GENESIS64 – ICONICS OPC UA Server Suite 5: Advanced Simulator

APPLICATION NOTE

September 2013

Description: Guide to use the ICONICS OPC Server Suite 5: Advanced Simulator driver.
OS Requirement: Vista x64/ Windows 7 x64/ Windows 8 x64/ Windows Server 2008 x64/ Windows Server 2008 R2 x64/ Windows Server 2012
General Requirement: Installation of ICONICS OPC Server Suite 5, and possibly Microsoft Office 2003/2007/2010 (not necessarily on the same machine).

Introduction

Although in a real application there is seldom the need to use simulated data, there are some other scenarios in which being able to have an advanced simulator server can be quite handy.

This can be during project development phase, when you need to perform specific tests, evaluating "what-if" scenarios, and may also be useful for operators training, where you want them to face real-life critical situations they need to be prepared for.

Among the different Simulator Servers available, ICONICS OPC Server Suite 5 offers the Advanced Simulator driver, which can be quite useful to control the data flow you send to your application.

This can be achieved by using some persistent data source to provide data through the simulator. For example you can get data out of a database table, or an Excel file. The simulator will read values from a specific column, one row at a time, and provide the value to the connected OPC clients.

Preparing the data

As we said, data will be provided by some persistent data source. For this reason, before configuring the simulator, we need to prepare our data.

We have a wide choice of data sources we can use here: everything for which an ODBC driver exists can be used. We will analyze two possible approaches here.

Using a database

The first possible choice is quite natural: a database. This can be an existing database containing already some data, or can be created from scratch. If the database is brand new, you will need to create a table with one column per each tag you want to simulate.

For example, suppose you want to simulate 4 different values, with 1s update rate, and a 60s period, after which the values will start again from the beginning, in a never ending loop. To achieve this you can create a table with 4 columns and fill in 60 rows with your preferred values. You will then tell the simulator to read those values, one row at a time, every second.

The simulator's tags, therefore, will have the values written in the first row of the database table at time 0, then from the second row after 1s and so on.

The advantage of using a database is that you can easily fill it with data from another application, or it may be an already existing set of data you want to reuse. For example, if you have data logged by an historian, you can use this simulator to "replay" your data, for example to see again what the operator could see on his screen when a specific problem happened.

Using an Excel file

The other approach we present here, and the one we will use for our final example, is an Excel file. It works exactly the same way as a database table per each of its sheets.

The big advantage of an Excel file, compared to a database, is that you can easily generate your values using Excel's functions, and you can easily modify these values anytime.

For example, suppose you want to provide a sine simulated tag. You can use the first column to write an index value *i*, whose values ranges from 0 to the number of rows, minus 1, which we'll call *n*. In the second column you will need to use this math function:

$$x = \sin\left(2\pi * \frac{i}{n}\right)$$

Using Excel syntax it becomes like this:

```
=SIN(2*PI()*A1/120)
```

Where A1 is the name of the first cell, and 120 is the number of rows in our example. Now you can simply copy the value of this cell down to the last row and it will adjust the cell name accordingly.

Feel free to use the power of Excel functions to generate some more columns for your tags. For example our configuration looks like this:

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	A	B	C	D	E	F
1	0	0	0	0	1	1
2	1	0.052336	1	1	0	0
3	2	0.104528	2	0	1	0
4	3	0.156434	3	1	0	0
118	117	-0.15643	27	1	0	0
119	118	-0.10453	28	0	1	0
120	119	-0.05234	29	1	0	0

Figure 1 – Our Excel sample file

Where the first column is an index, the second is a sine (as described above), then there is a ramp and 3 columns with bit values. We are now ready to move on with the server configuration.

Configuring the OPC UA Server

Once your source data is ready you launch the ICONICS OPC Server Suite 5. We will need to create a new channel by using the appropriate command. Give it any name you like and pick "Advanced Simulator" as the Device Driver. You can leave the other options with their default values until you reach the "New Channel – Data Source Selection" screen. From here we will need to configure a new DSN to the Excel file we created in the previous section.

Click on the "Configure DSN" button and pick the "System DSN" tab (in this way all users will be able to use this DSN). Click on the "Add…" button to create a new connection. Select an Excel driver and specify the workbook location for your file. Once you're done, click OK to go back to the "Data Source Selection" dialog and make sure you select the appropriate DSN from the dropdown. You will need to specify no user name and password for this file.

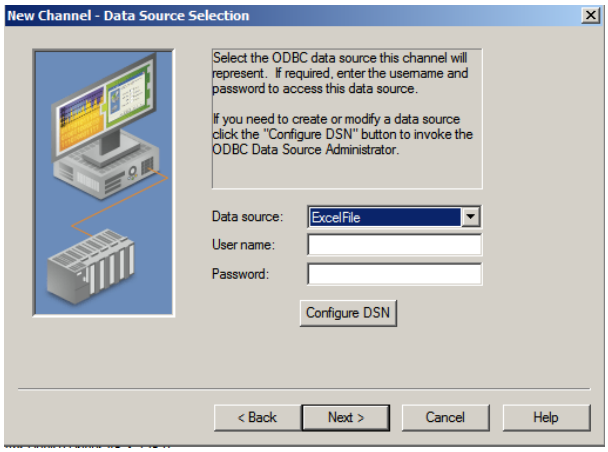

Figure 2 – Data Source Selection

Click on Next and leave all the other options untouched until you reach the end of the Wizard. Your new Channel has been created, and we can now add a Device to it.

Click on the "Click to add a device" link (or use the button in the toolbar or the menu, if you prefer). A new Wizard will appear. Give the device a name, leave the Device Model set to Generic and select the first worksheet for this device.
The "New Device – Timing Options" dialog offers the possibility to define the update rate and to automatically roll back to the first record after the last one has been read. We will set the interval to 1000ms to have a 1s update rate, and we will leave the option to move to the first record selected. If you don't want your simulated device to automatically loop, simply uncheck this. Click Next, then Finish, your new device has been created, and the Server should have already created a tag for each of the columns in your Excel spreadsheet.

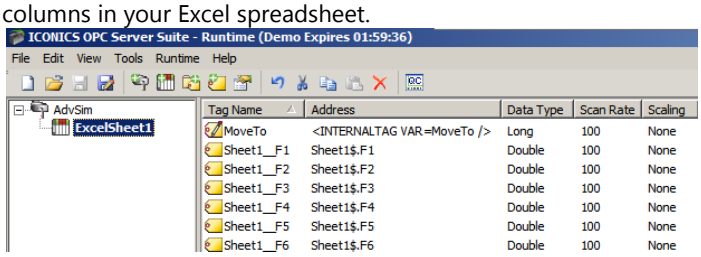

Figure 3 – The newly created device

You may have noted that there is an extra tag called "MoveTo". This is a very useful tag where you can write the value of the row where you want to move to. It allows to quickly jump to some specific set of values, in case you want to repeat a certain sequence of values, for example.
The configuration is complete. The only last thing we need to do is to verify that the values are actually provided by the server correctly. To do this we will use the OPC Quick Client which comes with the OPC UA Server. Feel free to use any other OPC DA/UA client. From the Tools menu, click on "Launch OPC Quick Client" (or use the "QC" button in the toolbar).
The Quick Client will show up already configured to show the data from the server. Click on the folder named after your channel and device and verify that the values shown there actually match with your Excel file content.

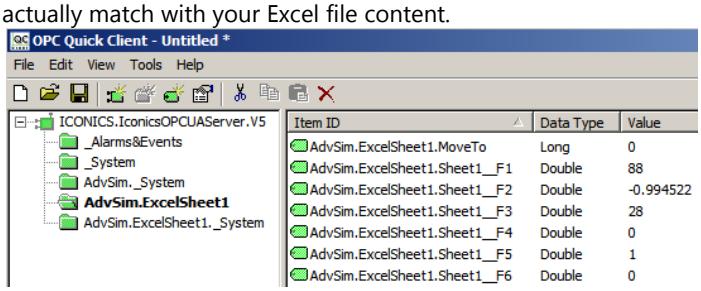

Figure 4 – The OPC Quick Client showing data from the server