

Integration Objects'

Solution for Interfacing with Wonderware Historian

**OPC HDA Server for Wonderware
IndustrialSQL
Version 1.4 Rev.3**

USER GUIDE



OPC HDA Server for InSQL User Guide Version 1.4 Rev.3
August 2016

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PREFACE

About this Guide

This guide:

- Describes the main features offered by Integration Objects' OPC HDA Server for InSQL,
- Lists the system requirements for installing and running Integration Objects' OPC HDA Server for InSQL,
- Explains how to configure this OPC HDA Server for database management;
- Explains how to use and run this OPC server,
- Describes all required DCOM settings on both the server and client sides.

Audience

This document is intended for users looking for applications that provide connectivity to IndustrialSQL databases. Knowledge of the basics of OPC HDA (Historical Data Access) standard is assumed. It is also expected that you have some prior knowledge of InSQL database configuration and SQL queries.

Related Documentation

OPC Foundation (www.opcfoundation.org)

- [OPC Historical Data Access](#)

Wonderware

- *IndustrialSQL documentation*

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INTRODUCTION

1. OVERVIEW

Integration Objects' OPC HDA Server for InSQL is a PC-based software application that is designed to offer full access to archived data monitored by the InSQL database systems to any OPC HDA client.

This chapter contains the following parts:

- First, we present a global architecture showing the interaction between this OPC server, OPC clients and the various supported databases in a client/server environment.
- Second, we describe all OPC Historical Data Access interfaces supported by this server.
- Finally, we enumerate software and hardware system requirements.

2. ARCHITECTURE

The OPC HDA Server for InSQL reads and updates data from/to the historian database via ADO (Active Data Objects) technology. It can be accessed locally or remotely via DCOM by any OPC HDA client.

The following figure describes a Client/Server architecture that shows the interaction between OPC HDA clients, OPC HDA servers and databases.

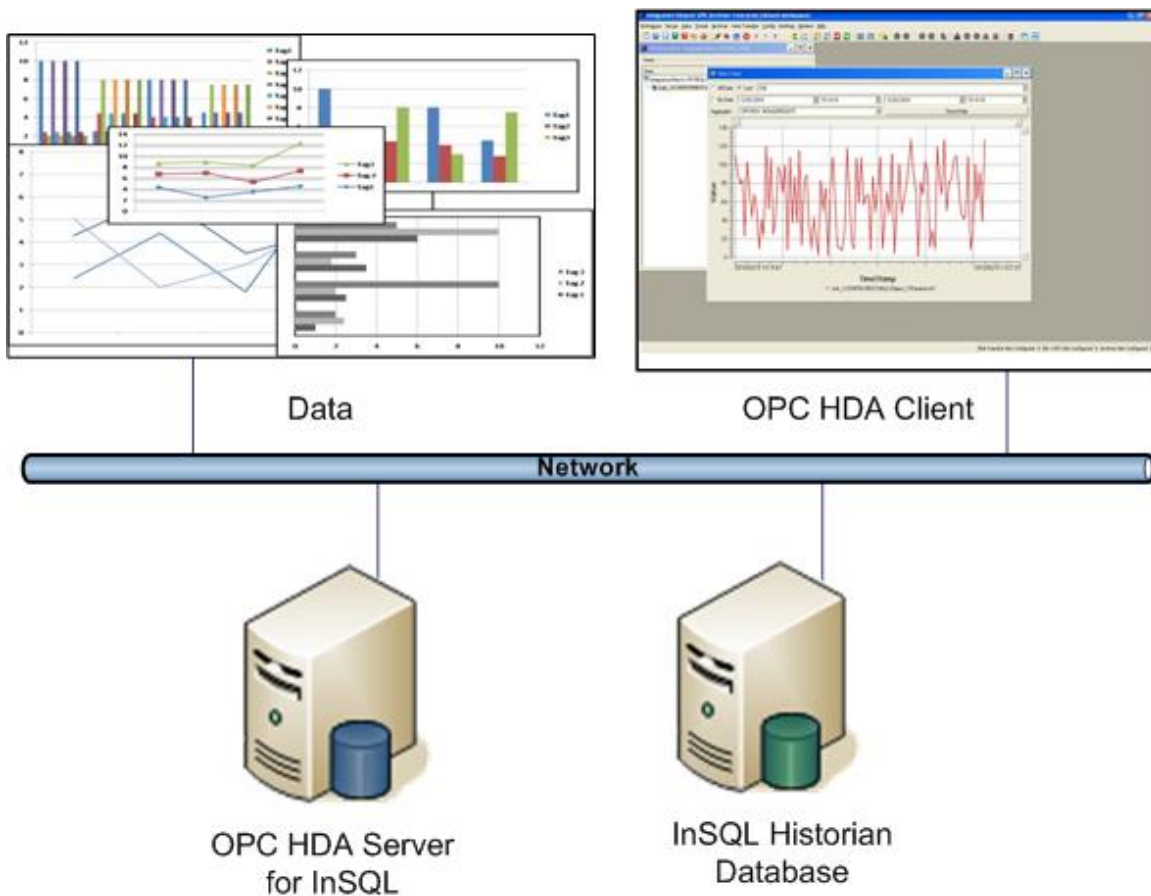


Figure 1: System architecture

This OPC HDA Server communicates with InSQL (IndustrialSQL) via ADO technology using the required OLE DB Provider.

3. OPC HDA SERVER FEATURES

This section describes and enumerates features offered by this OPC HDA Server including OPC HDA services and server/database configuration.

3.1. OPC HISTORICAL DATA ACCESS CAPABILITIES

This OPC HDA Server allows any OPC HDA client to retrieve simple and processed data from the pre-configured Wonderware database. Simple data retrieval includes raw reads and reads at time. However, summary data is computed using analysis functions such as average, interpolation, etc. Historical data can also be updated. You can insert

new data or replace existing raw(s) (checking the timestamp of the HDA item). You can also delete raw(s) for a specified time or during a time range when required.

This update feature depends on the Wonderware historian license. If you do not have a valid license, you may receive the following error message:

This Historian server is not licensed for modification of history data

For more details, you can refer to the “**OPC HDA Fundamentals.pdf**” delivered in the package (see the “Integration Objects\Integration Objects’ OPC HDA Server for InSQL\Documents” directory under the Program Files folder).

Following are the currently supported OPC HDA interfaces.

Object	Interface	Supported
OPCHDAServer	IOPCCommon	Yes
	IOPCHDA_Server	Yes
	IOPCHDA_SyncRead	Yes
	IOPCHDA_SyncUpdate (optional)	Yes
	IOPCHDA_SyncAnnotations (optional)	No
	IOPCHDA_AsyncRead (optional)	Yes
	IOPCHDA_AsyncUpdate (optional)	Yes
	IOPCHDA_AsyncAnnotations (optional)	No
	IOPCHDA_Playback (optional)	No
	IConnectionPointContainer	Yes
OPCHDABrowser	IOPCHDA_Browser	Yes

This server does not support the annotations and playback interfaces of the HDA standard, both of which are optional interfaces.

- **Supported attributes**

These are the standard HDA attributes supported by the server:

- OPCHDA_DATA_TYPE: Specifies the data type for the item.
- OPCHDA_ITEMID: Specifies the item id.

- **Supported aggregates**

This server supports the following standard aggregates defined by the OPC Foundation¹:

- OPCHDA_AVERAGE: the average data over the resample interval
- OPCHDA_TOTAL: the totalized value (time integral) of the data over the resample interval
- OPCHDA_COUNT: the number of raw values over the resample interval
- OPCHDA_INTERPOLATIVE: used for retrieving interpolated values
- OPCHDA_START: the value at the beginning of the resample interval. The time stamp is the time stamp of the beginning of the interval.
- OPCHDA_TIMEAVERAGE: the time weighted average data over the resample interval.
- OPCHDA_STDEV: the standard deviation over the resample interval
- OPCHDA_MINIMUMACTUALTIME: the minimum value in the resample interval and the timestamp of the minimum value
- OPCHDA_MINIMUM: the minimum value in the resample interval
- OPCHDA_MAXIMUMACTUALTIME: the maximum value in the resample interval and the timestamp of the maximum value
- OPCHDA_MAXIMUM: the maximum value in the resample interval.
- OPCHDA_END: the value at the end of the resample interval. The time stamp is the time stamp of the end of the interval.
- OPCHDA_DELTA: the difference between the first and last value in the resample interval
- OPCHDA_REGSLOPE: the slope of the regression line over the resample interval
- OPCHDA_REGCONST: the intercept of the regression line over the resample interval. This is the value of the regression line at the start of the interval.
- OPCHDA_REGDEV: the standard deviation of the regression line over the resample interval
- OPCHDA_VARIANCE: the variance over the sample interval
- OPCHDA_RANGE: the difference between the minimum and maximum value over the sample interval

¹ Aggregates descriptions are defined per the “OPC Historical Data Access Custom Interface Standard version 1.1” specification provided by OPC Foundation.

- OPCHDA_DURATIONGOOD: the duration (in seconds) of time in the interval during which the data is good
- OPCHDA_DURATIONBAD: the duration (in seconds) of time in the interval during which the data is bad
- OPCHDA_PERCENTGOOD: the percent of data (1 equals 100 percent) in the interval which has good quality
- OPCHDA_PERCENTBAD: the percent of data (1 equals 100 percent) in the interval which has bad quality
- OPCHDA_ANNOTATIONS: the number of annotations in the interval
- OPCHDA_WORSTQUALITY: the worst quality of data in the interval

3.2. EASY-TO-USE INTERFACE FOR DATABASE CONFIGURATION

Integration Objects' OPC HDA server for InSQL offers an intuitive graphical user interface to manage the supported databases. This configuration tool aims to configure tag IDs, data types, access rights, start bound, end bound, etc. Database configuration should be saved in an XML file for the next OPC HDA Server launch (configured tags are not added at runtime). The user can also Import/Export tag configurations from/to a CSV file.

At server start-up, it loads the configuration file to create tags and build its address space. The server also retrieves all database information like table names and matching between tag and column names to allow transactions from the server to the database.

3.3. BUILDING OPC HDA SERVER ADDRESS SPACE

The user has two options to build the OPC HDA server address space:

- **Automatic discovery:** by default, the OPC HDA Server automatically browses the configured historian tables to identify the OPC tags list and created its address space accordingly.
- **Import tags from CSV file:** The user can edit his current configuration by importing the CSV file specifying the OPC tags to be included in the address space of the OPC HDA server. The CSV file is to be generated using the OPC tag configuration tool.

4. OPC COMPATIBILITY

Integration Objects' OPC HDA Server for InSQL implements the OPC Historical Data Access (HDA) specifications version 1.1 and 1.2.

5. Wonderware Historian COMPATIBILITY

Integration Objects' OPC HDA Server for InSQL is compliant with the following Wonderware Historian versions:

- Wonderware Historian 9.0
- Wonderware Historian 10
- Wonderware Historian 2012 or 2012 R2
- Wonderware Historian 2014 or 2014 R2

6. SYSTEM REQUIREMENTS

- This application was successfully installed and executed under the following operating systems:
 - Windows XP
 - Windows Seven
 - Windows 8
 - Windows 10
 - Windows Server 2003
 - Windows Server 2008
 - Windows Server 2012
- Installing and running the application should be using administrator account
- Required OPC DLLs (described in more details in the next chapter).
- An OPC HDA client compliant with OPC HDA 1.1 and 1.2 standards (Integration Objects' OPC HDA clients are available through the following link: <http://www.integrationobjects.com>).

GETTING STARTED

1. PRE-INSTALLATION CONSIDERATIONS

First of all, you have to install the OPC Proxy/Stub DLLs. These DLLs are `opccomn_ps.dll`, `opcproxy.dll` and `opchda_ps.dll`.

These files are available for download from the OPC Foundation web site. You can follow this link to download the OPC core Components:

<https://opcfoundation.org/developer-tools/developer-kits-classic/core-components/>

These DCOM proxy/stub libraries are copied on the target system under the "system32" folder.

They should be registered:

- automatically: if you installed them from OPC core components without any problem
- manually: by using the **regsvr32** command as shown below:

Example (Windows XP)

```
/regsvr32 "C:\WINDOWS\system32\opcproxy.dll" (if your system drive is "C:")
```

```
/regsvr32 "C:\WINDOWS\system32\opccomn_ps.dll"
```

```
/regsvr32 "C:\WINDOWS\system32\opchda_ps.dll".
```

In order to properly run the tag configuration tool (`OPCTagConfigurationTool.exe`), you have to install the .NET Framework version 2.0 or higher.

2. INSTALLING THE OPC SERVER

The following are the required steps to install the OPC HDA Server for InSQL:

1. Double click on the installation executable.
2. Follow the installer wizard as it guides you through the rest of the installation.

The installation copies all necessary files to the target folder, creates a shortcut icon to invoke the OPC HDA Server in the Start menu and makes an un-installation entry in the Add/Remove Programs Window in the Control Panel.

For remote connection to this OPC server, you can apply the following registration files copied in the “Integration Objects\Integration Objects’ OPC HDA Server for InSQL\Reg Files” directory under the Program Files folder:

- Win2K_XP_RemoteServerReg.reg: should be applied on Windows Server 2000 or Windows XP Professional platforms.

3. SERVER REGISTRATION

In compliance with the OPC and COM specifications, the OPC HDA Server for InSQL creates the following registry entries under HKEY_CLASSES_ROOT when installed on the target system. These entries are removed when the server is uninstalled:

Registry Key	Value
IntegrationObjects.OPCHDA.InSQL	Integration Objects OPC HDA Server for InSQL; http://www.integrationobjects.com
IntegrationObjects.OPCHDA.InSQL \CLSID	{ CLSID } = {682B0E0D-C1F8-4d46-914B-D24CCD667246 }
CLSID{ CLSID }	Integration Objects OPC HDA Server for InSQL; http://www.integrationobjects.com
CLSID{ CLSID }\AppID	{ CLSID }
CLSID{ CLSID }\Implemented Categories\{7DE5B060-E089-11d2-A5E6-000086339399}	Historical Data Access Specification 1.1
CLSID{ CLSID }\LocalServer32	Path to server executable (OPCHDAInSQL.exe).
CLSID{ CLSID }\ProgID	IntegrationObjects.OPCHDA.InSQL

MANUAL REGISTRATION

The OPC HDA Server can also be registered manually using command-line parameters for the server executable in a command line window:

[-RegServer] or [/RegServer]

This command adds the necessary entries into the system registry. For example, in the command prompt window, you type:

Prompt> OPCHDAInSQL.exe -RegServer

Prompt is the path of the target directory where the OPCHDAInSQL.exe is located.

4. RUNNING THE OPC HDA SERVER

To start the OPC HDA Server manually, click on **Start → Programs → Integration Objects → OPC HDA Server for InSQL → OPC HDA Server for InSQL**

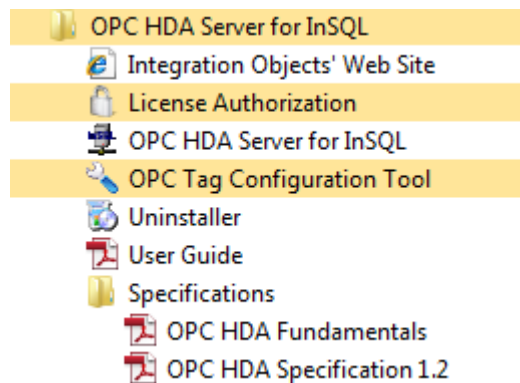


Figure 2: Start menu

If the server is not currently running, COM will attempt to launch it when the first client attempts to connect to it.

If it runs as a local executable when starting, a small icon appears in the tool tray at the right-hand side of the Task Bar.

In some cases, when a remote client tries to connect the OPC server, the OPC server's GUI does not show up. This is due to the DCOM configuration. You should set the Identity for your OPC HDA Server to "This user". Refer to the DCOM configuration chapter for more details on how to configure DCOM.

Right click on the icon to display the following menu.



Figure 3: Server menu

Click **Show Control Panel** to display the control panel for the server (Figure 4). The control panel displays general statistics for the server, such as the number of clients currently connected. It also displays the status of the server. The server state can be RUNNING or SUSPENDED.



Figure 4: Control panel

Click **Shutdown** to stop the OPC server.

Click **About** from the menu to display the About Box for the server. The About Box contains the server name and version number as well as other information about the software and Integration Objects.

Click **Contact us** to get helpful links or to ask for further information about this product and Integration Objects.

Click **Configure** to configure this server (the next chapter explains in details this server functionality).

5. REMOVING THE OPC SERVER

You can manually remove all registry information related to this OPC HDA Server by using one of the following command-line parameters:

[-UnregServer] or [/UnregServer]

To properly remove the server from your machine, close all OPC HDA Server applications and documents. To do it automatically, just click the **Uninstaller** short-cut icon in the Start menu.

The OPC HDA Server can also be removed manually as follows:

1. Click **Start**.
2. Click **Settings**.
3. Click **Control Panel**.
4. Click **Add/Remove Programs**.
5. In Add/Remove Programs dialog screen select "Integration Objects OPC HDA Server for InSQL".
6. Click **Change/Remove**, then **OK**.



The software will be removed with all registry entries and shortcuts created by the installation.

CONFIGURATION

1. OVERVIEW

Users can configure this server with an intuitive GUI (Graphical User Interface) database management.

We distinguish the following main sections:

1. **Server Configuration:** describes how to configure server object links to InSQL database.
2. **Tag Configuration:** describes how to export OPC Tags list from a historian table using the OPC configuration tool.
3. **Alias Configuration:** user has the possibility to configure alias names for tags with complicated identification.
4. **General Configuration:** contains server logging parameters and database recovery settings used once the connection is lost.

The main window consists of a menu bar (1), a toolbar (2) and two sub-views (a tree view (3) and a list view (4)).

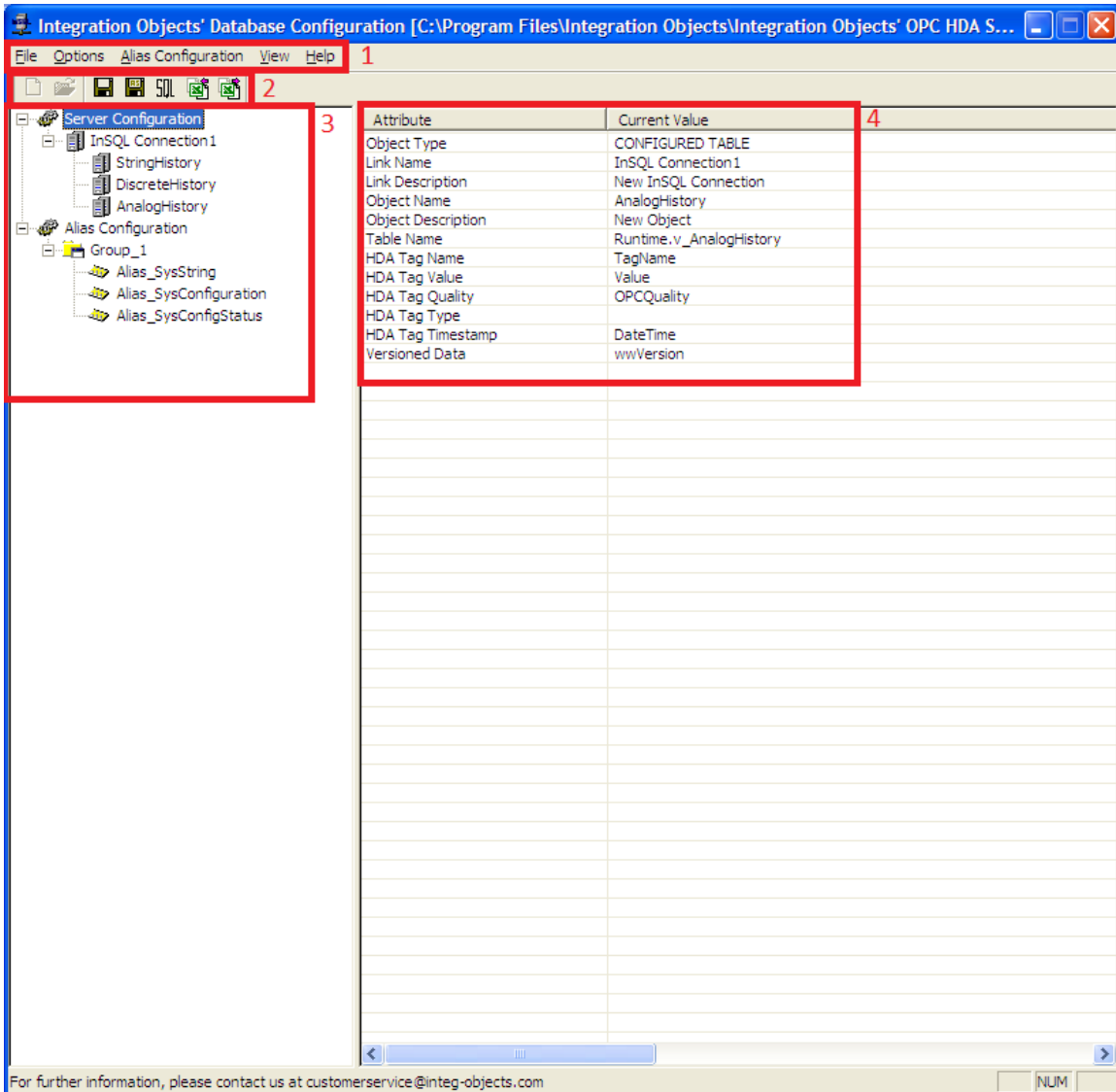


Figure 5: Graphical user interface

2. OPC Tag Configuration

Users can specify the OPC tags to be included in the OPC HDA server address space by using the OPC tag configuration tool. This tool allows you to export the selected OPC Tags list from your historian table into a specific CSV file. This file will be afterwards imported to the OPC HDA Server for InSQL.

To do so, you need to follow these steps:

1. Run the OPC tag configuration tool using an administrator account.

2. Configure the parameters to connect to the Wonderware historian.

The screenshot shows a dialog box titled "Industrial SQL Connection". It contains the following fields and controls:

- Server Name: 192.168.0.232
- Authentication: SQL Server Authentication (dropdown menu)
- User name: wwAdmin
- Password: [masked]
- Communication Timeout: 10 (Second)
- Query Timeout: 300 (Second)
- Database: Runtime (dropdown menu) with a Refresh button next to it.
- Buttons: Test connection and Configure Tags.

Figure 6: Configure connection

3. Select the Runtime database and then click the **Configure Tags** button to proceed.
4. Select the historian table name.

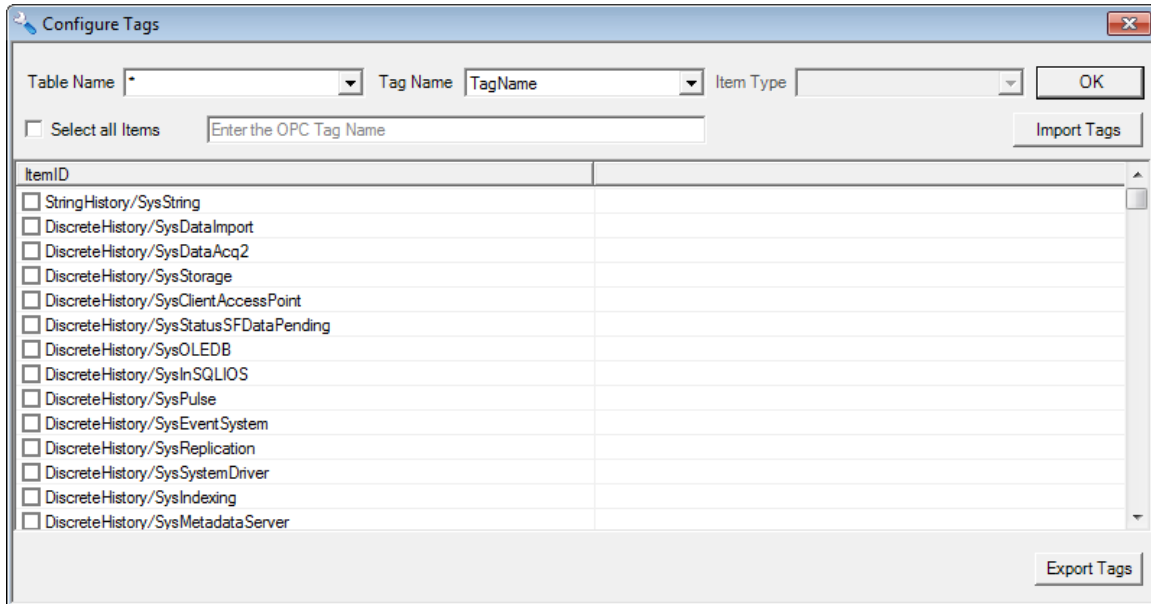


Figure 7: Configure tags

5. Select the tags you want to import into the OPC HDA Server for InSQL.
6. Click **Export Tags** to export the configuration into CSV file.

You can also use this tool to validate an existing CSV file by following the steps below:

1. Click **Import Tags** button
2. Select the CSV file from the displayed window
3. Check the needed OPC tags. Note that only the valid tags displayed with green color can be checked.

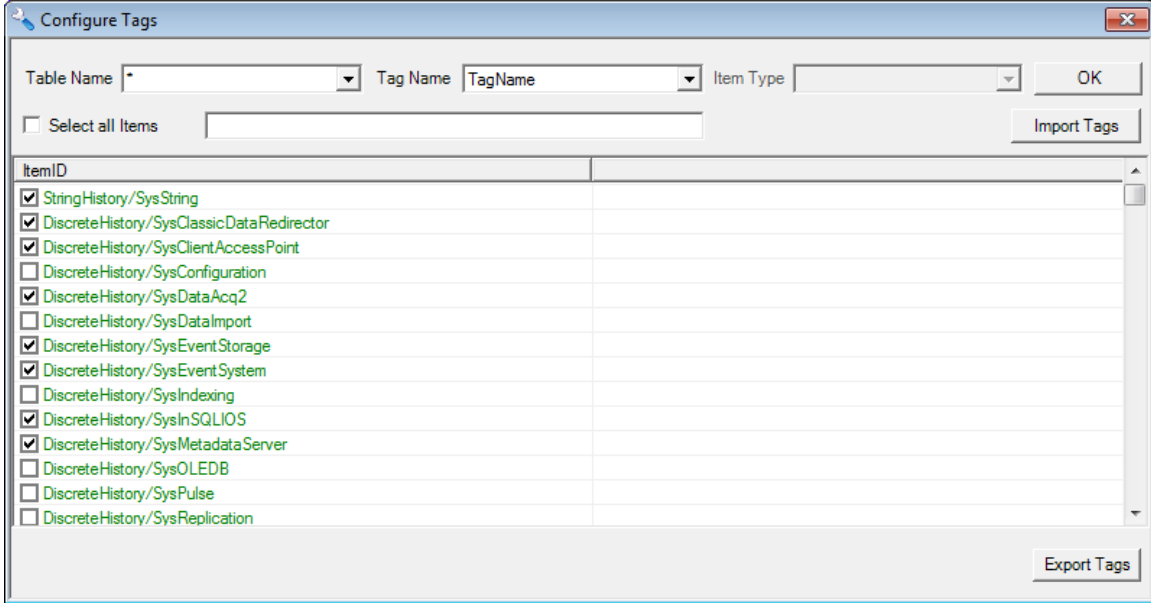


Figure 8: Validate OPC tags

4. Click **Export Tags** button.

3. SERVER CONFIGURATION

The main tree view for this server interface is composed of two main nodes: Server configuration and Alias configuration. Select one object under one of these nodes to display its current configuration.

3.1 CONFIGURING THE SERVER LINK

This section describes server link management: add, remove, enable/disable, connect, view configuration and edit the current configuration.

3.1.1 ADDING A SERVER LINK AND CONNECTING TO THE DATABASE

To add a server link, you can choose either custom or default mode. Select the “Server Configuration” node, right-click and select:

- **New Default InSQL Connection** : for default connection configuration
- **New Custom InSQL Connection** : for custom connection configuration

For each mode, every server link has a link to InSQL databases using the appropriate connection string. This OPC HDA Server uses ADO technology to manage the requested databases.

3.1.1.1 DEFAULT INSQL CONNECTION

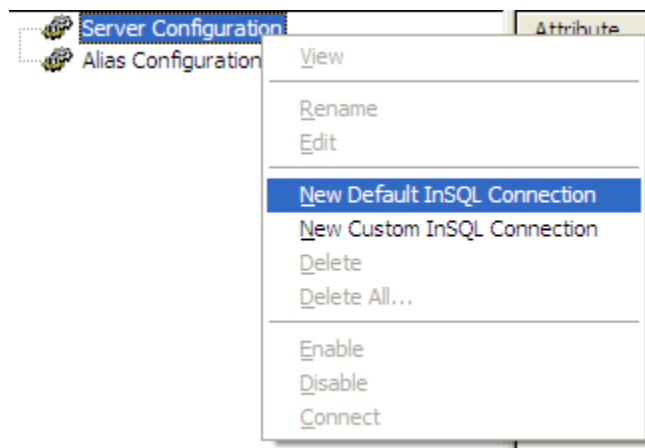


Figure 9: Add server link (Default InSQL Connection)

When you click on “New Default InSQL Connection”, you will get the following screen:

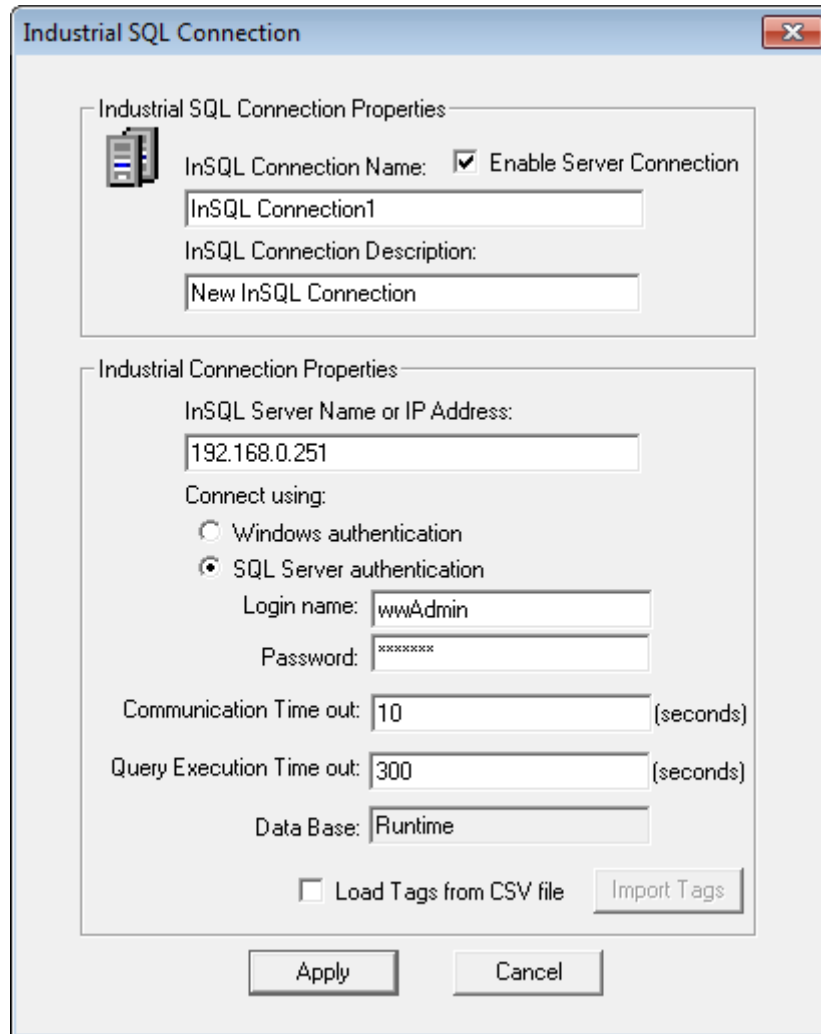


Figure 10: Add default InSQL connection

The following are the connection parameters:

Parameter	Description
InSQL Connection Name	A custom name of the connection
InSQL Connection description	A custom description of the connection
Server name	The server name: you have to select/enter the SQL Server associated with the IndustrialSQL (the Host name or the IP Address)
Connection properties	<ul style="list-style-type: none"> Windows authentication InSQL authentication: in this case, you should type the login/password parameters. <p>When the IndustrialSQL Server is installed, default login IDs are created. You can use them for logging on to the IndustrialSQL</p>

	<p>Server from the OPC HDA Server application such as (aaAdmin, pwAdmin) and (aaUser, pwUser). For further information about these pre-configured login IDs, please refer to the “IndustrialSQL Server Default Login IDs” section in the IndustrialSQL documentation.</p> <ul style="list-style-type: none"> • Connection time out: maximum duration to wait before the attempt expires • Query Execution timeout: maximum duration to wait before the query execution expires
Database Name	<ul style="list-style-type: none"> • The name of the database by default it is “Runtime”
Load Tags from CSV file	<p>Use this option to specify the tags to be included in the OPC HDA Server address space. This option overrides the automatic discovery of the tags for the StringHistory, DiscreteHistory and AnalogHistory tables. The CSV file is to be generated by the OPC tag configuration tool.</p>

After clicking the **Apply** button, the OPC HDA Server for InSQL will be connected to the Wonderware historian and retrieves automatically the default preconfigured data tables. The new server link is added as follows:

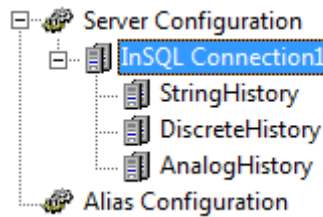


Figure 11: Added server link

During the connection, a default mapping is done in background. To change the tags’ settings, click **Edit** (right click menu). You will get the following screen:

Pre-configured Table: Settings

Server Configuration
Link Name: InSQL Connection1

Object Description
Name: StringHistory
Description: String History

Save old columns mapping

Tags Configuration
You can change your settings for tags attributes (local tag name, value, timestamp and quality):
Enter or Select a Table:
StringHistory Refresh

Tag Name: TagName Should be a column with String type.
Tag Value: Value
Tag Timestamp: DateTime Should be a column with Date/Time type.
Tag Quality: OPCQuality Select field with int type.
Tag Type: -- Select a Tag Type -- Map Types
Version: LATEST
Retrieval Mode: DELTA

Ignore Quality Load Tags from CSV File ImportTags

Time Bounds
Start Bound: 02/09/2015 17:00:40 End Bound: 02/09/2015 17:00:40

Interpolation
0 Y; 0 D; 0 H << 5 MN; 0 S

Apply Changes Cancel

Figure 12: Table's settings



You can load OPC tags from CSV file by checking the Load Tags from CSV File button (highlighted in red in the screenshot above), click Import tags and then select the generated CSV file using the OPC Tag Configuration Tool from the displayed window. Using this option, the OPC HDA Server will not use the automatic discovery feature to build its address space. It

will only load the tags included in the CSV file. For more details, refer to the **OPC Tag Configuration** section.

After applying your changes, you need to save the current configuration.

After applying the table settings and once the connection to the database is established, the server link state is set to **Connected** as follows:

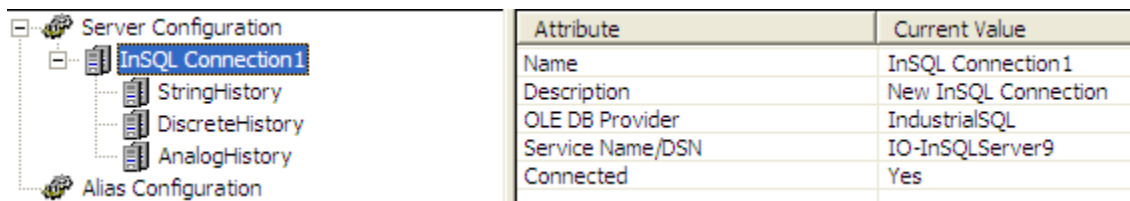


Figure 13: View added server link (default InSQL configuration)

3.1.1.2 CUSTOM INSQL CONNECTION

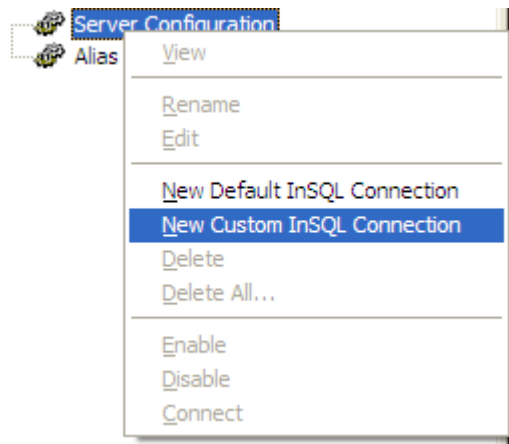


Figure 14: Add server link (custom InSQL connection)

When you click on “**New Custom InSQL Connection**”, you will get the following screen:

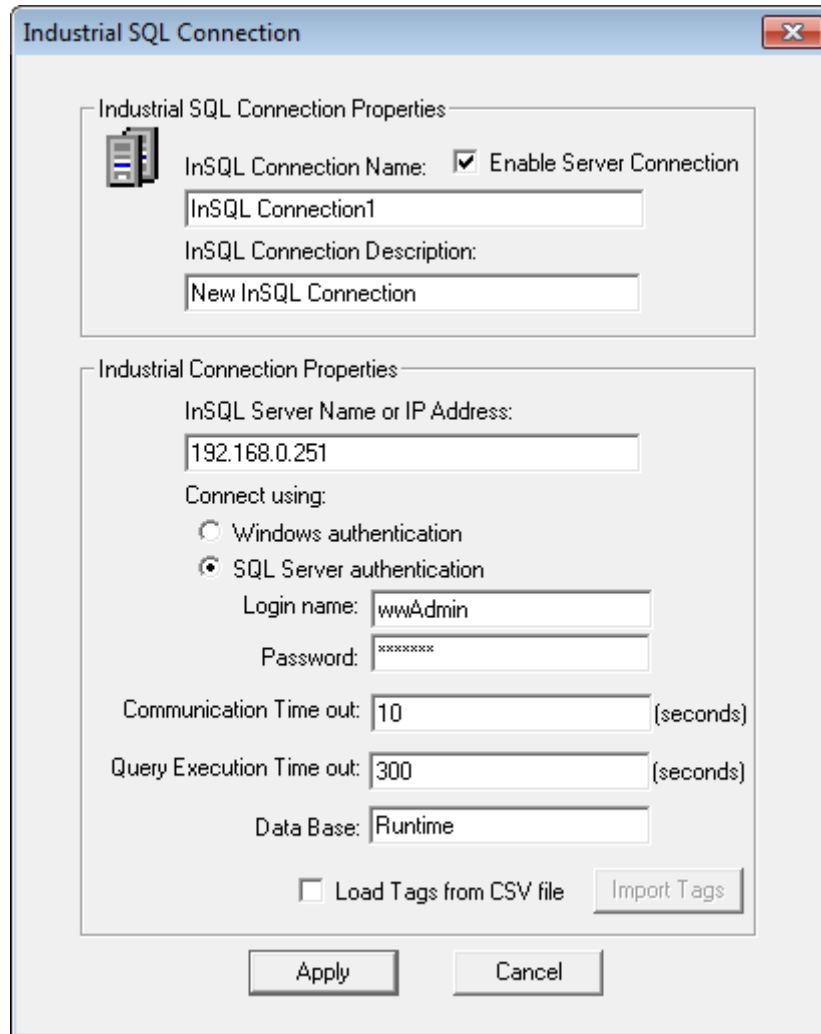


Figure 15: Add custom InSQL connection

The following are the connection parameters:

Parameter	Description
InSQL Connection Name	A custom name of the connection
InSQL Connection description	A custom description of the connection
Server name	The server name: you have to select/enter the SQL Server associated with the IndustrialSQL (the Host Name or the IP Address)
Connection properties	<ul style="list-style-type: none"> Windows authentication InSQL authentication: in this case, you should type the login/password parameters.

	<p>When the IndustrialSQL Server is installed, default login IDs are created. You can use them for logging on to the IndustrialSQL Server from the OPC HDA Server application such as (aaAdmin,pwAdmin) and (aaUser, pwUser). For further information about these pre-configured login IDs, please refer to the “IndustrialSQL Server Default Login IDs” section in the IndustrialSQL documentation.</p> <ul style="list-style-type: none"> • Connection time out: maximum duration to wait before the attempt expires • Query Execution timeout: maximum duration to wait before the query execution expires
Database Name	<ul style="list-style-type: none"> • The name of the database by default it is “Runtime”
Load Tags from CSV file	<p>Use this option to specify the tags to be included in the OPC HDA Server address space. The CSV file is to be generated by the OPC tag configuration tool.</p>

After clicking the **Apply** button, the Server link will be added. Then, you click on **New** (right click menu) to add a link to a preconfigured table.

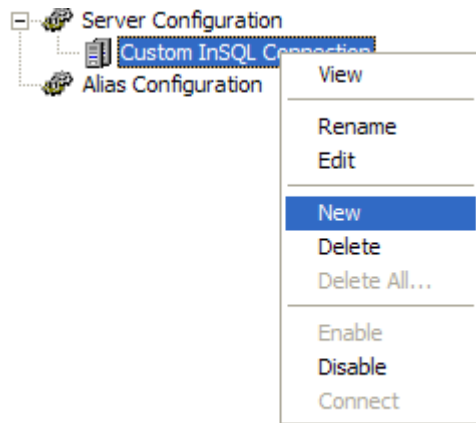


Figure 16: Add table link

You will get the following screen:

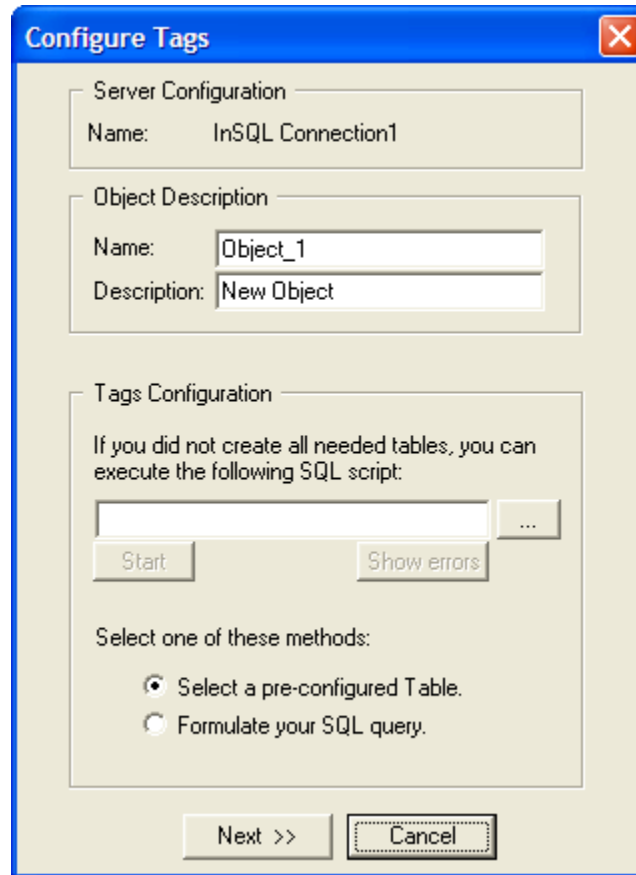


Figure 17: Configure tags window

Click **Next**. You will get the following screen:

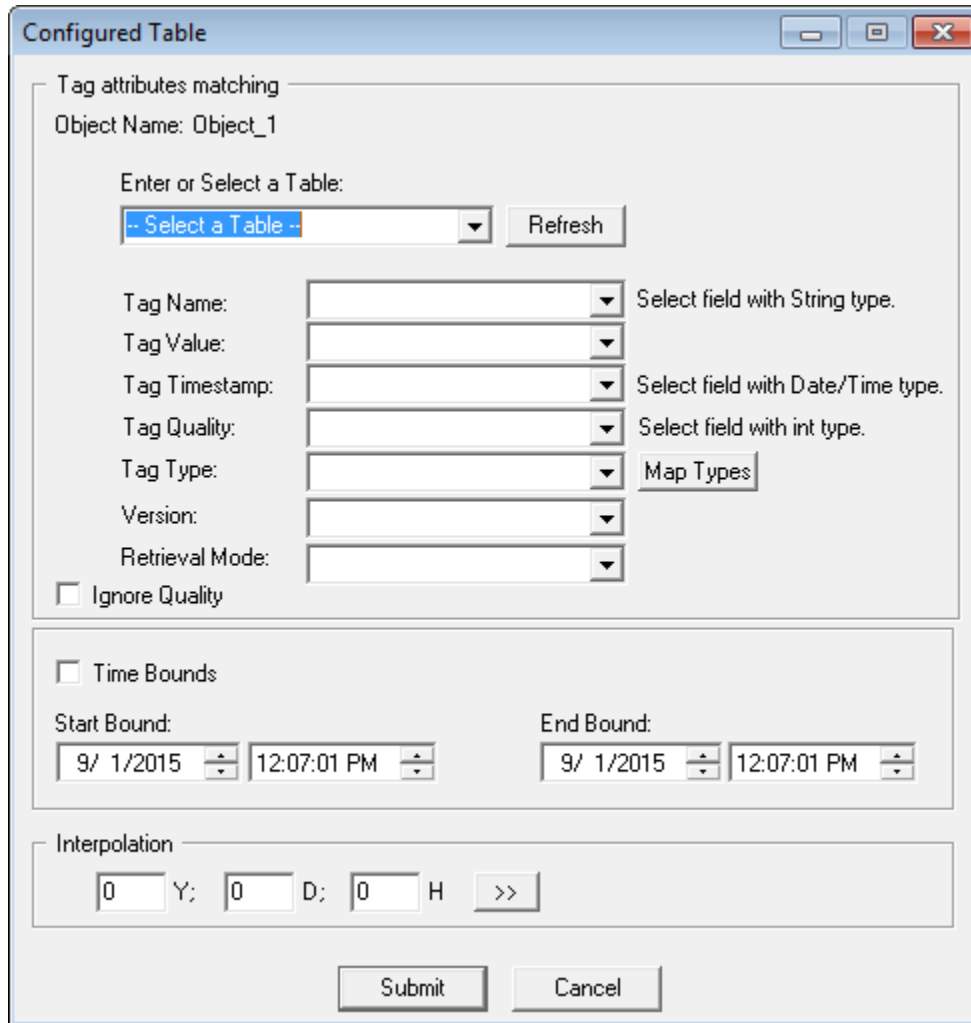


Figure 18: Configure table window

When you select a table name from the combo box, the OPC HDA Server maps automatically each tag's attribute with the appropriate column if the column name is similar to the default attribute name. Otherwise, you need to configure the field according to your database documentation

Once the connection to the database is established, the server link state is set to **Connected**. Click **View** to view server link configuration.

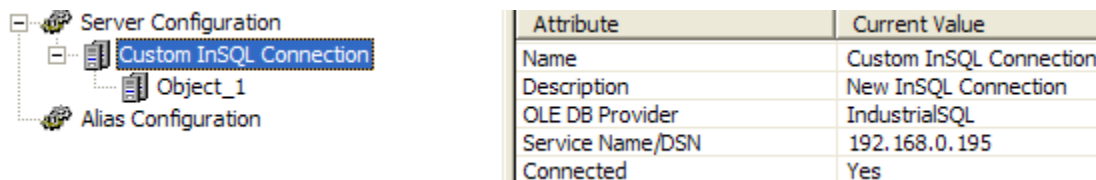


Figure 19: View added server link (custom InSQL configuration)

3.1.2 ENABLING/DISABLING A SERVER LINK

To allow object link management, enable your configured server link. You can enable your server link in two ways:

- 1- Check the “**Enable server link**” option when adding the server link.
- 2- Right-click on the selected server link node and click the **Enable** menu item.

To disable it, right-click the selected server link node and click the **Disable** menu item.

3.1.3 EDITING A SERVER LINK

To modify server settings, click **Edit** (right click menu). You will get the same screen as the “New Default/Custom Connection” one.

You can modify the following settings:

- Server link name
- Server link description
- Enabling/disabling the server link
- Authentication parameters: either Windows authentication or the login and password for the remote access.
- Loading OPC Tags from CSV file by clicking Import Tags button.

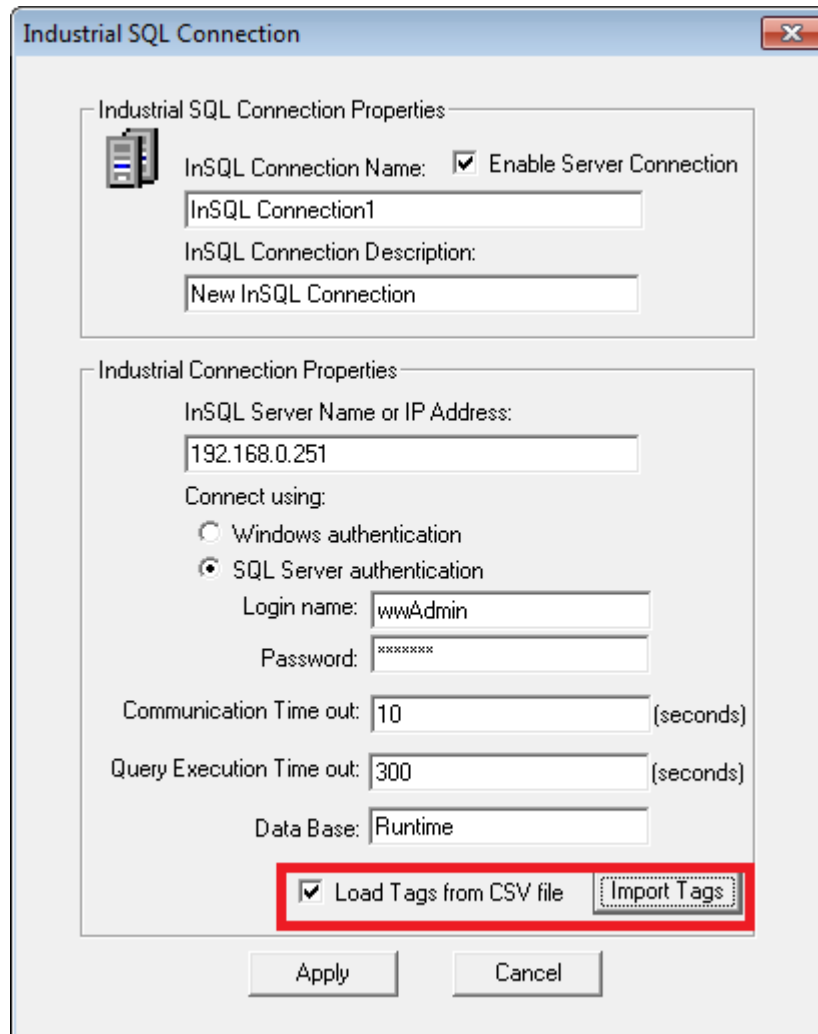


Figure 20: Edit server link



You can load OPC tags from CSV file by checking the Load Tags from CSV File button (highlighted in red in the screenshot above), click Import tags and then select the generated CSV file using the OPC Tag Configuration Tool from the displayed window. Using this option, the OPC HDA Server will not use the automatic discovery feature to build its address space. It will only load the tags included in the CSV file. For more details, refer to the OPC Tag Configuration section.

After applying your changes, you need to save the current configuration.

3.1.4 RENAMING A SERVER LINK

If you only want to change the server link name, click **Rename** (right click menu). You will get the following screen:

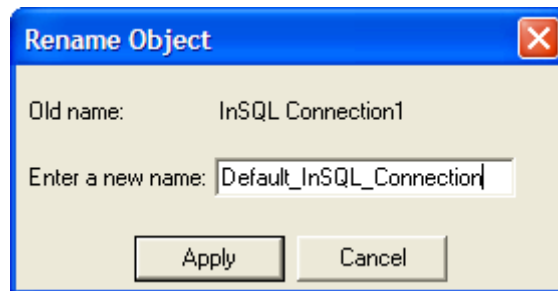


Figure 21: Rename server link

3.1.5 DELETING A SERVER LINK

To remove a server link, click **Delete** (right click menu). This will remove all object links configured under this server link.

3.1.6 DELETING ALL

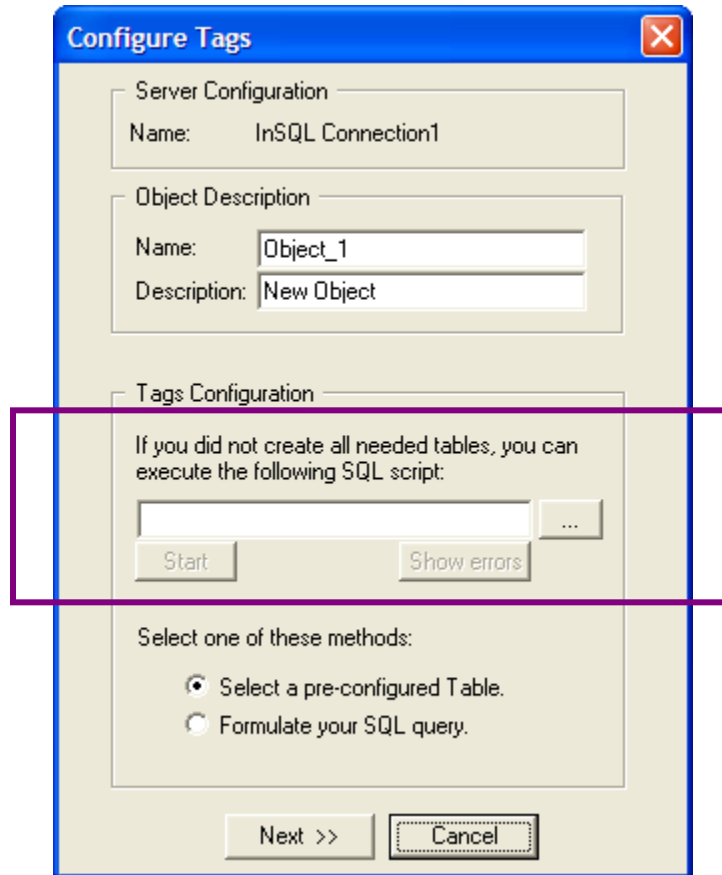
To remove all configured object links under the selected server link, click the **Delete All...** menu item (right click menu).

3.2 CONFIGURING THE OBJECT LINK

This section describes the object link management: add, remove, enable/disable, view configuration and edit the current configuration.

3.2.1 ADDING AN OBJECT LINK

Select the server link node to which you want to add an object link (under the “Server configuration” node), right-click and select “**new**”.



You may execute an SQL script that is already prepared.

Figure 22: New object link

SQL script example:

```
USE [master]
CREATE TABLE [dbo].[HistoryTable] (
    [ItemID] [varchar] (255) NULL,
    [ItemCurrentValue] [varchar] (8000) NULL,
    [ItemTimeStamp] [datetime2] (7) NULL,
    [ItemQuality] [varchar] (255) NULL,
    [ItemDataType] [varchar] (100) NULL
);
```

1st step: Select a method for matching column names with OPC tag attributes

Parameter	Description
Object name	The object link name.
Object description	The object link description.
Method of tag configuration	<ul style="list-style-type: none"> Select a pre-configured table. Formulate your SQL query.

2nd step: Matching column names with OPC tag attributes

There are two ways to map tag attributes with column names:

- You can use a pre-configured table. In this case, the table should be already created.
- You can also formulate your SQL query.

- **Pre-configured table**

You should select the first option “Select a Pre-configured Table” under the “Tags Configuration” section.

You need to select a table name from the list box or you enter a known table name.

You can then match OPC tag attributes including ‘Tag Name’, ‘Tag Value’, ‘Tag Timestamp’ and ‘Tag Quality’ with column names of the selected table.

Note that filling in the ‘Tag Name’, ‘Tag Value’ and ‘Tag Timestamp’ fields is mandatory.

The selected columns should also be distinct. Otherwise, the object is rejected.

Since the InSQL system supports versioned data, in addition to tag attributes configuration, you should configure the value version (for further information, please refer to IndustrialSQL documentation).

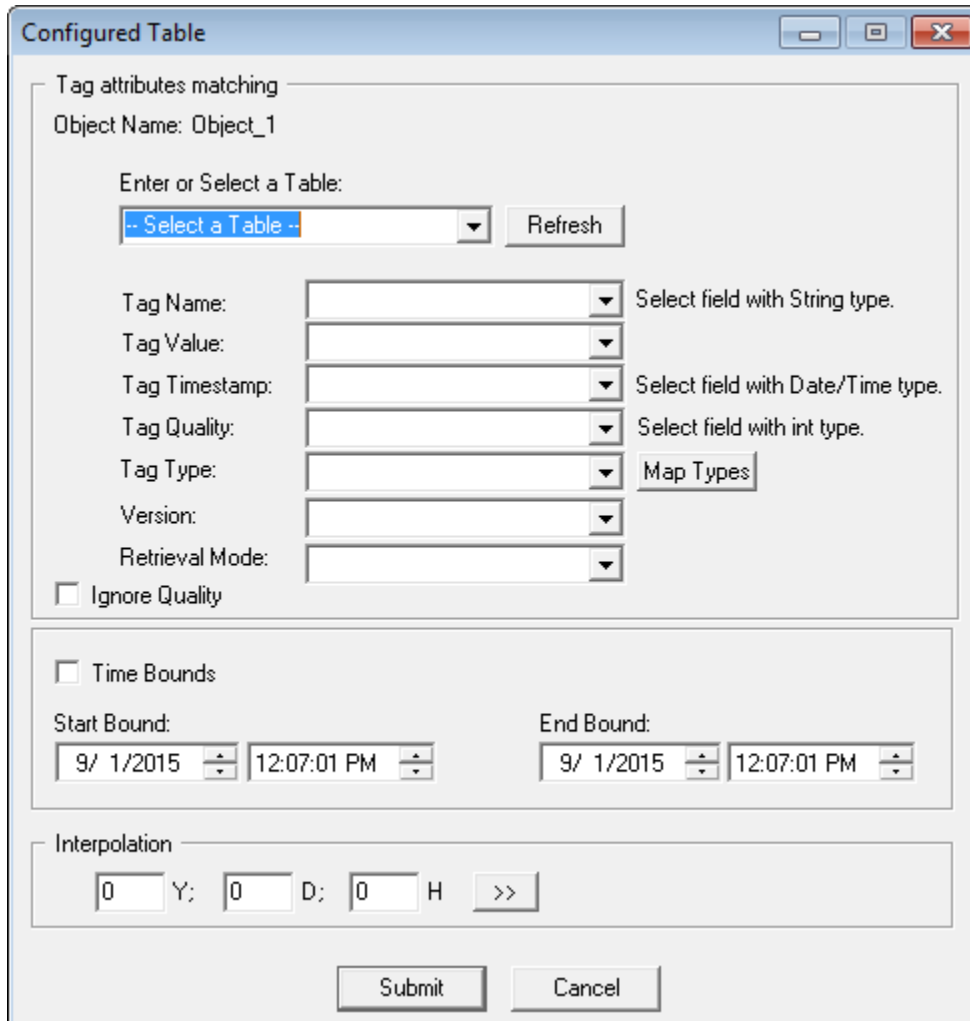


Figure 23: Pre-configured table

The following table describes the configuration parameters displayed in the above dialog screen:

Parameter	Description
Table name	The selected table name.
Tag Name	Select a column from the selected table from which the tag name will be collected.
Tag Value	Select a column from the selected table from which the tag value will be collected.
Tag Timestamp	Select a column from the selected table from which the tag timestamp will be collected.
Tag Quality	Select a column from the selected table from which the tag quality will be collected.

Tag Type	Select a column from the selected table from which the tag type will be collected.
Version	The column should be wwVersion. The value can be LATEST or ORIGINAL
Retrieval Mode	The column name is wwRetrievalMode default value is "DELTA"
Start Bound	The start bound used in HDA reads. This is an optional configuration parameter.
End Bound	The end bound used in HDA reads. This is an optional configuration parameter.

Example:

After selecting a table name, all fields will be activated. For each tag attribute, you can change the column name that you want.

NB: There are four tables where historian Data is archived, which are *history*, *AnalogHistory*, *DiscreteHistory* and *StringHistory*. It is recommended that you create a link for each one of them.

REFRESH TABLE NAMES LIST

To refresh the table names available on the selected InSQL database, click the **Refresh** button.

BOUNDING

This is optional.

You can select the start and end time that will be used in HDA reads.

INTERPOLATION

This is optional.

You can customize the time range for Read at time requests concerning interpolated values. The time range is [ftReadAtTime – Interpol, ftReadAtTime + Interpol] with ftReadAtTime the filetime argument passed in the ReadAtTime request and Interpol is the configured time range.

$$\text{Interpol} = x_1\mathbf{Y} + x_2\mathbf{D} + x_3\mathbf{H} + x_4\mathbf{MN} + x_5\mathbf{S}.$$

Y: year.

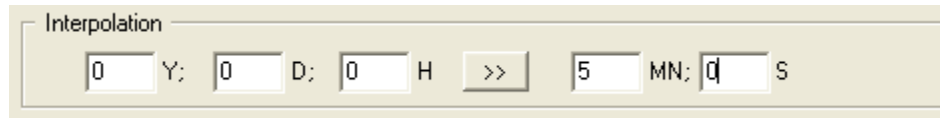
D: day.

H: hour.

MN: minute.

S: second.

Interpolation parameters:



The image shows a form titled "Interpolation" with five input fields and a button. The fields contain the values: 0, 0, 0, 5, and 0. The labels are Y, D, H, MN, and S. A button with the text ">>" is located between the H and MN fields.

Figure 24: Interpolation parameters

Example:

Interpol = 0Y+ 0D + 1H + 0MN + 0S.

VERSIONED DATA

The InSQL supports the versioning data feature. That means, for a given tag at the same timestamp, you can find a set of values for a specific version ('ORIGINAL' or 'LATEST').

- **SQL query**

You should select the second option "Formulate your SQL query" under the "Tags Configuration" section.

You can enter any type of SQL query (CREATE, SELECT, INSERT, UPDATE ...). Only "SELECT" queries are considered for column mapping. Note that conditions in the SELECT query are ignored (example: SELECT * FROM Test WHERE (condition1) → condition1 is ignored). You can then match OPC tag attributes including 'Tag Name', 'Tag Value', 'Tag Timestamp', 'Tag Quality' and 'Value Version' with the selected column names. You enter your SQL query in the edit text. Then, click the **Execute** button. Error messages are displayed in the edit text ("Success" for succeeded queries).



For InSQL, SQL queries have a specific syntax. Please refer to the InSQL documentation.

Example:

SQL query = "SELECT * FROM History WHERE TagName LIKE '%' AND TagName NOT LIKE """.

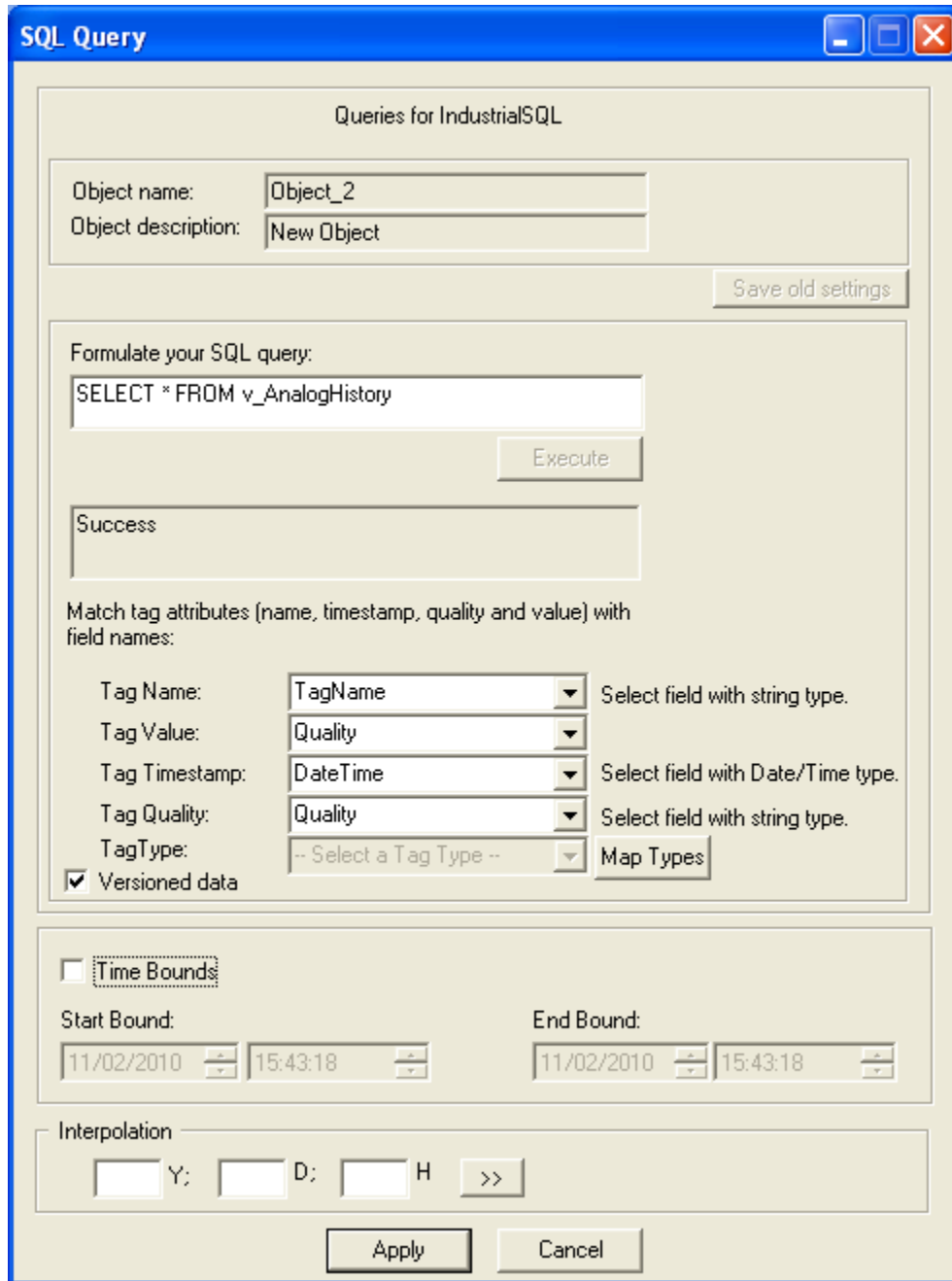


Figure 25: SQL query

3.2.2 ENABLING/DISABLING AN OBJECT LINK

To allow HDA reads/updates to tags related to an object link, enable your configured object link. You may right-click on the selected object link node or click the **Enable** menu item.

To disable it, right-click the selected object link node and click the **Disable** menu item.

3.2.3 EDITING OBJECT LINK

You may change your configuration for an Object link. Click **Edit** (right click menu) from the selected Object link.

- **Pre-configured table**

You can modify your configuration for an object link created using a pre-configured table.

You will get the following screen:

Pre-configured Table: Settings

Server Configuration
Link Name: InSQL Connection1

Object Description
Name: AnalogHistory
Description: Analog History

Save old columns mapping

Tags Configuration
You can change your settings for tags attributes (local tag name, value, timestamp and quality):
Enter or Select a Table:
AnalogHistory Refresh

Tag Name: TagName Should be a column with String type.
Tag Value: Value
Tag Timestamp: DateTime Should be a column with Date/Time type.
Tag Quality: OPCQuality Select field with int type.
Tag Type: -- Select a Tag Type -- Map Types
Version: LATEST
Retrieval Mode: DELTA

Ignore Quality Load Tags from CSV File ImportTags

Time Bounds
Start Bound: 02/09/2015 17:02:10 End Bound: 02/09/2015 17:02:10

Interpolation
0 Y; 0 D; 0 H << 5 MN; 0 S

Apply Changes Cancel

Figure 26: Edit pre-configured table settings



You can load OPC tags from CSV file by checking the Load Tags from CSV File button (highlighted in red in the screenshot above), click Import tags and then select the generated CSV file using the OPC Tag Configuration Tool from the displayed window. Using this option, the OPC HDA Server will not use the automatic discovery feature to build its address space. It

will only load the tags included in the CSV file. For more details, refer to the **OPC Tag Configuration** section.

After applying your changes, you need to save the current configuration.

- **SQL query**

You can modify your configuration for an object link created using an SQL query. You will get the same dialog screen as adding an object link with one difference: the **“Save Old Settings”** button is activated.

3.2.4 SAVING OLD COLUMNS MAPPING

You may keep your old settings for mapping tag attributes with column names.

3.3 ITEM ID SYNTAX

The slash “/” character is the separator used for item IDS in this OPC server.

A full tag name is defined as follows:

Server_Link/Type_Of_Method/Object_Link/Column_Name_Value

Possible values for “Type_Of_Method” are “QUERY” and “CONFIGUREDTABLE”.

Example: Link_1/QUERY/Object_1/tag1

4. ALIAS CONFIGURATION

Alias configuration is an option offered by Integration Objects’ OPC HDA Server for InSQL to avoid use of complicated full names for tags.

Each alias name matches an item path in the configured tag tree for the “Server Configuration” node. You may configure one or more alias names for the same item path.

4.1 CONFIGURING THE ALIAS GROUP

Alias names are gathered in groups.

4.1.1 ADDING GROUP ALIAS

To add a new group alias, select the “Alias Configuration” node from the tree view. Then, click the **New** menu item (right click menu). You will get the following dialog screen:



Figure 27: New alias group

Parameter	Description
Group name	The group alias name.

4.1.2 RENAMING GROUP ALIAS

If you only want to rename the group name, click **Rename** (right click menu). You will get the following screen:

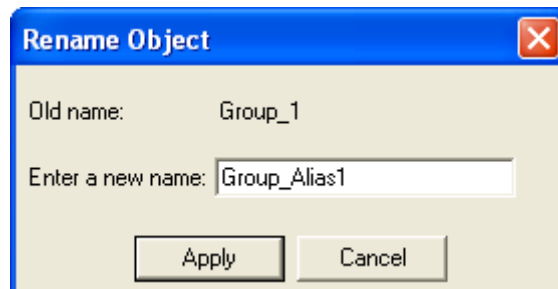


Figure 28: Rename group alias

4.1.3 DELETING GROUP ALIAS

To remove a group alias, click **Delete** (right click menu). This will remove all aliases configured under this group.

4.1.4 DELETING ALL

To remove all configured aliases under the selected group alias, click the **Delete All...** menu item (right click menu).

4.2 CONFIGURING ALIASES

4.2.1 ADDING AN ALIAS

Select the group alias node to which you want to add an alias (under the “Alias configuration” node), right-click and select “new”. You will get the following dialog screen:

Figure 29: New alias

4.2.2 BROWSE CONFIGURED ITEMS TREE

To select an item path from the available items’ tree for the configured alias, click the **Browse** button. You will get the following screen:

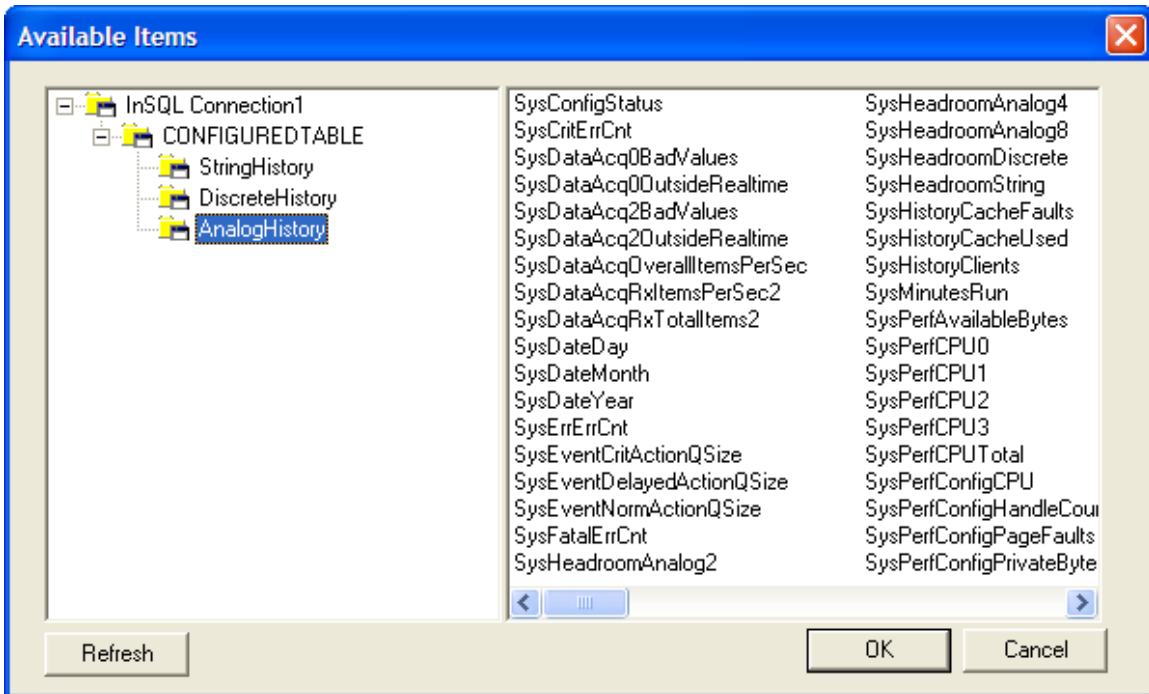


Figure 30: Select an item

4.2.3 REFRESH TABLE NAMES LIST

To refresh the available items' tree, click the **Refresh** button.

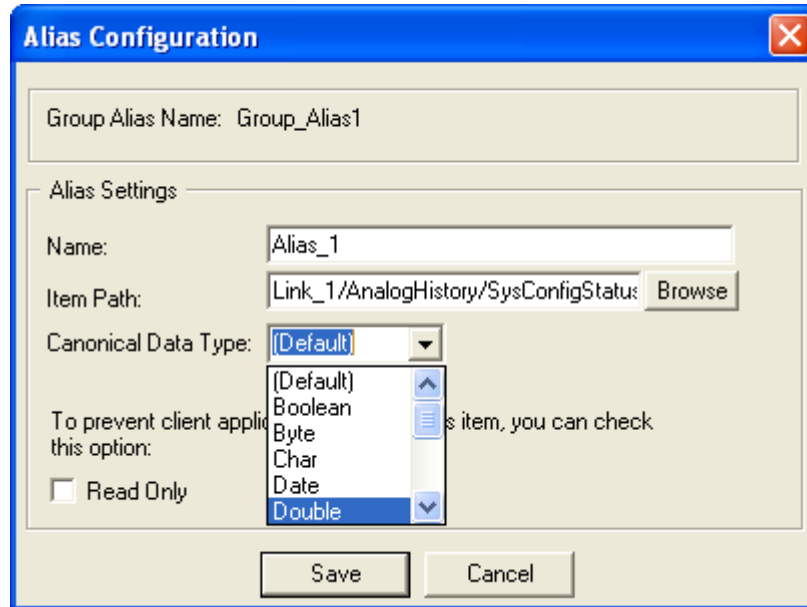


Figure 31: Select canonical data type

Parameter	Description
Alias name	The alias name.
Item Path	The item path.
Canonical data type	Item values returned to the OPC client will be coerced to use this data type.
Read Only	If you want to prevent OPC client applications from writing to this tag, you can check this option.

Canonical data type

Only simple types are available for the current version of this OPC server. You may select one of the following data types:

Displayed data type	VARIANT
Byte	VT_UI1
Short	VT_I2
Long	VT_I4
Float	VT_R4
Date	VT_DATE
Double	VT_R8

String	VT_BSTR
Int	VT_INT
Unsigned Int	VT_UINT
Unsigned short	VT_UI2
Unsigned long	VT_UI4
Boolean	VT_BOOL
Char	VT_I1



“(Default)” type is the default type of the item path.

Once the add operation succeeds, the tree view and the list view are updated as follows:

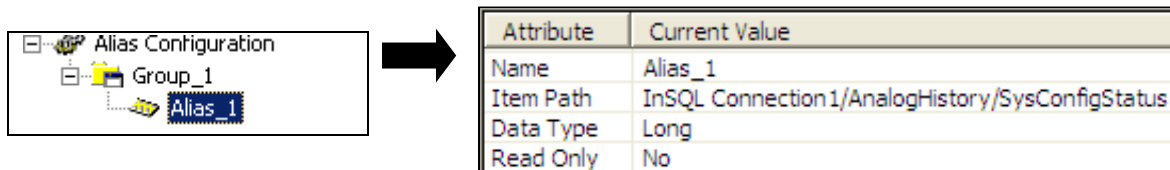


Figure 32: View alias properties

4.2.4 RENAMING ALIAS

If you only want to rename the alias, click **Rename** (right click menu). You will get the following screen:

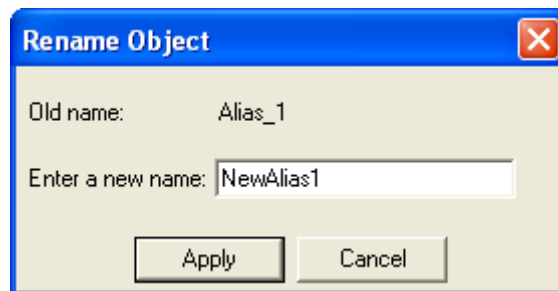


Figure 33: Rename alias

4.2.5 EDITING ALIAS

You may change configuration parameters for an alias. To do this, click the **Edit** menu item for the selected alias. You will get the same dialog screen as adding an alias.

4.2.6 DELETING ALIAS

To remove an alias, click the **Delete** menu item.

4.3 IMPORTING/EXPORTING ALIASES CONFIGURATION

You may import/export your alias configuration stored in a CSV file. To do so, click the **Alias Configuration** menu (Figure 34).

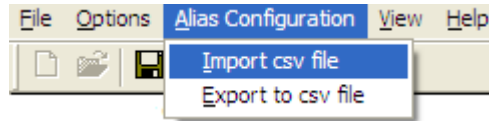


Figure 34: Alias configuration menu

Or, you can click on the toolbar as follows:

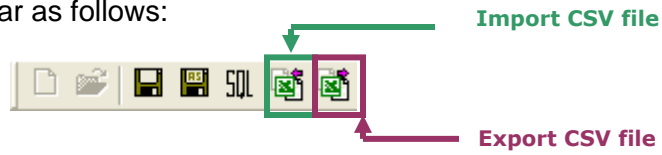


Figure 35: Alias configuration toolbar

When importing a CSV file, your current alias configuration will be replaced by the loaded one.

CSV FILE FORMAT

Comma-delimited text file (CSV) contains, in each line, a record that is composed of a set of fields. Fields are separated by a Comma mark. Each field is an alias attribute.

- Group,
- Alias,
- ItemPath,
- DataType,
- ReadOnly.

4.4 ITEM IDs SYNTAX

Remember that the slash “/” character is the separator used for item IDs in this OPC server. A tag is defined as follows:

Configured Aliases/Group_Alias/Column_Name_Value

Example: Configured Aliases /Group_1/tag1

5. GENERAL CONFIGURATION

Integration Objects' OPC HDA Server for InSQL provides you with a general configuration screen. General configuration includes the following main features:

- You may need to execute some SQL script to create your tables and populate them with rows before configuring server and object links.
- The database connection may be lost at server start-up or during server running. This OPC HDA Server incorporates a database recovery mechanism to restore lost connections.
- This OPC HDA Server supports event logging. This feature can be configurable. You may set some logging parameters.

5.1 EXECUTING SQL SCRIPT

You can execute any SQL script to create all needed tables. To do so, click the **Options** menu followed by the **Execute SQL script** menu item (Figure 36).

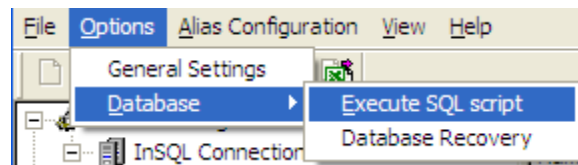


Figure 36: Execute SQL script menu

Or you can click on the toolbar as follows:



Figure 37: Alias configuration toolbar

You will get the following dialog screen:

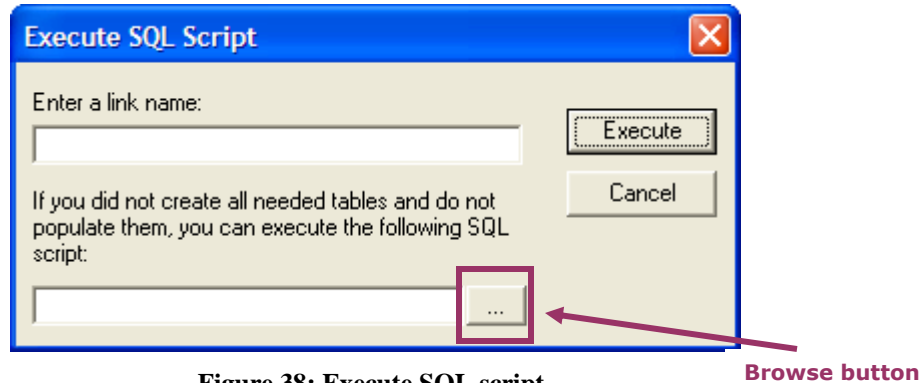


Figure 38: Execute SQL script

First off, enter a valid link name already connected to a database. Then, enter the full path of an SQL script (*.sql) or click the browse button to show a file dialog screen that allows you to select the script file.

Then, click the **Execute** button to execute the SQL script file. If errors occur while executing this script, you will get an error message box as illustrated in the figure below:

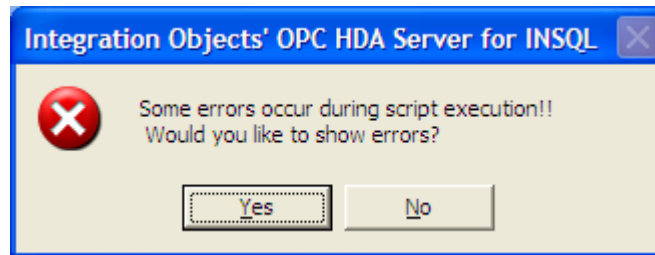


Figure 39: Configuration error when executing SQL script

If you want to view the log event file for script execution, click **Yes**.

5.2 DATABASE RECOVERY

You can customize database recovery parameters. To do so, click on the “Options” menu → “Database” menu item → “Database Recovery” sub menu item (see Figure 40).

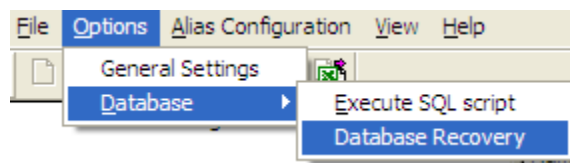


Figure 40: Database recovery menu

You will get the following dialog screen:

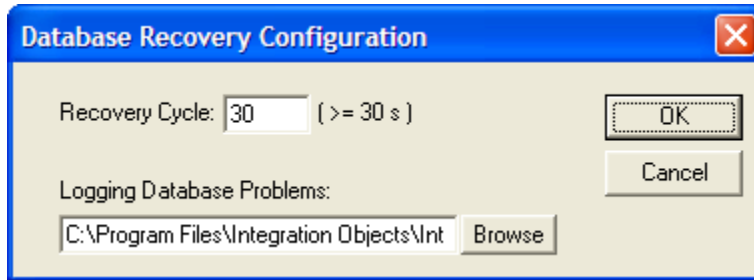


Figure 41: Database recovery settings

Parameter	Description
Recovery cycle	The amount of time (in seconds) that the server uses to check for database connection status. If there is any connection problem, the server application tries to restore this connection (at least 30 s).
Log event file path	This is the full path of log event file used to trace database connections problems.

5.3 SERVER/LOG SETTINGS

You can configure some general server parameters like server frequency. You can also configure your logging parameters. To do so, click the **Options** menu and then choose the **General Settings** menu item.

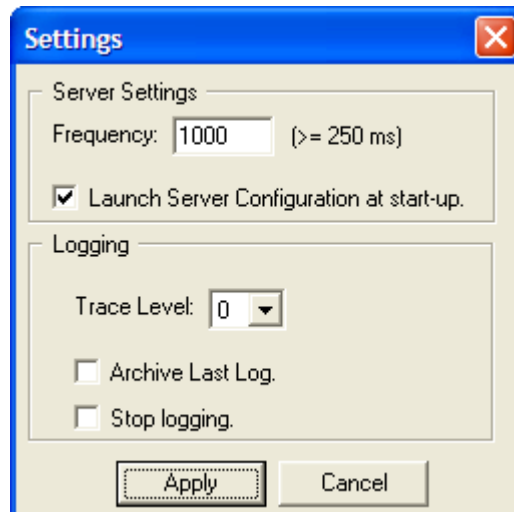


Figure 42: General settings

Parameter	Description
Frequency	Corresponds to the <i>Server_Rate</i> parameter in the ini file "DBSrv_CfgFile.ini" (at least 250 ms).
Launch server configuration at start-up	Corresponds to the <i>LoadConfigOnStartUp</i> parameter in the ini file "DBSrv_CfgFile.ini".
Trace level	Corresponds to the <i>LogLevel</i> parameter in the ini file "DBSrv_CfgFile.ini". The new log level will be taken in consideration in runtime.
Archive last log	Corresponds to the <i>ArchiveLastLog</i> parameter in the ini file "DBSrv_CfgFile.ini". Any modification for this parameter will be taken into consideration in runtime.
Stop logging	To stop logging.

5.4 VIEW CONFIGURATION ERRORS

You can view the last configuration/database problems. To do so, select the "View" menu → "Error messages" menu item.

DCOM CONFIGURATION

1. CONFIGURING THE SERVER FOR DCOM

To set up the server

1 Logon with administrator privileges.

Choose Run from the Windows Start menu and type **DCOMCNFG** on the computer where your target OPC HDA Server for InSQL is running, then click **OK** to run the program for configuring DCOM.

The DCOM configuration utility looks like this:

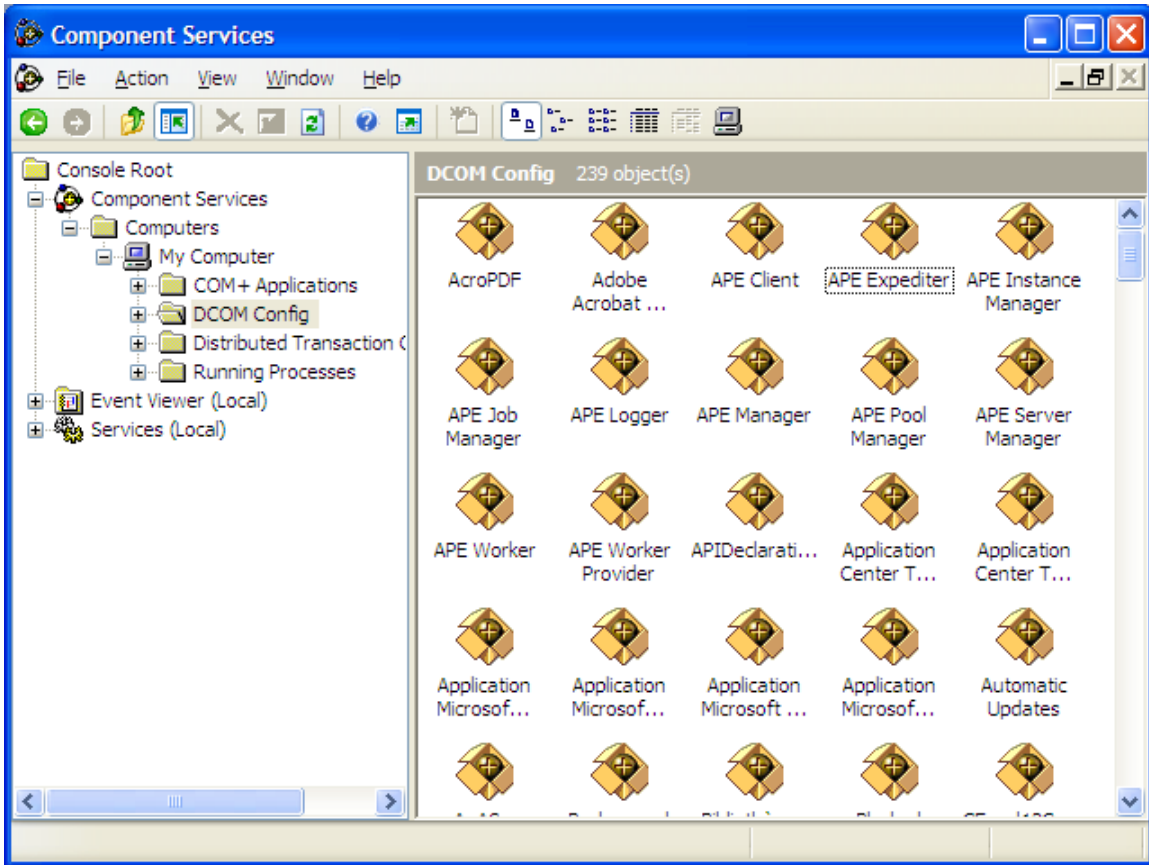


Figure 43: DCOM config

- a** Ensure that the Enable Distributed COM on this computer is enabled.
- b** Configure the Default Authentication Level to be Connect.
- c** Configure the Default Impersonation Level to be Identity.

2 Configure the Default Properties tab.

The Default Properties tab should look like this:

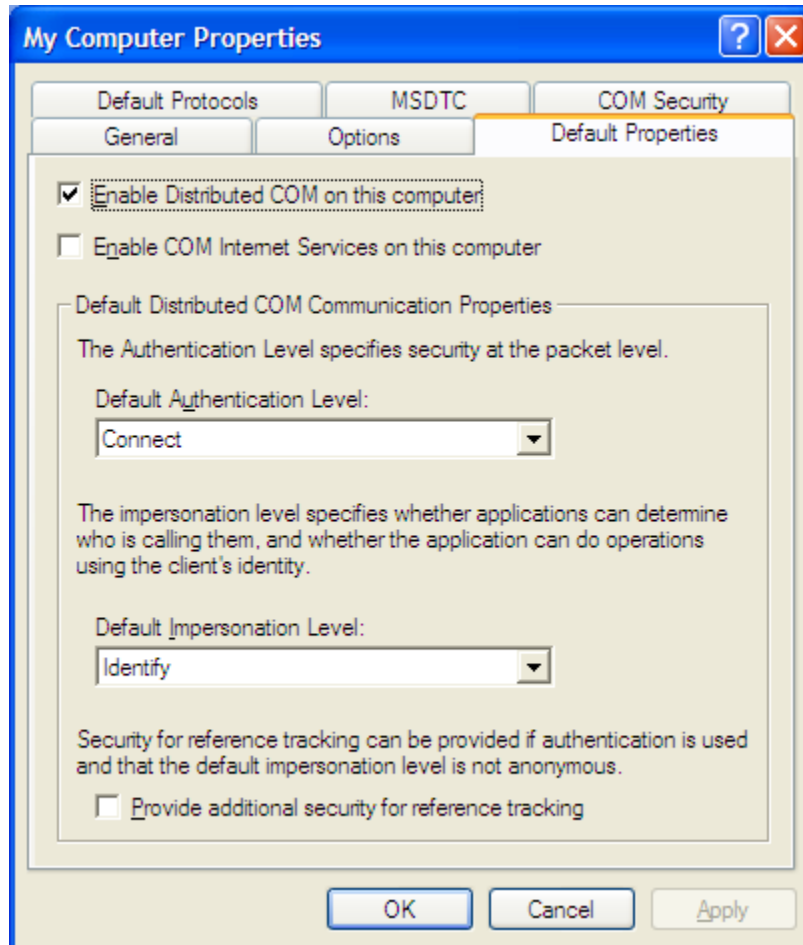


Figure 44: Default configuration

To configure DCOM settings for the OPC HDA Server for InSQL:

- 1 Click the **Application** tab in **DCOM Configuration** dialog and browse until you find the OPC HDA Server for InSQL.
- 2 Select the server and either right-click it or choose **Properties** to configure server-specific settings, as follows:
 - a On the **General** tab, we recommend that you leave the Authentication Level to be Default:

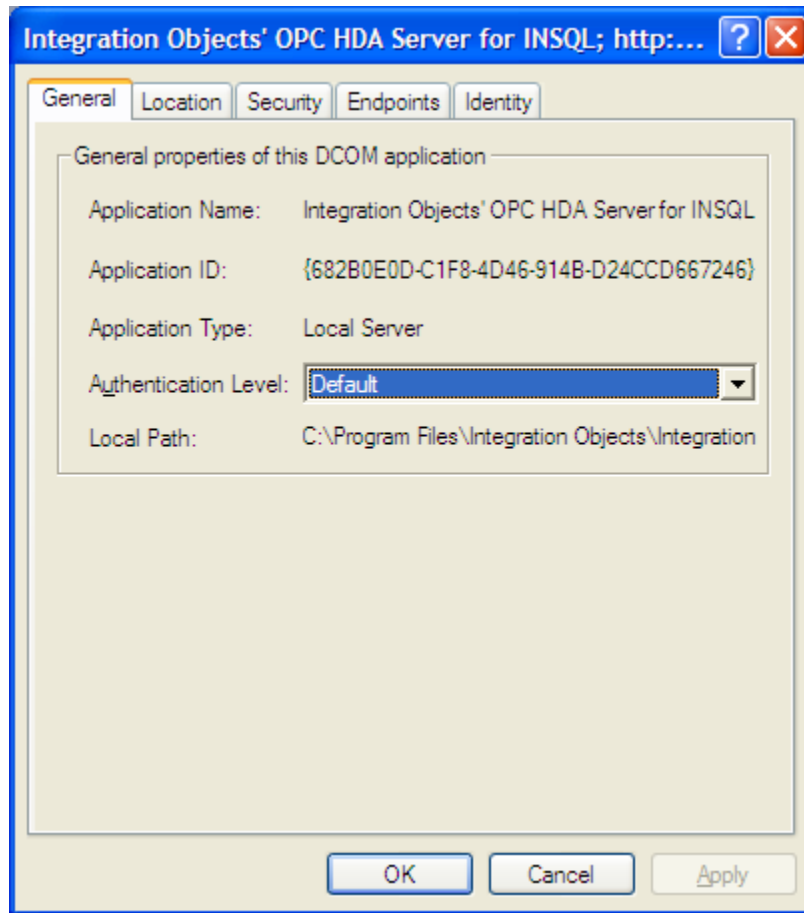


Figure 45: DCOM configuration

- b** On the **Location** Tab, ensure that **Run application on this computer** is the only check box that is checked:

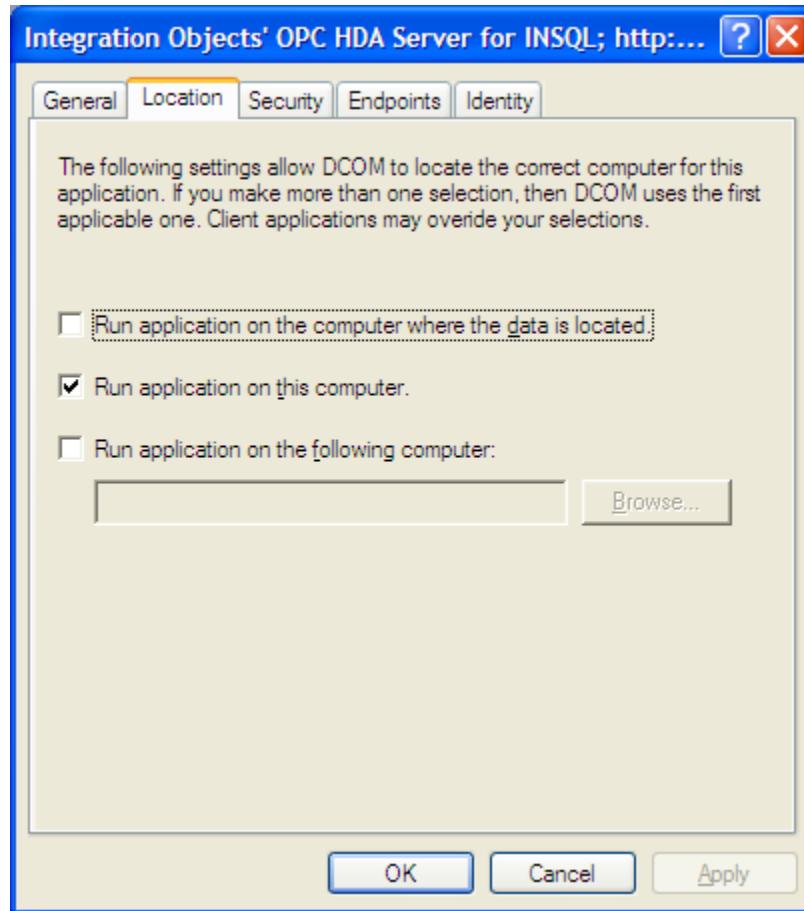


Figure 46: Location

- c** On the **Security** Tab, we recommend that you:
- Enable **Use default access permissions**, which means users/groups shown under the Default Security tab in the DCOM configuration utility, will have access to connect to this OPC Server.
 - Enable **Use default launch permissions**.

The same rules apply to using custom launch permissions here as they do to custom access permissions. If you choose to use the custom permissions to override the defaults, specify which users/groups to which you want to grant permissions.

The dialog looks like this:

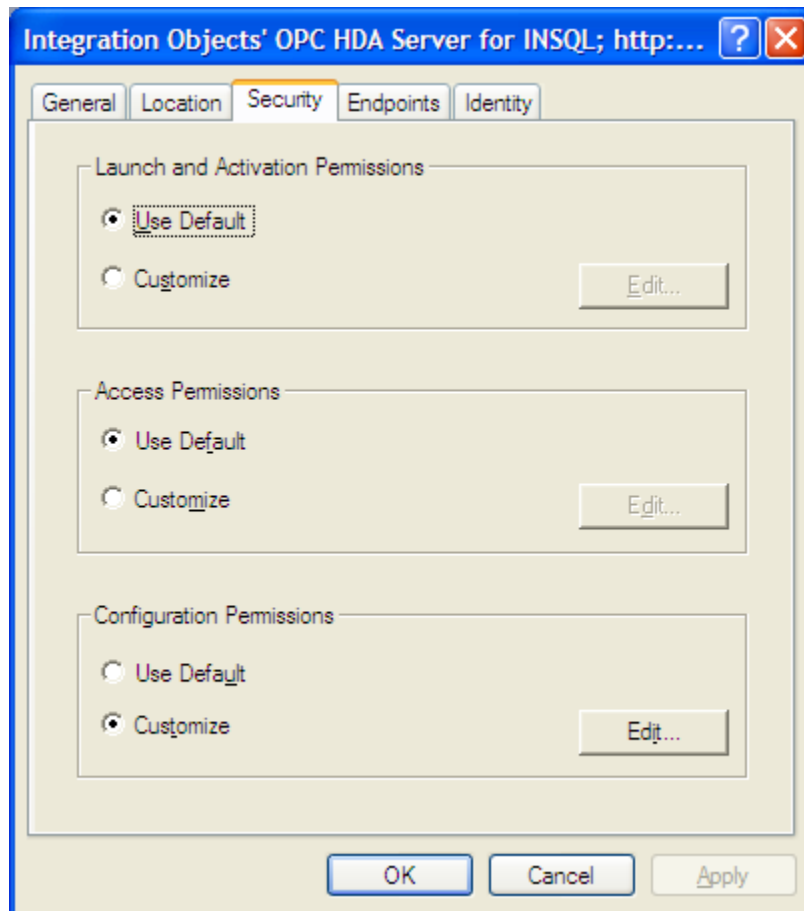


Figure 47: Security

- d** On the **Identity** Tab, select “This user” option and make sure to specify a user account with administrator privileges.

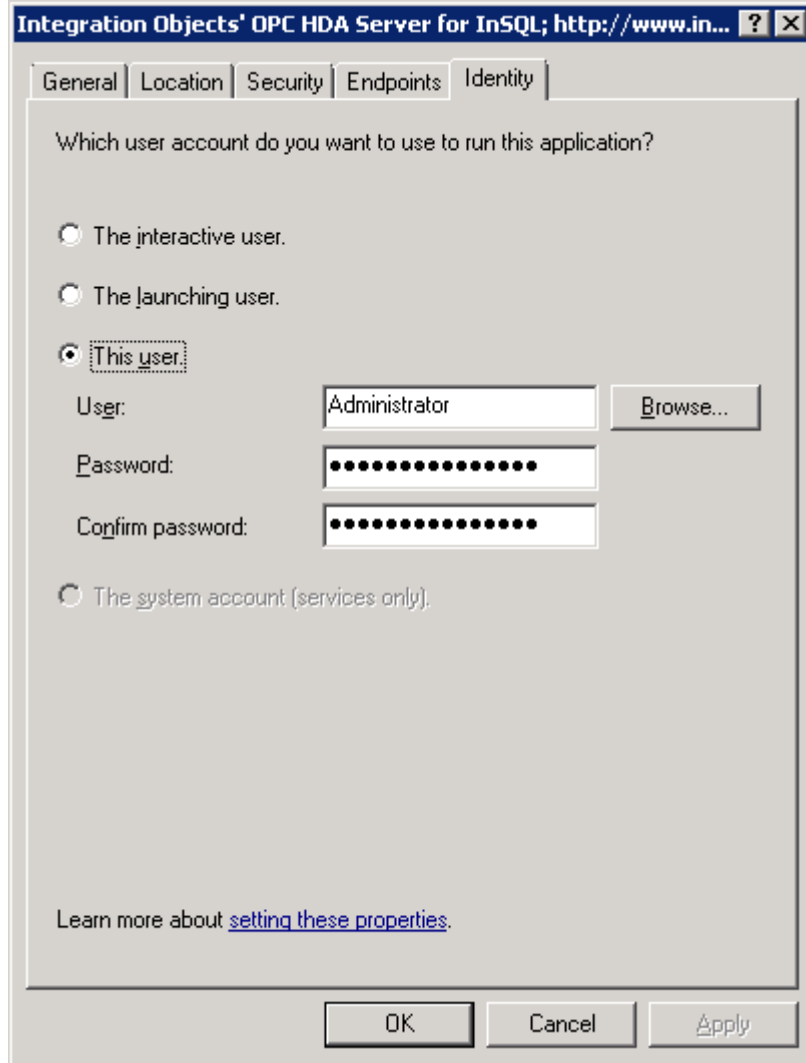


Figure 48: Identity

You do not need to configure anything on the **Endpoints** tab.

2. CONFIGURING THE CLIENT FOR DCOM

To set up the client

1. Launch the DCOM Config Utility.
2. Configure the **Default Properties** tab as you did on the server side.
3. Click the **Default Security** tab:

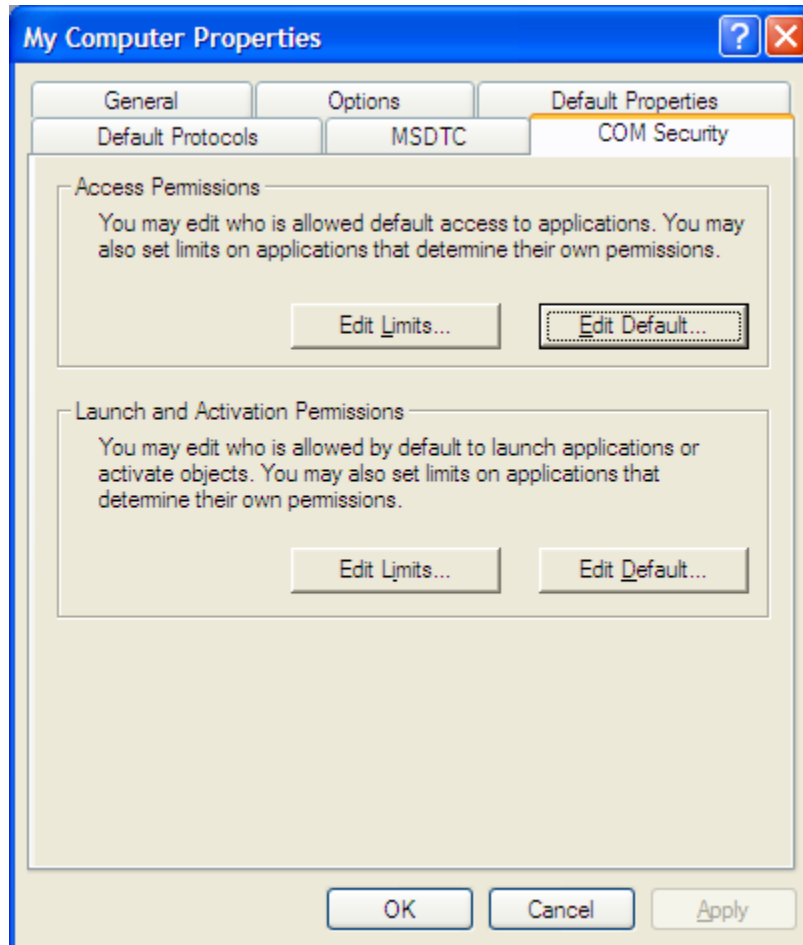


Figure 49: Default security

This is where you configure who has access to your OPC client from remote OPC servers. You only need to be concerned with the Default Access Permissions button on this tab.

4. Under Default Access Permissions:

Click the **Edit Default** button and configure the users of remote OPC servers whom you want to be able to make callbacks to this machine when your OPC client performs subscription-based read operations.

5. Configure the **Default Protocols** tab as you did on the server side.

Registering OPC HDA Server for InSQL:

To register the OPC HDA Server for InSQL on your client machine, you need to use a customized registry file. We shipped (*.reg) files for Windows XP professional platform. So, you just need to apply the appropriate file. Then, use the following steps to verify that the OPC HDA Server machine is properly delegated:

- a. On the client machine, run the DCOM Config Utility.
- b. Select your OPC HDA Server from the Applications tab and choose Properties.
- c. On the General tab, be sure that there is an entry for Remote Computer and that the remote computer name is correct.
- d. If the computer name is incorrect, select the Location tab.
- e. Ensure the Run application on the following computer setting is checked.

In the Dialog box, type in the correct computer name for your OPC HDA Server (see the figure below).

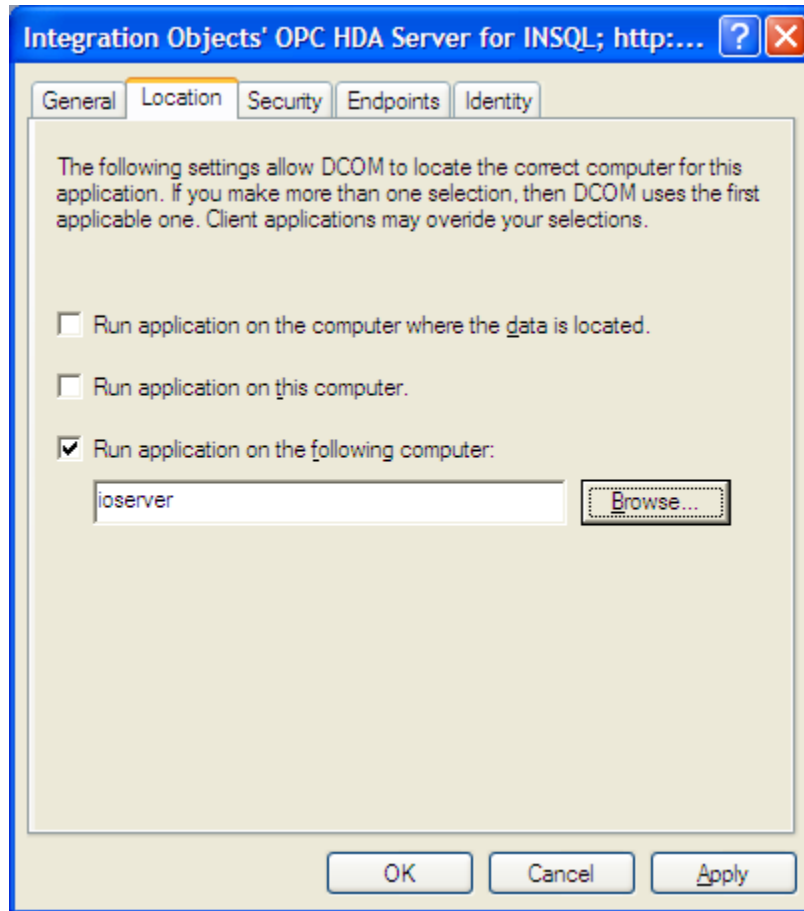


Figure 50: Location

You can also use the following steps to verify the remote computer name by using the Windows Registry:

- a. Run regedit.exe.
- b. The remote server name is specified in the following registry key:
HKEY_CLASSES_ROOT\AppID\{The CLSID of the OPC server}\RemoteServerName

TROUBLESHOOTING

1. Logging

The OPC HDA Server for InSQL produces a log file named “DBSrv_LogEvent.LOG” that records errors and debugging information for the server. As this server is based on Integration Objects’ OPC HDA Server DLL (DXServerDll.dll), you can view all logged DLL events in a separate file “SrvToolkit_LogEvent.LOG” for easy diagnostics. If difficulties occur with the server, the log files can be extremely valuable for troubleshooting. Under normal operations, the server logs very little information.

These log files are generated at start-up under the setup folder where the OPCHDAInSQL.exe is located.

This OPC HDA Server incorporates a configuration file “DBSrv_CfgFile.ini” which includes several logging parameters, a timing parameter (used to improve the performance of the server) and some database recovery parameters. All these parameters have default settings and can be changed at start-up by editing the configuration file or using the server GUI.

To change this file:

1. Open DBSrv_CfgFile.ini in a text editor.
2. Edit any of the parameters listed in the following tables:

Or you can update these parameters through the GUI of the server.

Log Setting	Description	Default Value
LogFileMaxSize	The maximum log file size, in bytes. Once this size is reached during run-time, the log file is overwritten.	1048576*2 ~ 2 Mo (MegaByte)
LogLevel	The log level. Possible Values are: 0: Only fatal error messages are logged. 1: All critical error messages are logged.	0

	<p>2: All errors are logged.</p> <p>3: All warnings are logged.</p> <p>4: All information is logged.</p> <p>5: For Debug information.</p> <p>The higher the log level is, the more information is recorded. We recommend using level 0 for a better performance of the server.</p>	
ArchiveLastLog	<p>TRUE: Old file is copied to an intermediate file with incremental extension, before being overwritten.</p> <p>FALSE: Any pre-existing log file is erased and overwritten at start-up.</p>	FALSE
LoadConfigOnStartUp	<p>TRUE: the server configuration will be loaded at OPC HDA Server start-up.</p> <p>FALSE: the server starts without loading configuration file (no tags in the server address space).</p>	TRUE
ConfigFilePath	The full path of the server configuration file for the database.	

PerfParameters	Description	Default Value
SERVER_RATE	This parameter is the frequency at which the server handles the asynchronous reads/updates.	250 ms (milliseconds)
ClientRequestTimeout	Recovery time before initiating restore procedure of the OPC Server. If set to 0, the automatic restore feature will be disabled	0 s (Seconds)

DBRecovery	Description	Default Value
sCycle	This parameter is the frequency at which the server checks for the database connection state.	30 s (seconds)
DBLogFile	The full path of the logging file for tracing database problems.	

InSQL Setting	Description	Default Value
UseHistoryMode	Set the field TRUE if you want the OPC HDA Server use the field wwRetrievalMode in the SQL queries.	FALSE
wwRetrievalMode	Retrieval Mode field to use in the SQL queries when UseHistoryMode is true	DELTA
UseBounds	When the OPC HDA client request bounds value and those values are not in the historian, the OPC HDA server should return empty values for the start time and end time. If your OPC HDA client cannot read empty values, you can set the value of this parameter to FALSE	TRUE
SQLVERSION	The version of SQL Server used in InSQL historian. Set the value to 2008 if the SQL Server version is 2008 or higher. Set the value to 2005 if the SQL Server version is 2005.	2008
Delimiter	OPC Item IDs delimiter	/

3. Save the file for the settings to take effect.

SAMPLE CONFIGURATION FILE

```
[LogSetting]
LogFileMaxSize=2097152
LogLevel=0
ArchiveLastLog=TRUE
LoadConfigOnStartUp=TRUE
ConfigFilePath=C:\Program Files\Integration Objects\Integration Objects' OPC HDA Server for
InSQL\Config.xml
[PerfParameters]
Server_Rate=250
ClientRequestTimeout=0
[DBRecovery]
sCycle=30
DBLogFile=C:\Program Files\Integration Objects\Integration Objects' OPC HDA Server for
InSQL\DBRecovery_LogEvent.LOG
[InSQLSetting]
UseHistoryMode = TRUE
wwRetrievalMode = DELTA
UseBounds = TRUE
SQLVERSION = 2008
Delimiter=\
```



You may change the configuration parameters in the “SrvToolkit_CfgFile.ini” configuration file for more details about the OPC calls by editing the log trace level parameters.

DATABASE LOGGING

All database connection problems are recorded in a configuration file that allows you to customize its full path (by default DBRecovery_LogEvent.LOG under the setup folder).

2. DCOM

This section addresses some DCOM related problems while using OPC servers:

Problem 1: You have an “Access denied” error on the client machine. The client and server are running on standalone machines (meaning not on the same domain).

Let’s assume that the OPC client is running on machine A and the OPC HDA Server on machine B.

When the OPC client and server are on different computers, you have to give each computer access to the other by giving access permissions. The permission issue is crucial to proper DCOM configurations.

Here the server is running on a standalone machine. So the ONLY user accounts it will trust are those it finds in its own "local" security database. Here is how this can get you into trouble when setting up an OPC client to server connection.

To allow a remote client to access the DCOM server, the DCOM utility uses a Windows Security database. For this reason, you cannot give access to a user account, which is not found in this database.

Here is the issue:

1. You can add Machine B onto the same domain as Machine A (or in a trusted domain), which is the safest way to correctly set up communication between the OPC client and the OPC server.

2. You need to create the EXACT SAME user account name AND password on BOTH machines (for example User1 (login), PWD1 (password)). Once you have that set up, when Machine A comes calling on Machine B with an OPC request and identifies himself as User1 with PWD1 password, Machine B will look in its database, see the same account name, the same password, and same "come on in request from Machine A". When Machine B goes to return its data from the OPC HDA Server to the OPC client on machine A, the OPC HDA Server will go call Machine A as User1 with a password -- Machine A will look in its database, see that it has that account, and accept the call. This workaround should resolve the communication problem between the OPC client and server.

Problem 2: You have been running your OPC client on a Windows XP machine. When upgrading the machine to XP Service Pack 2, the OPC client becomes unable to connect to the OPC server.

This is a common problem when using OPC via DCOM with Microsoft Windows XP Service Pack 2.

In fact, when Service Pack 2 is installed with its default configuration settings, OPC communication via DCOM will cease to work.

To resolve this issue, you have to reconfigure your settings for:

- 1- The windows XP firewall.
- 2- And DCOM.

Click on this link [Using OPC via DCOM with XP SP2.pdf](#) to download the OPC Foundation document that describes all steps to apply new settings.

Problem 3: Launching the OPC Server without needing to log to the System

To launch the OPC Server without needing to log to the System, please proceed to the following steps:

- 1- Stop the OPC Server and verify that the windows service is stopped.

- 2- Open Windows DCOM Configuration using the command DCOMCnfg
- 3- Locate the DCOM component Integration Objects' OPC HDA Server for InSQL

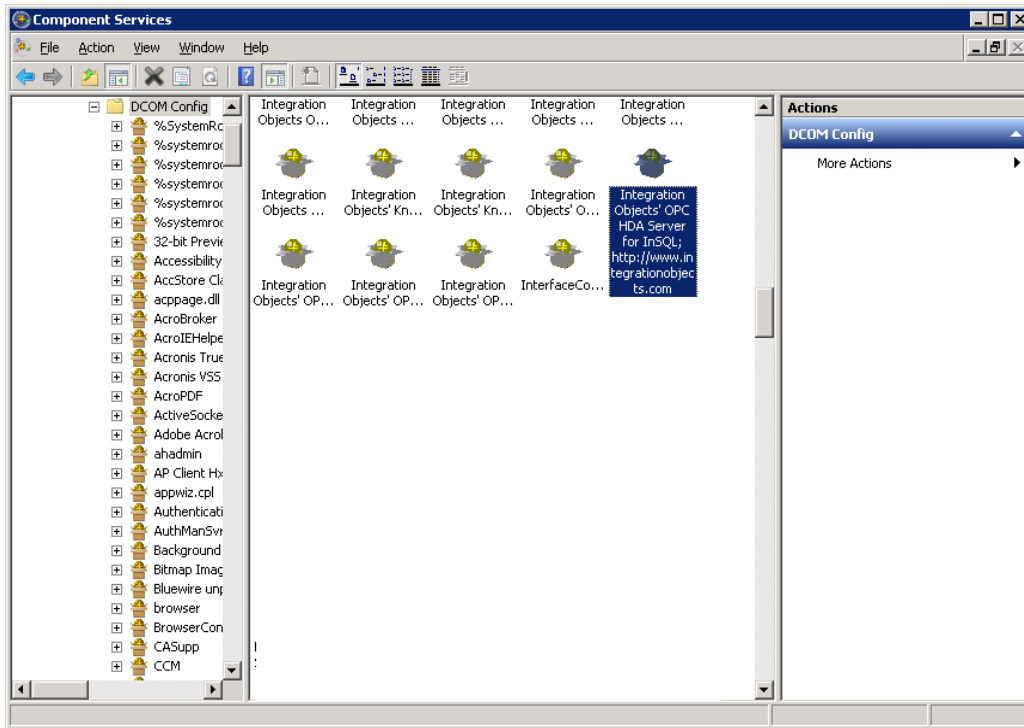


Figure 51: DCOM settings

- 4- Right click then select properties from the displayed menu:



Figure 52: Properties

- 5- Select Identity Tab
- 6- Choose This user

7- Enter your user name and password

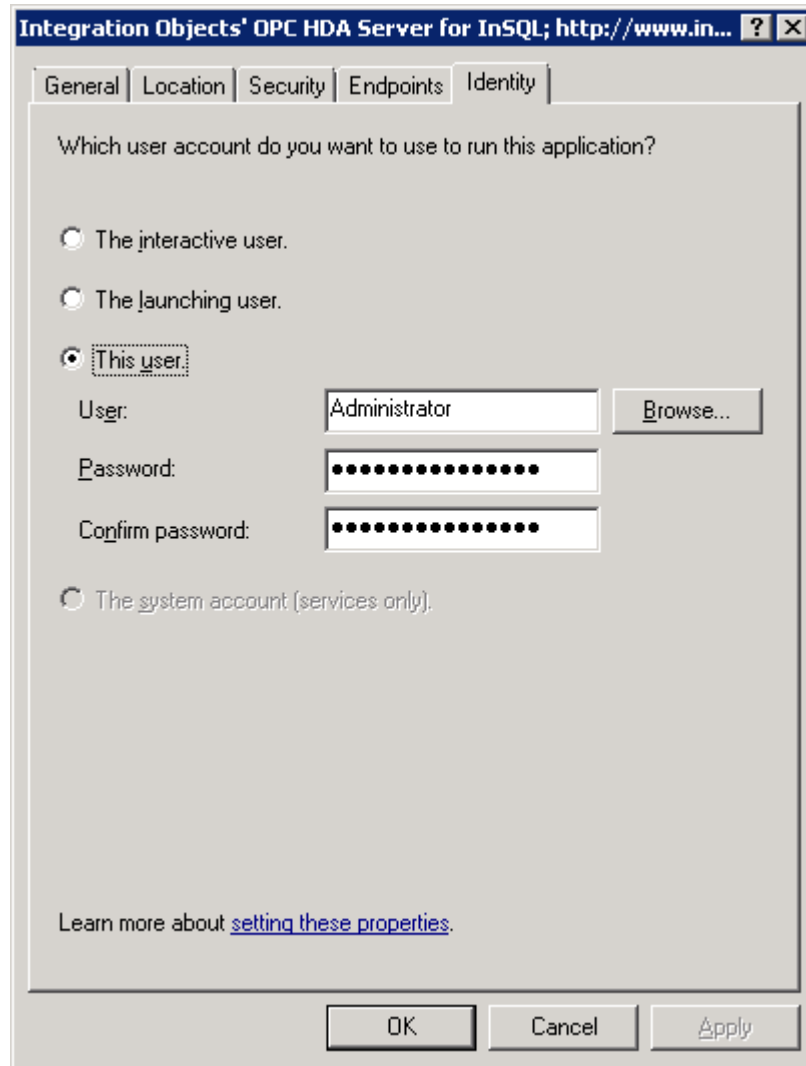


Figure 53: Identity

8- Click Apply

TIPS

1. TRUNCATED DATA

In update methods like insert and update, data may be truncated if you choose a variant type different to the canonical one.

Example: Insert a value with data type = VT_UI2 knowing that the canonical data type is VT_I4.

Original value: 223355 → 26747

2. SERVER SPECIFIC ERRORS

Integration Objects defines the following error codes for this OPC server:

Error code	Description
IO_E_DB_STATE	A database problem has occurred: may be an exception or a broken connection.

For additional information on this guide, questions or problems to report, please contact:

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