



AIOT CLOUD CORP.

AIC OPC UA Extender

User Manual

AIOT CLOUD CORP.

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FAQ



User Guides

CONTENTS

Preface

Disclaimer	1
Acknowledgements	1
Revision History.....	1

Chapter 1: Using the AIC OpcUa Extender Server

1.1 Introduction.....	2
1.2 Installing AIC OpcUa Extender Server	3
1.3 Launching AIC OpcUa Extender Server	8

Chapter 2: AIC OpcUa Extender Server Basics

2.1 Status	13
2.2 Endpoints	14
2.3 Users	16
2.4 Historical.....	19
2.4.1 Historical Editor	21
2.5 Alarm & Event.....	26
2.5.1 AlarmEvent Editor	27
2.6 Industrial Protocols.....	32
2.6.1 Modbus TCP	33
2.6.2 Modbus RTU.....	34
2.6.3 Modbus ASCII	35
2.6.4 OPC UA Client	36
2.7 Database	38
2.8 Option.....	54
2.9 License.....	56
2.10 About.....	58

Chapter 3: Advanced Functions

3.1 Update the Server Certificate	59
---	----

Chapter 4: Tutorial

4.1 Configure the Modbus Data Into OpcUa Extender Server	62
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PREFACE

Disclaimer

The information in this document is subject to change without prior notice and does not represent commitment from AIOT CLOUD CORP. However, users may update their knowledge of any product in use by constantly checking its manual posted on our website: <https://www.aiotcloud.dev>. AIOT CLOUD CORP. shall not be liable for direct, indirect, special, incidental, or consequential damages arising out of the use of any product, nor for any infringements upon the rights of third parties, which may result from such use. Any implied warranties of merchantability or fitness for any particular purpose is also disclaimed.

Acknowledgements

The AIC OPC UA Extender Server is a trademark of AIOT CLOUD CORP. All other product names mentioned herein are registered trademarks of their respective owners.

Revision History

Version	Date	Description
v1.0	May 2023	1. Support Modbus/TCP protocol 2. Support Modbus/RTU protocol 3. Support Modbus/ASCII protocol
v1.1	August 2023	1. Support OPC UA Client protocol

CHAPTER 1:

USING THE AIC OPCUA EXTENDER SERVER

1.1 Introduction

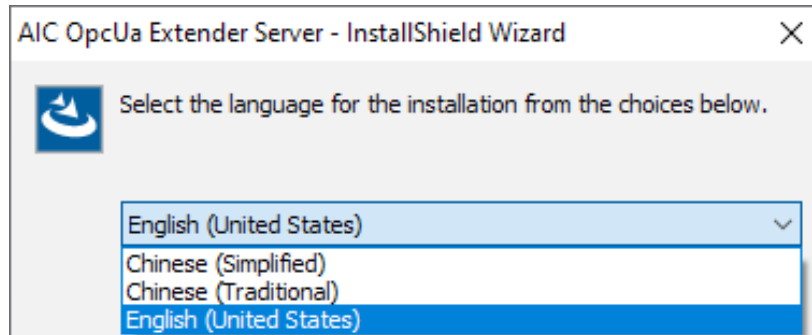
AIC OpcUa Extender Server is an Open Platform Communications Unified Architecture (OPC UA) server package focused on communicating with systems for data collection. Based on the OPC UA information model, we provide the platform required for information collection and allow users to leverage the service-oriented architecture of OPC UA to organize their complex data into an OPC UA namespace. With features such as tag subscriptions and real-time updates, AIC OpcUa Extender Server plays a key role as a communication portal that allows OPC UA clients to manipulate HMI or PLC data. AIC OpcUa Extender Server consists of a configurable GUI for parameters and settings as well as an OPC UA server service to act as a hub for gathering data and sending them to OPC UA client applications, enabling a streamlined OPC UA system operation.

Check the operating system requirement before installing the AIC OpcUa Extender Server. The following are the supported operating systems:

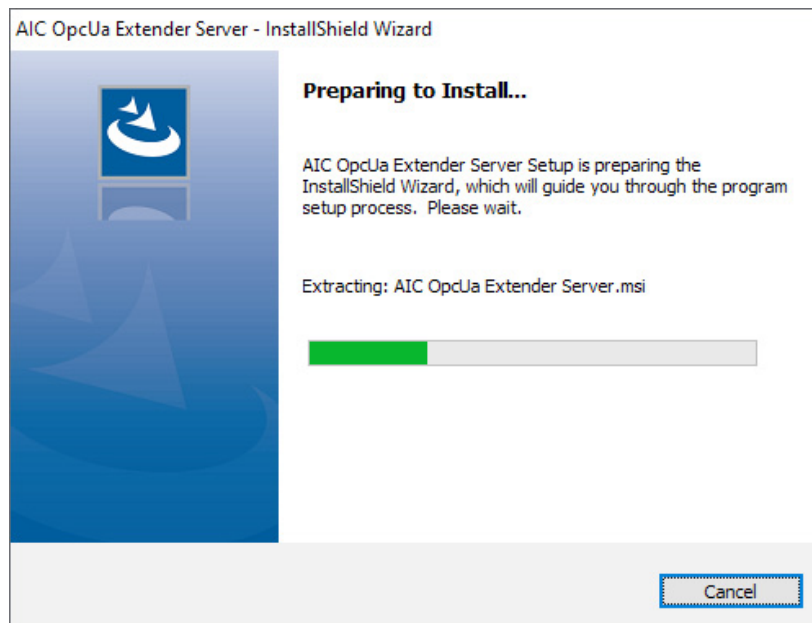
- Microsoft Windows 11, Windows 10
- Microsoft Windows Server 2019, 2016

1.2 Installing AIC OpcUa Extender Server

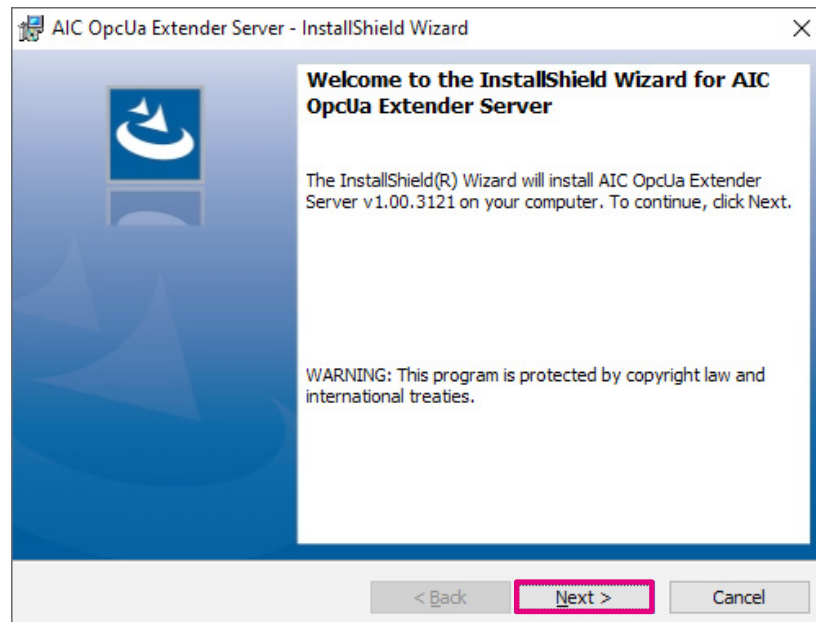
1. Double-click the AIC OpcUa Extender Server setup file, then select the language to install and click <OK>.



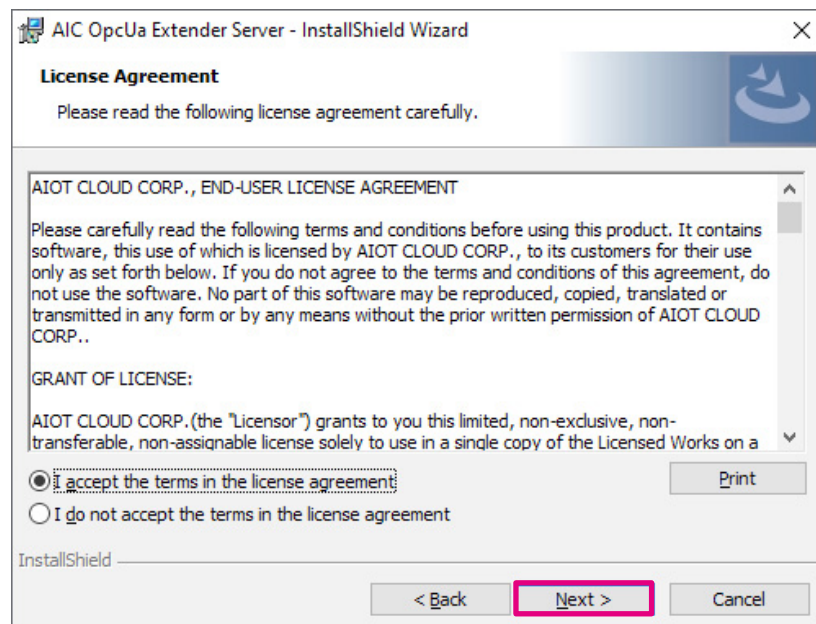
2. The installation wizard will prepare the setup process.



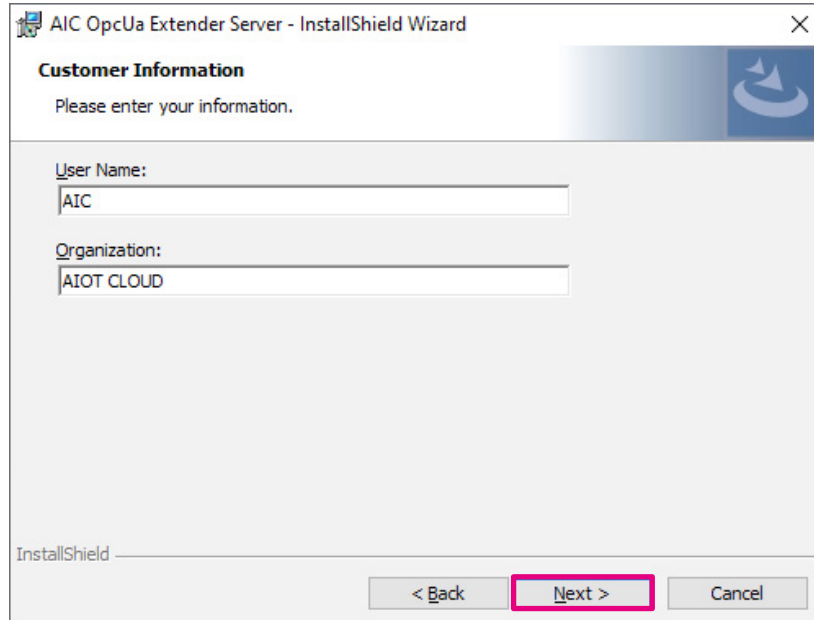
3. Click **<Next>** to proceed, or click **<Cancel>** to quit.



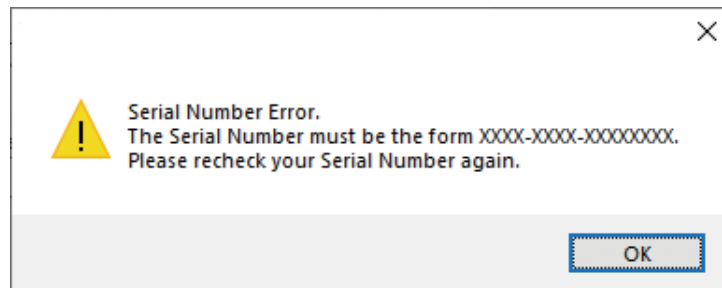
4. Check the **I accept the terms in the license agreement** option, and click **<Next>** to proceed.



5. Enter the user information, then click <Next>.

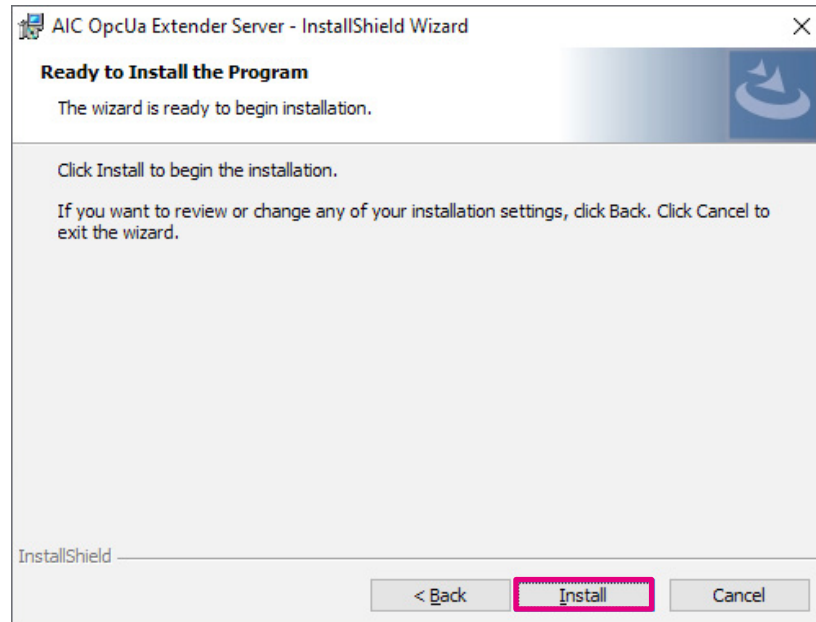


Note: You can use the Trial Version and enter the serial number later. The entered product key will introduce a respective version of AIC OpcUa Extender Server displayed on the title of the GUI.

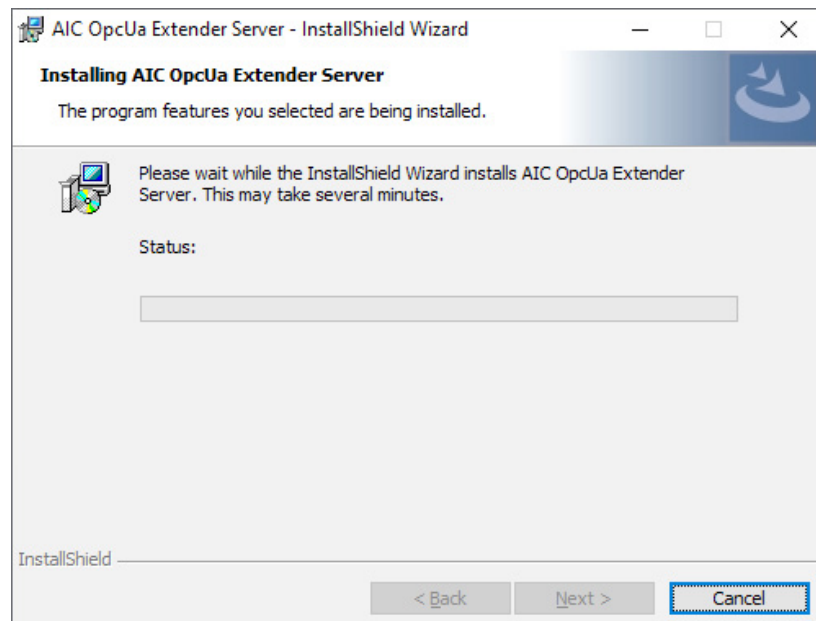


**A warning message will be prompted if the serial number is invalid.*

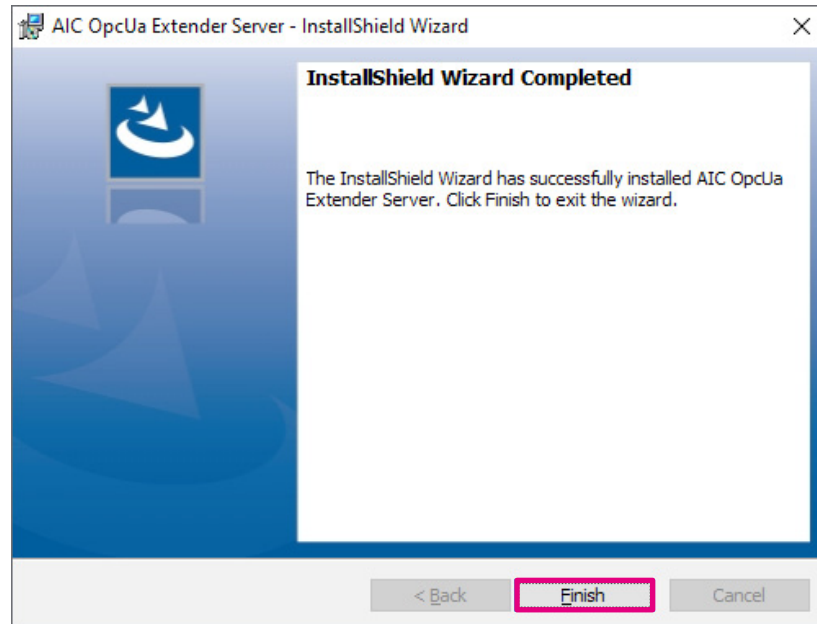
6. Click **<Install>** to continue with the installation.



7. The installation will begin and may take a while.

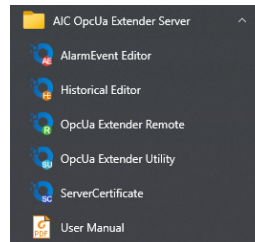


8. Once completed, click **<Finish>** to exit the installation wizard.

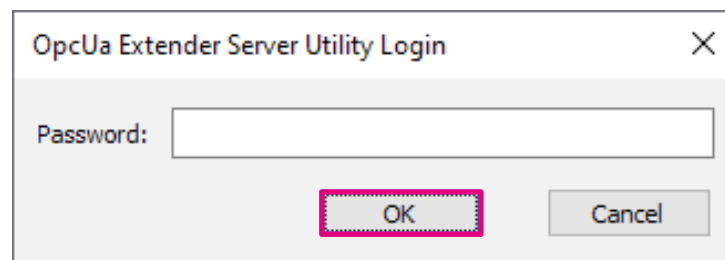


1.3 Launching AIC OpcUa Extender Server

Once installed, you should be able to find the program named **AIC OpcUa Extender Server** in the **All Programs** list as shown.

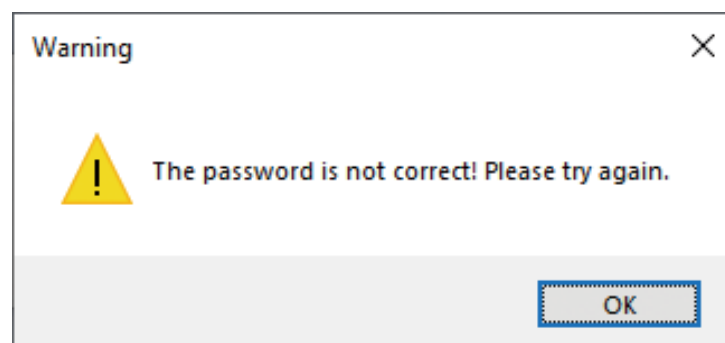


1. Click on the icon or **<OpcUa Extender Utility>** to launch the AIC OpcUa Extender Server.
2. Enter the password in the respective field, then click **<OK>**.



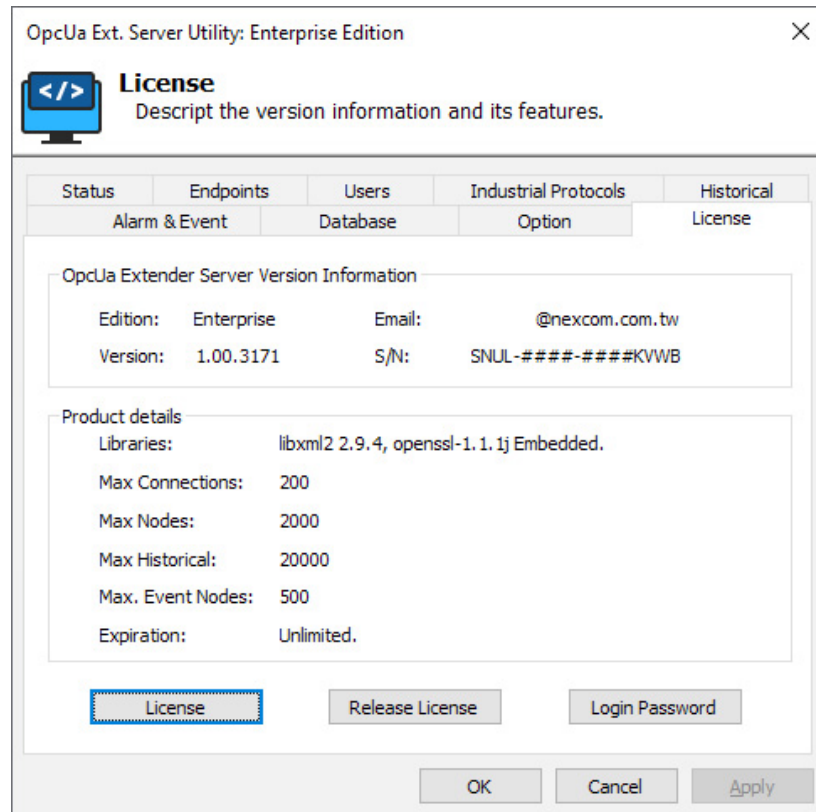
Note:

1. Use the default Password: *0000* to log in if you are logging in for the first time.
2. Remember to change the password frequently and keep it in a safe place to avoid hacking. Refer to [License](#) for setting the password.



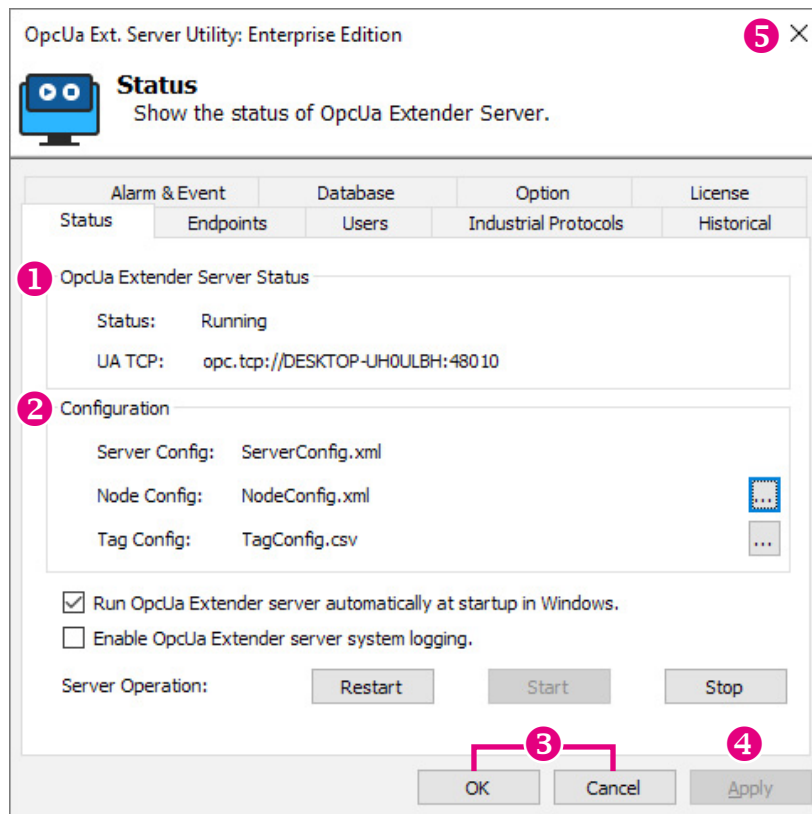
**A warning message will be prompted if an incorrect password is entered.*

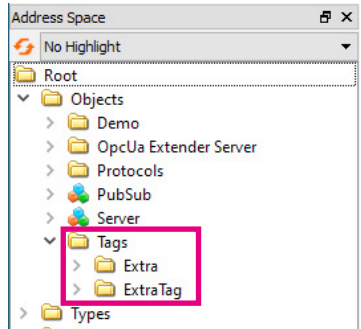
3. The GUI of AIC OpcUa Extender Server will be displayed on the screen.

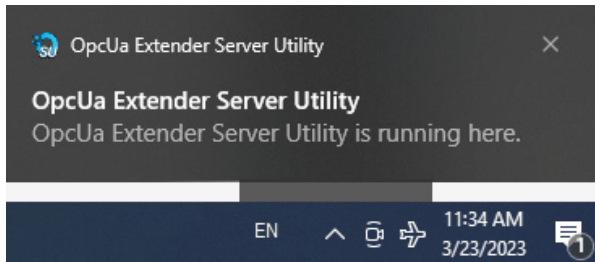

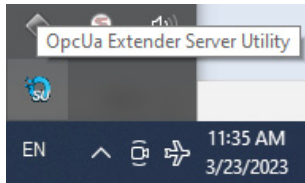
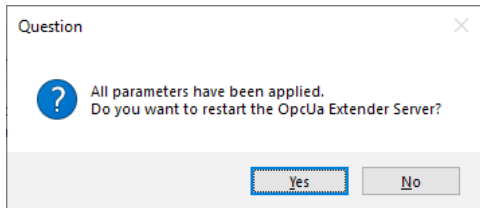


CHAPTER 2: AIC OPCUA EXTENDER SERVER BASICS

AIC OpcUa Extender Server consists of 9 pages of information and menus for server status and configurable parameters. Simply click on the corresponding tab for further configurations.

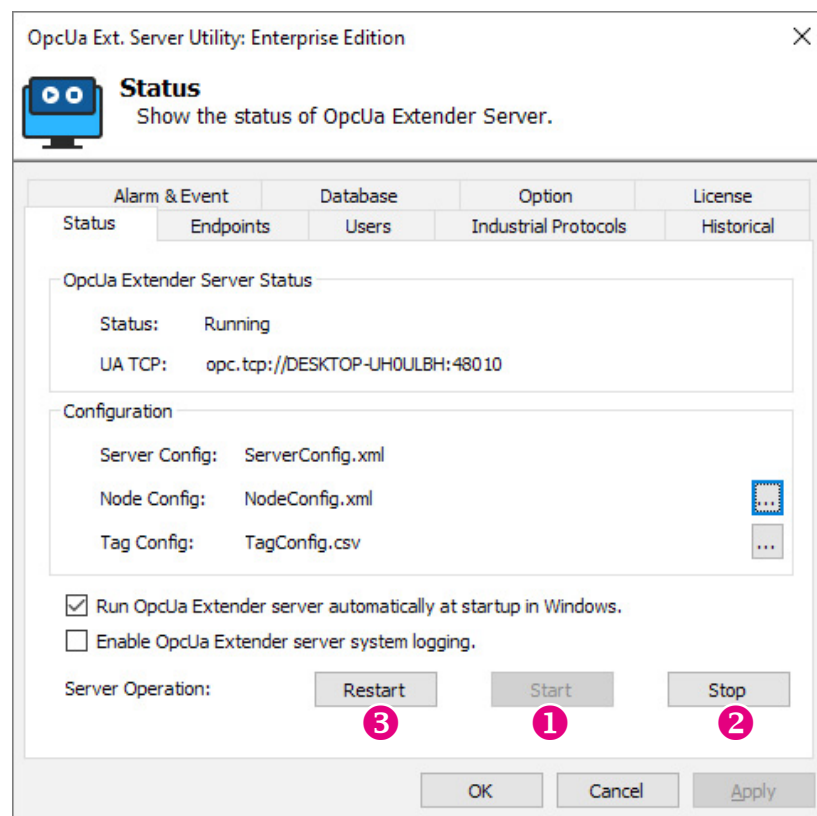


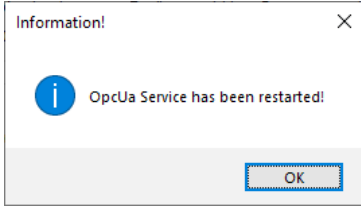
Item	Name	Description
1	OpcUa Extender Server Status	Move the cursor onto the connection address and right click to copy it.
2	Configuration	<p>Server Config: Config the Server using the ServerConfig.xml file</p> <p>Node Config: Config Nodes using the xml file. Click < ... > to select the node config file, the default is NodeConfig.xml</p> <p>Tag Config: Config Tags using csv file. Click < ... > to select the tag config file, the default is TagConfig.csv.</p> <p>The Tag CSV definition:</p> <ul style="list-style-type: none"> - Format: Tag_Name, Display_Name, Directory, Data_Type, Length, Default - Tag_Name: The Tag Name. - Display_Name: The Tag in OpcUa node browser name. - Directory: OpcUa node directory for this Tag. - Data_Type: There are STRING, BOOLEAN, SHORT, INT16, WORD, UINT16, LONG, INT32, DWORD, UINT32, FLOAT, DOUBLE, BCD, LBCD. - Length: The Tag data length if > 1 means array data type. - Default: The default value. <p>In UaExport will in Address Space has Tags folder with tags like below:</p> 

Item	Name	Description
3	OK/Cancel	<p>Click <OK> or <Cancel> to hide the interface in the background.</p>  <p>To bring the interface back to the screen, click on <Show hidden icons> () in the taskbar, and click on the icon of OpcUa Extender Server. A message will prompt you to enter the password.</p> 
4	Apply	<p>Click <Apply> to make the configured parameters take effect. A message will prompt you with the option to restart the server.</p> 
5	X	Click on the <X> button to exit AIC OpcUa Extender Server.

2.1 Status

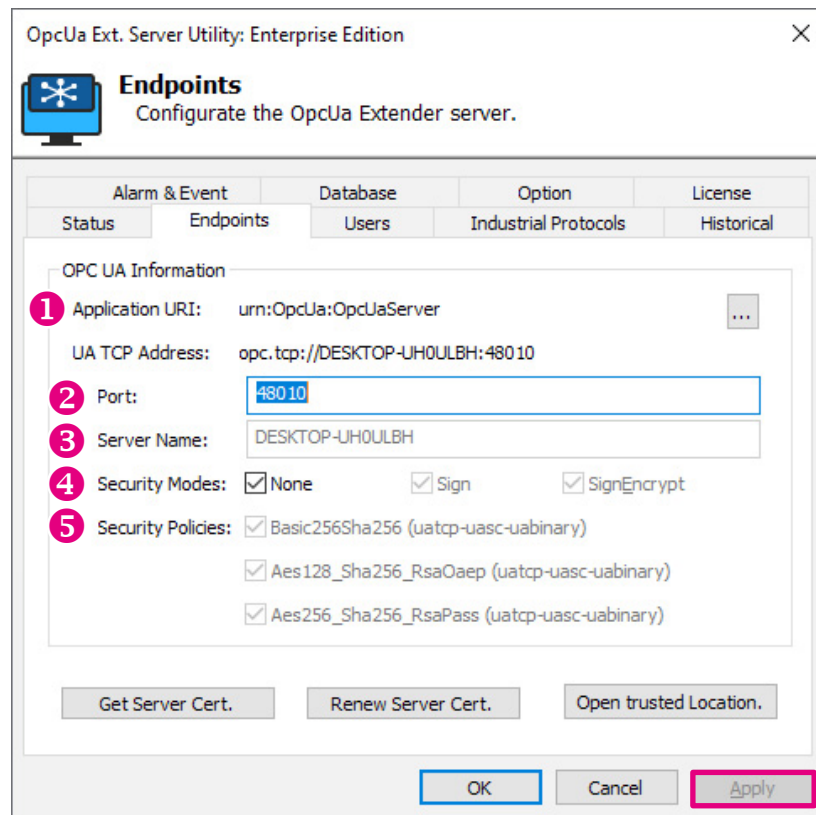
The Status page displays brief information about the current server status. When AIC OpcUa Extender Server is launched, the server operation is initially stopped by default. Once AIC OpcUa Extender Server is up and running, the connection addresses for **UA TCP:** will be displayed respectively, allowing client applications to use the addresses to connect to AIC OpcUa Extender Server.



Item	Name	Description
1	Start	Click < Start > to get the server running.
2	Stop	Click < Stop > to stop the server operation.
3	Restart	Click < Restart > to stop and start the server operation. 

2.2 Endpoints

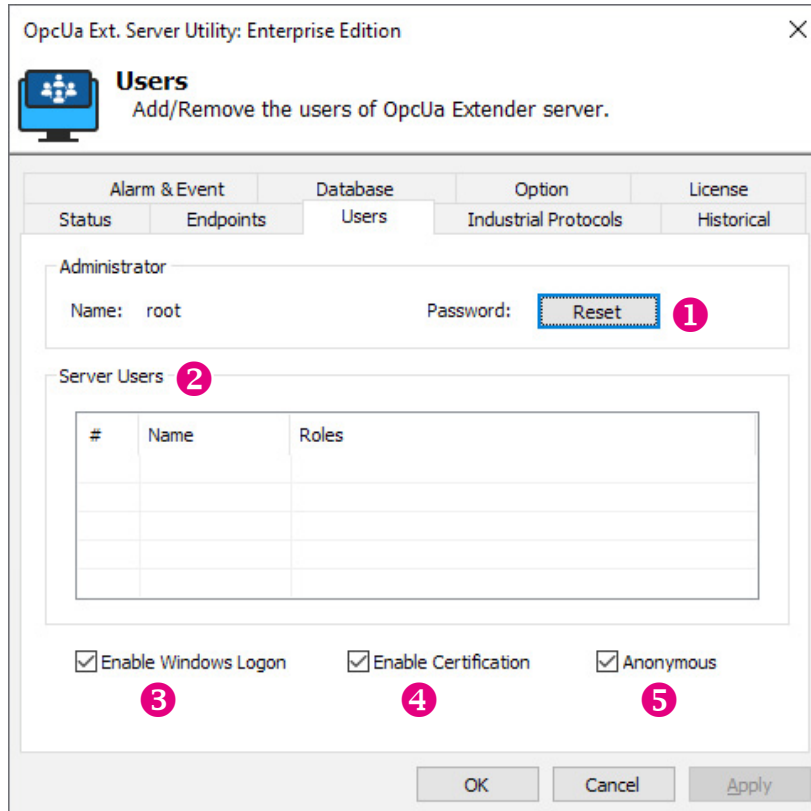
The Endpoints page allows you to configure all affiliated settings of connections between endpoints. You can edit the settings and save them by clicking **<Apply>** at the bottom of the user interface. The settings are applied once the server has been restarted.



Item	Name	Description
1	Appliation URI	UA TCP is the default network protocol for the endpoints.
2	Port	Enter a number in the Port field to set the dedicated port for the connection address.
3	Server Name	Enter a name in the Server Name field to set the hostname for the connection address.
4	Security Modes	<p>Check either of the checkboxes in Security Modes to set the method for authenticating the connection.</p> <ul style="list-style-type: none"> • None: The connection does not require authentication. • Sign: The connection requires sign-in information. • SignEncrypt: The connection requires and encrypts sign-in information.
5	Security Policies	<p>Check either of the checkboxes in Security Policies to set the encryption algorithm used for the connection.</p> <ul style="list-style-type: none"> • Basic128Rsa15: The connection adopts RSA15 as the key wrap algorithm and 128-bit Basic as the message encryption algorithm. • Basic256: The connection adopts 256-bit Basic as the message encryption algorithm. • Basic256Sha256: The connection uses SHA256 for the signature digest and 256-bit Basic as the message encryption algorithm.

2.3 Users

The Users page displays user authentication settings. Connections to AIC OpcUa Extender Server can be authenticated with username/password, Windows Logon, or Certification.



OpcUa Ext. Server Utility: Enterprise Edition

Users

Add/Remove the users of OpcUa Extender server.

Alarm & Event Database Option License

Status Endpoints Users Industrial Protocols Historical

Administrator

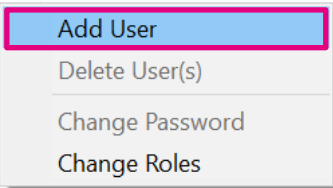
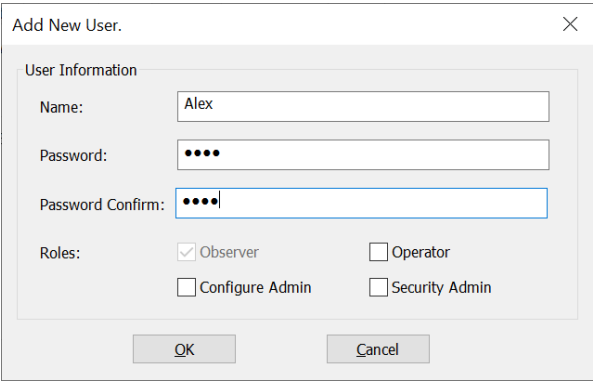
Name: root Password:

Server Users

#	Name	Roles

Enable Windows Logon Enable Certification Anonymous

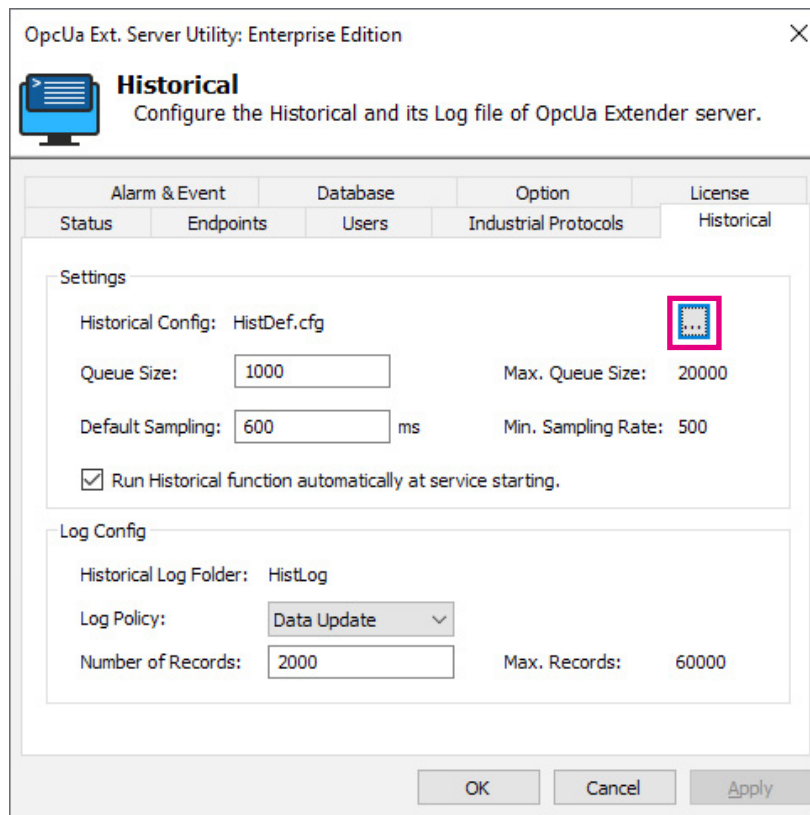
OK Cancel Apply


Item	Name	Description
1	Reset	Click <Reset> to change the password of the Administrator .
2	Server Users	<p>Right-click on the table in Server Users to Add a user, Delete one or multiple users, Change Password of a user, and Change Roles of a user.</p> <p>Note: Press and hold the Shift key and click on the name of the user to select multiple users.</p> 
	Add User	<p>Select Add User in the pop-up window to add a new account. Enter the required information in the respective fields, and select the required Access Right option by selecting the respective checkboxes. Click <OK> when done.</p> 
3	Enable Windows Logon	Check the checkbox on the left of Enable Windows Logon to enable or disable Windows logon, which is a feature that uses username and password of the local windows installation for AIC OpcUa Extender Server connection.

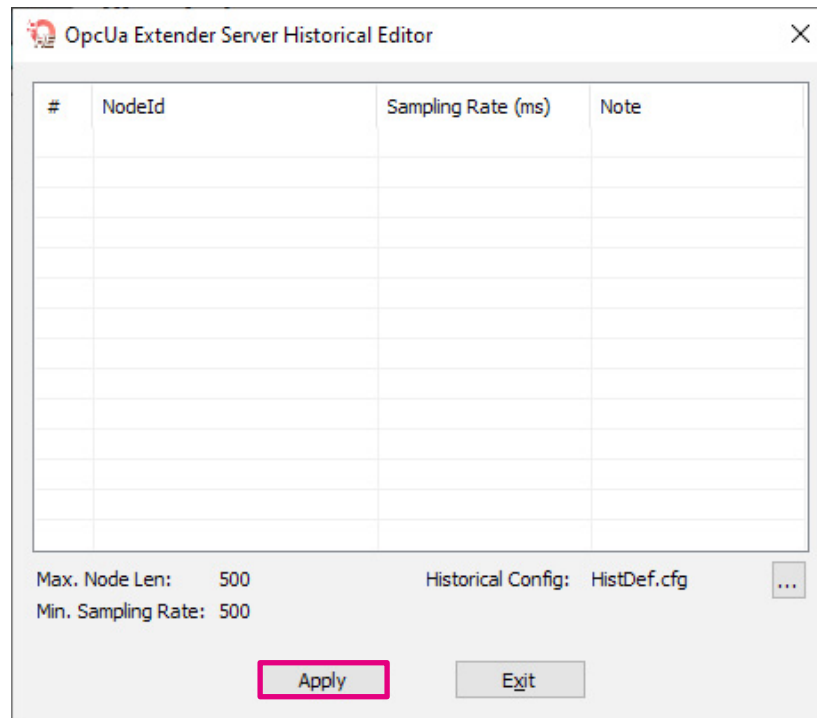
4	Enable Certification	<p>Check the checkbox on the left of Enable Certification to enable or disable asymmetrical cryptography to authenticate with the self-signed certificate for AIC OpcUa Extender Server connection.</p> <p>The trusted self-signed public key is stored in the following path: C:\Program Files\NEXCOM\AIC OpcUa Server\pkuser\trusted\certs</p> <p>The rejected self-signed public key is stored in the following path: C:\Program Files\NEXCOM\AIC OpcUa Server\pkuser\rejected</p> <p>Note: Moving a rejected self-signed public key from the “rejected” location to the “trusted” location results in its status becoming trusted.</p>
5	Anonymous	Check the checkbox on the left of Anonymous to enable or disable anonymous login.

2.4 Historical

The Historical page displays the **Settings** and **Log Config** of the AIC OpcUa Extender Server Utility. The historical configuration is used to provide historical data for a variable from the AIC OpcUa Extender Server Utility.

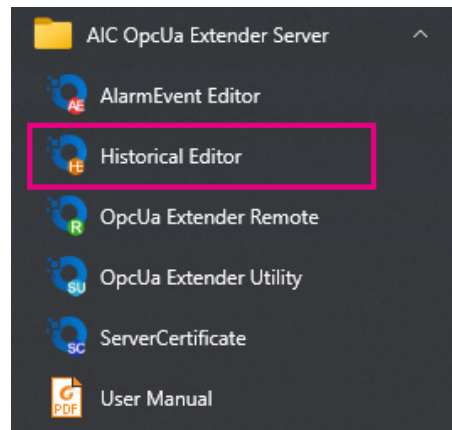


To add NodeId, Sampling Rate, and Note, click on  to bring up the OpcUa Extender Server Historical Editor. Right-click the mouse on the Editor window to enable the shortcut menu, select the item you want to configure, and then click **<Apply>** to activate the settings when you have completed the configuration. For more operations, refer to the next section.

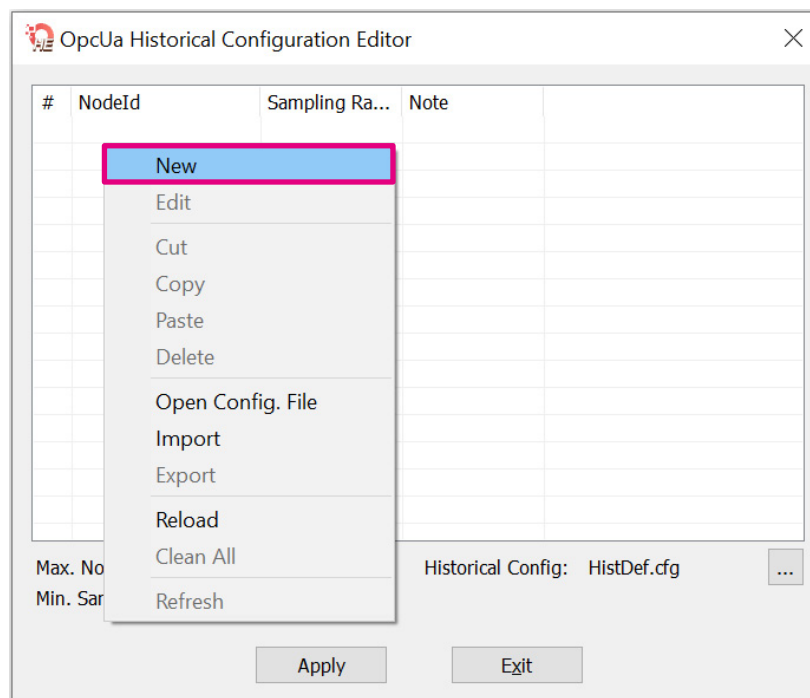


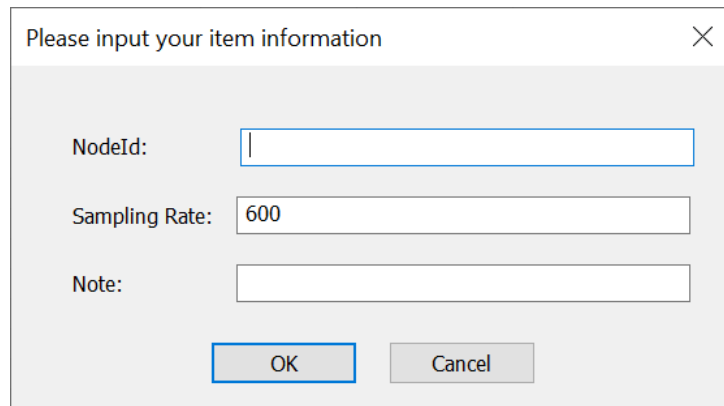
2.4.1 Historical Editor

Apart from the method mentioned in the [previous section](#), you can also click on <History Editor> under the AIC OpcUA Extender Server in the Windows Start menu to add NodeId, Sampling, Rate, and Note.

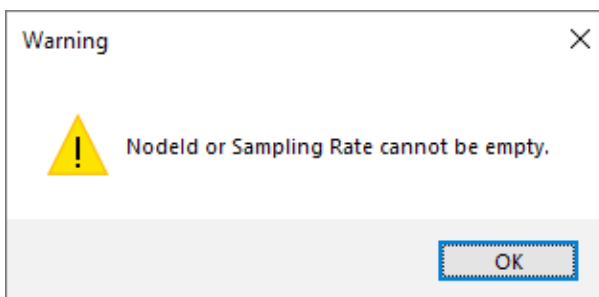


Right-click the mouse and a shortcut menu will appear on the screen. Click on <New> to add NodeId, Sampling, Rate, and Note here.



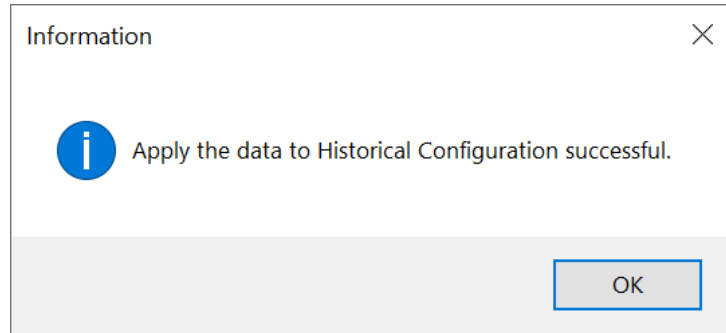
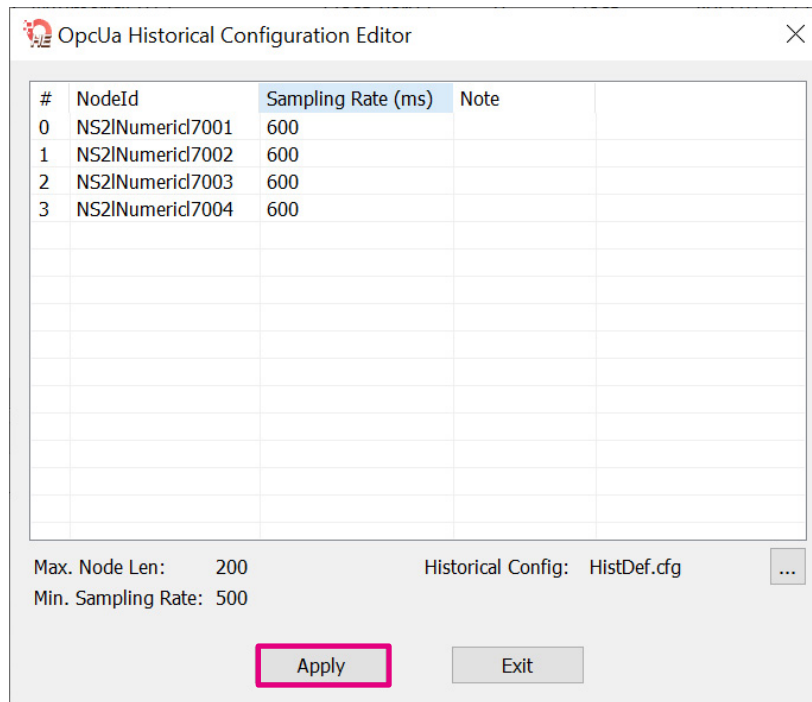


A dialog box titled "Please input your item information" with a close button (X) in the top right corner. It contains three input fields: "NodeId:" with an empty text box, "Sampling Rate:" with a text box containing "600", and "Note:" with an empty text box. At the bottom, there are two buttons: "OK" and "Cancel".

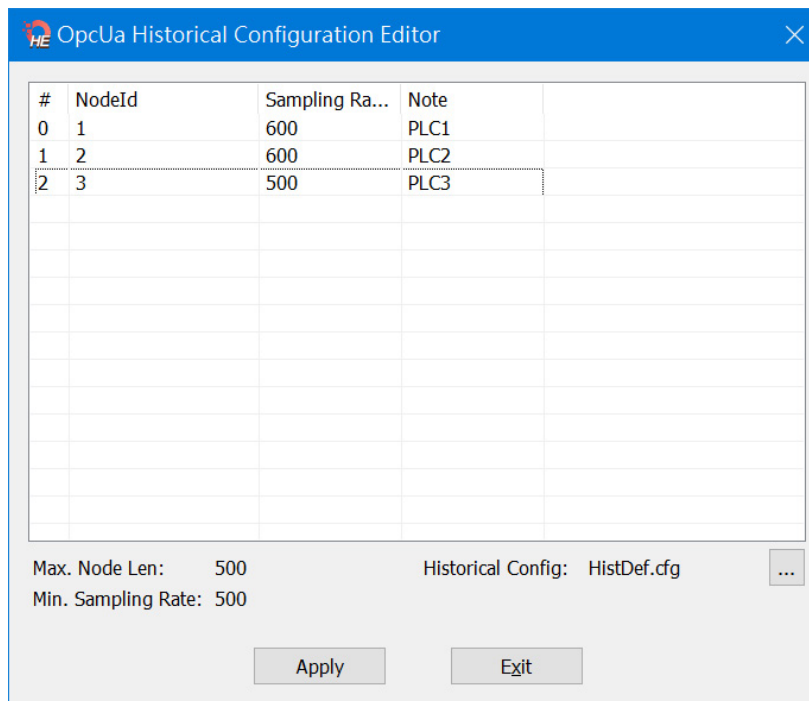
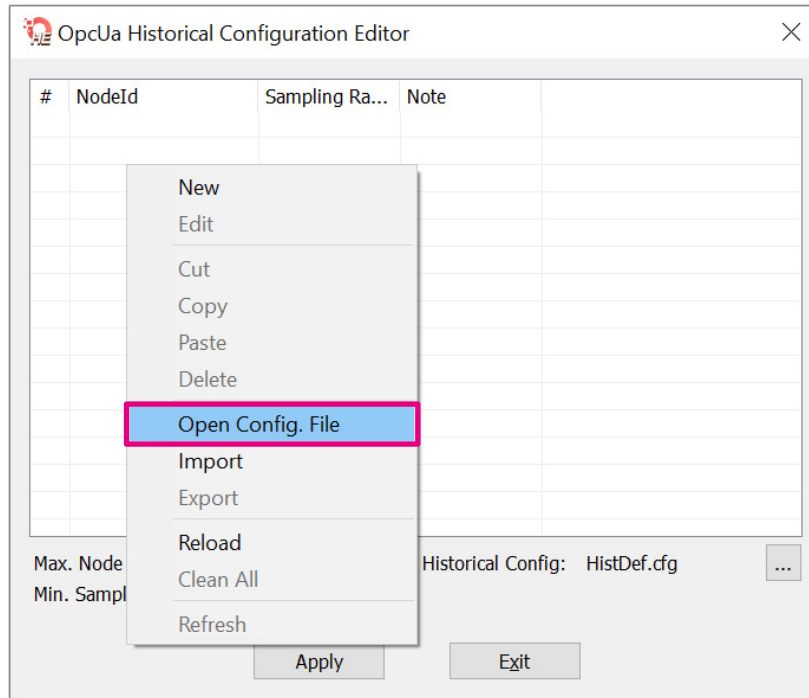


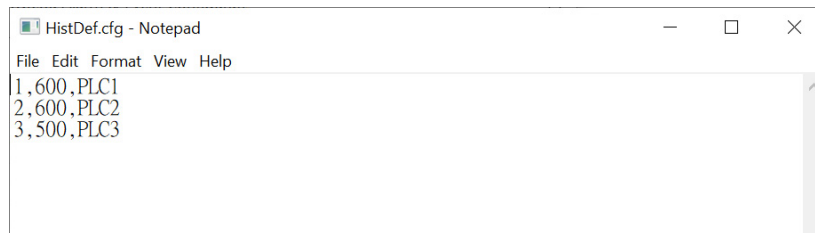
*A warning message will appear if the option of Nodeld is empty.

Click **<Apply>** to activate the settings when you are finished.

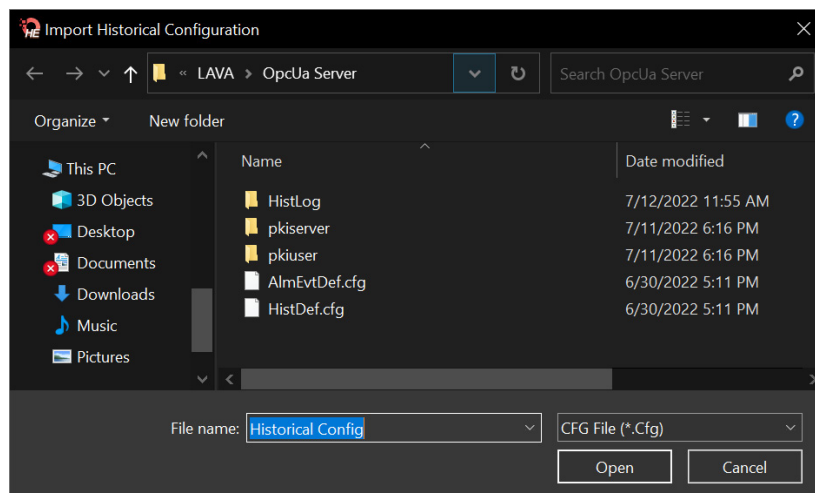
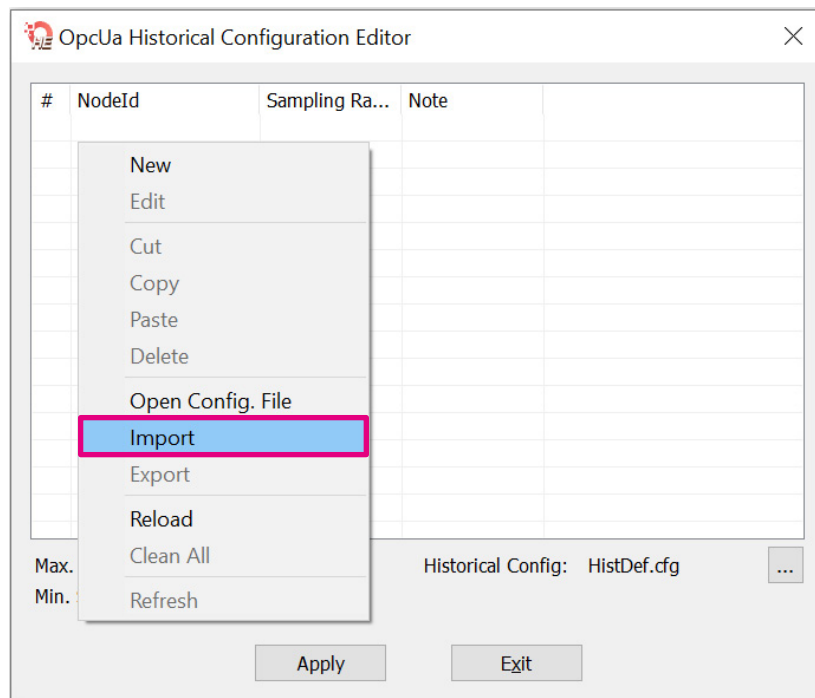


To view the detailed configuration file, right-click on **<Open Config. File>**. The data will be listed on a line by line basis in text format.




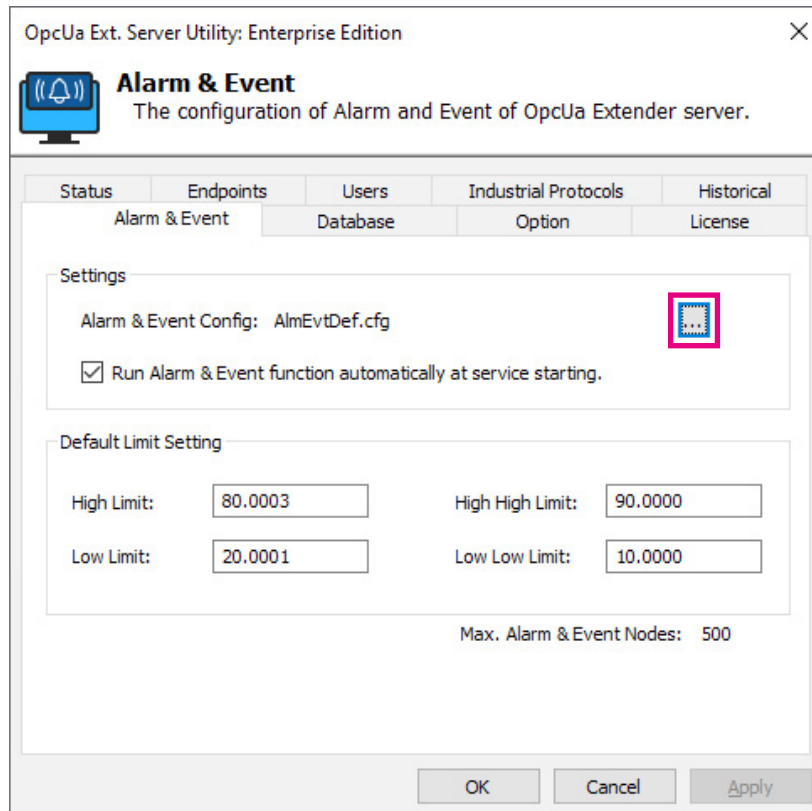


Click on **<Import>** if you have an old configuration file.



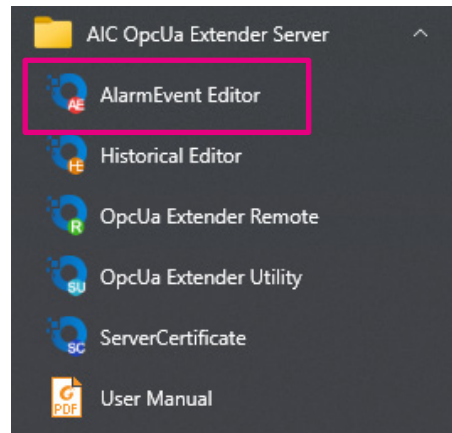
2.5 Alarm & Event

The Alarm and Event page is for users to browse and setup all the nodes with alarm notification values, including High High, Low Low, High, Low. Please click  to open the editor. Alternatively, you may click **<AlarmEvent Editor>** in the Windows Start menu to launch it. For more detailed operation, refer to the next section.

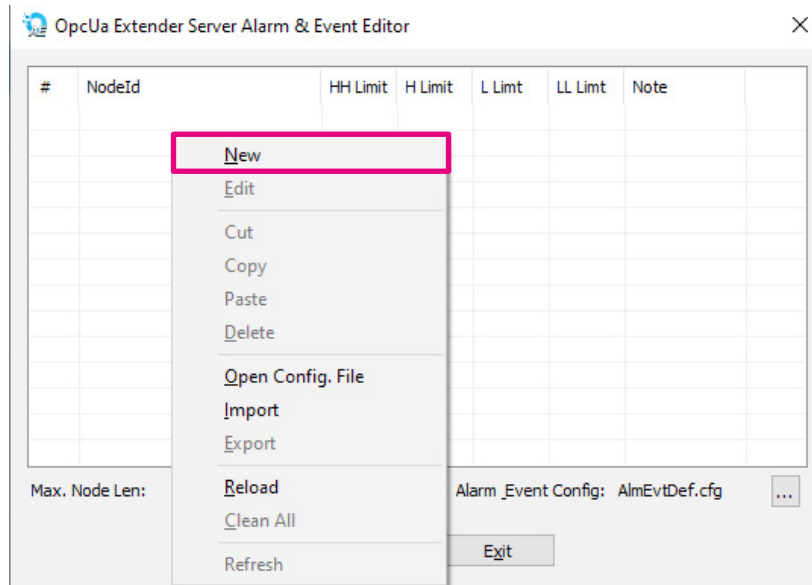


2.5.1 AlarmEvent Editor

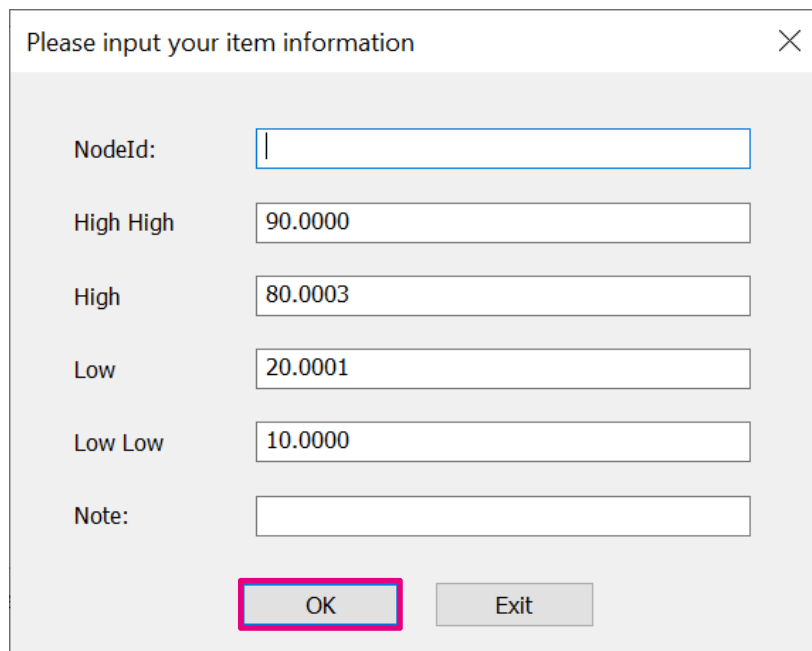
Apart from the method mentioned in the [previous section](#), you can also click on <**AlarmEvent Editor**> under the AIC OpcUA Extender Server in the Windows Start menu to view and edit the OPC UA High High, High, Low Low, Low data.



To add a new NodeID, right-click on the muse to select **New**.



Input the necessary information and then click <OK>.



Please input your item information

NodeId:

High High:

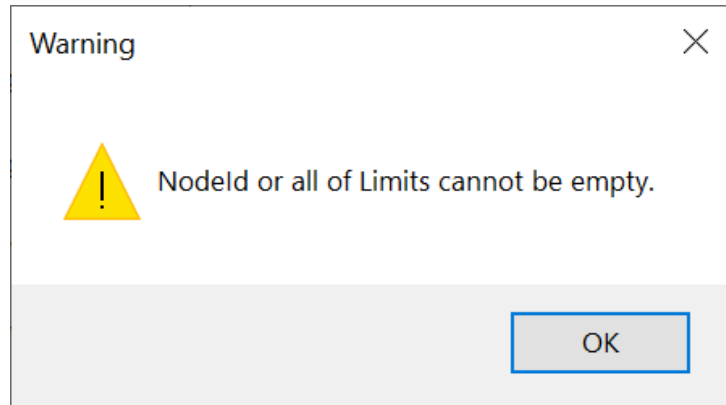
High:

Low:

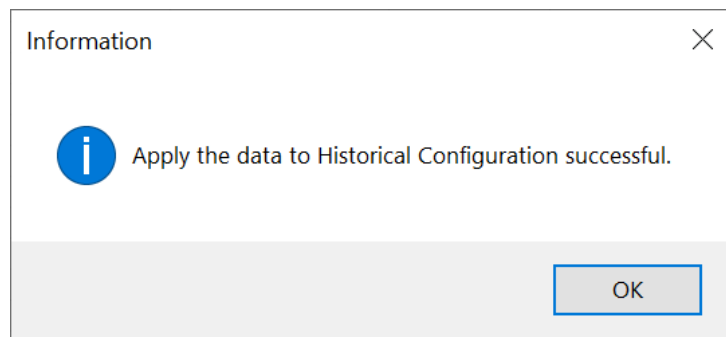
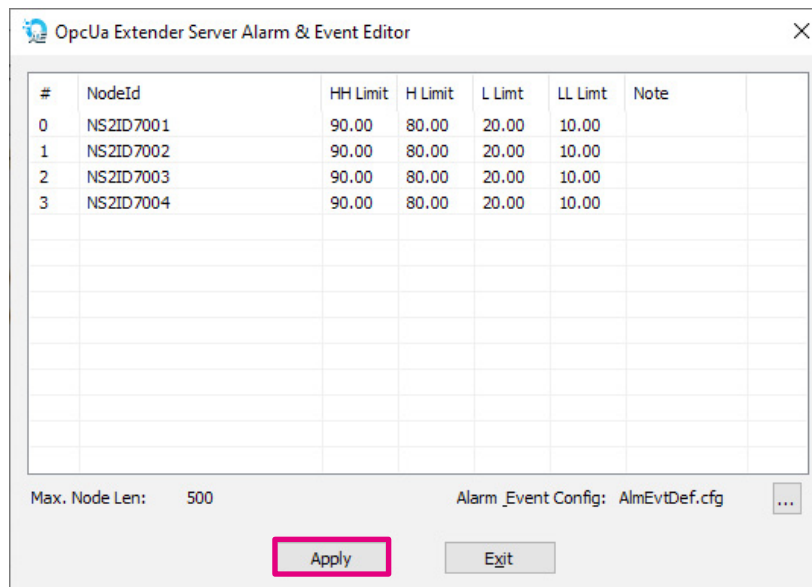
Low Low:

Note:

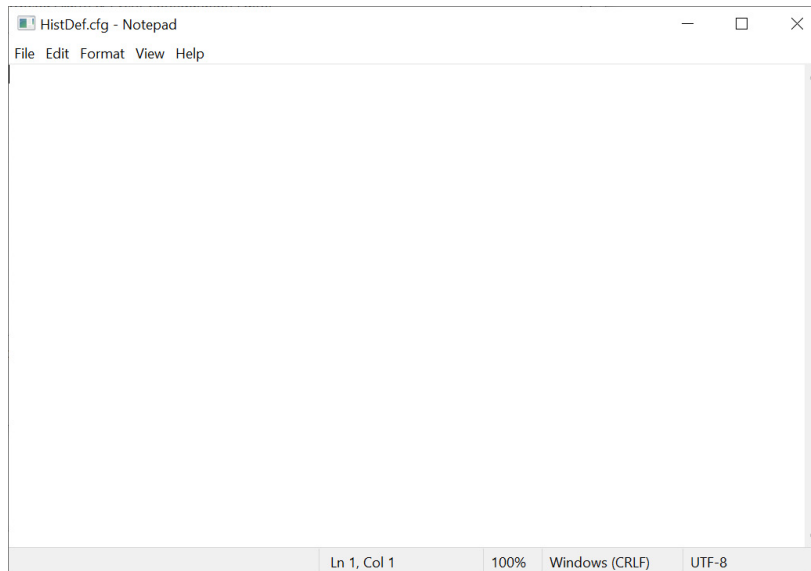
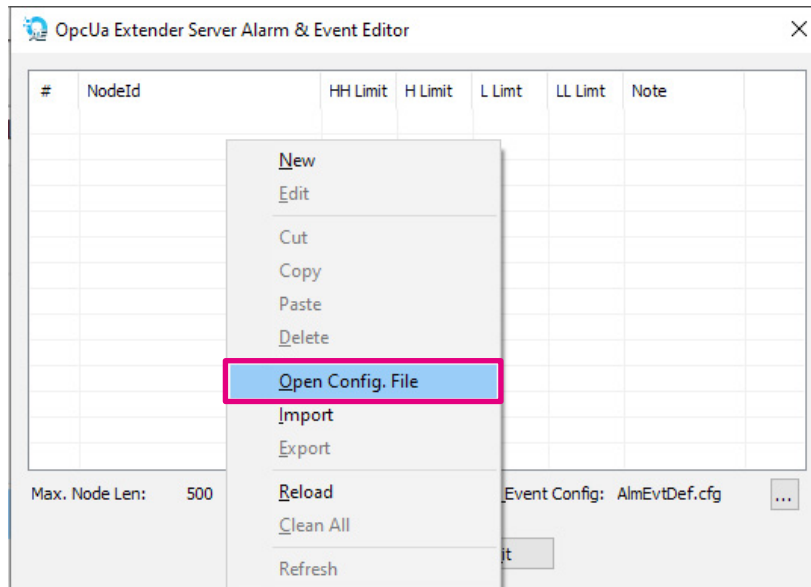
*A warning message will appear if the option of NodeId is empty.



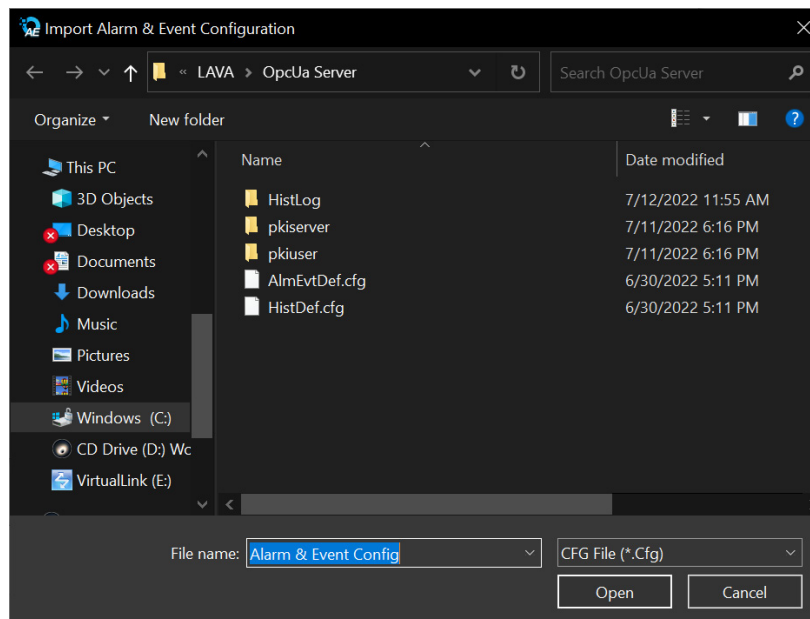
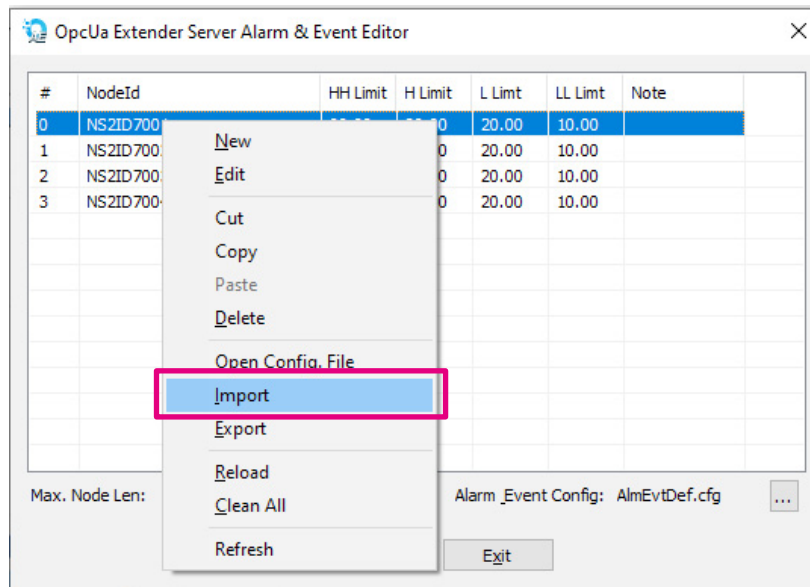
Click <**Apply**> to activate the settings when you are finished.



Right-click on the mouse to select **Open Config. File** to open the HistDef.cfg file, and it can be edited by Notepad.

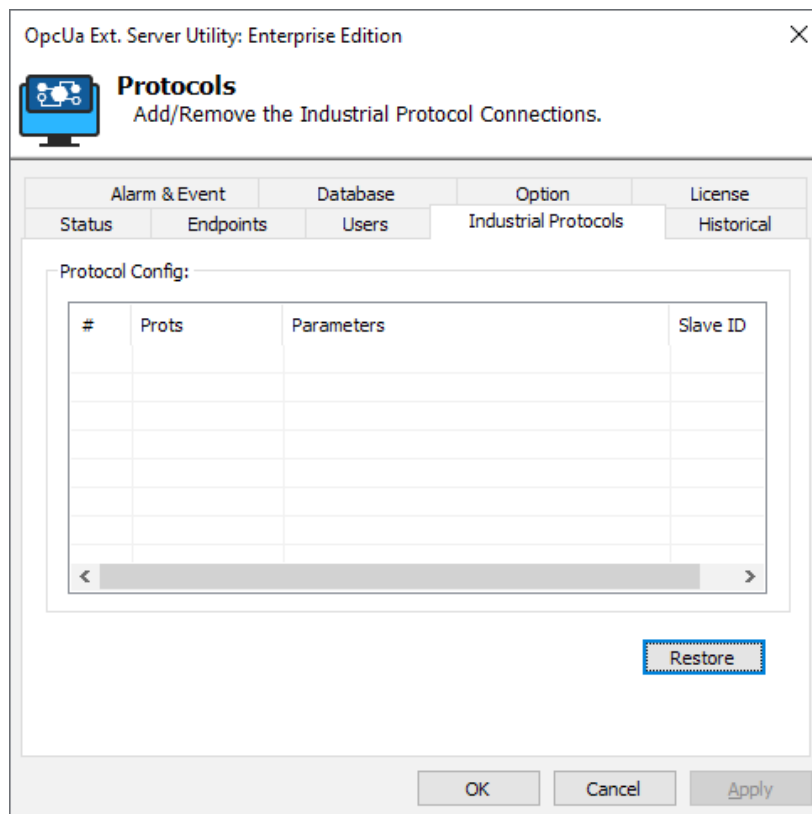


Right click on the mouse to select **Import** to import the old file.



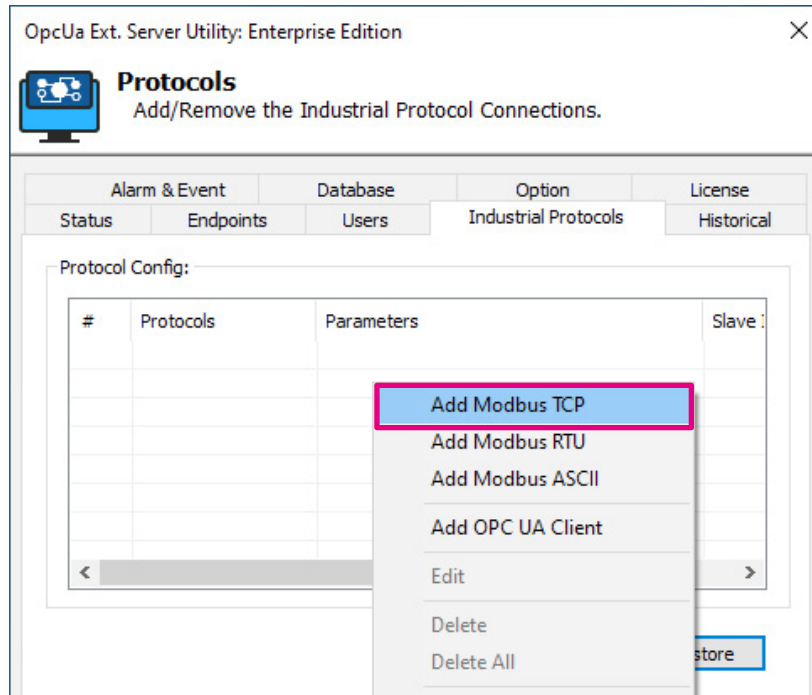
2.6 Industrial Protocols

The Industrial Protocols page allows you to configure the industrial protocols, read the data directly into our OpcUa Extender Server, the available options are Modbus TPC, Modbus RTU, and Modbus ASCII. Select the protocol according to the device you are accessing. Refer to next section for more detailed operations.

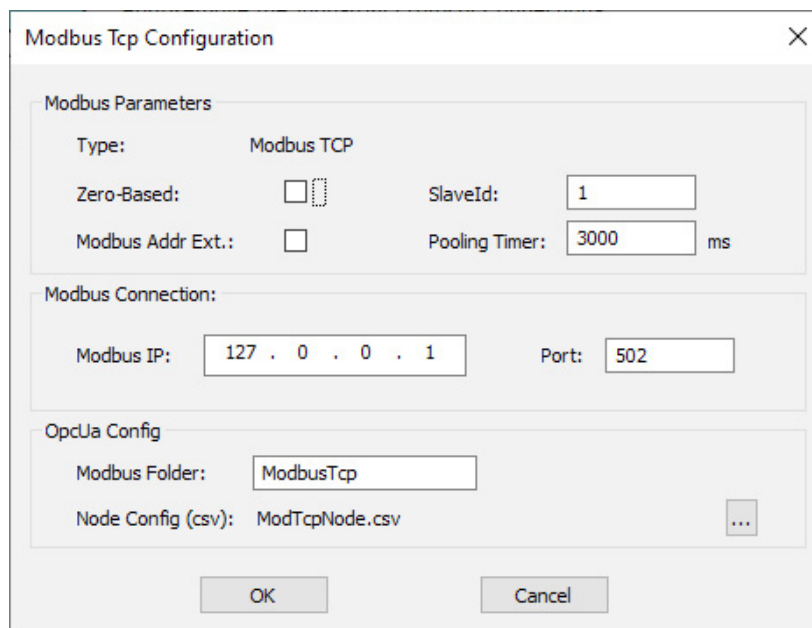


2.6.1 Modbus TCP

Move the mouse and right-click to select **Add Modbus TCP**.

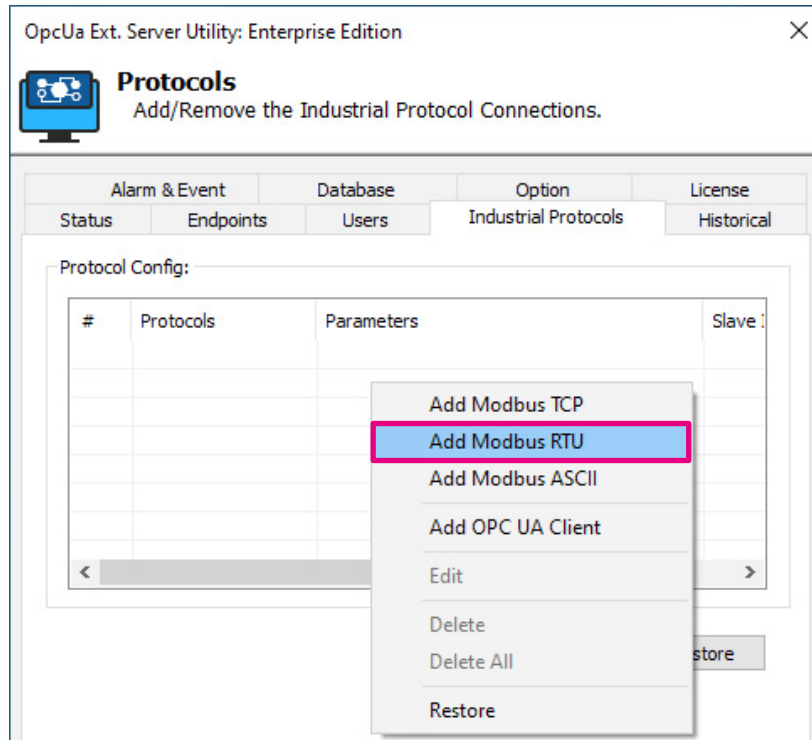


Fill in the Modbus TCP parameters.

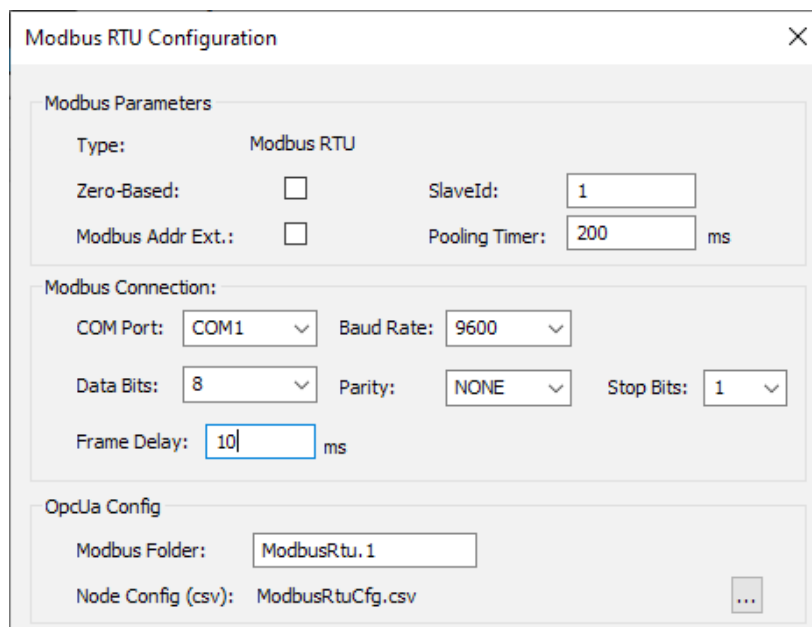


2.6.2 Modbus RTU

Move the mouse and right-click to select **Add Modbus RTU**.

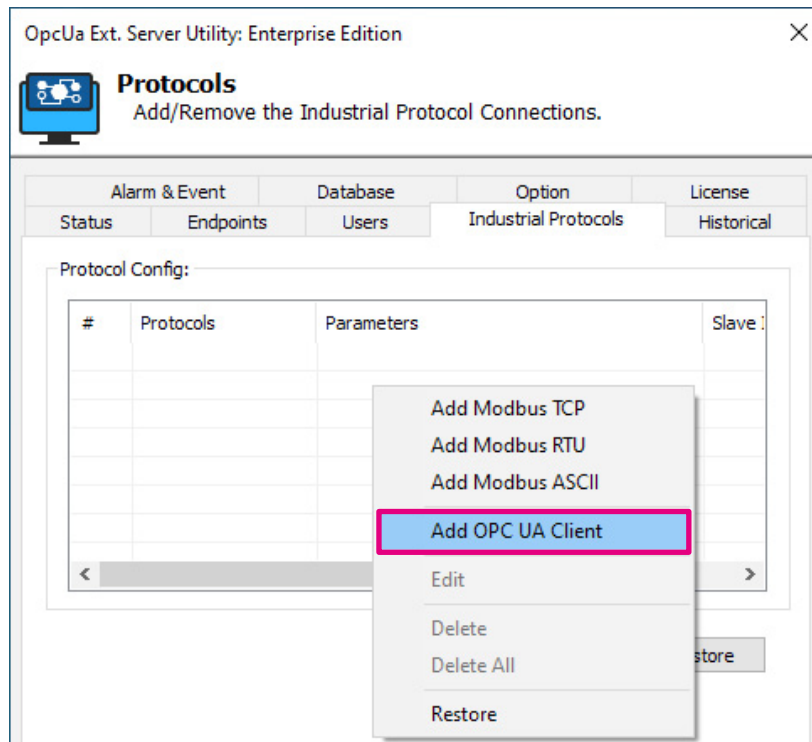


Fill in the Modbus RTU parameters.

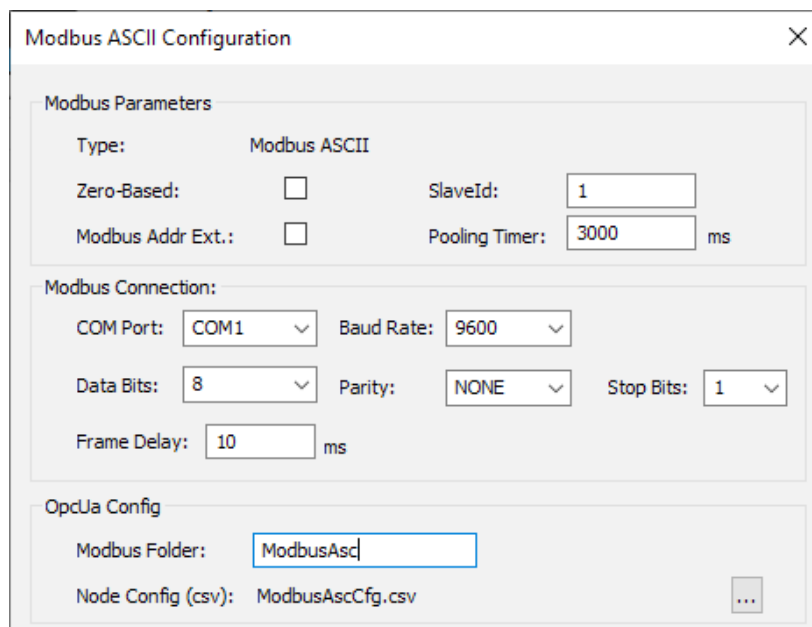


2.6.3 Modbus ASCII

Move the mouse and right-click to select **Add Modbus ASCII**.

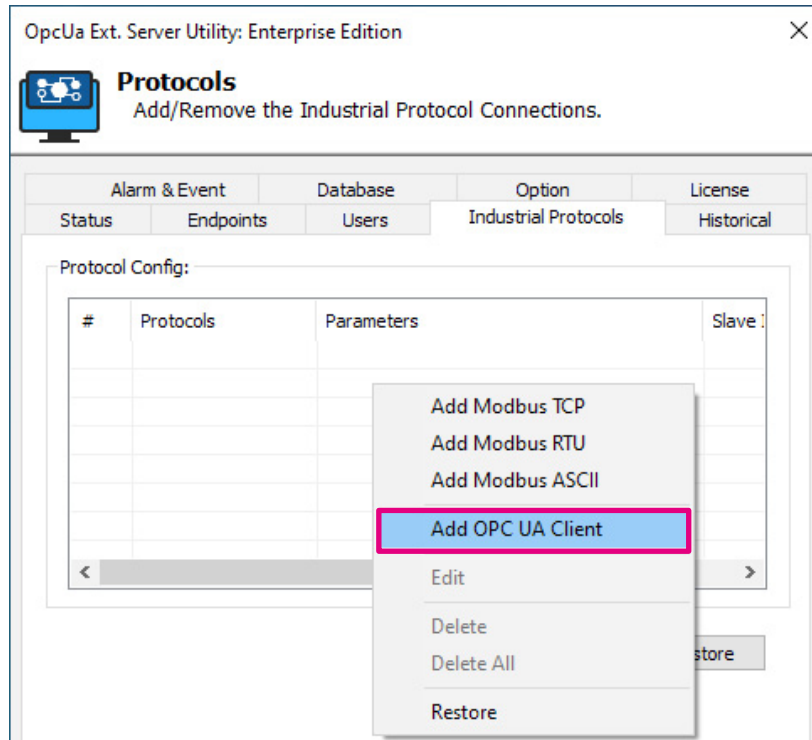


Fill in the Modbus ASCII parameters.

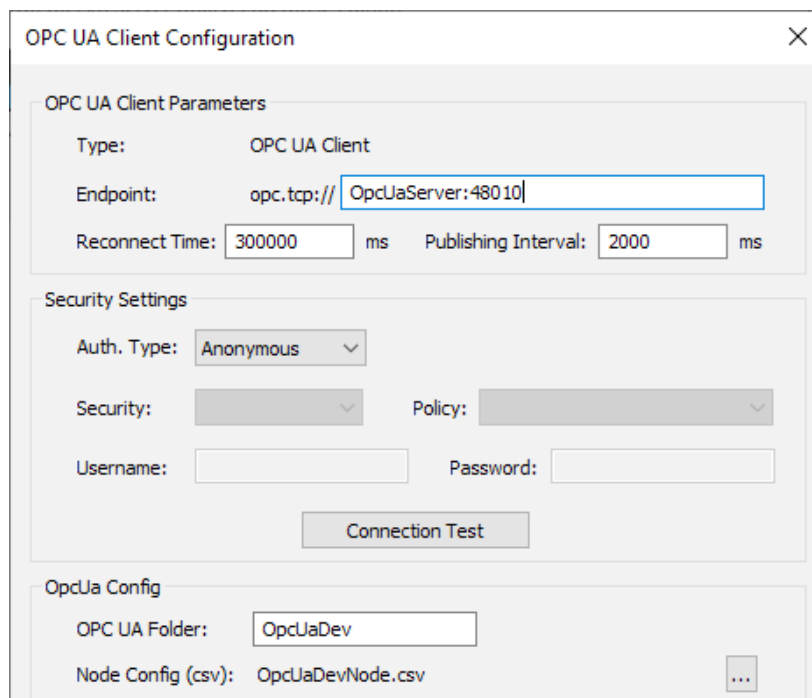


2.6.4 OPC UA Client

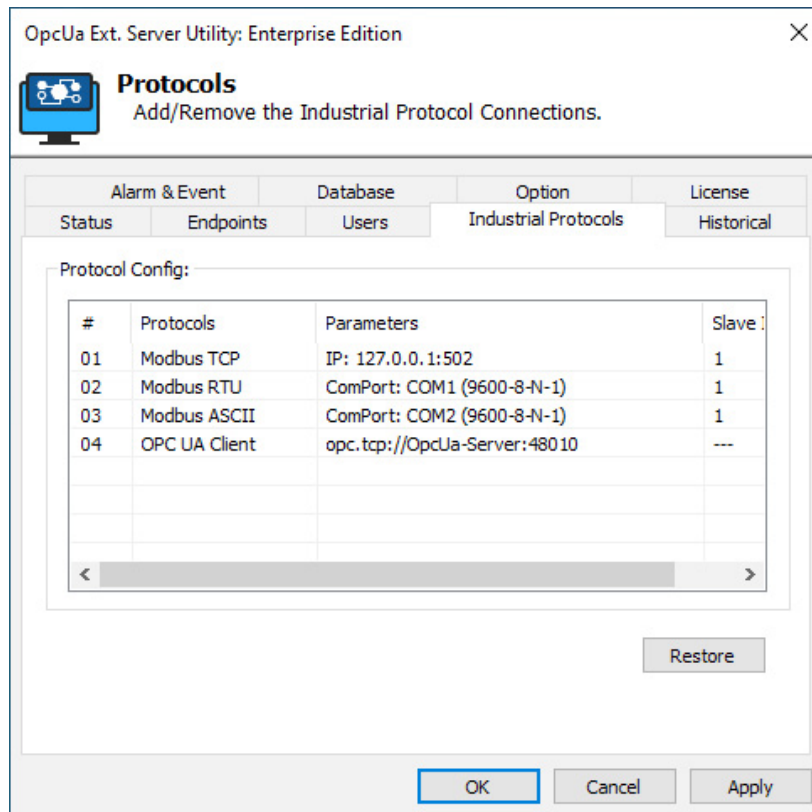
Move the mouse and right-click to select **Add OPC UA Client**.



Fill in the OPC UA Client parameters.

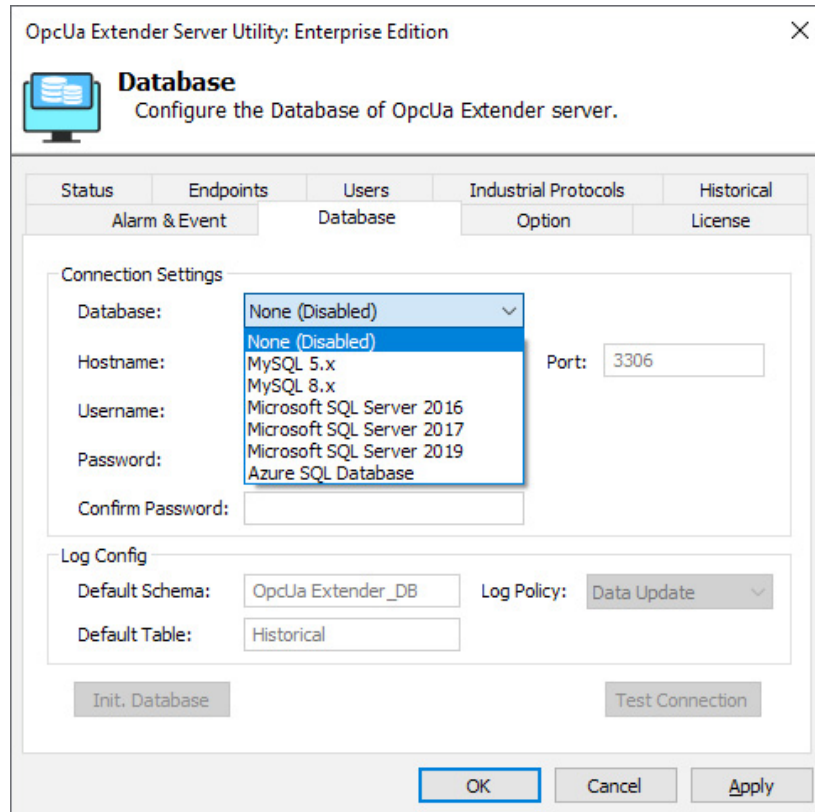


Once configured, the screen should look like the following.



2.7 Database

The Database page is designed to store the historical, Alarm & Event data in the database for use by other applications.



OpcUa Extender Server Utility: Enterprise Edition

Database
Configure the Database of OpcUa Extender server.

Status	Endpoints	Users	Industrial Protocols	Historical
Alarm & Event		Database	Option	License

Connection Settings

Database: (Dropdown menu: None (Disabled), MySQL 5.x, MySQL 8.x, Microsoft SQL Server 2016, Microsoft SQL Server 2017, Microsoft SQL Server 2019, Azure SQL Database)

Hostname:

Username:

Password:

Confirm Password:

Port:

Log Config

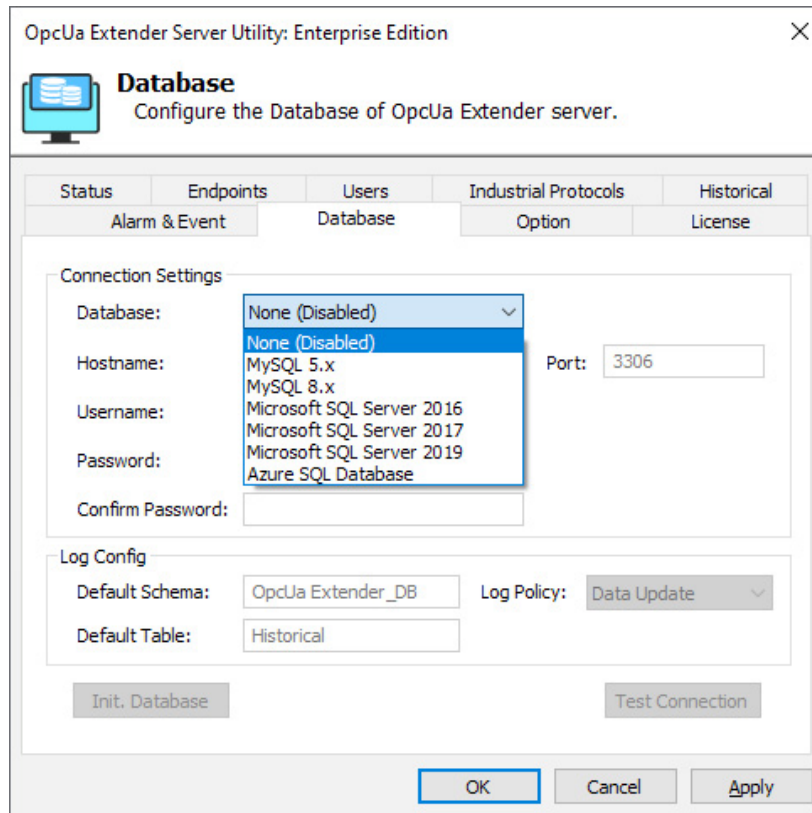
Default Schema: Log Policy: (Dropdown menu)

Default Table:

The supported databases are: My SQL 5.x, My SQL 8.x, Microsoft SQL Server 2016, 2017, 2019, and Azure SQL Database.

The first step is to prepare the database, and then input Hostname, Port, Username, and Password for accessing the database.

In Log Config, input the Default Schema and Default Table. These files are dependant on your design in database. **Data Update** and **Sampling Rate** are available for the Log Policy.



The screenshot shows the 'Database' configuration window in the OpcUa Extender Server Utility. The window title is 'OpcUa Extender Server Utility: Enterprise Edition'. The main heading is 'Database' with the subtitle 'Configure the Database of OpcUa Extender server.' Below this is a navigation bar with tabs for 'Status', 'Endpoints', 'Users', 'Industrial Protocols', and 'Historical'. Under 'Industrial Protocols', there are sub-tabs for 'Alarm & Event', 'Database', 'Option', and 'License'. The 'Database' sub-tab is active.

The 'Connection Settings' section includes:

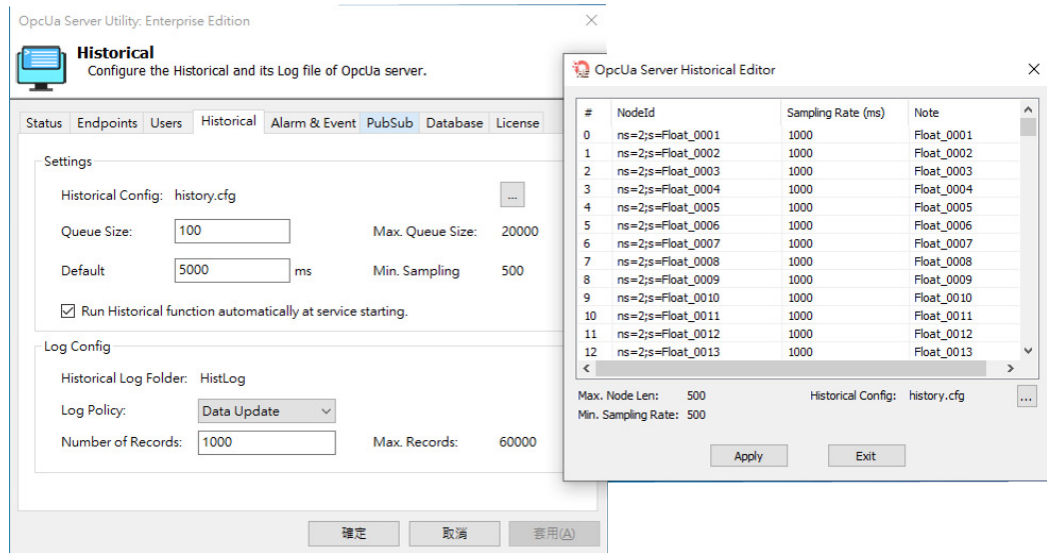
- Database: A dropdown menu currently showing 'None (Disabled)' with a list of options: 'None (Disabled)', 'MySQL 5.x', 'MySQL 8.x', 'Microsoft SQL Server 2016', 'Microsoft SQL Server 2017', 'Microsoft SQL Server 2019', and 'Azure SQL Database'.
- Hostname: A text input field.
- Port: A text input field containing '3306'.
- Username: A text input field.
- Password: A text input field.
- Confirm Password: A text input field.

The 'Log Config' section includes:

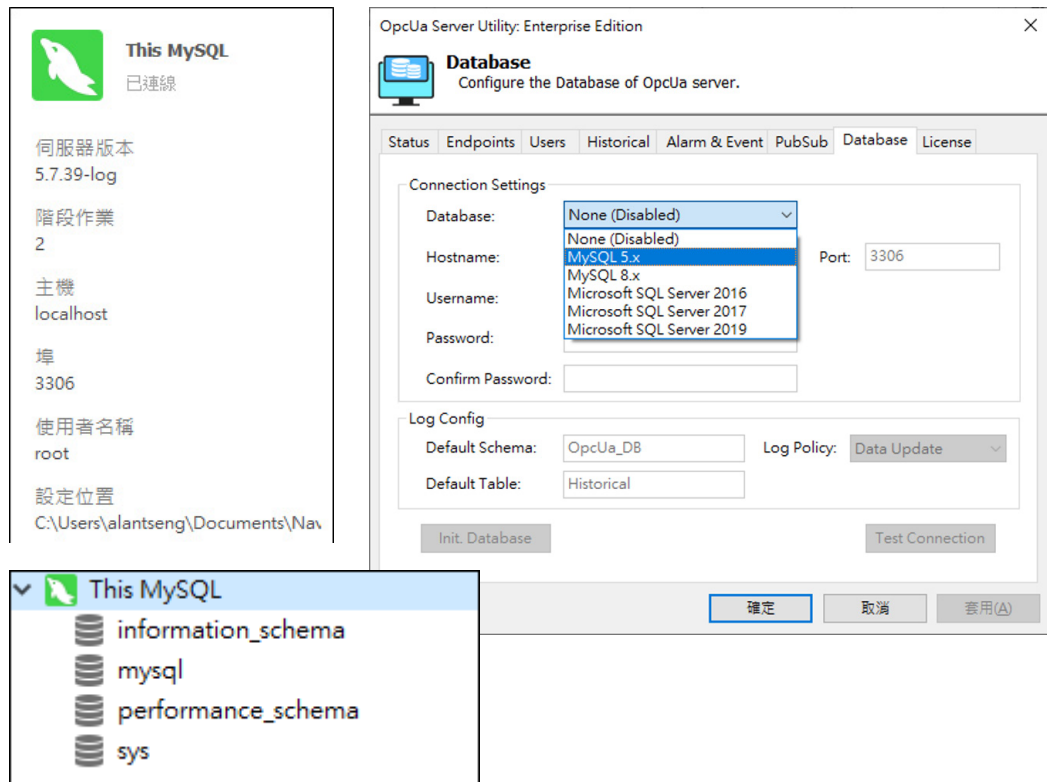
- Default Schema: A text input field containing 'OpcUa Extender_DB'.
- Default Table: A text input field containing 'Historical'.
- Log Policy: A dropdown menu showing 'Data Update'.

At the bottom of the window, there are buttons for 'Init. Database', 'Test Connection', 'OK', 'Cancel', and 'Apply'.

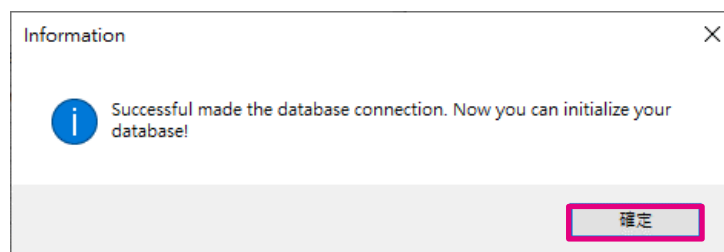
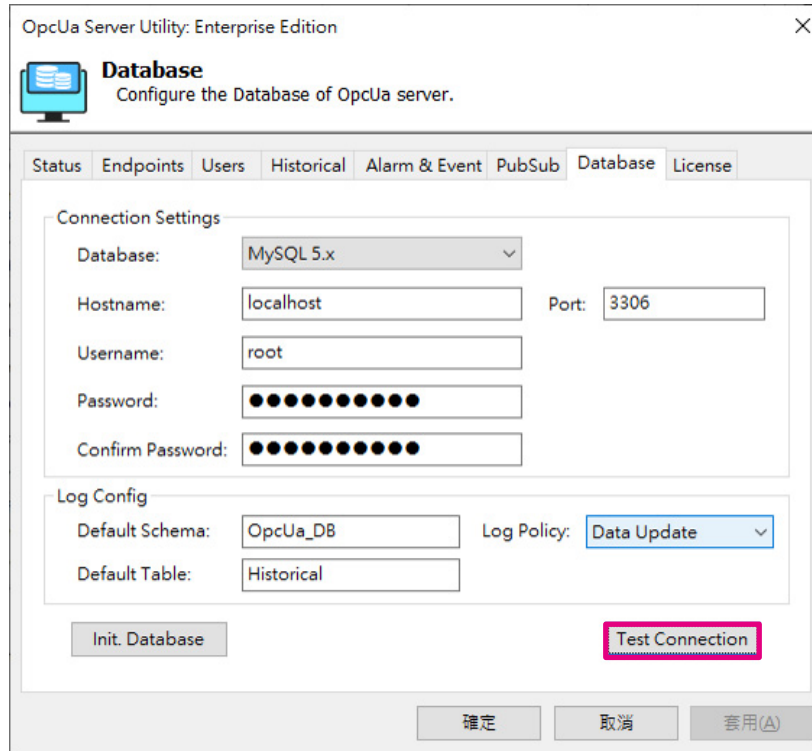
Example 1: Set a historical configuration and save to MySQL Database.



Example 1.1: Set your database to **MySQL 5.x** (the example here is using MySQL 5.7.39).

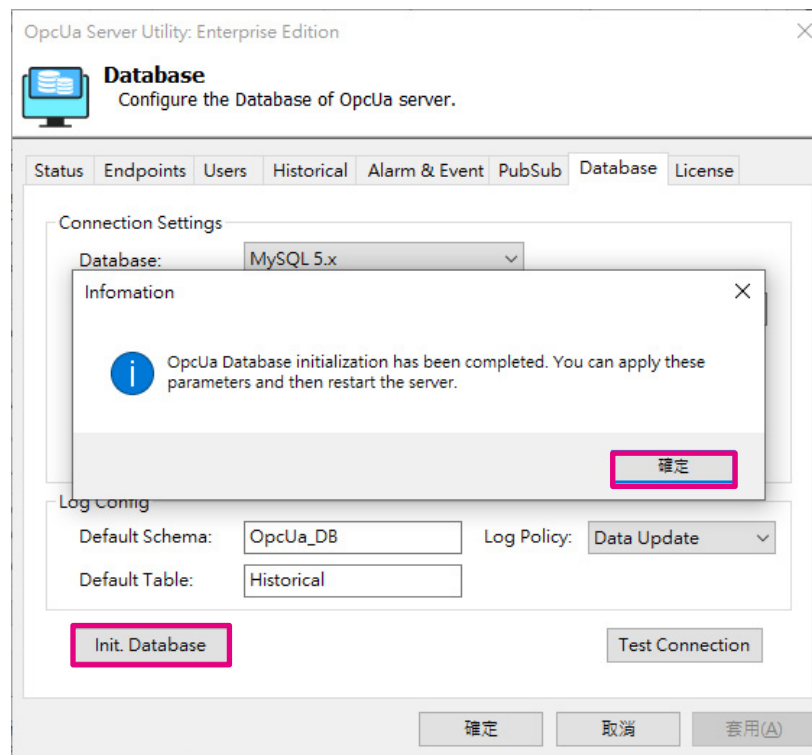
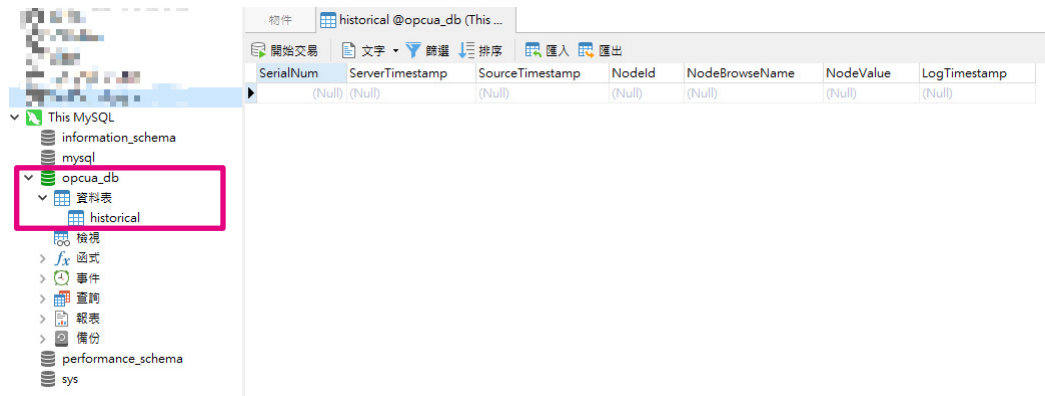


Example 1.2: Set login information (Hostname, Username, Port, Password, and confirm it) then click button <Test Connection>. Once connected, click <OK> to exit.

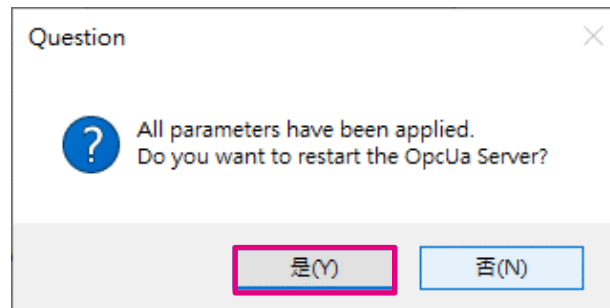
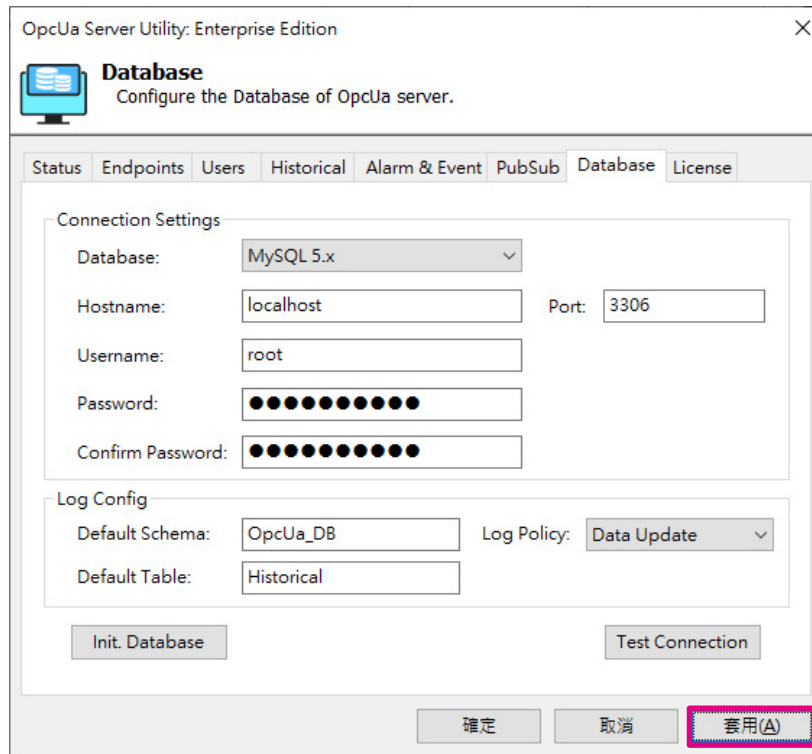


Example 1.3: Click button <Init. Database> and check the initialization completed message.

A new schema **opcua_db** and a new table **historical** are shown in the db server of the left panel.



Example 1.4: Click <Apply> and click <Yes> to restart the AIC OpcUa Extender Server.



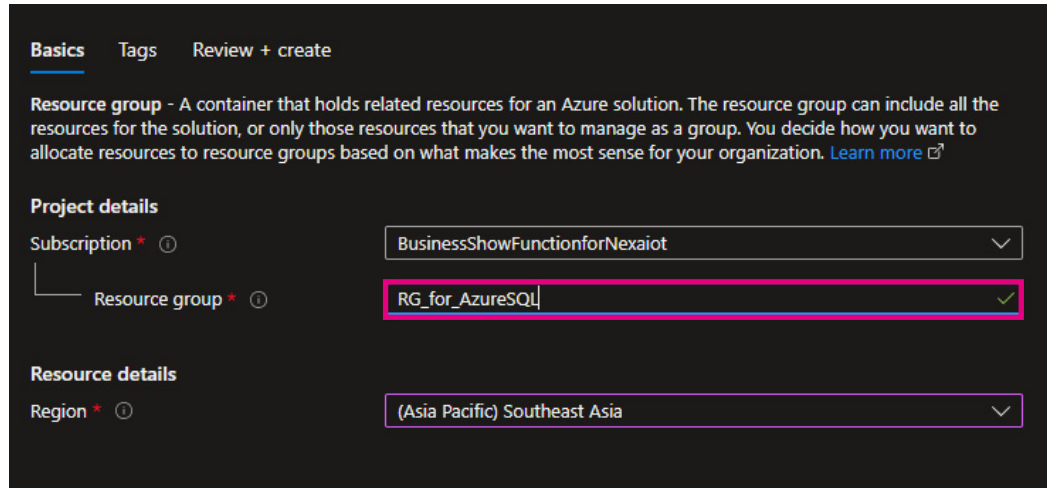
Example 1.5: The changed information is recorded in the table.

SerialNum	ServerTimestamp	SourceTimestamp	Nodetd	NodeBrowseName	NodeValue	LogTimestamp
1	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0001	Float_0001	0	2022-08-03 09:10:46
2	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0002	Float_0002	0	2022-08-03 09:10:46
3	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0003	Float_0003	0	2022-08-03 09:10:46
4	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0004	Float_0004	0	2022-08-03 09:10:46
5	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0005	Float_0005	0	2022-08-03 09:10:46
6	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0006	Float_0006	0	2022-08-03 09:10:46
7	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0007	Float_0007	0	2022-08-03 09:10:46
8	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0008	Float_0008	0	2022-08-03 09:10:46
9	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0009	Float_0009	0	2022-08-03 09:10:46
10	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0010	Float_0010	0	2022-08-03 09:10:46
11	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0011	Float_0011	0	2022-08-03 09:10:46
12	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0012	Float_0012	0	2022-08-03 09:10:46
13	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0013	Float_0013	0	2022-08-03 09:10:46
14	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0014	Float_0014	0	2022-08-03 09:10:46
15	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0015	Float_0015	0	2022-08-03 09:10:46
16	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0016	Float_0016	0	2022-08-03 09:10:46
17	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0017	Float_0017	0	2022-08-03 09:10:46
18	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0018	Float_0018	0	2022-08-03 09:10:46
19	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0019	Float_0019	0	2022-08-03 09:10:46
20	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0020	Float_0020	0	2022-08-03 09:10:46
21	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0021	Float_0021	0	2022-08-03 09:10:46
22	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0022	Float_0022	0	2022-08-03 09:10:46
23	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0023	Float_0023	0	2022-08-03 09:10:46
24	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0024	Float_0024	0	2022-08-03 09:10:46
25	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0025	Float_0025	0	2022-08-03 09:10:46
26	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0026	Float_0026	0	2022-08-03 09:10:46
27	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0027	Float_0027	0	2022-08-03 09:10:46
28	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0028	Float_0028	0	2022-08-03 09:10:46
29	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0029	Float_0029	0	2022-08-03 09:10:46
30	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0030	Float_0030	0	2022-08-03 09:10:46
31	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0031	Float_0031	0	2022-08-03 09:10:46
32	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0032	Float_0032	0	2022-08-03 09:10:46
33	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0033	Float_0033	0	2022-08-03 09:10:46
34	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0034	Float_0034	0	2022-08-03 09:10:46
35	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0035	Float_0035	0	2022-08-03 09:10:46
36	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0036	Float_0036	0	2022-08-03 09:10:46
37	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0037	Float_0037	0	2022-08-03 09:10:46
38	2022-08-03 09:10:40	2022-08-03 09:10:40	ns=2;s=Float_0038	Float_0038	0	2022-08-03 09:10:46

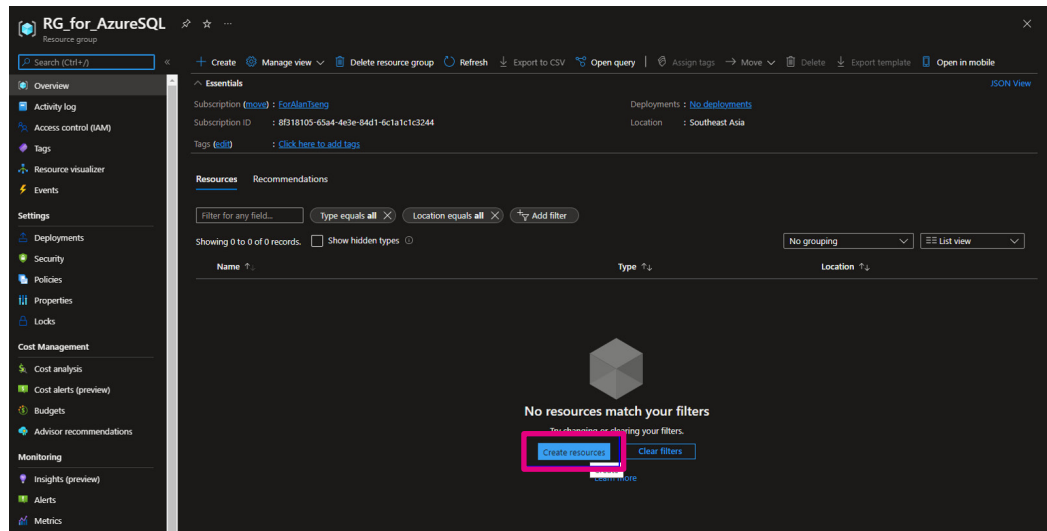
SerialNum	ServerTimestamp	SourceTimestamp	NodeId	NodeBrowseName	NodeValue	LogTimestamp
3945	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0461	Float_0461	4.61e+07	2022-08-03 09:49:19
3946	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0462	Float_0462	4.62e+07	2022-08-03 09:49:19
3947	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0463	Float_0463	4.63e+07	2022-08-03 09:49:19
3948	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0464	Float_0464	4.64e+07	2022-08-03 09:49:19
3949	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0465	Float_0465	4.65e+07	2022-08-03 09:49:19
3950	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0466	Float_0466	4.66e+07	2022-08-03 09:49:19
3951	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0467	Float_0467	4.67e+07	2022-08-03 09:49:19
3952	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0468	Float_0468	4.68e+07	2022-08-03 09:49:19
3953	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0469	Float_0469	4.69e+07	2022-08-03 09:49:19
3954	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0470	Float_0470	4.7e+07	2022-08-03 09:49:19
3955	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0471	Float_0471	4.71e+07	2022-08-03 09:49:19
3956	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0472	Float_0472	4.72e+07	2022-08-03 09:49:19
3957	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0473	Float_0473	4.73e+07	2022-08-03 09:49:19
3958	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0474	Float_0474	4.74e+07	2022-08-03 09:49:19
3959	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0475	Float_0475	4.75e+07	2022-08-03 09:49:19
3960	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0476	Float_0476	4.76e+07	2022-08-03 09:49:19
3961	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0477	Float_0477	4.77e+07	2022-08-03 09:49:19
3962	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0478	Float_0478	4.78e+07	2022-08-03 09:49:19
3963	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0479	Float_0479	4.79e+07	2022-08-03 09:49:19
3964	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0480	Float_0480	4.8e+07	2022-08-03 09:49:19
3965	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0481	Float_0481	4.81e+07	2022-08-03 09:49:19
3966	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0482	Float_0482	4.82e+07	2022-08-03 09:49:19
3967	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0483	Float_0483	4.83e+07	2022-08-03 09:49:19
3968	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0484	Float_0484	4.84e+07	2022-08-03 09:49:19
3969	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0485	Float_0485	4.85e+07	2022-08-03 09:49:19
3970	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0486	Float_0486	4.86e+07	2022-08-03 09:49:19
3971	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0487	Float_0487	4.87e+07	2022-08-03 09:49:19
3972	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0488	Float_0488	4.88e+07	2022-08-03 09:49:19
3973	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0489	Float_0489	4.89e+07	2022-08-03 09:49:19
3974	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0490	Float_0490	4.9e+07	2022-08-03 09:49:19
3975	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0491	Float_0491	4.91e+07	2022-08-03 09:49:19
3976	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0492	Float_0492	4.92e+07	2022-08-03 09:49:19
3977	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0493	Float_0493	4.93e+07	2022-08-03 09:49:19
3978	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0494	Float_0494	4.94e+07	2022-08-03 09:49:19
3979	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0495	Float_0495	4.95e+07	2022-08-03 09:49:19
3980	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0496	Float_0496	4.96e+07	2022-08-03 09:49:19
3981	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0497	Float_0497	4.97e+07	2022-08-03 09:49:19
3982	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0498	Float_0498	4.98e+07	2022-08-03 09:49:19
3983	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0499	Float_0499	4.99e+07	2022-08-03 09:49:19
3984	2022-08-03 09:49:13	2022-08-03 09:49:13	ns=2;s=Float_0500	Float_0500	5e+07	2022-08-03 09:49:19
3985	2022-08-03 10:00:22	2022-08-03 10:00:22	ns=2;s=Float_0500	Float_0500	4.13174e+06	2022-08-03 10:00:29
3986	2022-08-03 10:03:35	2022-08-03 10:03:35	ns=2;s=Float_0500	Float_0500	1.23457e+08	2022-08-03 10:03:40

Example 2: Set up an Azure SQL database.

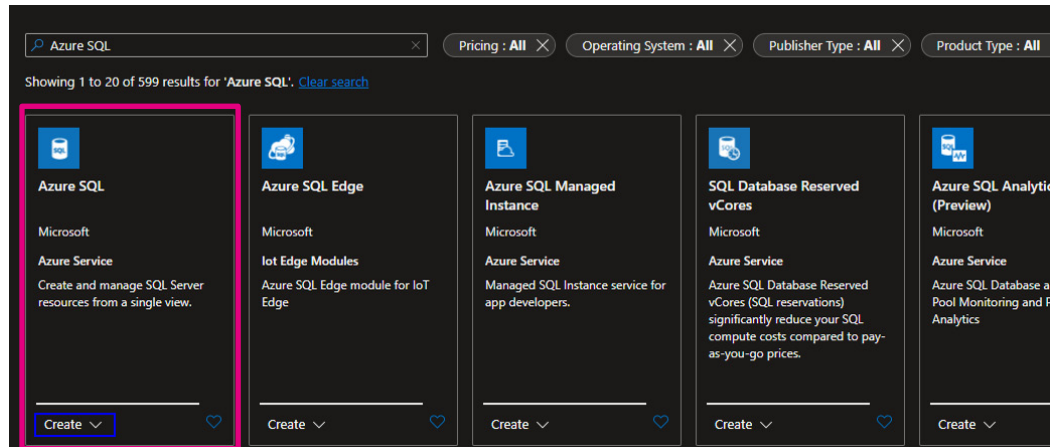
Example 2.1: Create a Resource group.



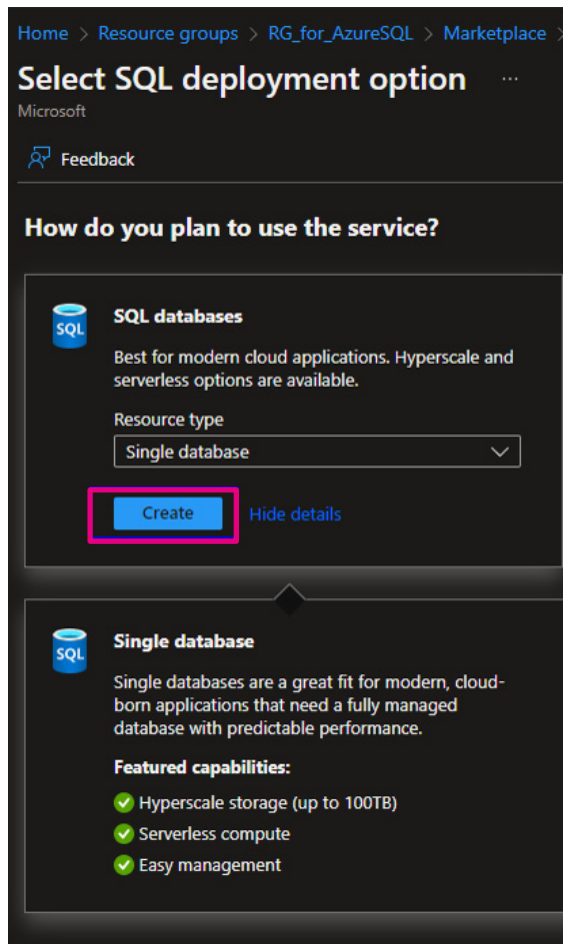
Example 2.2: Click <Create resources>.



Example 2.3: Select **Azure SQL**.



Example 2.4: Select **Single database** and click <Create>.



Example 2.5: Click <**Create new**> to create a server if there is no one.

Home > Resource groups > RG_for_AzureSQL > Marketplace > Select SQL deployment option >

Create SQL Database

Microsoft

Did you know that new users in Azure can create a free Azure SQL Database and use it for 12 months using Azure free account? [Learn more](#)

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription *

Resource group * [Create new](#)

Database details

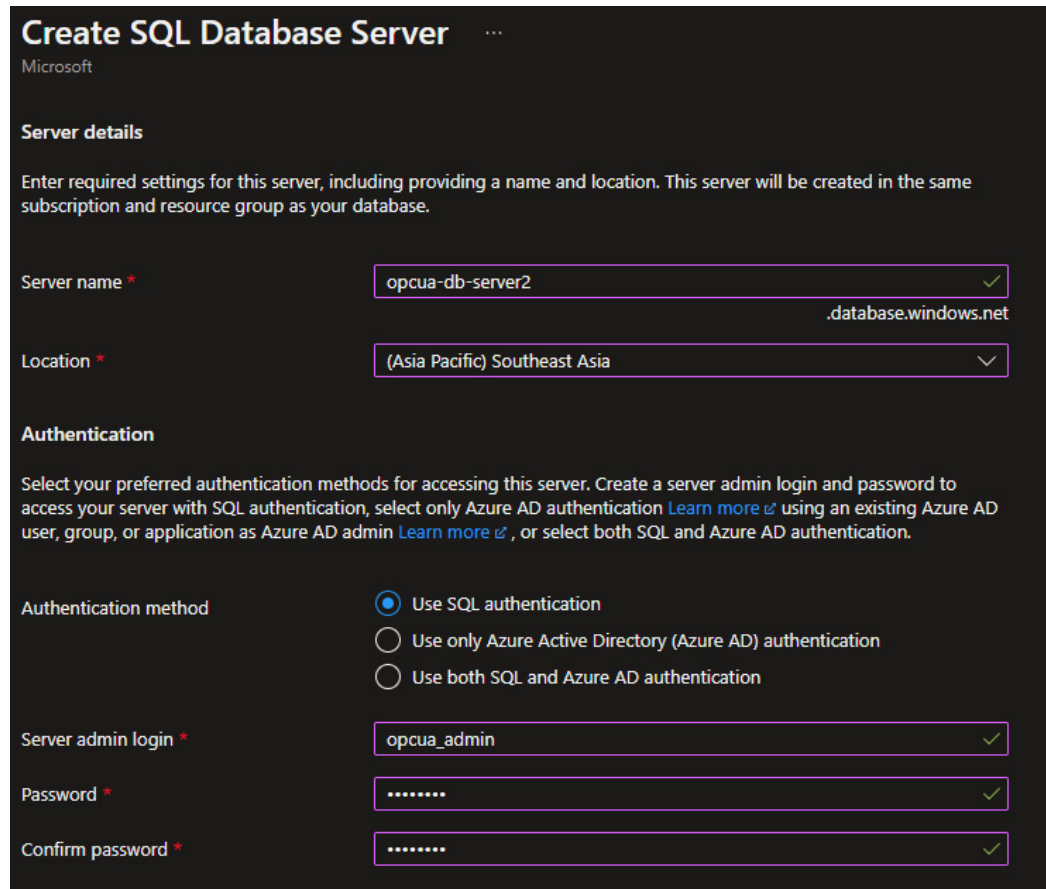
Enter required settings for this database, including picking a logical server and configuring the compute and storage resources

Database name *

Server * [Create new](#)

Want to use SQL elastic pool? Yes No

Example 2.6: Define the server name, user name (admin login), and password.



Create SQL Database Server

Microsoft

Server details

Enter required settings for this server, including providing a name and location. This server will be created in the same subscription and resource group as your database.

Server name * ✓
.database.windows.net

Location * ✓

Authentication

Select your preferred authentication methods for accessing this server. Create a server admin login and password to access your server with SQL authentication, select only Azure AD authentication [Learn more](#) using an existing Azure AD user, group, or application as Azure AD admin [Learn more](#), or select both SQL and Azure AD authentication.

Authentication method

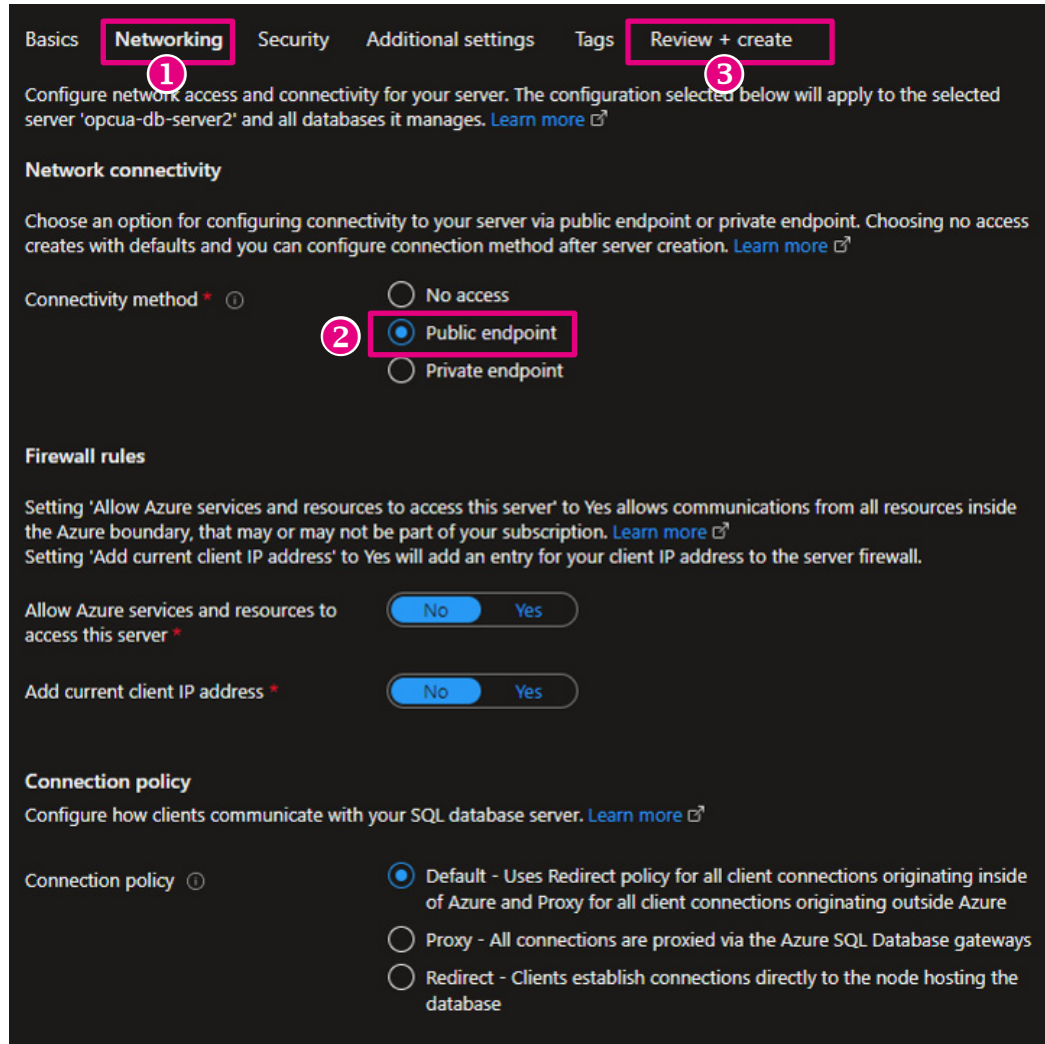
- Use SQL authentication
- Use only Azure Active Directory (Azure AD) authentication
- Use both SQL and Azure AD authentication

Server admin login * ✓

Password * ✓

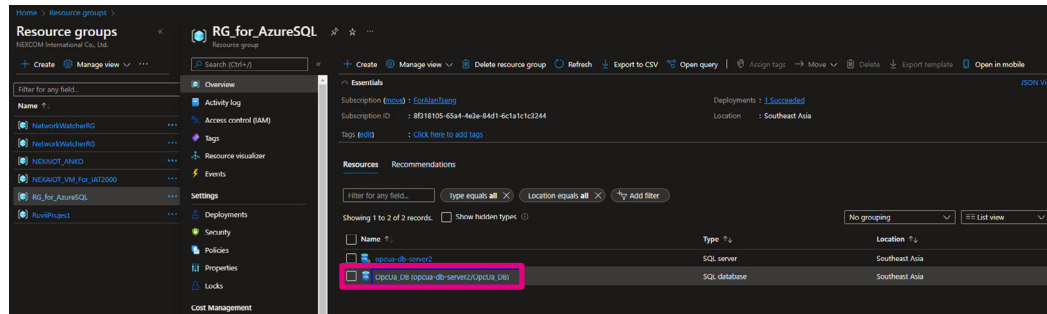
Confirm password * ✓

Example 2.7: Select **Public endpoint** in the **Networking** tab. Then go to **Review + create** tab to create this database.

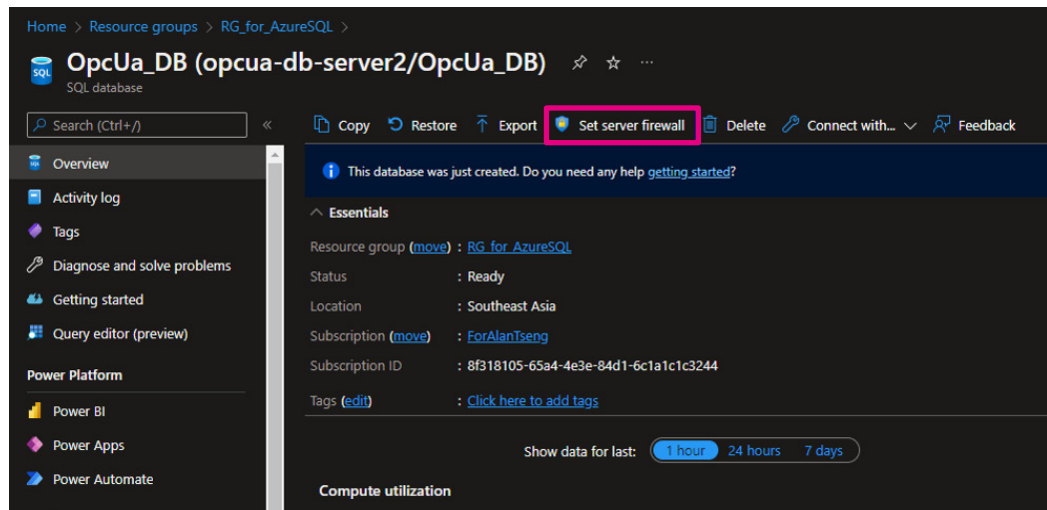


The screenshot displays the configuration interface for the AIC OpcUa Extender Server. The 'Networking' tab is selected and highlighted with a pink box and a circled '1'. The 'Review + create' tab is also highlighted with a pink box and a circled '3'. The 'Connectivity method' section shows three radio button options: 'No access', 'Public endpoint' (selected and highlighted with a pink box and a circled '2'), and 'Private endpoint'. The 'Firewall rules' section contains two toggle switches: 'Allow Azure services and resources to access this server' and 'Add current client IP address', both currently set to 'No'. The 'Connection policy' section shows three radio button options: 'Default - Uses Redirect policy for all client connections originating inside of Azure and Proxy for all client connections originating outside Azure' (selected), 'Proxy - All connections are proxied via the Azure SQL Database gateways', and 'Redirect - Clients establish connections directly to the node hosting the database'.

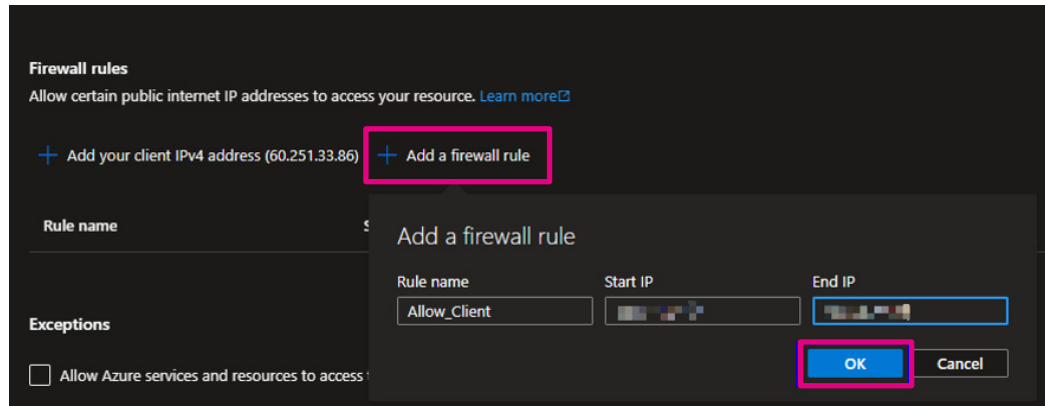
Example 2.8: Check the database in your resource group and click it.



Example 2.9: Click **Set server firewall** to set a firewall.



Example 2.10: Click on <+ **Add a firewall rule**> to enter the IP address of the AIC Opc Ua Extender Server which allows the server to connect to Azure SQL, and then click <**OK**> to confirm. Once the firewall rule has been created, click <**Save**> to exit.



Firewall rules
Allow certain public internet IP addresses to access your resource. [Learn more](#)

+ Add your client IPv4 address (60.251.33.86) + Add a firewall rule

Rule name Add a firewall rule

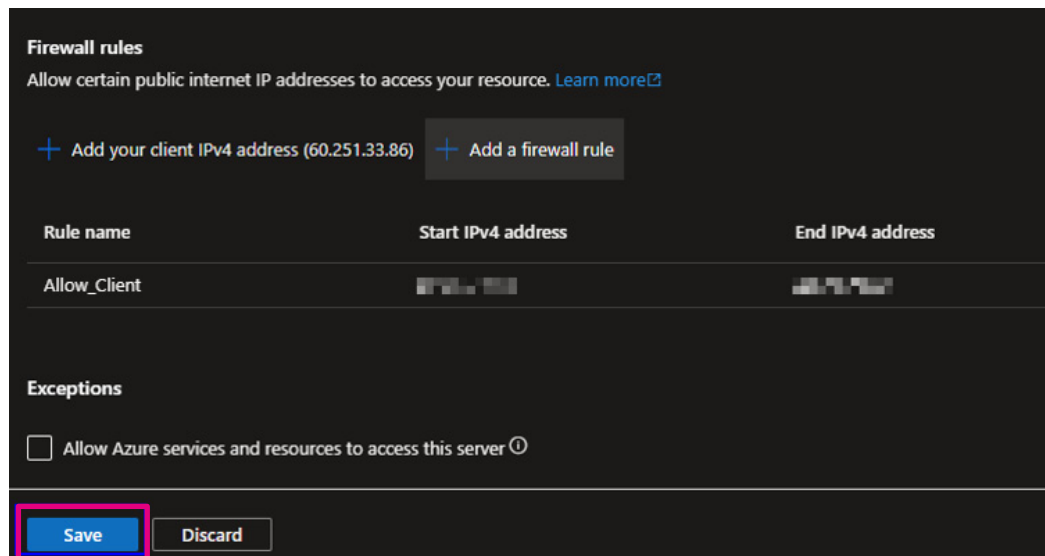
Rule name Start IP End IP

Allow_Client [IP] [IP]

Exceptions

Allow Azure services and resources to access this server

OK Cancel



Firewall rules
Allow certain public internet IP addresses to access your resource. [Learn more](#)

+ Add your client IPv4 address (60.251.33.86) + Add a firewall rule

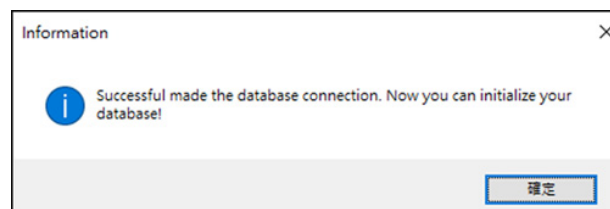
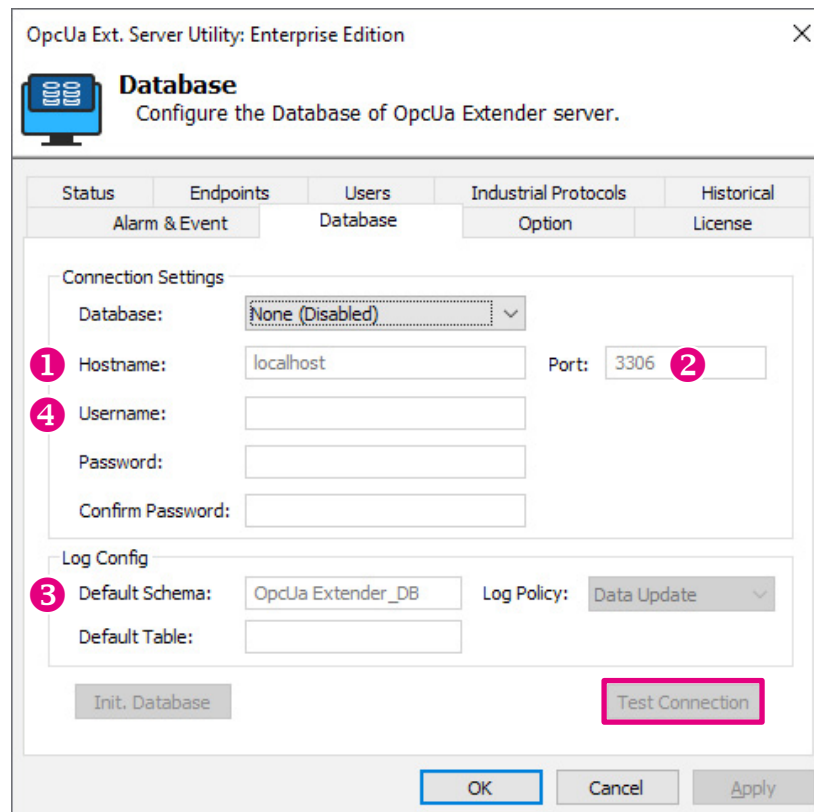
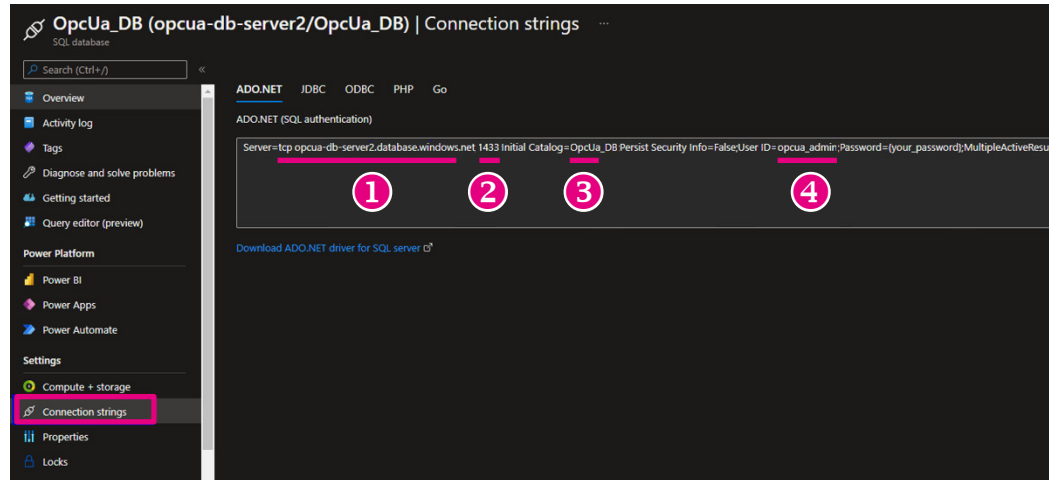
Rule name	Start IPv4 address	End IPv4 address
Allow_Client	[IP]	[IP]

Exceptions

Allow Azure services and resources to access this server ⓘ

Save Discard

Example 2.11: Click <**Connection Strings**> in the left panel to see the necessary information. Press <**Test Connection**> once you have entered it on the **Database** page of AIC OpcUa Extender Server.



2.8 Option

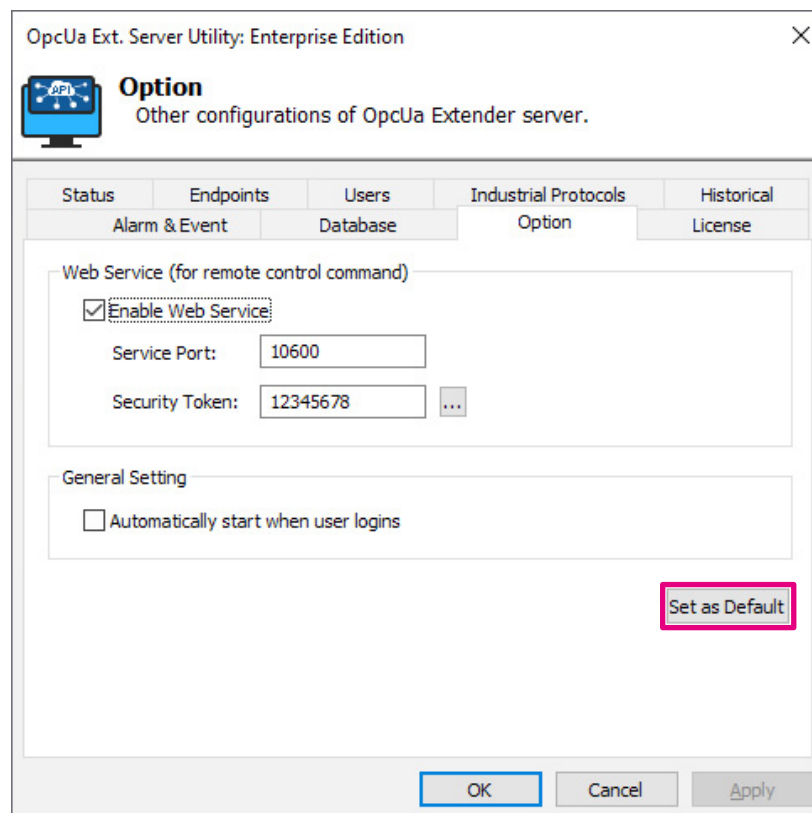
The Option page provides additional play and launch options that can be enabled during play mode and startup.

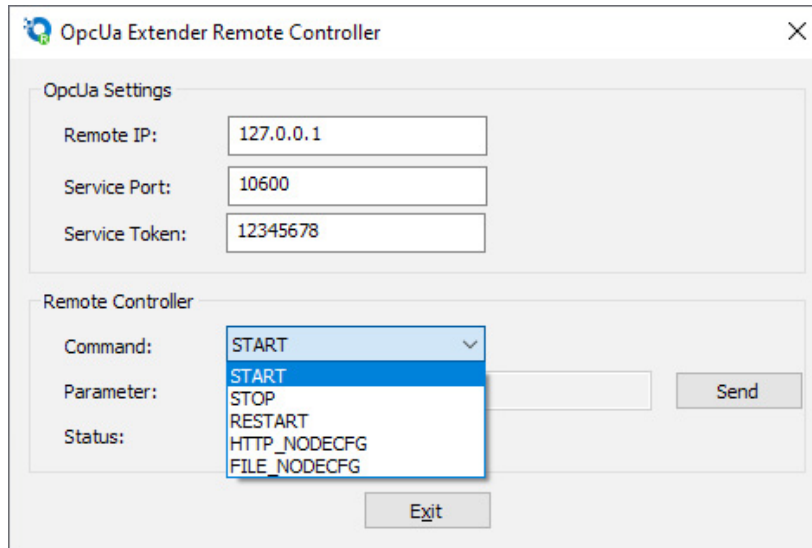
Click the **<Set as Default>** button to return to the default options.

The Web Service will provide the Restful API for customers to remotely control the server to START, STOP, RESTART, HTTP_NODECFG, FILE_NODECFG.

One option is available:

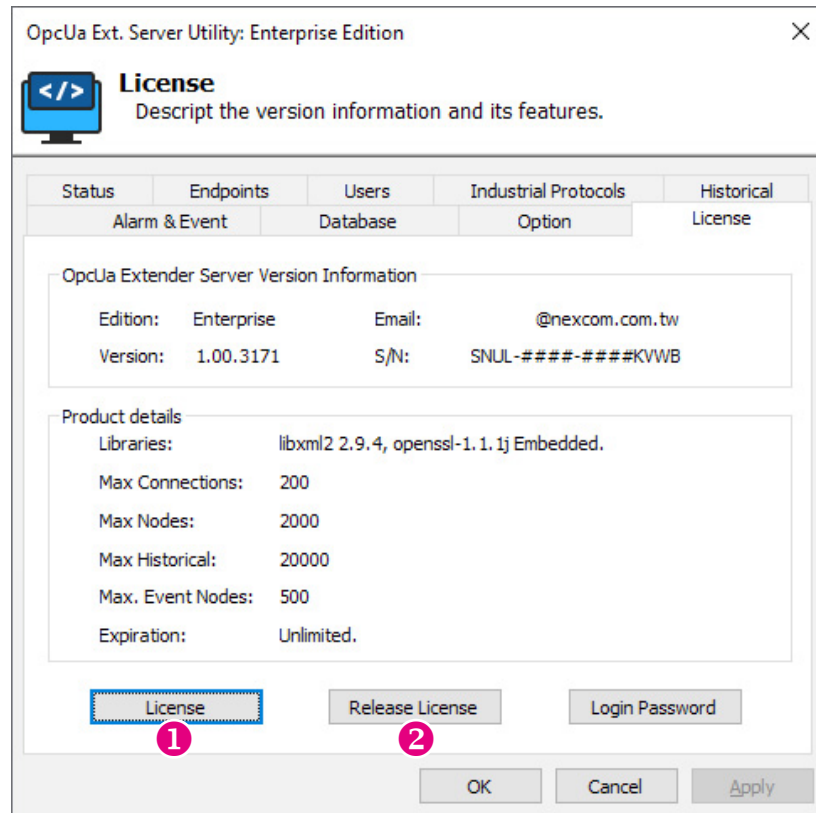
- Auto launch when logged in to the system.

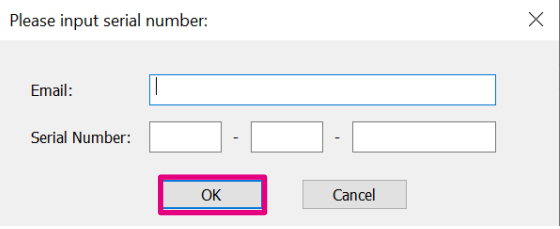
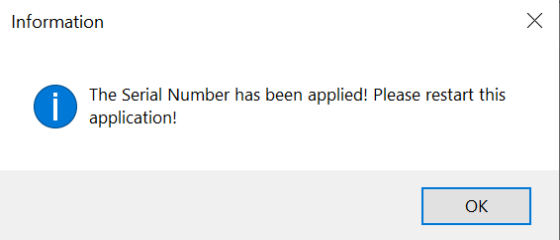





2.9 License

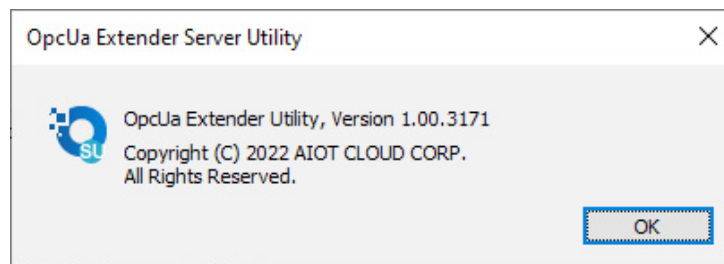
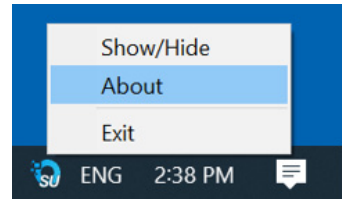
The License page displays the **OpcUa Extender Server Version Information** and **Product details**. Also, this page allows you to register the product key.



Item	Name	Description
1	License	<p>Click <License> and enter your software key in the respective fields. Click <OK> when done.</p>  
2	Release License	Click it to release the license key on the current device, then you can use the license key in the other device.

2.10 About

To see the version number, right-click on the icon  in the lower-right corner of Windows Taskbar and click "About".

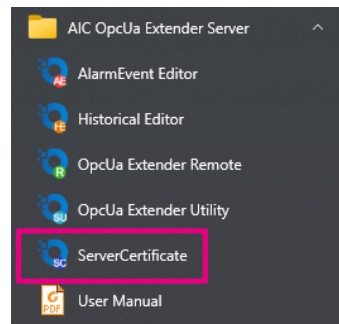


CHAPTER 3: ADVANCED FUNCTIONS

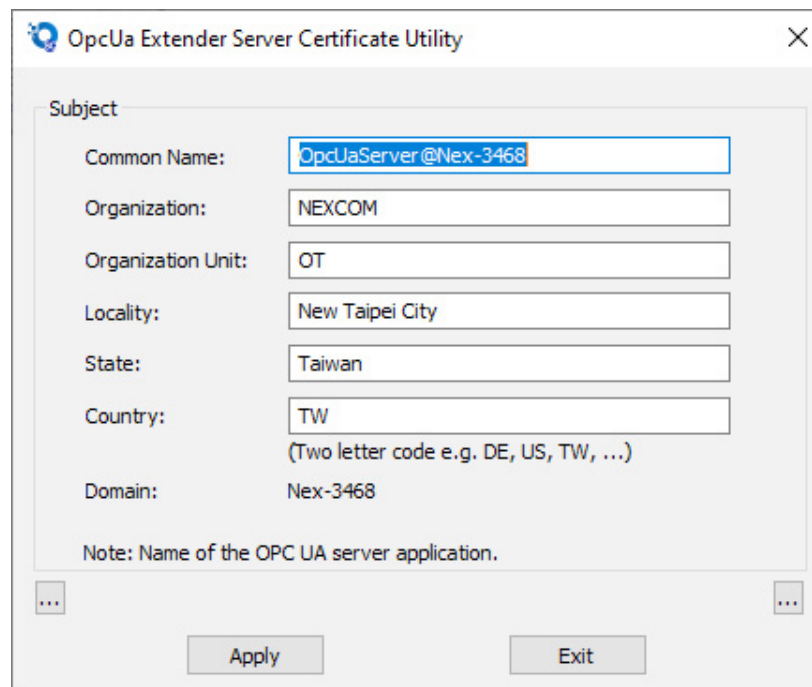
3.1 Update the Server Certificate


The OpcUa Extender Server Certificate Utility is designed for server certificate management. You can create your own server certificate, load the default value, or select a new server certificate using this utility.

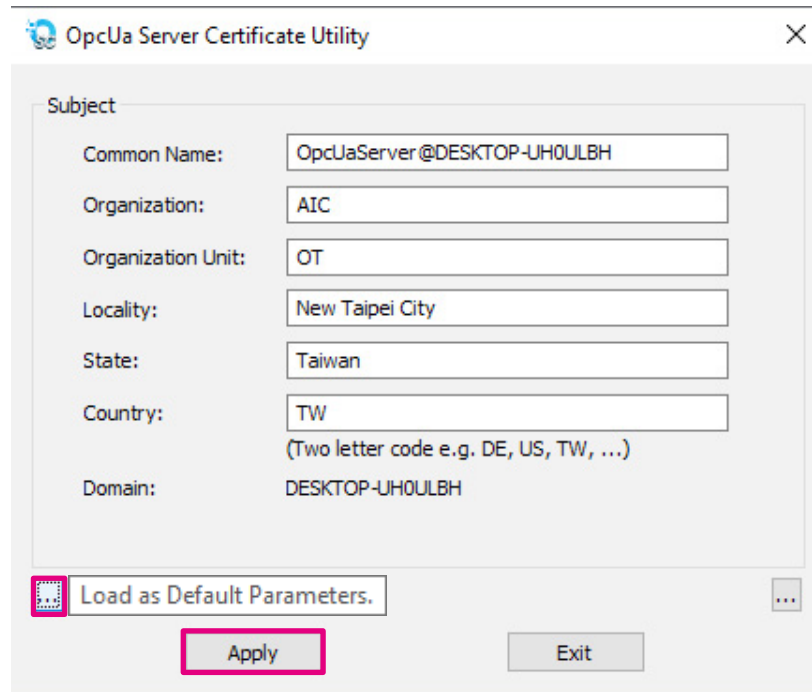
1. Click on <**Server Certificate**> to launch the Server Certificate.




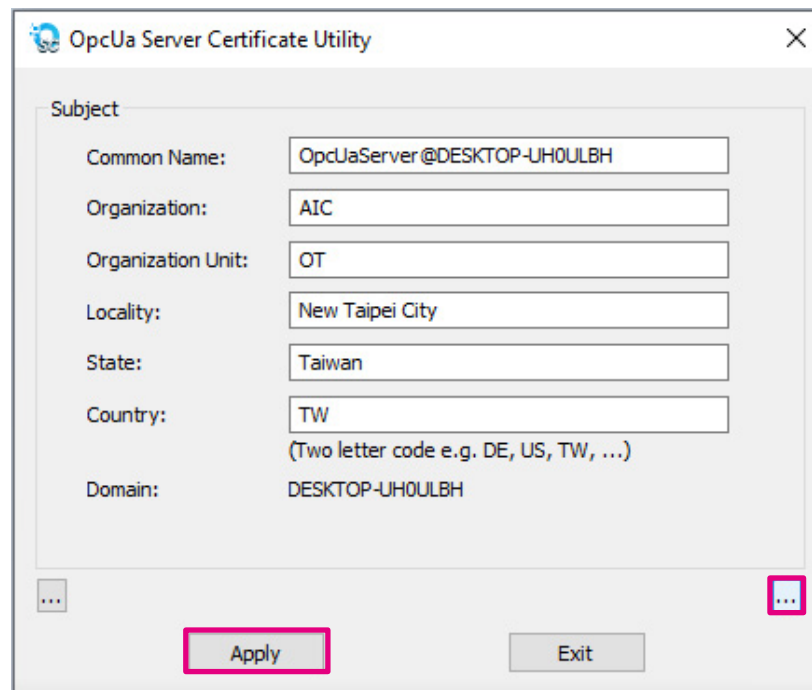
2. The GUI of Server Certificate will be displayed on the screen.



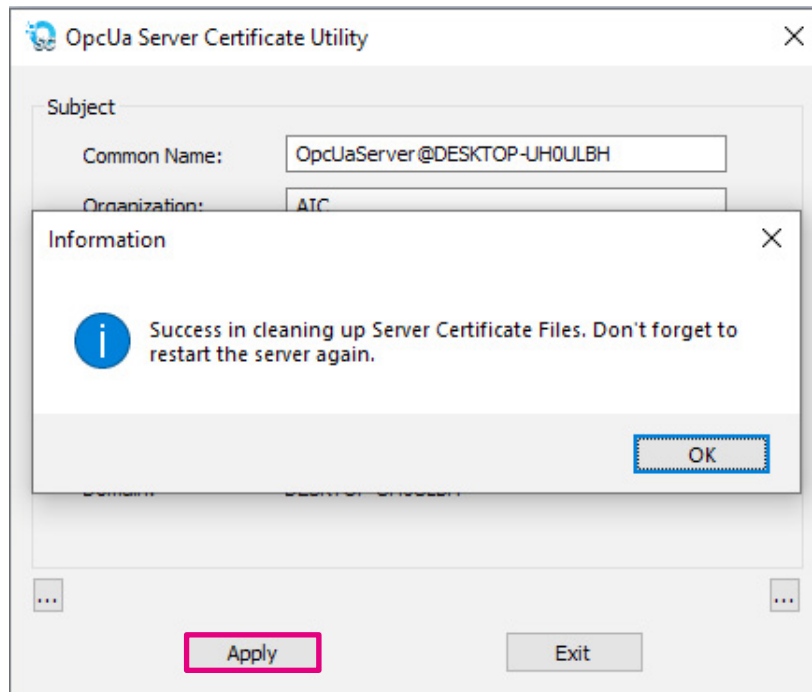
- To load the default certificate, click on the bottom left corner as indicated below () and then click <Apply> button.



- To load a preferred certificate, click on the bottom right corner as indicated below () and then click <Apply> button.



5. Make sure to restart the server once you have pressed the **<Apply>** button.

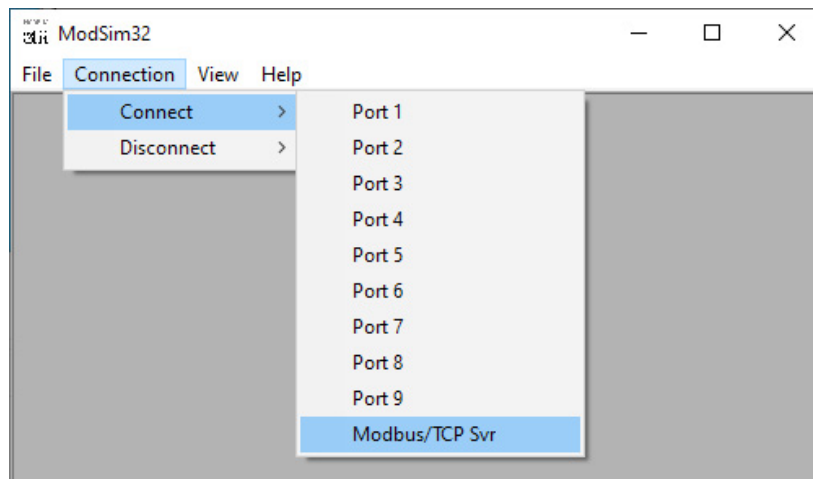


CHAPTER 4: TUTORIAL

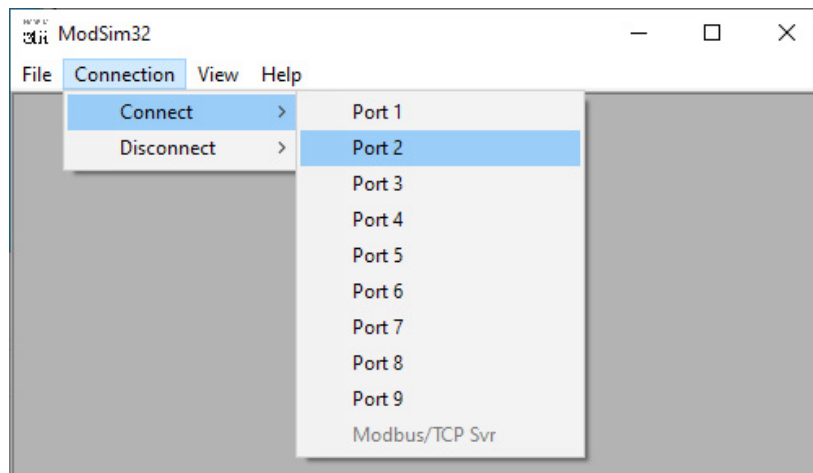
4.1 Configure the Modbus Data Into OpcUa Extender Server

In this chapter you will be guided how to get the Modbus data into the OpcUa Extender Server. Make sure the information of the Modbus/TCP server and the Modbus/RTU server are prepared before the configuration.

1. Use ModSim32 to simulate the Modbus/TCP Server.



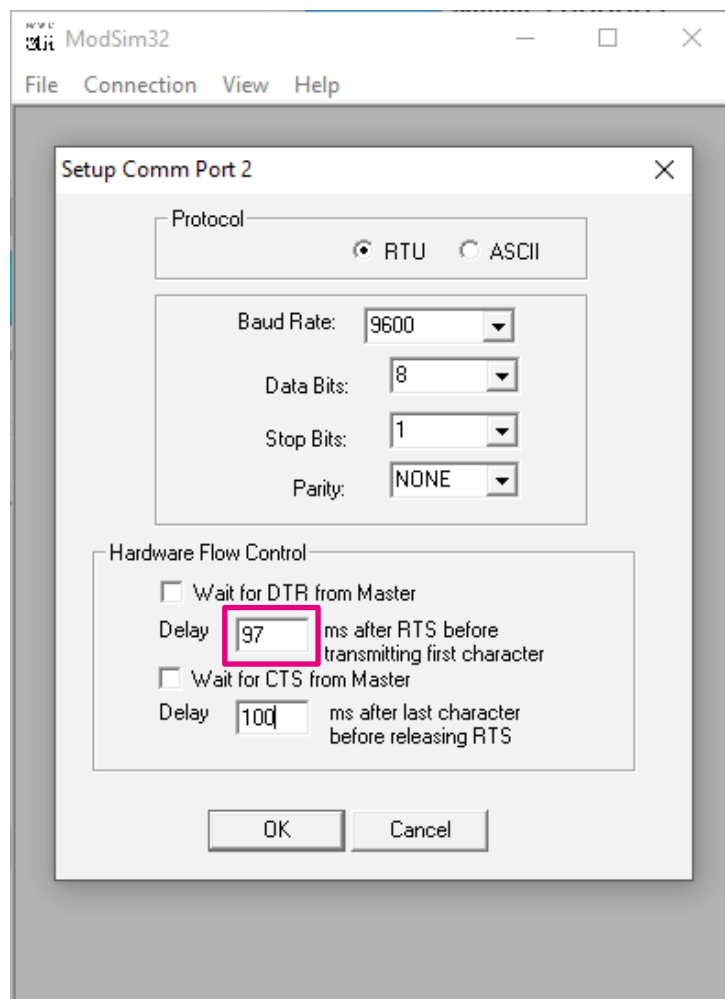
Or use ModSim32 to simulate the Modbus/RTU Server.



2. Set up the RTU Parameters:

- Protocol : RTU
- Baud Rate : 9600
- Data Bits : 8
- Stop Bits : 1
- Parity : NONE

Suggested delay time 4ms for Baud Rate 9600 bps. See reference table on next page.



According to the Modbus RTU standard, the minimum silent period should be 1.75 ms regardless of the baud rate.

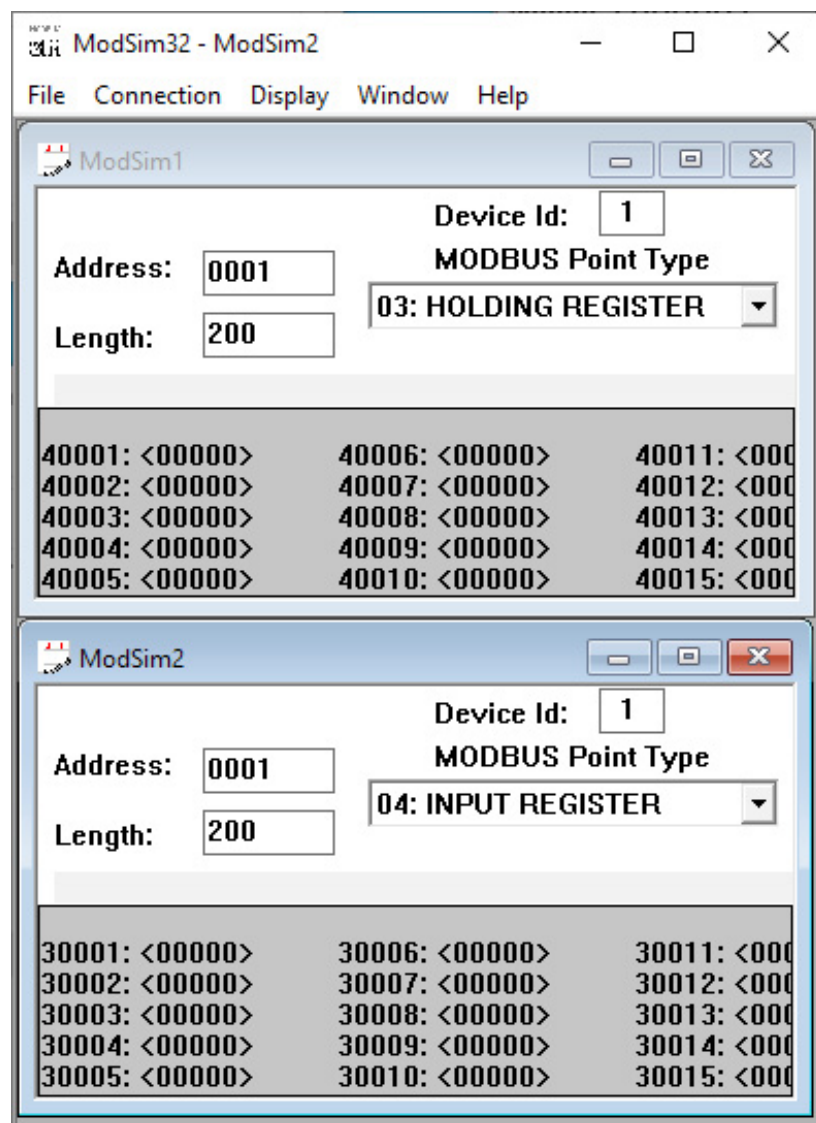
Baud rate	Bit rate	Bit time	Character time	3.5 character times
2400	2400 bits/s	417 us	4.6 ms	16 ms
4800	4800 bits/s	208 us	2.3 ms	8.0 ms
9600	9600 bits/s	104 us	1.2 ms	4.0 ms
19200	19200 bits/s	52 us	573 us	2.0 ms
38400	38400 bits/s	26 us	286 us	1.75 ms (1.0 ms)
115200	115200 bits/s	8.7 us	95 us	1.75 ms (0.33 ms)

3. Add 2 files between two Servers :

One is MODBUS Point Type : 03: HOLDING REGISTER

Another is MODBUS Point Type : 04: INPUT REGISTER

- Recommended parameters:
 - Device id : 1
 - Address : 0001
 - Length : 200



The Modbus/TCP server or RTU server is ready once the parameters have been filled in.

4. Prepare 2 csv files with the following definitions: tags address, type and length.

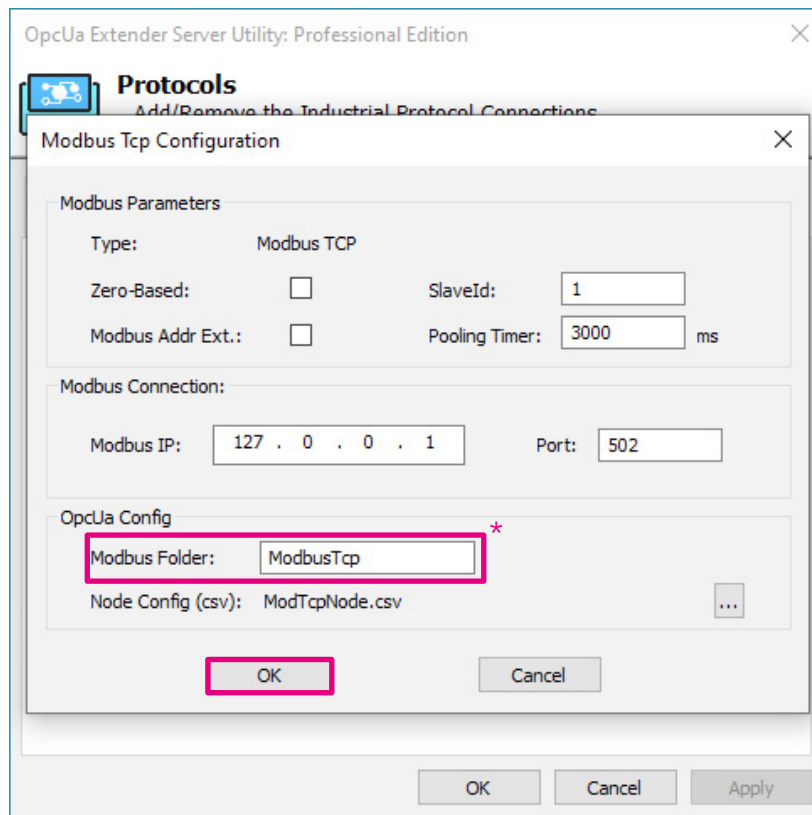
- ModRtuNode.csv
- ModTcpNode.csv
- csv sample:

	A	B	C	D	E	F	G	H	I
1	TagName	DisplayName	Directory	Type	Trans	Address	Length	Factor	Offset
2	TagString.30001.200	TagString.30001.200	DataType/String	STRING		30001	200		
3	TagString.30001.200.L	TagString.30001.200.L	DataType/String	STRING.L		30001	200		
4	TagString.30001.200.H	TagString.30001.200.H	DataType/String	STRING.H		30001	200		
5	TagString.40001.200	TagString.40001.200	DataType/String	STRING		40001	200		
6	TagString.40001.200.L	TagString.40001.200.L	DataType/String	STRING.L		40001	200		
7	TagString.40001.200.H	TagString.40001.200.H	DataType/String	STRING.H		40001	200		
8	TagBoolean.00001.1	TagBoolean.00001.1	DataType/Boolean	BOOLEAN		1	1		
9	TagBoolean.00001.100	TagBoolean.00001.100	DataType/Boolean	BOOLEAN		1	100		
10	TagBoolean.10001.1	TagBoolean.10001.1	DataType/Boolean	BOOLEAN		10001	1		
11	TagBoolean.10001.100	TagBoolean.10001.100	DataType/Boolean	BOOLEAN		10001	100		
12	TagShort.30001.1	TagShort.30001.1	DataType/Short	INT16		30001	1		
13	TagShort.30001.100	TagShort.30001.100	DataType/Short	INT16		30001	100		
14	TagShort.40001.1	TagShort.40001.1	DataType/Short	INT16		40001	1		
15	TagShort.40001.100	TagShort.40001.100	DataType/Short	INT16		40001	100		
16	TagWord.30001.1	TagWord.30001.1	DataType/Word	UINT16		30001	1		
17	TagWord.30001.100	TagWord.30001.100	DataType/Word	UINT16		30001	100		
18	TagWord.40001.1	TagWord.40001.1	DataType/Word	UINT16		40001	1		
19	TagWord.40001.100	TagWord.40001.100	DataType/Word	UINT16		40001	100		
20	TagLong.30001.1	TagLong.30001.1	DataType/Long	INT32		30001	1		

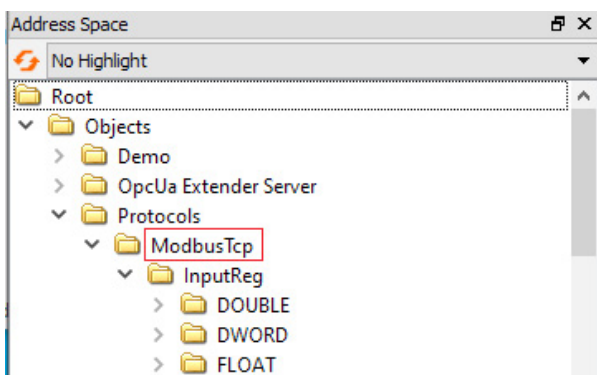
CSV simple:

- Format: Tag_Name, Display_Name, Directory, Data_Type, Transfer, Address, Length, Scaling_Factor, Scaling_Offset
- Tag_Name : The Tag Name.
- Display_Name : The Tag in OpcUa node browser name.
- Directory: OpcUa node directory for this Tag
- Data_Type: There are STRING, BOOLEAN, SHORT, INT16, WORD, UINT16, LONG, INT32, DWORD, UINT32, FLOAT, DOUBLE, BCD, LBCD.
- Transfer: There are ABCD, BADC, CDAB and DCBA and only for FLOAT type.
- Address: The Modbus item address
- Length: The Tag data length if > 1 means array data type
- Scaling_Factor and Scaling_Offset:
 - Scaling factor and offset for read/write operation. For Read, will read data from PLC, then will calc the $new_data = (data * factor) + offset$, then write new_data to OpcUa Server. For Write, will read data from OpcUa Server, then calc the $new_data = (data - offset) / factor$, then write new_data to PLC.
 - for SHORT, INT16, WORD, UINT16, LONG, INT32, DWORD, UINT32, FLOAT, BCD, LBCD
 - Scaled Data Type is FLOAT only

5. Add Modbus TCP and Modbus RTU to the **Industrial Protocols** tab, then click **<OK>** and restart the AIC OpcUa Extender Server.



* This Folder will show on UaExport Protocol folder like the image below.



Modbus RTU Configuration [X]

Modbus Parameters

Type: Modbus RTU

Zero-Based: SlaveId: 1

Modbus Addr Ext.: Pooling Timer: 200 ms

Modbus Connection:

COM Port: COM1 Baud Rate: 9600

Data Bits: 8 Parity: NONE Stop Bits: 1

Frame Delay: 10 ms

OpcUa Config

Modbus Folder: ModbusRtu.1

Node Config (csv): ModbusRtuCfg.csv ...

OK Cancel

Modbus ASCII Configuration [X]

Modbus Parameters

Type: Modbus ASCII

Zero-Based: SlaveId: 1

Modbus Addr Ext.: Pooling Timer: 3000 ms

Modbus Connection:

COM Port: COM1 Baud Rate: 9600

Data Bits: 8 Parity: NONE Stop Bits: 1

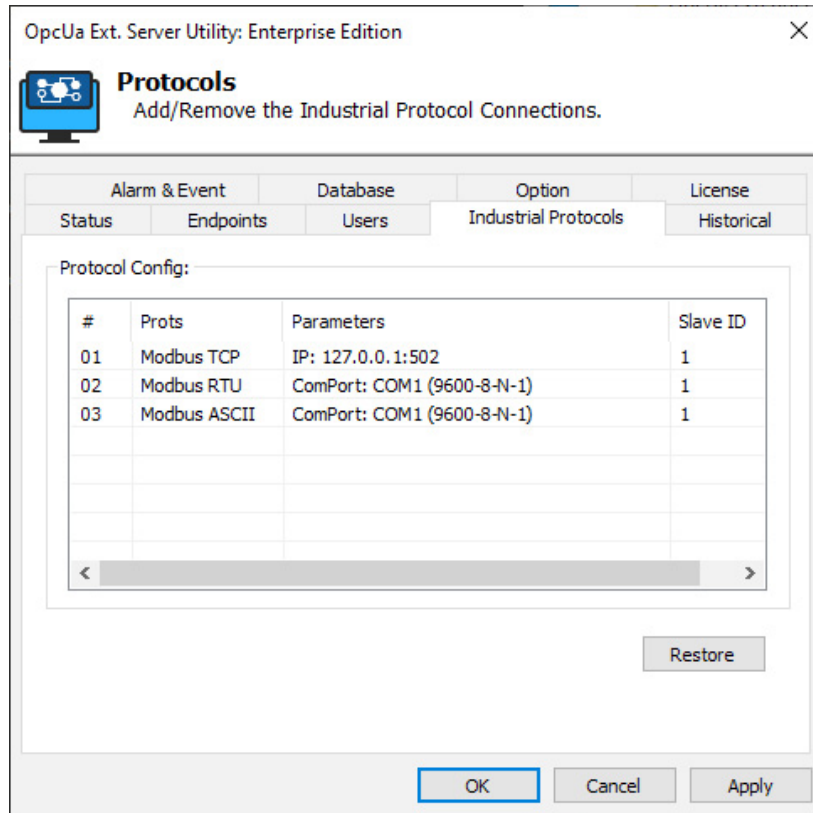
Frame Delay: 10 ms

OpcUa Config

Modbus Folder: ModbusAsc

Node Config (csv): ModbusAscCfg.csv ...

OK Cancel



7. Q & A

If you are interested in information about the OpcUa Extender Server product, we recommend that you visit the AIC website. On the AIC website, you can find related information about the product such as product introductions, features, and application cases.

If you require more detailed technical information, you can seek assistance through the AIC Forum. You can post questions or technical issues, receive answers and suggestions from technical experts and other members of the community. This can help you to gain a deeper understanding of the OpcUa Extender Server and use it more effectively.

The AIC Form QRCode is in below:



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