen.
   In order to change the configured values, open this process picture and select the entry "Modify existing connection" in the "DataConnector" menu. The Wizard will restart and you may change the configured values.
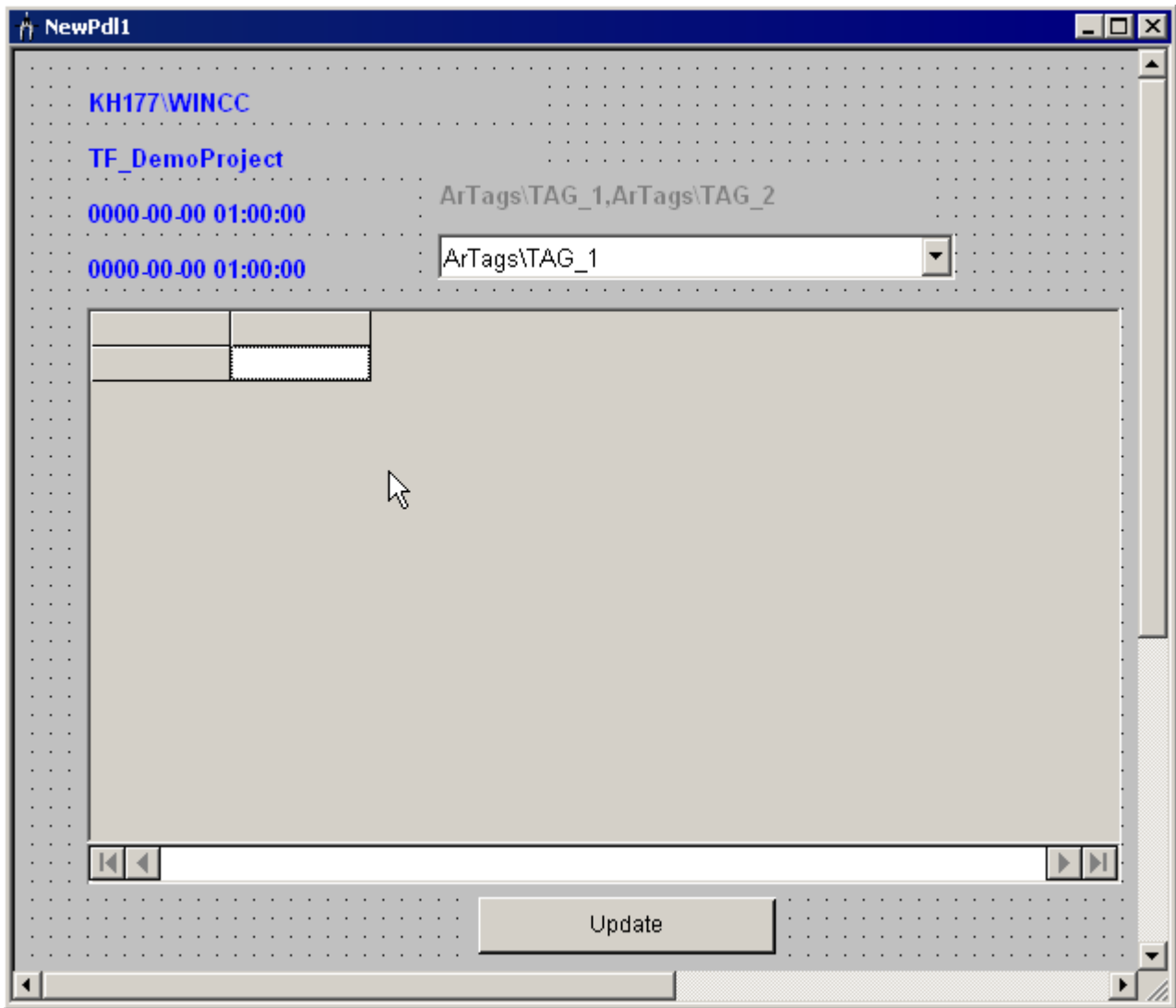
7. Start WinCC Runtime and open this process picture with the database query. The query will be initially executed directly upon opening of the process picture.
   In Runtime, the data found will be displayed in tabular form in Data Grid Control, and you may navigate within the table using ADO Data Control.
   With more than one configured archive tags, the tag, whose values are to be displayed can be chosen in the selection field.

The displayed data can be updated via the "Update" button, for example, if the most recent hour was indicated as a relative time frame.

Note

Archive query using data connector control on the Web client

If an archive query is to be performed on a WebNavigator client using the DataConnector control in a process picture, the Connectivity Pack client must also be installed on the Web client.

See also

Querying Alarm Message Archives (Page 57)

Querying Process Value Archives (Page 51)

3.7.4 Examples: Analyzing Process Value Archives

3.7.4.1 Example: Analyzing Process Value Archives in WinCC Project

Introduction

This example shows the operation of the WinCC project "OPConPack". The WinCC project contains the process value archives used. The queries are created for this archive data. The query result is displayed in tabular form with time stamp, value and quality code. Statistics show the number, the average value, the sum and the standard deviation of the process values. The result can be exported as a csv file.

The WinCC project can also be copied to the hard drive of your computer at a later time from the folder "Samples\Connectivity Pack\DemoProject."

Requirement

- The computer has been entered as a server in the computer list of the WinCC project.
- The WinCC project "OPConPack" has been activated.
- The folder "D:\out" has been created.

Procedure

1. Click on the button "Simulator on". The simulator supplies the tags with values.

2. Click on the button "Tags archive 1x". The dialog box "Database Taglogging1" will open.
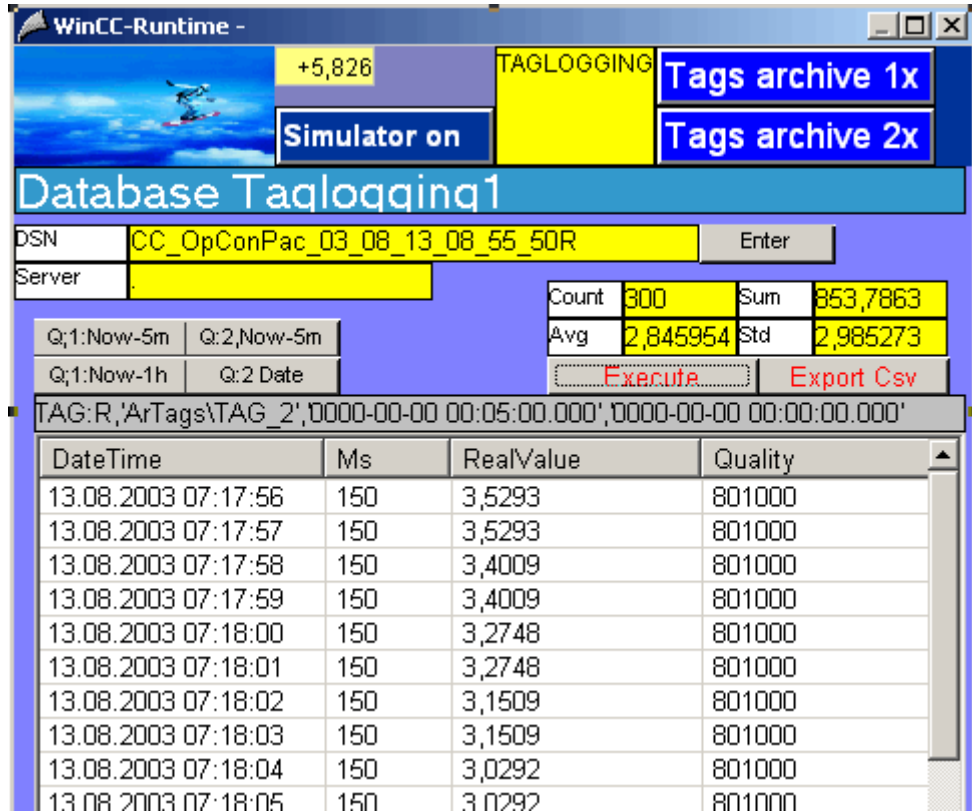
How to Analyze Process Value Archives

1. Click on the button "Q:1,Now-1h".
   The buttons "Q:,.." are linked to queries. The corresponding query is shown in the field below the buttons. "Q:1" and "Q:2" represent the queried ValueID, respectively.
   - "Q:1,Now-5m" and "Q:2,Now -5m" return as result the process values of the last 5 minutes.
   "Q:1,Now-1h" returns the process values of the last hour as a result.
   "Q:2,Date" returns the process values of a certain day as a result.

2. Click on the button "Execute". Confirm the next dialog. The query will then be performed.
   The data will be displayed with a time stamp (DateTime and Ms), process value (RealValue), and quality code (Quality) in a table.
   The field "Count" delivers the number of selected process values. The field "Sum" contains the sum of all process values. The field "Avg" contains the average value of the column "RealValue" and the field "Std" the standard deviation.

3. Click on the button "Export Csv". Confirm the next dialog.
   The query results are stored in the CSV file "OutTAGEXP1.csv" in the folder "D:\out".

3.7.4.2 Example: Reading Process Value Archive With WinCC OLE DB Provider and Visual Basic 6

Introduction

In this example, the values of the last 10 minutes of the tag "Tag_1" are read from the local WinCC RT database. The data is displayed in a ListView with a time stamp, value and quality code. The output of values is limited to 100 (constant NMAX = 100).

The example does not include error processing.

Procedure

1. Create a WinCC tag named "Tag_1".

2. Create a process value archive named "ArTags". Connect the WinCC tag "Tag_1" with the process value archive.

3. Create a Visual Basic project. Connect the MS Windows Common Controls 6.0 "ListView Control" with the name "ListView1". The columns in the ListView are created by the script. Set the property "View" to the option "3 - lvwReport" on the ListView control.

4. Create a "CommandButton". Copy in the script from the section "Example Script" below.

5. In the script, adjust the name of the WinCC Runtime database "CC_OpConPac_04_10_01_10_36_36R" to your own project.
   The database name can be found in the SQL Enterprise Manager at "SQL Server Group" > "<Computer Name>\WinCC" > "Databases" > "<Database name_R>".

6. Activate WinCC Runtime and start the VB application.

7. Click on the "CommandButton".

Example Script

```
Option Explicit
Const NMAX = 100
Private Sub Command1_Click()
Dim sPro As String
Dim sDsn As String
Dim sSer As String
Dim sCon As String
Dim sSql As String
Dim conn As Object
Dim oRs As Object
Dim oCom As Object
Dim oItem As ListItem


Dim m, n, s, nRec
Dim strDateTime As String
Dim iMS As Long



'1.1 Make connection string for ADODB
sPro = "Provider=WinCCOLEDBProvider.1;"
sDsn = "Catalog=CC_OpConPac_04_10_01_10_36_36R;"
sSer = "Data Source=.\WinCC"
sCon = sPro + sDsn + sSer

' 1.2 Define command text in sSql (relative time)
sSql = "TAG:R,'ArTags\Tag_1','0000-00-00 00:10:00.000','0000-00-00 00:00:00.000'"


MsgBox "Open with:" & vbCr & sCon & vbCr & sSql & vbCr

' 2.1 Make connection
Set conn = CreateObject("ADODB.Connection")
conn.ConnectionString = sCon
conn.CursorLocation = 3
conn.Open

' 2.2 Use command text for query
Set oRs = CreateObject("ADODB.Recordset")
Set oCom = CreateObject("ADODB.Command")
oCom.CommandType = 1
Set oCom.ActiveConnection = conn
oCom.CommandText = sSql
```

```
' 2.3 Fill the recordset
Set oRs = oCom.Execute
m = oRs.Fields.Count
nRec = NMAX


' 3.0 Fill standard listview object with recordset
ListView1.ColumnHeaders.Clear
ListView1.ColumnHeaders.Add , , CStr(oRs.Fields(1).Name), 2500   ' DateTime
ListView1.ColumnHeaders.Add , , "MS", 1500                       ' Milisecond
ListView1.ColumnHeaders.Add , , CStr(oRs.Fields(0).Name), 1500   ' VarID
ListView1.ColumnHeaders.Add , , CStr(oRs.Fields(2).Name), 1500   ' RealValue
ListView1.ColumnHeaders.Add , , CStr(oRs.Fields(3).Name), 1500   ' Quality
ListView1.ColumnHeaders.Add , , CStr(oRs.Fields(4).Name), 1500   ' Flags


If (m > 0) Then
oRs.MoveFirst
n = 0
Do While (Not oRs.EOF And n < nRec)
n = n + 1
SplitDateTimeAndMs oRs.Fields(1).Value, strDateTime, iMS    'Split Milisecond from DateTime
s = FormatDateTime(strDateTime, 2) & " " & FormatDateTime(strDateTime, 3)
Set oItem = ListView1.ListItems.Add()
oItem.Text = s
oItem.SubItems(1) = iMS
oItem.SubItems(2) = oRs.Fields(0).Value
oItem.SubItems(3) = FormatNumber(oRs.Fields(2).Value, 4)
oItem.SubItems(4) = Hex(oRs.Fields(3).Value)
oItem.SubItems(5) = Hex(oRs.Fields(4).Value)


oRs.MoveNext
Loop
oRs.Close
Else
End If


Set oRs = Nothing
conn.Close
Set conn = Nothing
End Sub



Sub SplitDateTimeAndMs(dtDateTimeWithMs_in, strDateTime_out, strMs_out)


Dim diff
```

```
Dim dtTemp
Dim lTemp As Long


lTemp = 86400000 '24 * 60 * 60 * 1000


diff = (CDbl(dtDateTimeWithMs_in) - CDbl(CDate(CStr(dtDateTimeWithMs_in)))) * lTemp
If (diff < 0) Then
diff = 1000 + diff
dtTemp = CDbl(dtDateTimeWithMs_in) - diff / lTemp
strDateTime_out = CDate(dtTemp)
Else
strDateTime_out = CDate(dtDateTimeWithMs_in)
End If
strMs_out = "00" & Round(diff)
strMs_out = Right(strMs_out, 3)


End Sub
```

Note

To improve the performance, note the following information:

- Replace the "Data Source=.\WinCC" instruction with the "Data Source=<Computer name>\WinCC" instruction.
- For the query, use "ValueID" instead of "ArchiveName>\<Tag name>". In the example script under Item 1.2, the expression 'ArTags\Tag_1' should be replaced by "ValueID".

See also

Displaying Process Value Archives (Page 48)

Querying Process Value Archives (Page 51)

Querying the Archive Data (Page 49)

Establishing the Connection to the Archive Database (Page 47)

3.7.4.3 Example: Reading Process Value Archive With WinCC OLE DB Provider and Visual Basic.NET

Introduction

In this example, the values of the last 10 minutes of the tag "Tag_1" are read from the local WinCC RT database. The data is displayed: time stamp, value and quality code in a ListView. The output of values is limited to 100 (constant MaxRows = 100).

The example includes simple error handling.

Procedure

1. Create a WinCC tag named "Tag_1".

2. Create a process value archive named "ArTags".

3. Connect the WinCC tag "Tag_1" with the process value archive.

4. Create a new Visual Basic project in Visual Studio 2005 of the type "Windows Application."

5. Change to Designer View mode and enlarge the Windows Form "Form1" to a size of ca. 500x600.

6. Drag a "ListView Control" from the Toolbox to the left upper corner of the form and enlarge it to ca. 400x450.

7. Drag a button from the Toolbox to the middle of the form below the Control.
   The button will automatically be named "Button1."

8. Double-click the button and add the VB.NET sample code listed below IN FRONT OF the instruction "End Sub" in the method "Private Sub Button1_Click."

9. Select "Build > Build Solution" in the menu or press <CTRL+Shift+B> to compile the finished VB.NET project.

10. In the script, adjust the name of the WinCC Runtime database "CC_CPSample_07_10_09_13_44_26R" to your own project.
    The database name can be found in the SQL Server Management Studio under "Object Explorer > <Computer Name>\WinCC > Databases > <Database name_R>".

11. Start WinCC Runtime and select "Debug->Start Debugging" in the menu or press <F5> to start the VB application.

12. Click on the "Button1" button.

Sample code

```
Const MaxRows = 100


 '1.1 Make connection string for ADO.NET access
 Dim ProviderName As String
 Dim CatalogName As String
 Dim DataSourceName As String
 Dim ConnectionString As String
 Dim CommandString As String


 ProviderName = "Provider=WinCCOLEDBProvider.1;"
 CatalogName = "Catalog=CC_CPSample_07_10_09_13_44_26R;"
 DataSourceName = "Data Source=.\WinCC"


 ConnectionString = ProviderName + CatalogName + DataSourceName

    ' 1.2 Define command string for OLE DB access (relative time range, last 10 minutes)
 CommandString = "TAG:R,'ArTags\Tag_1','0000-00-00 00:10:00.000','0000-00-00 00:00:00.000'"


 Try


 Dim DBConnection As System.Data.OleDb.OleDbConnection
 Dim DBCommand As System.Data.OleDb.OleDbCommand
 Dim DBReader As System.Data.OleDb.OleDbDataReader


 ' 2.1 Open an OLE DB connection
 DBConnection = New System.Data.OleDb.OleDbConnection(ConnectionString)


 DBConnection.Open()


 ' 2.2 Execute command
 DBCommand = New System.Data.OleDb.OleDbCommand(CommandString, DBConnection)


 DBReader = DBCommand.ExecuteReader()


 ' 3.1 Prepare list view control
 Dim DBTimeStamp As System.DateTime
 Dim DBValue As System.Double
 Dim DBQualityCode As Integer
 Dim DBFlags As Integer
 Dim ColumnEntry As String


 Me.ListView1.View = View.Details
```

```
Me.ListView1.GridLines = True

Me.ListView1.TabIndex = 0

Me.ListView1.Width = 400


Me.ListView1.Columns.Add("TimeStamp",HorizontalAlignment.Center)

Me.ListView1.Columns(0).Width = 150

Me.ListView1.Columns(0).Text = "Time Stamp"


Me.ListView1.Columns.Add("Value", HorizontalAlignment.Center)

Me.ListView1.Columns(1).Width = 60

Me.ListView1.Columns(1).Text = "Value"


Me.ListView1.Columns.Add("QC", HorizontalAlignment.Center)

Me.ListView1.Columns(2).Width = 60

Me.ListView1.Columns(2).Text = "Quality Code"


Me.ListView1.Columns.Add("Flags", HorizontalAlignment.Center)

Me.ListView1.Columns(3).Width = 60

Me.ListView1.Columns(3).Text = "Flags"


Dim SingleRow As ListViewItem


Dim Count As Integer

Count = 0


' 3.2 Fetch subsequent rows of the result set

While (DBReader.Read And Count < MaxRows)


DBTimeStamp = DBReader.GetDateTime(1)

DBValue = DBReader.GetDouble(2)

DBQualityCode = DBReader.GetInt32(3)

DBFlags = DBReader.GetInt32(4)


' 3.3 Fill list view columns

ColumnEntry = String.Format("{0:dd.MM.yy HH:mm:ss.}{1:D2}", DBTimeStamp, DBTimeStamp.Millisecond)

SingleRow = New ListViewItem(ColumnEntry)


ColumnEntry = String.Format("{0:F}", DBValue)

SingleRow.SubItems.Add(ColumnEntry)


ColumnEntry = String.Format("{0:X2}", DBQualityCode)

SingleRow.SubItems.Add(ColumnEntry)


ColumnEntry = String.Format("{0:X4}", DBFlags)
```

```
SingleRow.SubItems.Add(ColumnEntry)


Me.ListView1.Items.Add(SingleRow)


Count = Count + 1


End While


' 4 Clean up
DBReader.Close()
DBConnection.Close()


' 5 Exception (error) handling
Catch ex As Exception
MessageBox.Show(ex.Message, "Error Occured !")


End Try
```

3.7.4.4   Example: Comparing Measured Value Profiles in the WinCC Project

Introduction

This example shows how a comparison of measured value profiles can be configured. To keep the WinCC project simple, only measured value profiles from a single and not two process value archives are compared. From the local WinCC RT database, the process values of the tag with the ID = 1 are selected. For the comparison, the process values are read time-delayed. The query results are exported in two csv files.

The WinCC project can also be copied to the hard drive of your computer at a later time from the folder "Samples\Connectivity Pack\DemoProject."

Requirement

- The computer has been entered as a server in the computer list of the WinCC project.
- The WinCC project "OPConPack" has been activated.
- The folder "D:\out" has been created.

Procedure

1. Click on the button "Simulator on". The simulator supplies the tags with values.
2. Click on the button "Tags archive 2x".

How to Analyze Process Value Archives

1. In the area "Database Taglogging1", click the "Q:1,Now-1h" button. Click on the button "Execute".

2. In the area "Database Taglogging2", click on the button "Q:1,Now-5m". Click on the button "Execute".
    The data will be displayed with a time stamp (DateTime and Ms), process value (RealValue), and quality code (Quality) in tables.
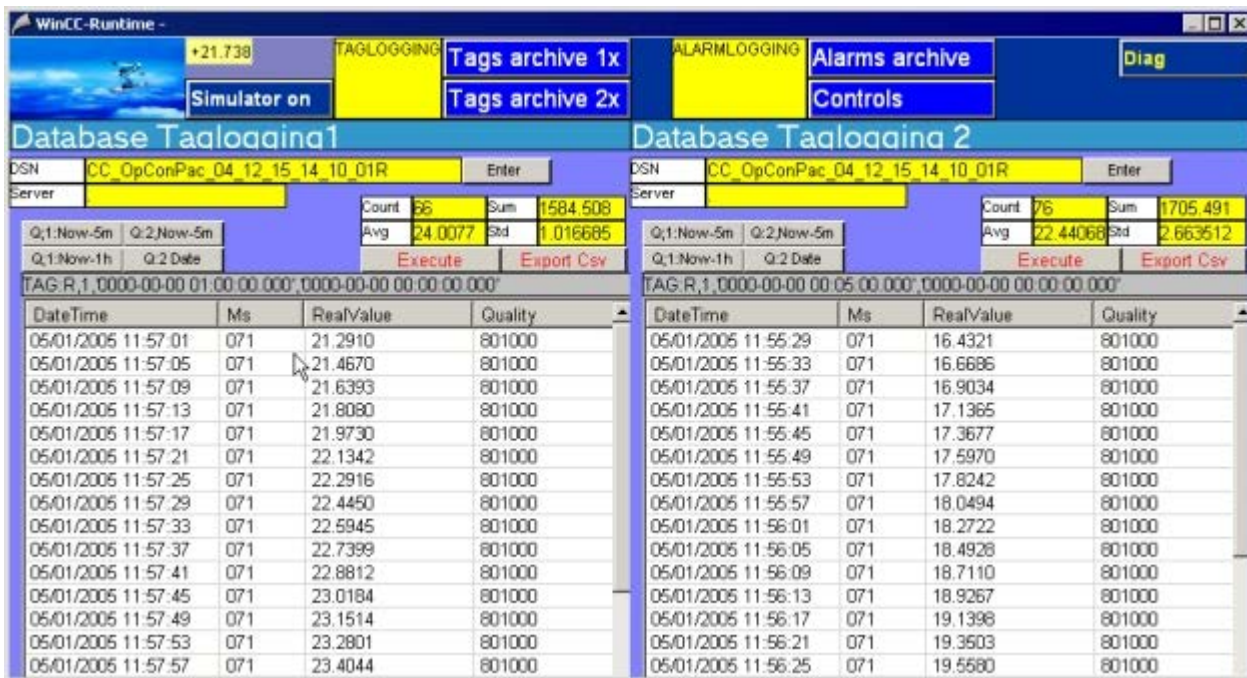
3. The field "Std" contains the standard deviation. You can now compare the standard deviation of the databases TagLogging1 and TagLogging2 with each other.

4. Click on the button "Export Csv". Confirm the next dialog.
    The query result of the database TagLogging1 is exported in the csv file "OutTAGEXP1.csv". The query result of the database TagLogging2 is exported in the csv file "OutTAGEXP2.csv".

3.7.4.5   Example: Analyzing Process Value Archives with a VB Application

Introduction

This example shows the operation of the VB application "WinCCDBPr". This application contains several query examples. The query result is displayed in ListView with time stamp, value, and quality code. Statistics show the number, the average value, the sum and the standard deviation of the process values. The results are exported in a csv file.

You can also install the VB application "WinCCDBPr" from the WinCC DVD. Do to so, double-click the "setup.exe" file in the "Samples\Connectivity Pack\VB_Sample" directory.

You will find the sources for this example in the directory "Samples\Connectivity Pack \VB_Sample\Sourcecode." The "Samples\Connectivity Pack\VB_Sample\DATABASES" directory contains Tag Logging databases for testing.

Requirement

- The folder "D:\out" has been created.

- The desired, swapped-out databases of Tag Logging must be connected to the SQL server, e.g., using the Archive Connector.

- The VBA application "WinCCDBP" has been installed and started.

Procedure

1. From the "Database" menu, select the entry "1.Connect". The dialog box "Enter Server and Database" will open.
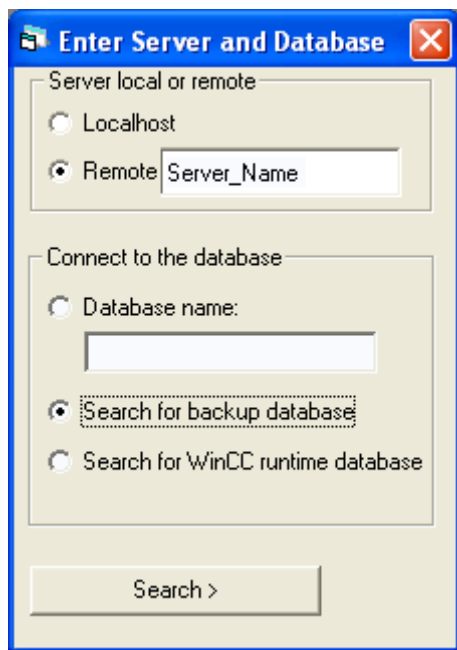
For the local access, activate the radio button "Localhost". For the remote access, activate the radio button "Remote". Enter the server name in the field "Remote".

2. In the area "Connect to database", the database can be directly specified or searched for. Activate the option "Search for backup database". Click on the button "Search". The dialog box "WinCC Database Example - [Select the Data ...]" will open.

3. Highlight the archive database and click on the button "Connect".

4. From the "Database" menu, select the entry "2.TagLogging".

5. Via the button "Next Example", the various query examples can be accessed.
   The query is shown in the field above the button. The following query examples are available:
   TAG:R,1,'0000-00-00 00:01:00','0000-00-00 00:00:00'
   TAG:R,(1;2),'0000-00-00 00:30:00.000','0000-00-00 00:00:00.000'
   TAG:R,1,'0000-00-00 01:00:00.000','0000-00-00 00:00:00.000'
   TAG:R,2,'0000-00-00 00:05:00.000','0000-00-00 00:00:00.000'
   TAG:R,3,'0000-00-00 00:05:00.000','0000-00-00 00:00:00.000'
   In addition, an example for the query of the current day will be displayed while the VBA application automatically suggests the date of the current and the subseqent day. (Format: TAG:R,1,'<Date>','<Date+1>')

6. Click on the button "Execute". The query will then be performed. The data will be displayed in a table. The display field above the buttons will show the number of selected process values.
   In order to check whether the query was performed without errors, click the button "Show ERR". The display field will show errors occurred, if any.

7. Click the "Statistics" button.
   The statistical values for the performed query will be displayed in the display field:

   – N = number of selected process values

   – Sum = sum of all process values

   – Avg: = average of process values

   – Sta = Standard deviation

8. Click on the button "Export(csv)". The query result is exported in the file "WCCTAG.csv" in the folder "D:\out".

9. Click on the button "Show Connection". The display field will show the ConnectionString and the query.

3.7.5 Examples: Analyzing Alarm Message Archives

3.7.5.1 Example: Analyzing Alarm Message Archives in the WinCC Project

Introduction

This example shows the operation of the WinCC project "OpConP". The WinCC project contains the archive databases used. The queries are created for this archive data. The query result is displayed in tabular form. The result can be exported as a csv file. A list contains information about the frequency and duration of the alarms.

The WinCC project can also be copied to the hard drive of your computer at a later time from the folder "Samples\Connectivity Pack\DemoProject."

Requirement

- The computer has been entered as an available server in the computer list of the WinCC project.
- The WinCC project "OPConPack" has been activated.
- The folder "D:\out" has been created.

Procedure

1. Click on the button "Simulator on". The simulator supplies the tags with values.

2. Click on the button "Alarms archive". The dialog box "Database Alarms" will open.
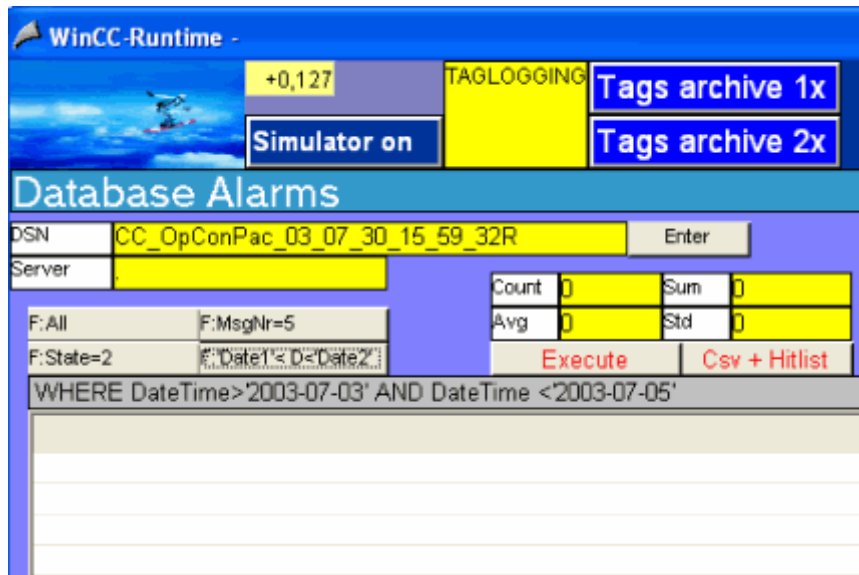
3. The field "DSN" contains the name of the WinCC RT database. The field "Server" contains the server name.

How to Analyze Alarm Message Archive Data

1. Click on the button ""F:'Date1'<D<'Date2'".
The buttons "F:..." are linked to queries. The respective query is displayed in the field below the buttons.
- "F:All" returns all messages as a result.
- "F:MsgNr=5" returns the messages of message no. 5 as a result.
- "F:State=2" returns the messages with message status 2 as a result.
- "F:'Date1'<D<'Date2'" returns the messages generated between July 3, 2003 and July 5, 2003.

2. Click on the button "Execute". The following dialog box will open.
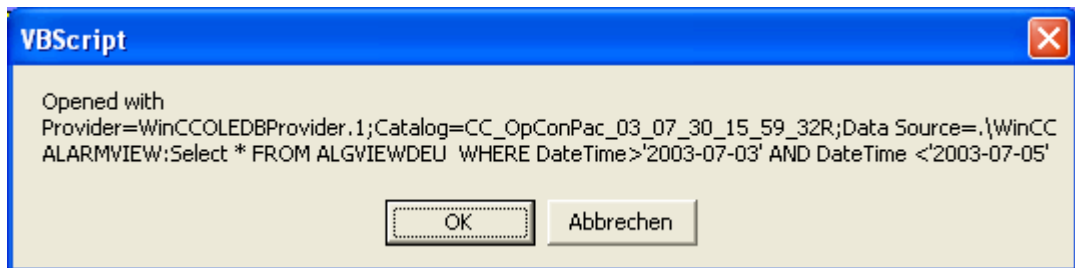
In this dialog box, the ConnectionString and query used are output. Close the dialog by clicking on the "OK" button. The query will then be performed.

3. The data is displayed with a time stamp (DateTime), alarm message number (MsgNr), alarm message state (State) and alarm message class name (TypeName) in a table.

4. The field "Count" contains the number of the alarm messages. The fields "Avg", "Sum" and "Std" are displayed, but are irrelevant for this example.

5. Click on the button "Csv + Hitlist". Confirm the next dialog. The query results are stored in the csv file "ALGEXP.csv" in the folder "D:\out".

6. The data are shown in tabular form. The column "CNT" indicates how many times the alarm message was pending. The column "Total" indicates how long the alarm message was pending in total.

3.7.5.2 Example: Reading Message Archive Data with the WinCC OLE DB Provider and Visual Basic 6

Introduction

In this example, a time interval of 10 minutes is read from the alarm message archive data. The data are displayed in a ListView Control with a time stamp, message number, status and message type.

The example includes simple error handling.

Procedure

1. Create a Visual Basic project. Connect the MS Windows Common Controls 6.0 ListView Control to the name "ListView1".

2. The columns in the ListView are created by the script.

3. Create a "CommandButton". Copy in the script from the section "Example Script" below.

4. In the script, change the name of the WinCC Runtime database "CC_OpenArch_03_05_27_14_11_46R" to that of your own project.
The database name can be found in the SQL Enterprise Manager at "SQL Server Group" > "<Computer Name>/WinCC" > "Databases" > "<Database name_R>".

5. This example uses the English database table "AlgViewEXEnu". If you want to read the alarm message archive data of another language, this entry needs to be modified.

6. Activate WinCC Runtime. start the VB application.

7. Click on the "CommandButton".

Example Script

```
Dim sPro As String
Dim sDsn As String
Dim sSer As String
Dim sCon As String
Dim sSql As String


Dim conn As Object
Dim oRs As Object
Dim oCom As Object
Dim oItem As ListItem


Dim m, n, s


On Error GoTo ErrorHandlerA


'1.1 Make connection string for ADODB
sPro = "Provider=WinCCOLEDBProvider.1;"
sDsn = "Catalog=CC_OpenArch_03_05_27_14_11_46R;"
sSer = "Data Source=.\WinCC"
sCon = sPro + sDsn + sSer


' 1.2 Define command text in sSql
sSql = "ALARMVIEWEX:Select * FROM AlgViewEXEnu WHERE DateTime>'2003-07-30 11:30:00'
AND DateTime<'2003-07-30 11:40:00'"
'sSql = "ALARMVIEWEX:Select * FROM AlgViewEXEnu WHERE MsgNr = 5"
'sSql = "ALARMVIEWEX:Select * FROM AlgViewEXEnu"
MsgBox "Open with:" & vbCr & sCon & vbCr & sSql & vbCr


' 2.1 Make connection
Set conn = CreateObject("ADODB.Connection")
conn.ConnectionString = sCon
conn.CursorLocation = 3
conn.Open


' 2.2 Use command text for query
Set oRs = CreateObject("ADODB.Recordset")
Set oCom = CreateObject("ADODB.Command")
oCom.CommandType = 1
Set oCom.ActiveConnection = conn
oCom.CommandText = sSql


' 2.3 Fill the recordset
```

```
Set oRs = oCom.Execute
m = oRs.Fields.Count

' 3.0 Fill standard listview object with recordset
ListView1.ListItems.Clear
ListView1.ColumnHeaders.Clear
ListView1.ColumnHeaders.Add , , CStr(oRs.Fields(2).Name), 140
ListView1.ColumnHeaders.Add , , CStr(oRs.Fields(0).Name), 60
ListView1.ColumnHeaders.Add , , CStr(oRs.Fields(1).Name), 60
ListView1.ColumnHeaders.Add , , CStr(oRs.Fields(34).Name), 100
If (m > 0) Then
oRs.MoveFirst
n = 0
Do While Not oRs.EOF
n = n + 1
If (n < 100) Then
s = Left(CStr(oRs.Fields(1).Value), 23)
Set oItem = ListView1.ListItems.Add()
oItem.Text = CStr(oRs.Fields(2).Value)
oItem.SubItems(1) = CStr(oRs.Fields(0).Value)
oItem.SubItems(2) = CStr(oRs.Fields(1).Value)
oItem.SubItems(3) = CStr(oRs.Fields(34).Value)
End If
oRs.MoveNext
Loop
oRs.Close
Else

End If
Set oRs = Nothing
conn.Close
Set conn = Nothing

ErrorHandlerA:
MsgBox Err.Description
```

Note

In order to improve performance, replace the "Data Source=.\WinCC" instruction with the "Data Source=<Computer name>\WinCC" instruction.

The output of the values is limited to 100 (n >100).

The times indicated refer to system time.

See also

3.7.5.3 Example: Reading Message Archive Data With WinCC OLE DB Provider and Visual Basic.NET

Introduction

In this example, a time interval of 10 minutes is read from the alarm message archive data. The data are displayed in a ListView Control with a time stamp, message number, status and message type.

The example includes simple error handling.

Procedure

1. Create a new Visual Basic project in Visual Studio 2005 of the type "Windows Application."

2. Change to Designer View mode and enlarge the Windows Form "Form1" to a size of ca. 600x600.

3. Drag a "ListView Control" from the Toolbox to the left upper corner of the form and enlarge it to ca. 500x450.

4. Drag a button from the Toolbox to the middle of the form below the Control.
   The button will automatically be named "Button1."

5. Double-click the button and add the VB.NET sample code listed below IN FRONT OF the instruction "End Sub" in the method "Private Sub Button1_Click."

6. Select "Build > Build Solution" in the menu or press <CTRL+Shift+B> to compile the finished VB.NET project.

7. In the script, adjust the name of the WinCC Runtime database "CC_CPSample_07_10_09_13_44_26R" to your own project.
   The database name can be found in the SQL Server Management Studio under "Object Explorer > <Computer Name>\WinCC > Databases > <Database name_R>".

8. Start WinCC Runtime and select "Debug >Start Debugging" in the menu or press <F5> to start the VB application.

9. Click on the "Button1" button.

Sample code

```
Const MaxRows = 100

 '1.1 Make connection string for ADO.NET access

 Dim ProviderName As String
```

```
Dim CatalogName As String

Dim DSN As String

Dim ConnectionString As String

Dim CommandString As String


ProviderName = "Provider=WinCCOLEDBProvider.1;"

CatalogName = "Catalog=CC_CPSample_07_10_09_13_44_26R;"

DSN = "Data Source=.\WinCC"


ConnectionString = ProviderName + CatalogName + DSN


' 1.2 Define command string for ADO.NET access

CommandString = "ALARMVIEWEX:Select * From AlgViewEXEnu WHERE
DateTime > '2007-10-10 12:00:00' AND DateTime > '2007-10-10
12:10:00'"

'CommandString = "ALARMVIEWEX:Select * From AlgViewEXEnu WHERE
MsgNr = 1"

'CommandString = "ALARMVIEWEX:Select * From AlgViewEXEnu"


Try


Dim DBConnection As System.Data.OleDb.OleDbConnection

Dim DBCommand As System.Data.OleDb.OleDbCommand

Dim DBReader As System.Data.OleDb.OleDbDataReader


' 2.1 Open an OLE DB connection

DBConnection = New
System.Data.OleDb.OleDbConnection(ConnectionString)


DBConnection.Open()


' 2.2 Execute command

DBCommand = New System.Data.OleDb.OleDbCommand(CommandString,
DBConnection)


DBReader = DBCommand.ExecuteReader()
```

```
' 3.1 Prepare list view control
Dim ColumnEntry As String

Me.ListView1.View = View.Details
Me.ListView1.GridLines = True
Me.ListView1.TabIndex = 0
Me.ListView1.Width = 500

Me.ListView1.Columns.Add("Number", HorizontalAlignment.Center)
Me.ListView1.Columns(0).Width = 90
Me.ListView1.Columns(0).Text = "Number"

Me.ListView1.Columns.Add("Date/Time", HorizontalAlignment.Center)
Me.ListView1.Columns(1).Width = 130
Me.ListView1.Columns(1).Text = "Date/Time"

Me.ListView1.Columns.Add("State", HorizontalAlignment.Center)
Me.ListView1.Columns(2).Width = 60
Me.ListView1.Columns(2).Text = "State"

Me.ListView1.Columns.Add("Type", HorizontalAlignment.Center)
Me.ListView1.Columns(3).Width = 150
Me.ListView1.Columns(3).Text = "Type"

Dim SingleRow As ListViewItem
Dim MsgDateTime As DateTime
Dim MsgMilliSecs As Integer
Dim MsgNumber As Integer
Dim MsgState As Integer
Dim MsgTypeName As String

Dim Count As Integer
Count = 0

' 3.2 Fetch subsequent rows of the result set
```

```
While (DBReader.Read And Count < MaxRows)


MsgNumber = DBReader.GetInt32(0)

MsgDateTime = DBReader.GetDateTime(2)

MsgMilliSecs = DBReader.GetInt16(3)

MsgState = DBReader.GetInt16(1)

MsgTypeName = DBReader.GetString(34)


' 3.3 Fill list view columns
ColumnEntry = String.Format("{0:D10}", MsgNumber)

SingleRow = New ListViewItem(ColumnEntry)


ColumnEntry = String.Format("{0:dd.MM.yy HH:mm:ss.}{1:D2}",
MsgDateTime, MsgMilliSecs)

SingleRow.SubItems.Add(ColumnEntry)


ColumnEntry = String.Format("{0:D5}", MsgState)

SingleRow.SubItems.Add(ColumnEntry)


ColumnEntry = MsgTypeName

SingleRow.SubItems.Add(ColumnEntry)


Me.ListView1.Items.Add(SingleRow)


Count = Count + 1


End While


' 4 Clean up
DBReader.Close()

DBConnection.Close()


' 5 Exception (error) handling
Catch ex As Exception

MessageBox.Show(ex.Message, "Error Occured !")
```

```
End Try
```

3.7.5.4   Example: Analyzing Alarm Message Archives With a VB Application

Introduction

This example shows the operation of the VB application "WinCCDBPr". This application contains several query examples. The query result is displayed in tabular form. The result can be exported as a csv file. A list contains information about the frequency and duration of the alarms.

You can also install the VB application "WinCCDBPr" from the WinCC DVD. Do to so, double-click the "setup.exe" file in the "Samples\Connectivity Pack\VB_Sample" directory.

You will find the sources for this example in the directory "Samples\Connectivity Pack \VB_Sample\Sourcecode."

Requirement

- The folder "D:\out" has been created.

- The desired, swapped-out databases of Alarm Logging must be connected to the SQL server, e.g., using the Archive Connector.

- The VBA application "WinCCDBP" has been installed and started.

Procedure

1. From the "Database" menu, select the entry "1.Connect". The dialog box "Enter Server and Database" will open.
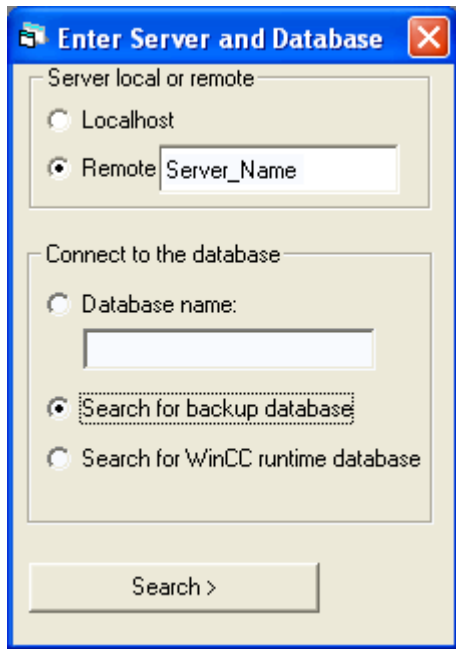
   For the local access, activate the radio button "Localhost". For the remote access, activate the radio button "Remote". Enter the server name in the field "Remote".

2. In the area "Connect to database", the database can be directly specified or searched for. Activate the option "Search for backup database".

3. Click on the button "Search". The dialog box "WinCC Database Example - [Select the Data ...]" will open.
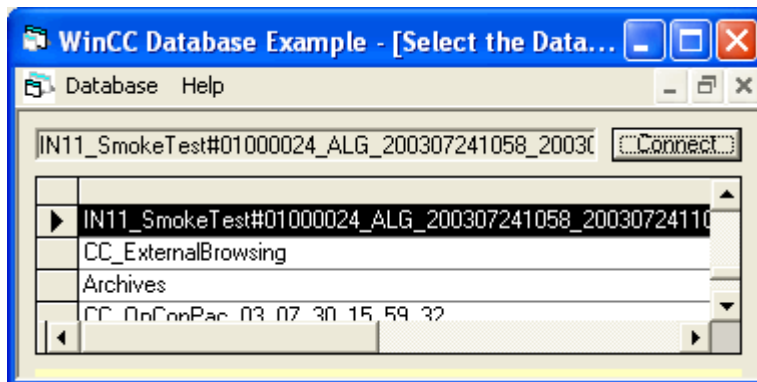
4. Highlight the archive database and click on the button "Connect".

5. From the "Database" menu, select the entry "3.Alarms".
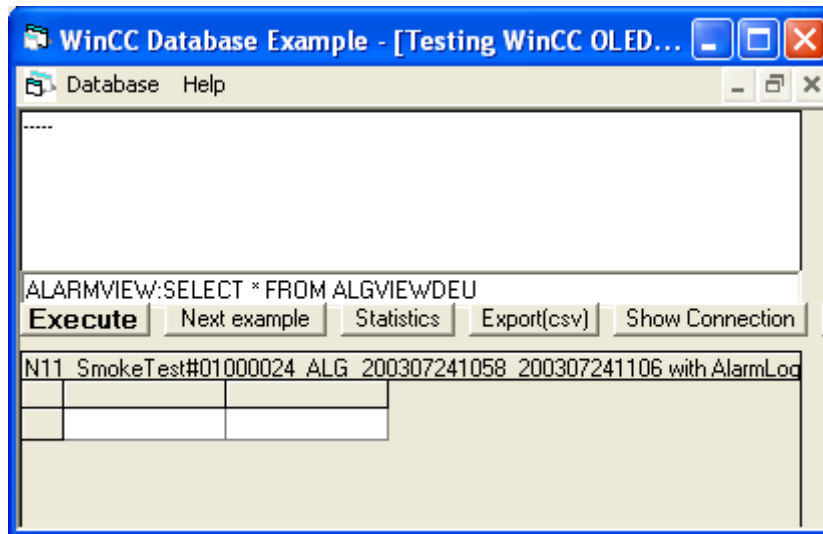
6. Via the button "Next Example", the various query examples can be accessed. The query is shown in the field below the button. The time intervals can be adjusted.
   The following query examples are available:

   – ALARMVIEWEX:SELECT * FROM ALGVIEWEXDEU

   – ALARMVIEWEX:SELECT * FROM ALGVIEWEXDEU WHERE DateTime>'2003-07-01' AND DateTime<'2003-08-01'

   – ALARMVIEWEX:SELECT * FROM ALGVIEWEXDEU WHERE State=2

   – ALARMVIEWEX:SELECT * FROM ALGVIEWEXDEU WHERE DateTime>'2003-08-01'

   – ALARMVIEWEX:SELECT * FROM ALGVIEWEXDEU WHERE TimeDiff>100

7. Click on the button "Execute". The query will then be performed. The data will be displayed in a table. In the upper field, the number of the selected alarm messages is shown.

8. Click the button "Statistics".
   The upper field will display how often and for how long in total the message number 2 was present.

9. Click on the button "Export(csv)". The query result is exported in the file "WCCALA.csv" in the folder "D:\out".

10. Click on the button "Show Connection". In the upper field, the ConnectionString and the query are shown.

11. From the "Database" menu, select the entry "Statistics/Csv".

MsgNr	CNT	Total
1	2367	51815
2	1193	51986
3	591	51002
4	286	48886
5	135	44252
6	65	41773
7	17	16673
8	9	11041
9	2	5409
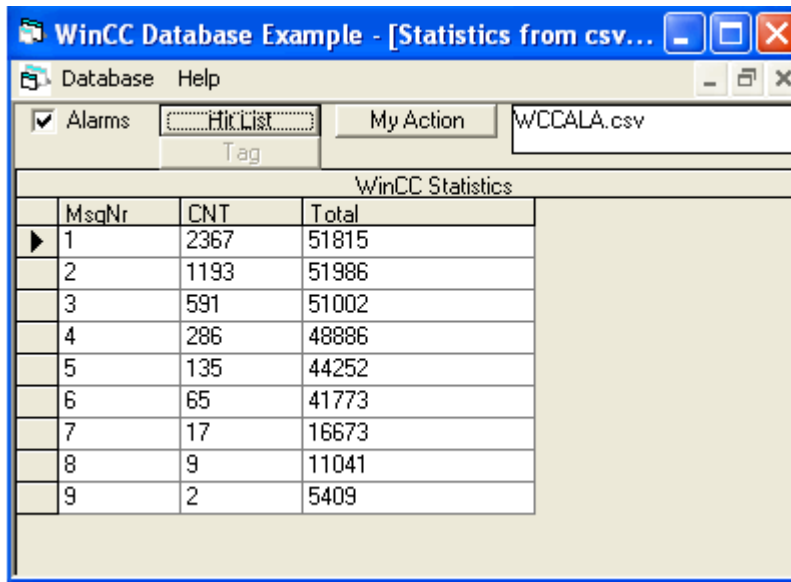
Click on the button "HitList". The data are shown in tabular form. The column "CNT" indicates how many times the alarm message was pending. The column "Total" indicates how long the alarm message was pending in total. As the database, the csv file "WCCALA.csv" is used.

3.8 Connectivity Station

3.8.1 Basics of the Connectivity Station

Introduction

With the Connectivity Station, you can access WinCC stations with server packages from a central computer without the WinCC software. The WinCC stations can be accessed through two different interfaces:

- OPC interfaces of the Connectivity Station
- OLE DB interface of the Connectivity Pack

The access options include different functions.

OPC interfaces of the Connectivity Station

The Connectivity Station provides interfaces via which you can access the following content with an OPC client:

- OPC DA server: Tags, such as process values
- OPC HDA server: Archives process values
- OPC A&E server: Messages

Licensing

You need the "WinCC Connectivity Station" license to use the OPC interfaces of the Connectivity Station on a computer without WinCC installation.

If you only use the OPC interfaces of a WinCC installation, you only need the "Connectivity Pack" license.

The following table shows the rules:

	New: WinCC-independent installation at Connectivity Station	Conventional installation: OPC with WinCC
OPC DA	"WinCC Connectivity Station" license	No license required
OPC HDA	"WinCC Connectivity Station" license	"WinCC Connectivity Pack" license
OPC A&E	"WinCC Connectivity Station" license	"WinCC Connectivity Pack" license

OLE DB interface of the Connectivity Pack

The Connectivity Pack server or Connectivity Pack client necessary for the operation of the Connectivity Station provides an additional OLE DB interface. You can access messages and tags via such OLE DB interfaces.

Transparent access to archived data

The Connectivity Station supports the transparent access to the archive databases of WinCC stations.

Installation and Configuration

You will need the following to install the Connectivity Station:

● PC with Connectivity Pack Server or Connectivity Pack Client

In order to configure a computer as a Connectivity Station, run the Connectivity Pack client setup on the computer.

From the "Installing Software" menu of the installation DVD, select the entry "Connectivity Station".

After the installation, you can set up the access to the WinCC stations with one of the following program:

● SIMATIC Manager of STEP 7 or

● SIMATIC NCM PC Manager of the current SIMATIC NET Edition.

The figure below provides an overview of the configuration steps for the Connectivity Station:

Settings for operation with several network adapters

Make sure that you have selected the correct network card in the settings of the SIMATIC Shell.

Click on the the SIMATIC Shell icon and select "Settings of SIMATIC Shell" in the shortcut menu. You may have to select a different network card under "Selection of terminal bus".

See also

Bases of OLE DB (Page 42)

Licensing (Page 7)

Transparent access to archived data (Page 37)

Functionality of OPC (Page 104)

Use of OPC interface of the Connectivity Station (Page 233)

Use of OLE DB interface of the Connectivity Station (Page 235)

3.8.2 Functionality of the Connectivity Station

3.8.2.1 Use of OPC interface of the Connectivity Station

Principle

The Connectivity Station includes the WinCC OPC-Server through which you can access WinCC stations with server packages, using the OPC client.

You can use the OPC client locally on the Connectivity Station or on a separate computer. The OPC client requires DCOM access rights to the Connectivity Station.
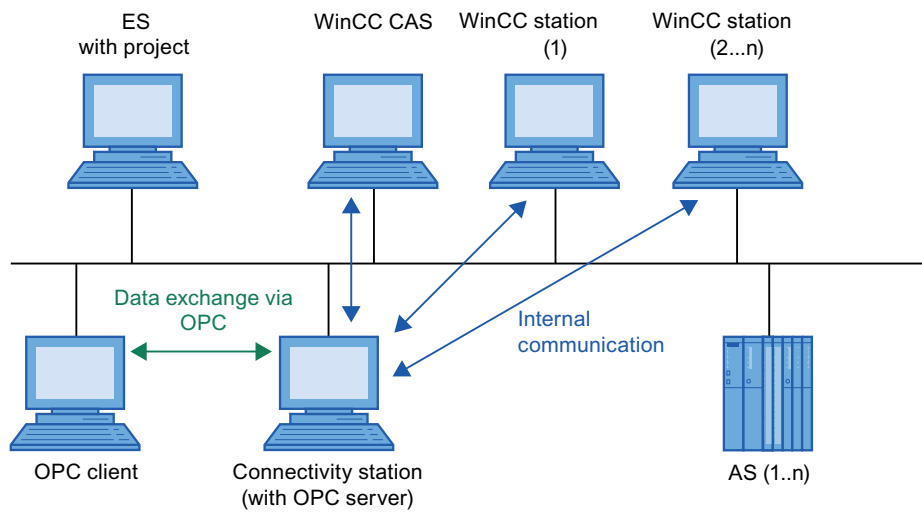
ES = Engineering station
      with STEP 7 or NCM PC Manager
AS = Programmable logic controller (PLC)
CAS = WinCC Central Archive Server

Server name of the OPC-Servers

The data exchange between the OPC client and the Connectivity Station takes place via the OPC. The following WinCC OPC-Servers are integrated into the Connectivity Station.

WinCC OPC-Server	Server name
OPC DA	WinCCConnectivity.OPCDAServer
OPC HDA	WinCCConnectivity.OPCHDAServer.1
OPC A&E	WinCCConnectivity.OPCAEServer.1

Supported OPC Standards

The Connectivity Station supports the following OPC standards:

- OPC DA 2.05a Specification
- OPC DA 3.00 Specification
- OPC XML DA 1.00 Specification
- OPC AE 1.10 Specification
- OPC HDA 1.20 Specification

Transparent access to archived data

With OPC, you have transparent access to all archive databases of the WinCC stations.

Central restart of OPC servers

The "ConfigureSposa" tool enables central restart of OPC servers. You can find "ConfigureSposa" in the installation folder of the ConnectivityStation. Following the start, an icon appears in the toolbar by which you can control the OPC servers.

See also

Basics of the Connectivity Station (Page 231)

Using OPC in WinCC (Page 105)

Access Using OPC to WinCC Archives, Tags, and Messages (Page 35)

Transparent access to archived data (Page 37)

3.8.2.2 Use of OLE DB interface of the Connectivity Station

Principle

The Connectivity Station can only be used, if there is a Connectivity Pack Server or a Connectivity Pack Client installed. The WinCC OLE DB provider of the Connectivity Pack Server/Client provides an OLE DB interface. You can access messages and tags via such OLE DB interfaces.
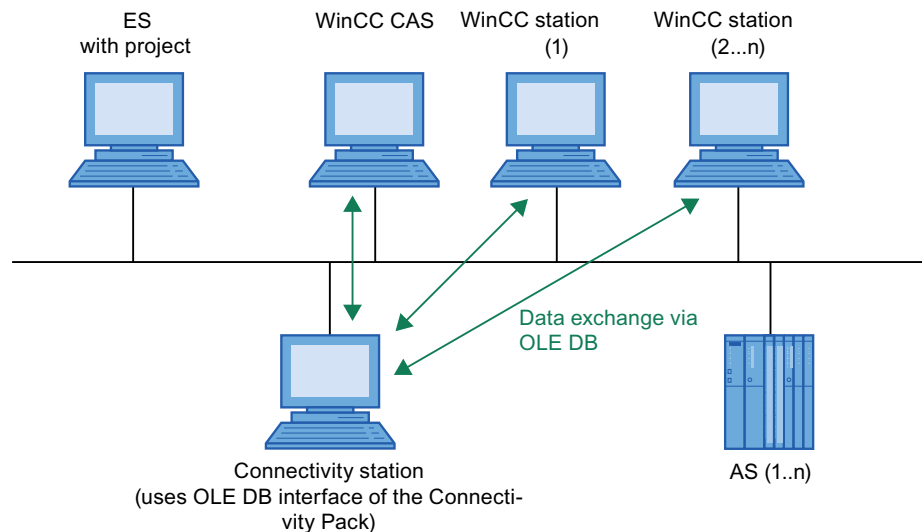

```
ES =    Engineering station
        with STEP 7 or NCM PC Manager
AS =    Programmable logic controller (PLC)
CAS =   WinCC Central Archive Server
```

Access to databases with OLE DB

For access to databases with WinCC OLE DB, you may write your own applications. For the communication with the WinCC OLE DB Provider, applications - created with, for example, Visual Basic, VBScript or VBA - use the ADO DB.

> **Note**
>
> **Use of Connectivity Station on a client with own project**
>
> If you use the Connectivity Station on a client with own project and use the OLE-DB interface, then observe the following:
>
> You can only access those WinCC stations, which you entered during the configuration phase of the Connectivity Station. Connectivity Station does not use the server packages available on the client.

Transparent access to archived data

With OLE DB, you can only access process value archives transparently.

Only one WinCC CAS may be used in a project for transparent access via WinCC OLE DB-Provider.

If you want to use a Connectivity station in two projects and both these projects contain a WinCC CAS, you need to remove the DCF file of the previous project before changing the project. You can find the DCF file on the Connectivity station under the following path:

● Installation directory\Siemens\AutomationProjects \<PROJEKTNAME_ConnectivityStationName>.DCF

> **Note**
>
> Enter the WinCC project name for "Catalog" for transparent access; for e.g.: "Catalog=WinCC_Project_Name".

See also

3.8.3 Configuring the Connectivity Station in the S7 project

Introduction

In order to set up the Connectivity Station, you will add a new "SIMATIC PC Station" to the system configuration. This "SIMATIC PC Station" receives the properties of the Connectivity Station by configuring the application "SPOSA Application".

Depending on the project type, one of the following objects will be created in the "SPOSA Application".

- "Connectivity Station_(s)" in the "STEP 7" project type.

- With project type "STEP 7", this is the object "Open_PCS7_Station_(n)".

In the following description, the project type "STEP 7" and the respective object name are used.

Requirements

- The required software for the Connectivity Station is installed on the Connectivity Station PC.

- The system configuration contains WinCC stations with server packages.

Procedure

The configuration procedure for the Connectivity Station consists of the following steps:

1. Create and configure SIMATIC PC Station

2. Assign WinCC Station

3. Transfer Connectivity Station

Create and configure SIMATIC PC Station

1. Select the project directory in the navigation window in the SIMATIC Manager. Select the entry "Insert New Object > SIMATIC PC STATION" in the popup menu.
   A new object, "SIMATIC PC Station" will be inserted into the navigation window and will remain selected.

2. Select the entry "Open object" in the popup menu of the SIMATIC PC Station.
   The Editor "HW Config" will be opened and the new PC station will be displayed as a blank central rack.

3. Select the entry "SPOSA Application" in the module catalog in the directory "SIMATIC PC Station > HMI". Insert the selected module by Drag&Drop into an open slot of the central rack.

4. Select the menu command "Station > Save and translate".

5. Select the menu command "Station > Exit" to close "HW Config".

Assign WinCC Station

1. Using the "SPOSA Application", navigate to the "Connectivity Station" icon in the directory of the new PC station. Select the "Assign OS Server..." option in the "Connectivity Station" shortcut menu.
   The "Assignment of OS Server for Open_TIA_Station" dialog is opened.

2. Select the WinCC stations in the table in the column "OS Information", whose data the Connectivity Station is to gain access to. Close the dialog by clicking on the "OK" button.

3. Select the "Connectivity Station" icon in the navigation window. Select the "Object properties" option on the shortcut menu.
   The "Properties - TIA application" dialog appears: "Connectivity Station" is opened.

4. Change to "Destination System" tab and enter the path to the Connectivity Station PC in the "Path" field.
   As an alternative, you may open a selection dialog via the "Browse..." button and search for the computer in the network.
   After you have entered the computer name, you click on the "Apply" button. The directory "Automation Projects" will be appended to the computer name.
   Close the dialog by clicking the "OK" button.

Transfer Connectivity Station

1. Check whether the "Connectivity Station" icon is clicked in the directory of the new PC station in the navigation window.

2. Select the "Target System > Load" option in the popup menu. Acknowledge the message after exiting this process.

Result

A computer in the hardware configuration in the S7 project is supplemented and configured for the Connectivity Station. The required project data has been transferred to this computer.

3.8.4 Accessing WinCC data with the Connectivity Station

Introduction

The Connectivity Station allows access to the data of different WinCC stations by means of an OPC client. For this, the OPC client must simply connect to the Connectivity Station.

The data exchange between the OPC client and the Connectivity Station takes place via the OPC. The following WinCC OPC-Servers are integrated into the Connectivity Station.

OPC-Server	Server name
OPC DA	WinCCConnectivity.OPCDAServer
OPC HDA	WinCCConnectivity.OPCHDAServer.1
OPC A&E	WinCCConnectivity.OPCAEServer.1

Requirements

- The software for the Connectivity Station is installed on the Connectivity Station PC.

- The Connectivity Station is configured in the S7 project and the project data is transferred to the computer of the Connectivity Station.

- An OPC client in accordance with the OPC specifications is available.

The Procedure in Principle

The following description depicts the basic procedure.

1. Start the OPC client on the PC.

2. Select the OPC-Server according to the desired data.
   The same names as the ones in the above table apply to the WinCC OPC-Server.

3. Define which data should be transferred, e.g. tags.

Result

The OPC client is connected to the Connectivity Station and receives the WinCC data.

See also

Examples for Access Using OLE DB Provider (Page 196)

Access Using OPC to WinCC Archives, Tags, and Messages (Page 35)

Establishing the Connection to the Archive Database (Page 47)

OPC - Open Connectivity (Page 103)

3.9 Connectivity Station for OPC UA

3.9.1 Basics of the Connectivity Station

Introduction

With the Connectivity Station, you can access WinCC stations with server packages from a central computer without the WinCC software. You can use the OPC UA interface of the Connectivity Station to access the WinCC stations.

OPC interface of the Connectivity Station

The Connectivity Station provides the OPC UA interface, via which you can access the following content with an OPC client:

- Process values
- Values from tag archives
- WinCC messages

Licensing

You will need the "WinCC Connectivity Station" license to use the OPC interface of the Connectivity Station on a computer without WinCC installation.

If you are only using the OPC interface of a WinCC installation, you will only need the "Connectivity Pack" license.

The following table shows the rules:

	WinCC-independent installation at Connectivity Station	OPC with WinCC
OPC UA	"WinCC Connectivity Station" license	"WinCC Connectivity Pack" license

Transparent access to archived data

The Connectivity Station supports the transparent access to the archive databases of WinCC stations.

Installation and Configuration

You will need the following to install the Connectivity Station:

- PC with Connectivity Pack Server or Connectivity Pack Client

In order to configure a computer as a Connectivity Station, run the Connectivity Pack client setup on the computer.

From the "Installing Software" menu of the installation DVD, select the entry "Connectivity Station".

After the installation, you can set up the access to the WinCC stations with one of the following program:

● SIMATIC Manager of STEP 7 or

● SIMATIC NCM PC Manager of the current SIMATIC NET Edition.

The figure below provides an overview of the configuration steps for the Connectivity Station:

Configuration steps   System response

```
Operating system
    ┌─────────────────────┐
    │ Install Connectivity │
    │ Pack Client/Server   │
    └─────────────────────┘
              │
              ▼
    ┌─────────────────────┐
    │ Install Connectivity │ ──→  Installs "Automation
    │      Station         │       Projects" release
    └─────────────────────┘

SIMATIC Manager
    ┌─────────────────────┐
    │ Open STEP 7 project  │
    └─────────────────────┘
              │
              ▼
    ┌─────────────────────┐
    │ Create or import     │
    │ WinCC Station        │
    └─────────────────────┘
              │
              ▼
    ┌─────────────────────┐
    │ Create Connectivity  │
    │      Station         │
    └─────────────────────┘
              │
              ▼
    ┌─────────────────────┐
    │ Configure Connectivi-│
    │ ty Station in HW     │
    │      Config          │
    └─────────────────────┘
              │
              ▼
    ┌─────────────────────┐
    │ Assign WinCC OS of   │ ──→  Generated DCF file with
    │ Connectivity Station │       system configuration
    └─────────────────────┘
              │
              ▼
    ┌─────────────────────┐
    │ Transfer Connectivity│ ──→  Generated DCF file will
    │      Station         │       be copied to "Automati-
    └─────────────────────┘       on Projects"
```

Settings for operation with several network adapters

Make sure that you have selected the correct network card in the settings of the SIMATIC Shell.

Click on the the SIMATIC Shell icon and select "Settings of SIMATIC Shell" in the shortcut menu. You may have to select a different network card under "Selection of terminal bus".

3.9.2 Use of OPC interface of the Connectivity Station

Principle

The Connectivity Station includes the WinCC OPC-Server through which you can access WinCC stations with server packages, using the OPC client. The WinCC OPC UA server supports the OPC UA specification 1.02.

You can use the OPC client locally on the Connectivity Station or on a separate computer.

The exchange of data between the OPC client and the Connectivity Station takes place via the OPC UA. The WinCC OPC server "WinCCConnectivity.OPCUAServer" is integrated into the Connectivity Station.
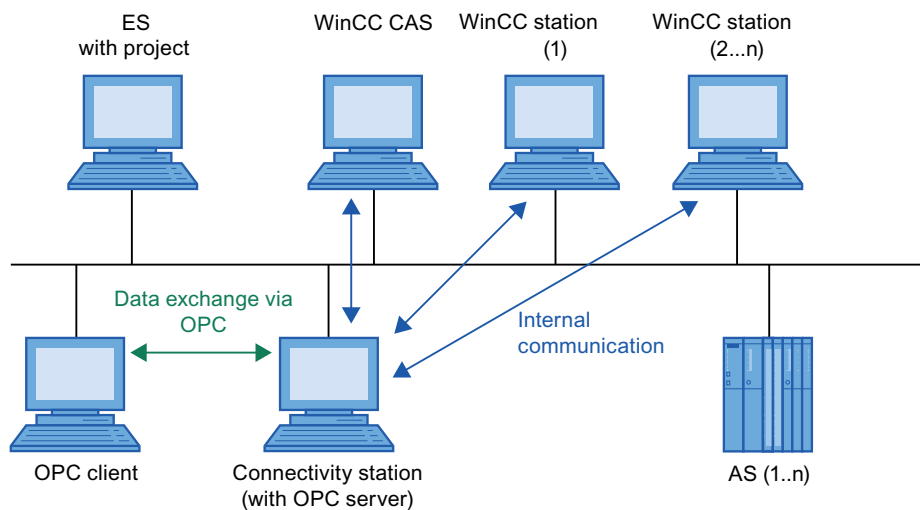
ES = Engineering station
      with STEP 7 or NCM PC Manager
AS = Programmable logic controller (PLC)
CAS = WinCC Central Archive Server

Central restart of OPC servers

The "ConfigureSposa" tool enables central restart of OPC servers. You can find "ConfigureSposa" in the installation folder of the ConnectivityStation. Following the start, an icon appears in the toolbar by which you can control the OPC servers.

3.9.3 Configuring the Connectivity Station in the S7 project

Introduction

In order to set up the Connectivity Station, you will add a new "SIMATIC PC Station" to the system configuration. This "SIMATIC PC Station" receives the properties of the Connectivity Station by configuring the application "SPOSA Application".

Depending on the project type, one of the following objects will be created in the "SPOSA Application".

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Procedure

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1. Create and configure SIMATIC PC Station

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3. Transfer Connectivity Station

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1. Select the project directory in the navigation window in the SIMATIC Manager. Select the entry "Insert New Object > SIMATIC PC STATION" in the popup menu.
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2. Select the entry "Open object" in the popup menu of the SIMATIC PC Station.
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3. Select the entry "SPOSA Application" in the module catalog in the directory "SIMATIC PC Station > HMI". Insert the selected module by Drag&Drop into an open slot of the central rack.

4. Select the menu command "Station > Save and translate".

5. Select the menu command "Station > Exit" to close "HW Config".

Assign WinCC Station

1. Using the "SPOSA Application", navigate to the "Connectivity Station" icon in the directory of the new PC station. Select the "Assign OS Server..." option in the "Connectivity Station" shortcut menu.
   The "Assignment of OS Server for Open_TIA_Station" dialog is opened.

2. Select the WinCC stations in the table in the column "OS Information", whose data the Connectivity Station is to gain access to. Close the dialog by clicking on the "OK" button.

3. Select the "Connectivity Station" icon in the navigation window. Select the "Object properties" option on the shortcut menu.
The "Properties - TIA application" dialog appears: "Connectivity Station" is opened.

4. Change to "Destination System" tab and enter the path to the Connectivity Station PC in the "Path" field.
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After you have entered the computer name, you click on the "Apply" button. The directory "Automation Projects" will be appended to the computer name.
Close the dialog by clicking the "OK" button.

Transfer Connectivity Station

1. Check whether the "Connectivity Station" icon is clicked in the directory of the new PC station in the navigation window.

2. Select the "Target System > Load" option in the popup menu. Acknowledge the message after exiting this process.

Result

A computer in the hardware configuration in the S7 project is supplemented and configured for the Connectivity Station. The required project data has been transferred to this computer.

3.9.4   Accessing WinCC data with the Connectivity Station

Introduction

The Connectivity Station allows access to the data of different WinCC stations by means of an OPC client. For this, the OPC client must simply connect to the Connectivity Station.

The exchange of data between the OPC client and the Connectivity Station takes place via the OPC UA. The WinCC OPC server "WinCCConnectivity.OPCUAServer" is integrated into the Connectivity Station.

Requirements

- The software for the Connectivity Station is installed on the Connectivity Station PC.

- The Connectivity Station is configured in the S7 project and the project data is transferred to the computer of the Connectivity Station.

- An OPC client in accordance with the OPC specifications is available.

The Procedure in Principle

The following description depicts the basic procedure.

1. Start the OPC client on the PC.

2. Select the OPC-Server according to the desired data.
   The names in the table above apply to WinCC OPC servers.

3. Define which data should be transferred, e.g. tags.

Result

The OPC client is connected to the Connectivity Station and receives the WinCC data.

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