OPAL-RT Technologies

RT-LAB OPC server Configuration

Internal documentation: v2.0

Technical Support
3/22/2012

1 Revision history

Revision 2.0	RT-LAB OPC server Configuration	Janardhan KS.

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4 Introduction

An OPC Server is a software application that acts as an API (Application Programming Interface) or protocol converter. An OPC Server will connect to a device such as a PLC, DCS, RTU, or a data source such as a database or User interface, and translate the data into a standard-based OPC format. OPC compliant applications such as an HMI (Human Machine Interface), historian, spreadsheet, trending application, etc. can connect to the OPC Server and use it to read and write device data. An OPC Server is analogous to the role a printer driver plays to enable a computer to communicate with an ink jet printer. An OPC Server is based on a Server/Client architecture.

In this document – we read about how to configure the RT-LAB OPC server step by step and learn to make connections between RT-LAB OPC servers and other Third party OPC servers over network.

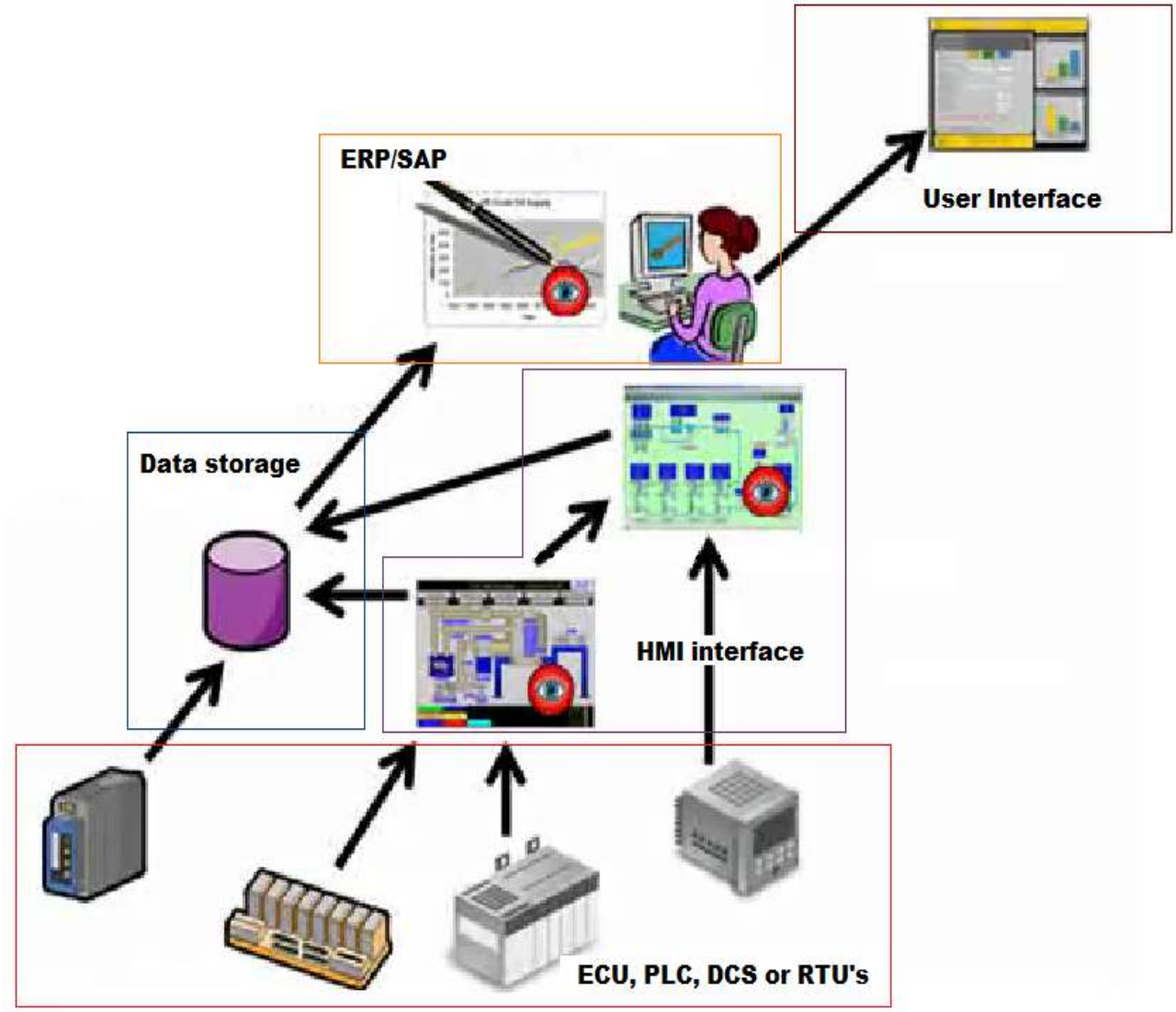

Figure 1: Before OPC server

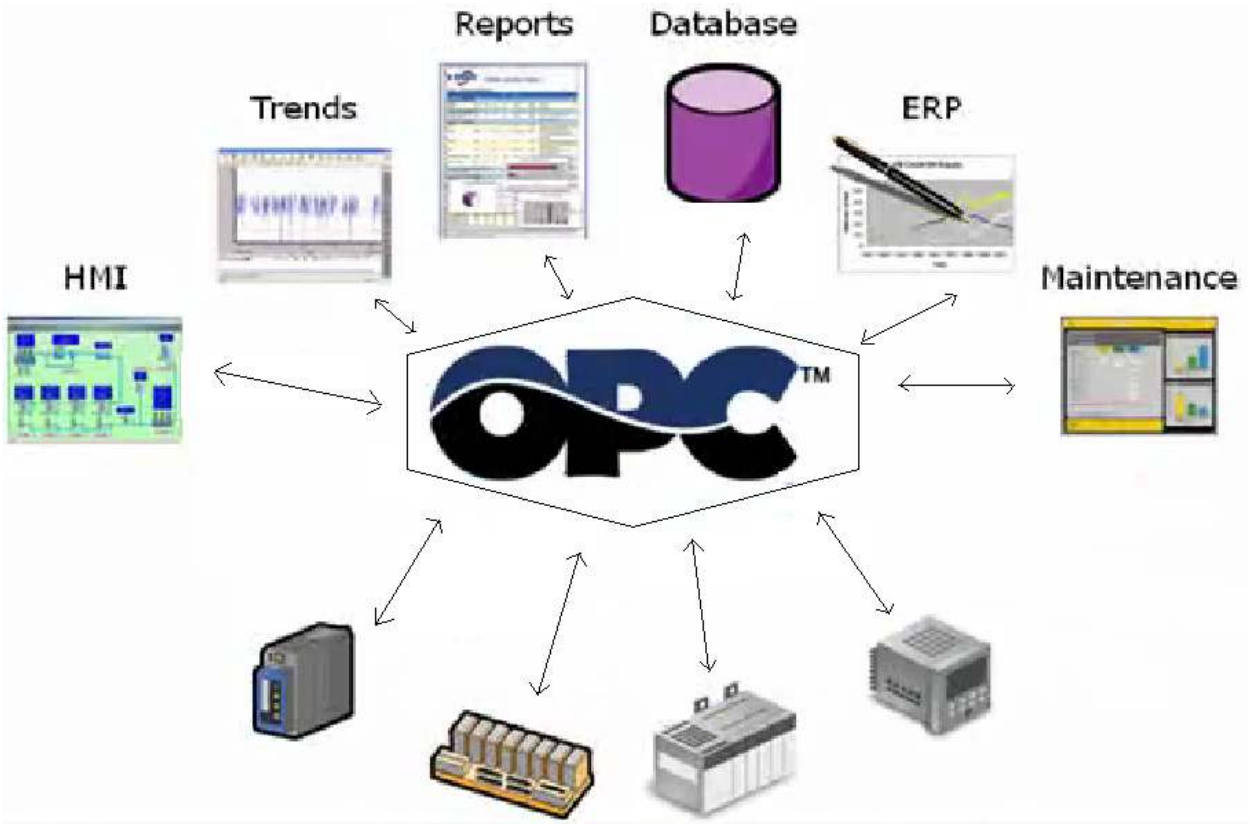

Figure 2: After introduction of OPC (common language)

4.1 Pre requisites

- Knowledge in Matlab/Simulink and basics of making a .mdl file compatible with RT-LAB environment.
- Need to have basic knowledge in usage of RT-LAB software - 10.X version.
- Also must have basic knowledge of OPC server and should know how to configure.

4.2 Overview

- configuration of RT-LAB OPC server please refer the document: UserGuide.pdf or Quickref.pdf
- For making OPC server connection with another OPC server/client over network you will need to make the *"basic configuration"* explained in UserGuide.pdf.
- Software required to be downloaded:

  http://www.kepware.com/Products/products_linkmaster.asp

- LinkMaster is used as bridging software to make connections between one OPC to another over network.
- In LinkMaster – we could choose any signal or parameter by means of drag and drop method. Only the signals chosen in LinkMaster will be seen on the third part OPC server/client over network.

- DCOM Settings

  - DCOM (Distributed Component Object Model) is a set of Microsoft concepts and program interfaces in which client program object s can request services from server program objects on other computers in a network. DCOM is based on the Component Object Model (COM), which provides a set of interfaces allowing clients and servers to communicate within the same computer (that is running Windows 95 or a later version).

- **Optional** Software

  https://www.matrikonopc.com/downloads/174/software/index.aspx

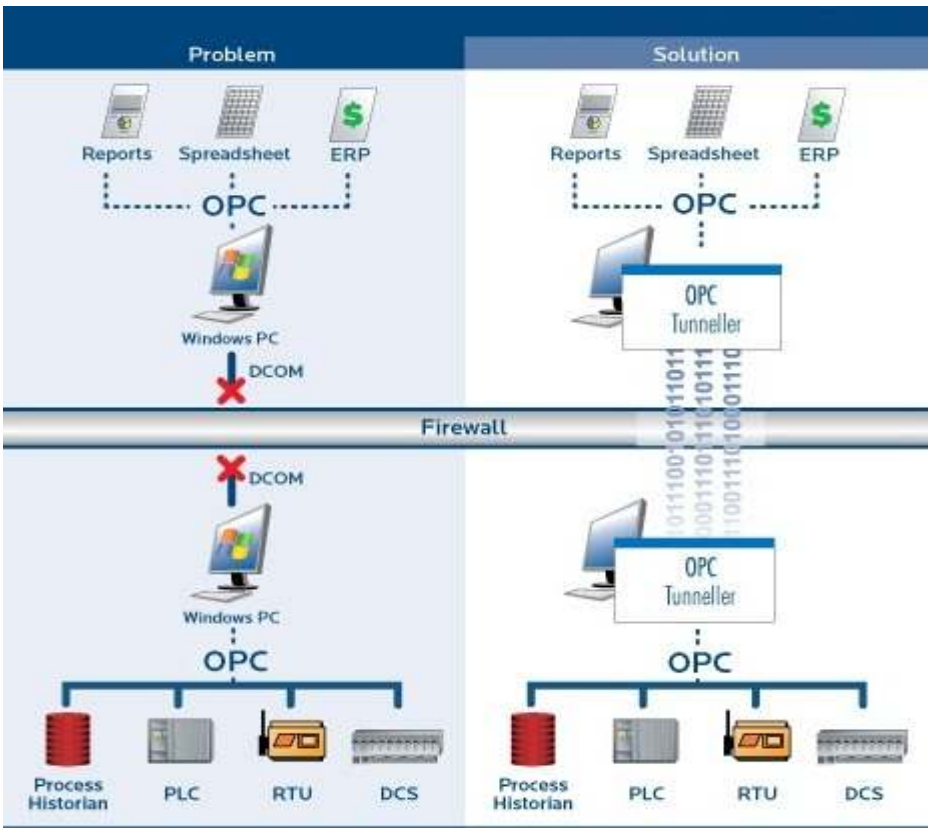

Figure3: Tunneller V/S DCOM

- OPC Tunneller provides an easy, reliable and secure way to communicate between networked computers. It does away with the headaches typically associated with DCOM configuration. No longer are different protocols, security settings or locations a factor when sharing data between computers. This is achieved by simply installing OPC Tunneller on the OPC client and OPC server nodes and then telling the Tunneller client where the Tunneller server exists.
- If Matrikon OPC or softing OPC servers are being used, and if efforts in configuring DCOM settings needs to be bypassed, then Tunneller software could be downloaded.
- Tunneller software needs to be installed on host computer and on the computer on which the 3rd party OPC server (ex. Matrikon OPC server) runs.
- Tunneller software needs to be running in "*Server-side gateway configuration*" mode on the host computer where RT-LAB OPC server is installed. And on the other computer where 3rd party OPC server runs, "*Client-side gateway configuration*" must be chosen.

4.3 Hardware Configuration

The hardware configuration required for this set up are:

- Target – OP5600 or OP500 (Wanda)
- OP5154 FPGA
- Host computer

4.4 Software Configuration

The software configuration required for this set up are:

- Target – Redhat Real Time Operating System
- Host computer
  - RT-LAB 10.X version
  - RT-LAB OPC server
  - Kepware –LinkMaster
  - Tunneller Software from Matrikon (**optionl**)

5 RT-LAB configuration

- Creating a simulink model , and making it RT-LAB compatible.
- Compilation, loading and execution of the model should be done successfully.

6 Configuration of RT-LAB OPC server

6.1 Starting RT-LAB OPC server

RT-LAB OPC server could be found in the following link – Start →RT-LAB.OPC-ServerX.X

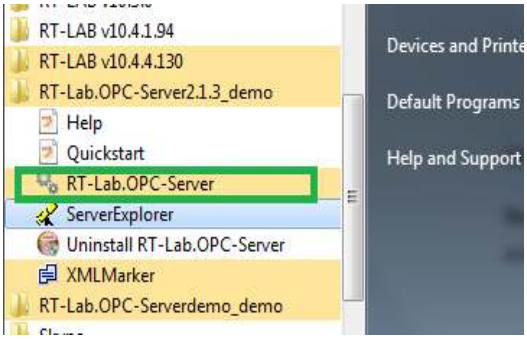

Figure 3: RT-LAB OPC server

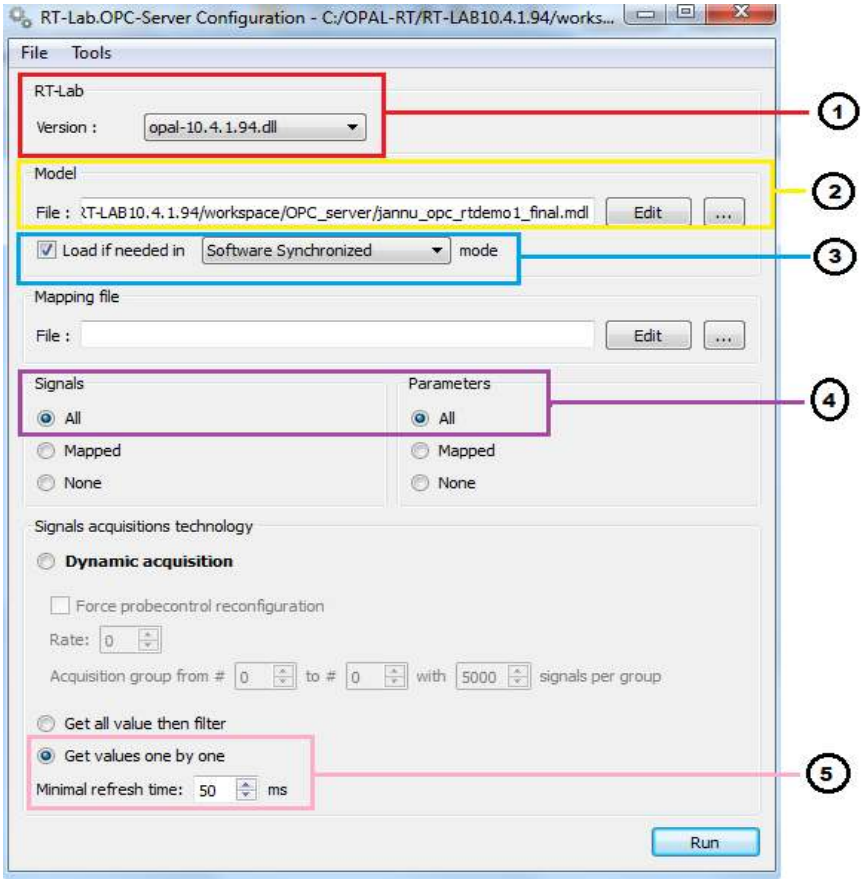

Figure 5: Configuration window

1 Select the RT-LAB version that was used to compile the respective model.
2 Click on the dotted button to browse for the model, and verify if link appeared in the window is the right.
3 If the model has OPAL-RT IO's then Hardware sync mode should be selected, else software sync or simulation sync could be selected (note: simulation – is not real time)
4 According to basic configuration, we need not create an XML file, so selecting "*All*" for both signals and parameters should be done.
5 Signal acquisition technology could be done by selecting "*Get values one by one*" mode and entering time step at which refreshing of the signal values should take place.

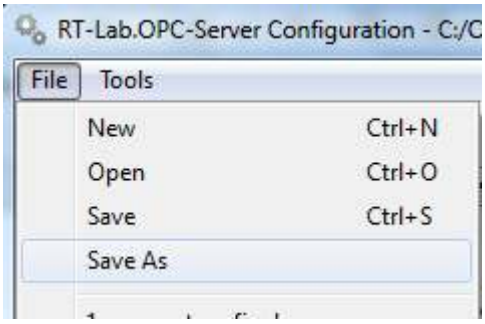

Figure 6: OPC server Save window

- Save the settings by giving it an appropriate name with a .ogp extension.

Figure 7: OPC server Run window

- Click run to start the OPC server configuration.

Figure 8: OPC server System tray window

- Once the OPC server configuration is run, the application minimises to the system tray in the right bottom corner of your screen.

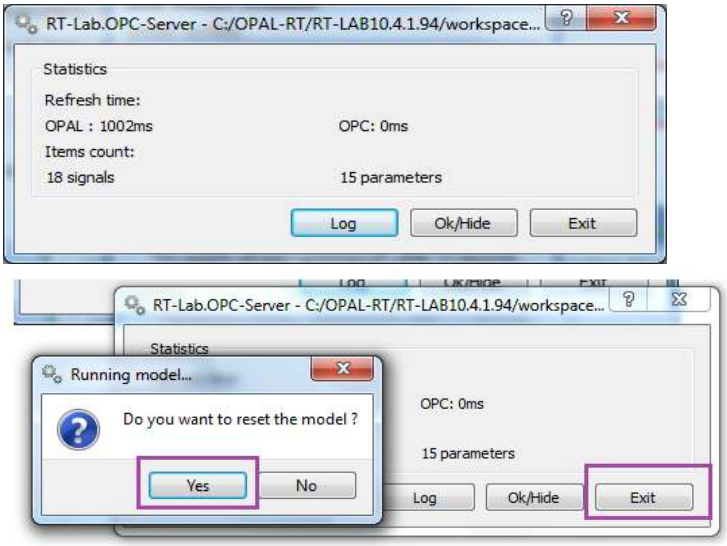

Figure 9: Execution of OPC server application window.

- Right click on the application icon and select "*Restore*" option to maximise the execution of OPC server application window.
- To Stop the execution of OPC server , select "*Exit*". And to leave it running it in background select "*Ok/Hide*". Select "*Log*" to see the succefull execution of RT-LAB OPC server.

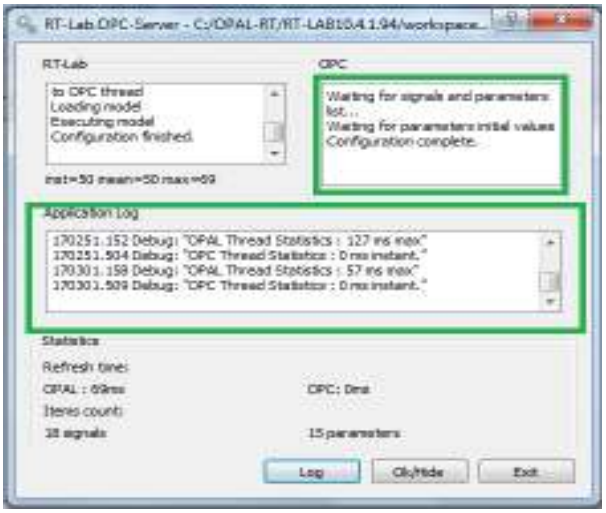

Figure 10: working Configuration window

6.2 OPC Server explorer

Now that OPC server has been configured successfully, we would want to view all the parameters and signals, and manipulate any parameter values. To do so, we use RT-LAB OPC server explorer.

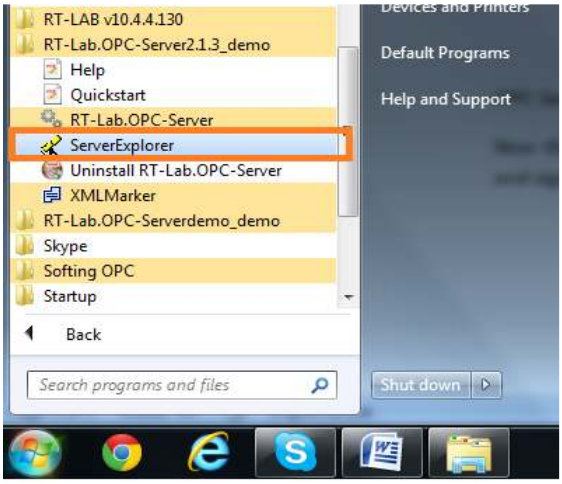

Figure 11: OPC server explorer

- RT-LAB OPC server explorer location in Start→ RT-LAB.OPC-ServerX.X.X→server explorer.
- If host system uses Windows7, please make sure that it has been set to run in "*Administrative mode*".

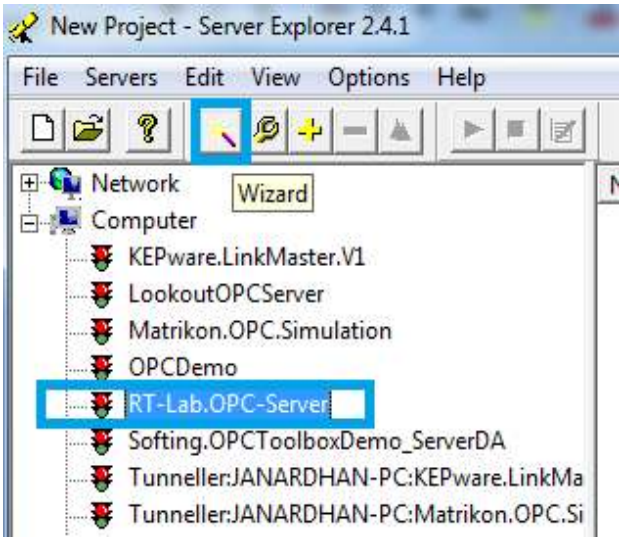

Figure 12: RT-LAB OPC server detection

- Now RT-LAB OPC server could be selected and the magic wand button could be selected to start the wizard.

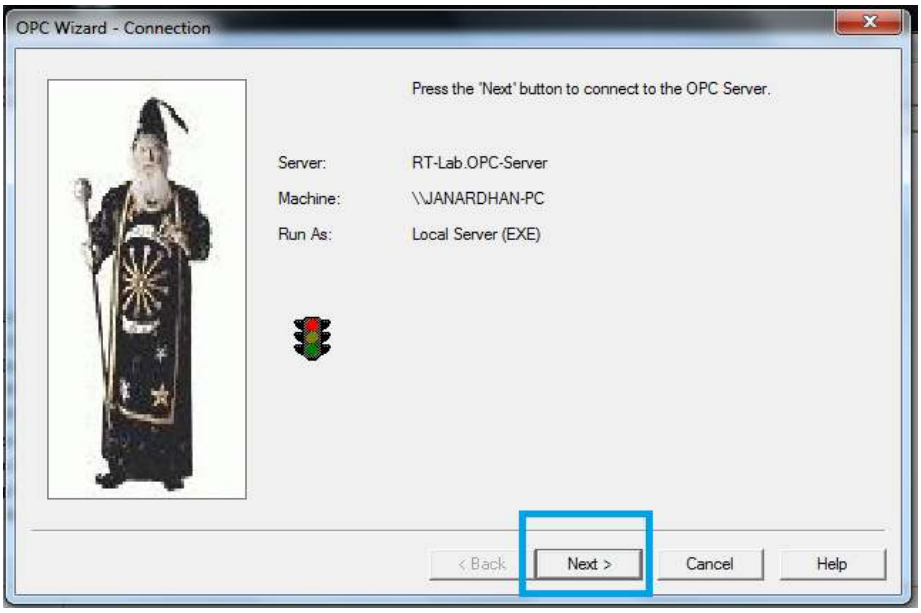

Figure 13: RT-LAB OPC server explorer Wizard settings – 1

- Select "*Next*" to continue.

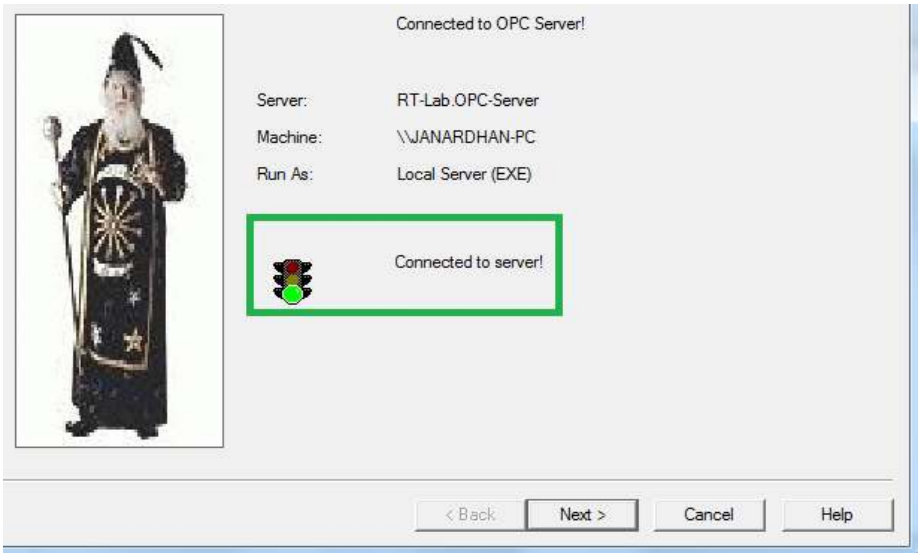

Figure 14: RT-LAB OPC server explorer Wizard settings – 2

- The green signal indicates good connection. Select "*Next*" to continue. The wizard could be configured successfully by selecting "*Next & Finish*".

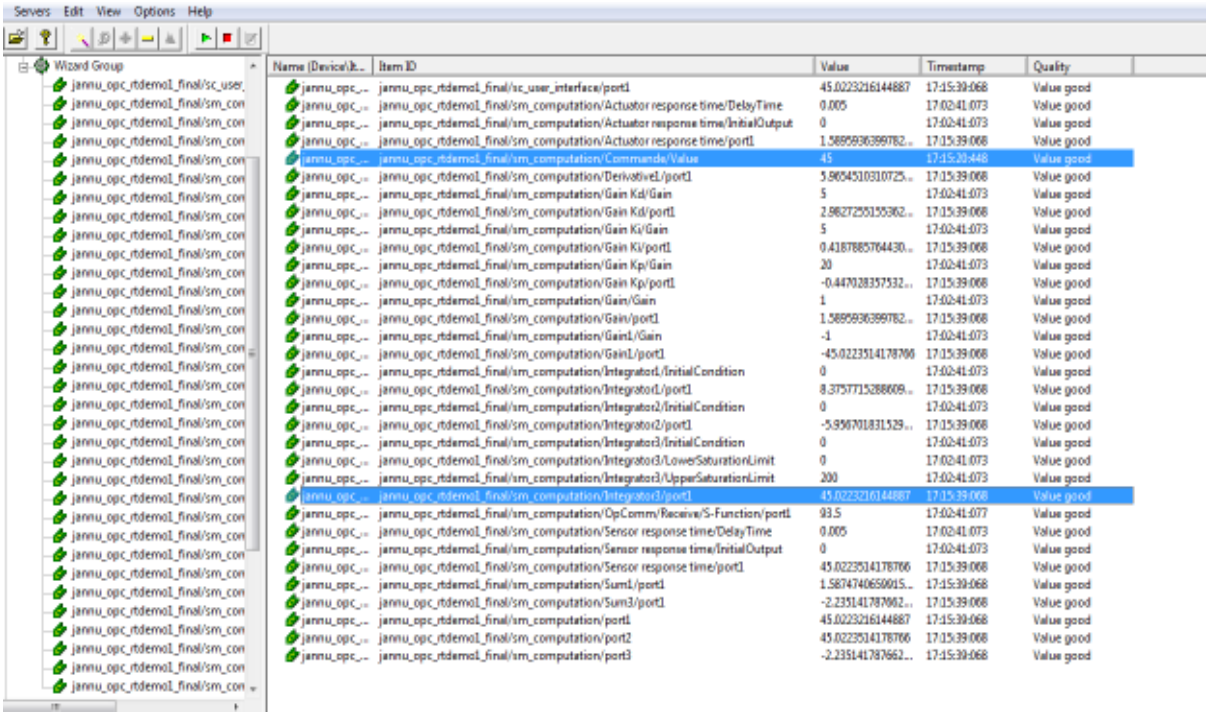

Figure 15: Running RT-LAB OPC server explorer window.

All the parameters and signals are now seen on the user interface. Changes could be made to the parameters and effect could be observed accordingly.
Ex. A PID model is running in the background and the command value (reference value – highlighted in blue) is changed and in effect, the system response is trying to reach the reference value.
So at this point of time, we are able to make changes in the parameters and observe the effect on the signals successfully.

7 Configuration of Bridging Software

Now that we are able to make changes in the parameters and observe the effect on the signals successfully, we need to move further onto the bridging software.

The bridging software is mandatory software to create a link between our RT-LAB OPC server and the rest of the OPC servers/clients over network.

The bridging software we use is the LinkMaster from Kepware technologies.

http://www.kepware.com/Products/products_linkmaster.asp

More information can be obtained on why bridging software is required in the above link.

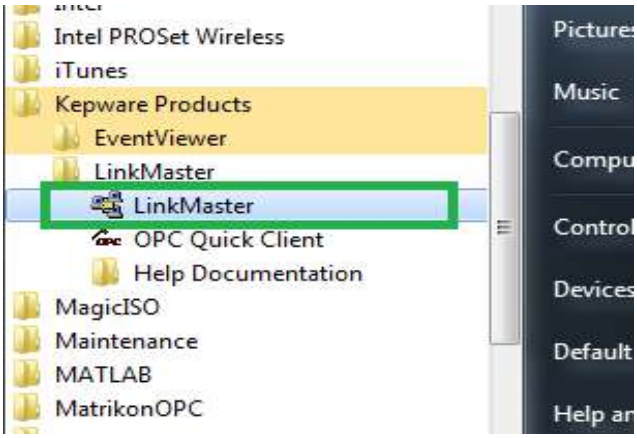

Figure 16: Kepware LinkMaster

LinkMaster location on host computer – start → Kepware Products →LinkMaster → LinkMaster.exe
Please make sure, if you are using window 7, then you need to run the LinkMaster.exe in "*Admin mode*".

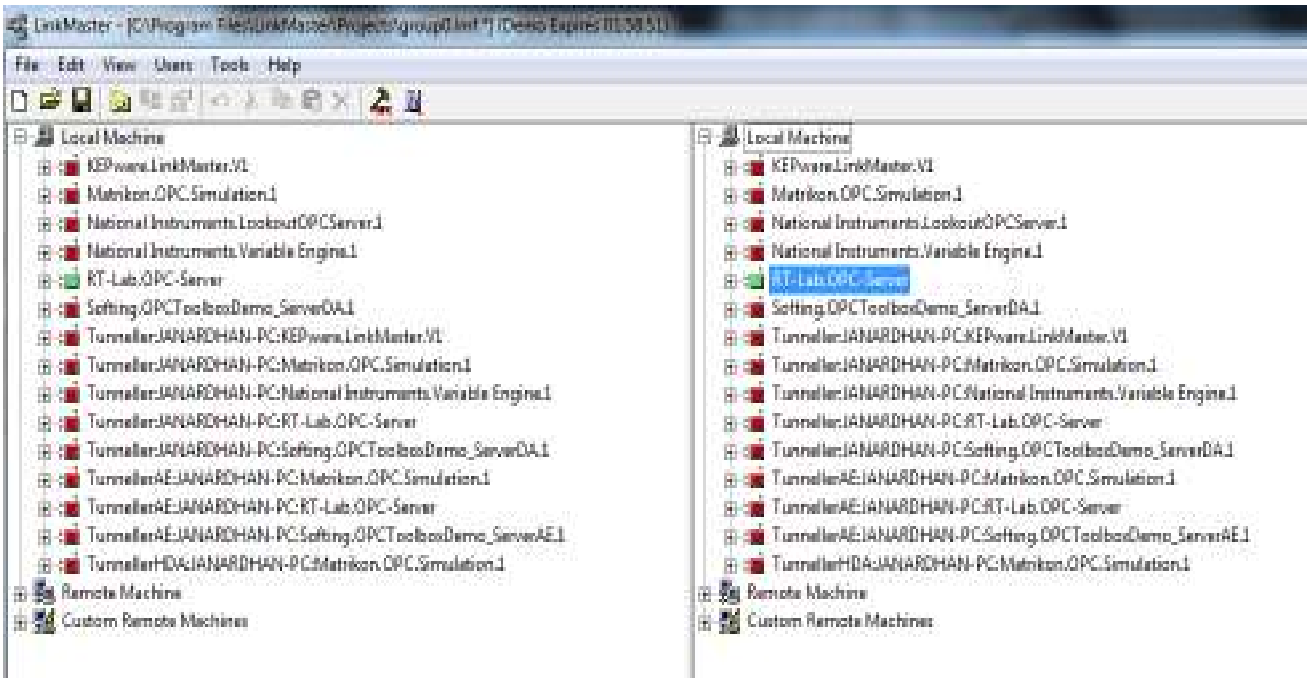

Figure 17: LinkMaster User Interface

- Now you could right click on the RT-LAB OPC-Server and click "*Connect*".
- The red colored folder now changes to green indicating good connection.

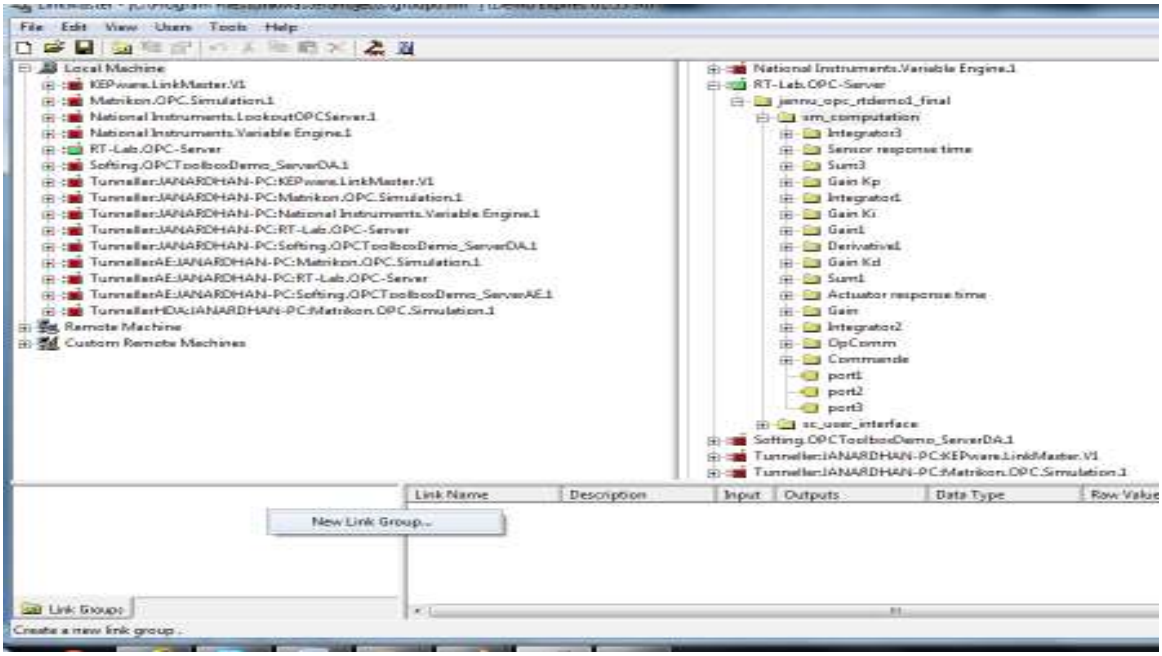

Figure 18: LinkMaster Signal tree.

Right click on the link groups space and select "*New Link Group...*" to create a group, and you could give an appropriate name to the group (ex. DemoGroup0).

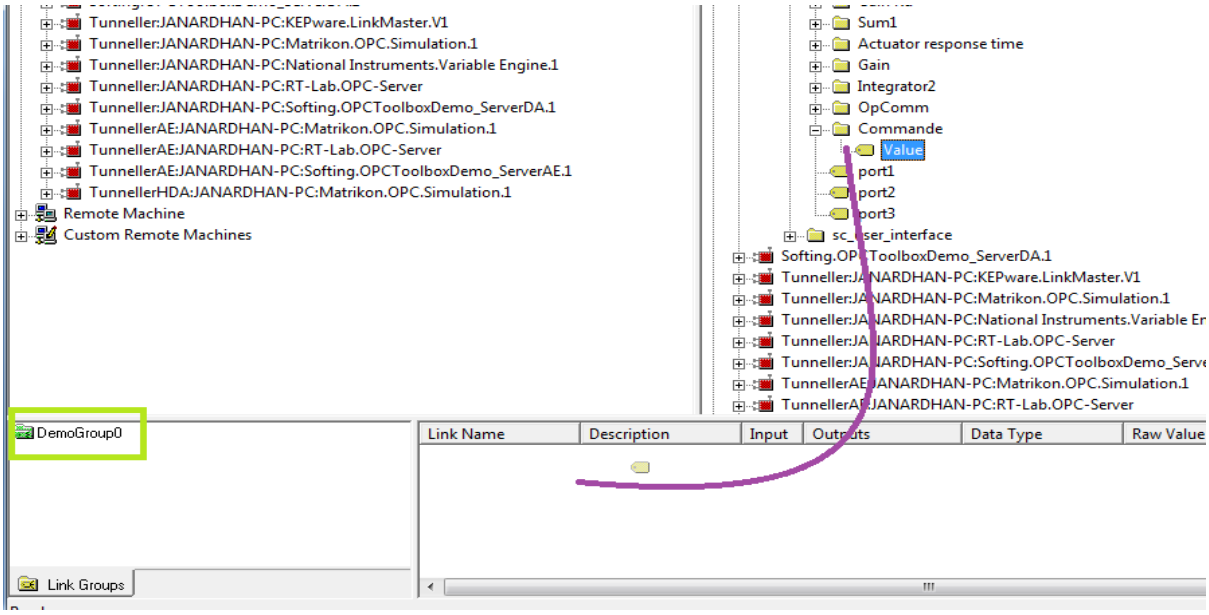

Figure 19: Adding tags in LinkMaster.

Drag and drop the desired signal tags and parameter tags into the white space as shown the figure above.
The Tags can be renamed for reference sake.

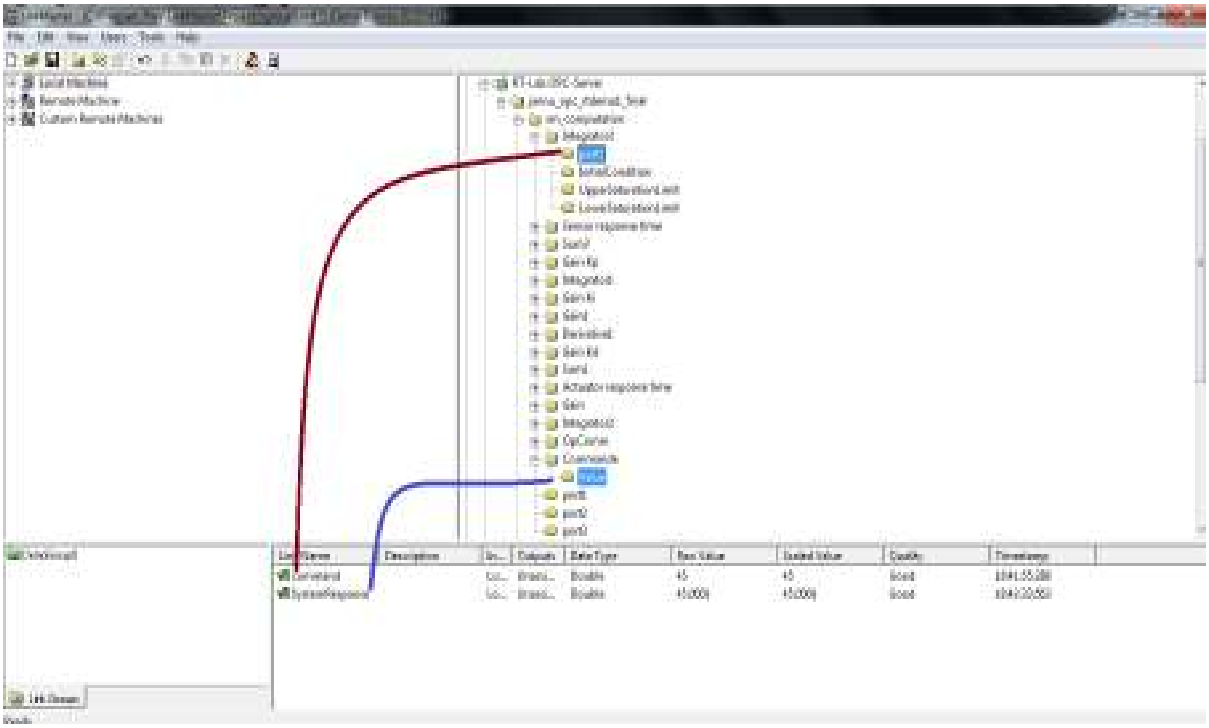

Figure 20: Renaming tags in LinkMaster

Now this configuration/group that was just created could be saved if there is a need.

Those tags that were added into the group will be the ones that we would view later in the other OPC server explorers.

Ex. In the above figure we can observe that the parameter tag named "*value*" is added into the white space (renamed to command) and a signal tag named port1 is added into the white space (renamed to SystemResponse).

Now in the other OPC server explorer we would see only these two tags, and none other.

If we have RT-LAB OPC server Explorer running already (or we could start RT-LAB OPC server explorer again) – we could change the parameter in the explorer and observe the same change reflected in the LinkMaster.

8 Optional Software

If user is planning to avoid the pain of making the DCOM settings then the user could install the tunneller from Matrikon.

Link for downloading the software could be found below.

https://www.matrikonopc.com/downloads/174/software/index.aspx

We will need to install (if Windows7 Please run as Admin) Tunneller software in both the systems (host as well as in the system in which the third party OPC server is installed.)

For Demonstration, Matrikon OPC server will be used.

Note: After installation, please configure Server-Side Gateway config., and Client side Gateway config (if the 3rd party OPC is installed on Windows7) to be run in Admin Mod. Also Firewall needs to be turned off.

In the host computer- we need the server- side Gateway config to be running, and there is no need of making any changes in the settings. Default settings are good enough for a successful connection.

In the computer, that houses the 3rd party OPC server (Ex. Matrikon OPC server)- Client side Gateway config should be running in admin mode (for Windows7).

Figure 21: Tuneller Software – Adding Remote Connection

- Select File→ Add Remote Tunneller Connection

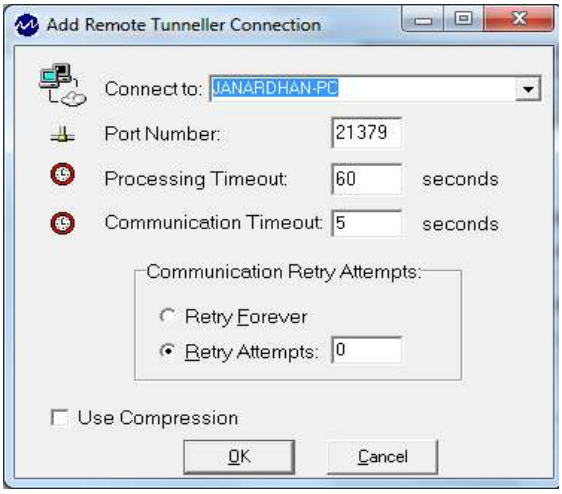

Figure 22: Tunneller Software: Selecting a connection

- Click "*OK*" and a list of all the OPC servers must be visible

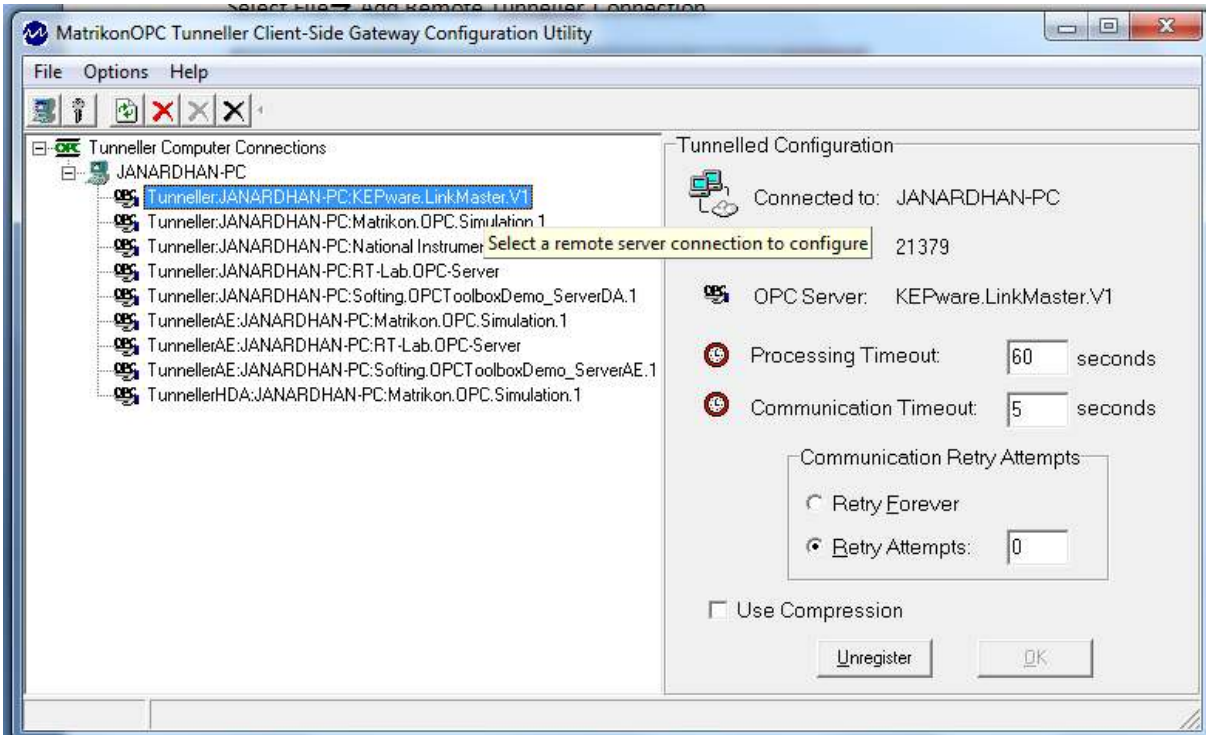

Figure 23: Tunneller Software: locating Kepware LinkMaster

- Check if Kepware.LinkMaster is in the list of OPC servers.
- Now we could just minimize it and let it run in the background.

9 Third Party OPC server (Matrikon OPC server)

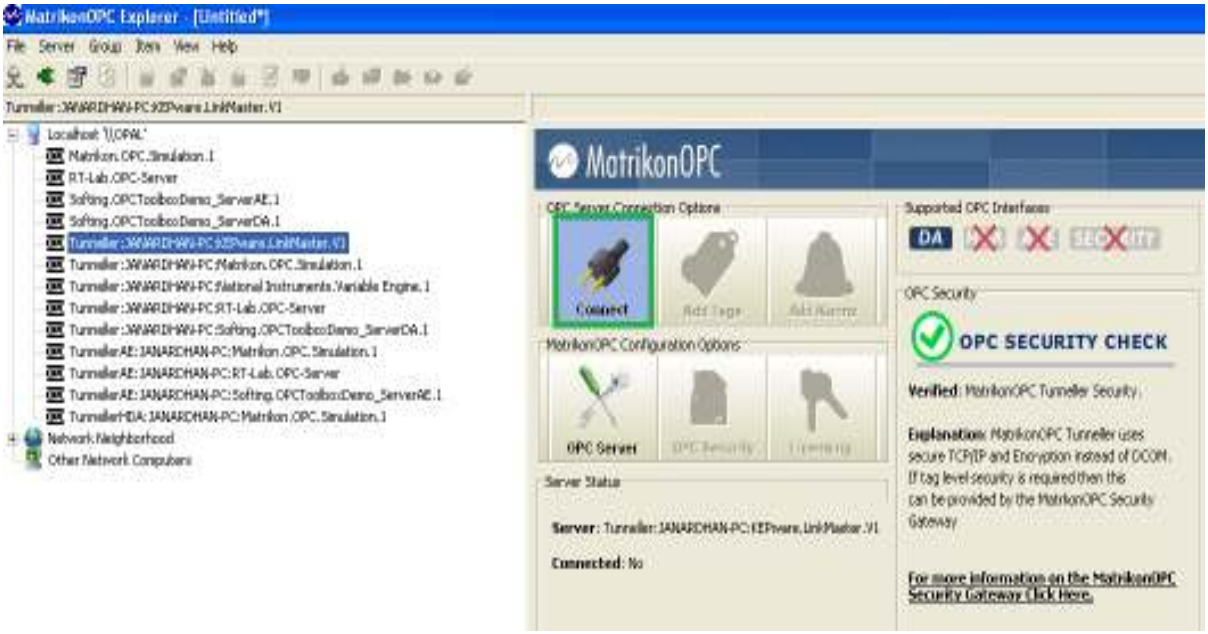

Figure 24: Matrikon OPC server User Interface

- Select connect to connect to Kepware's LinkMaster Software.

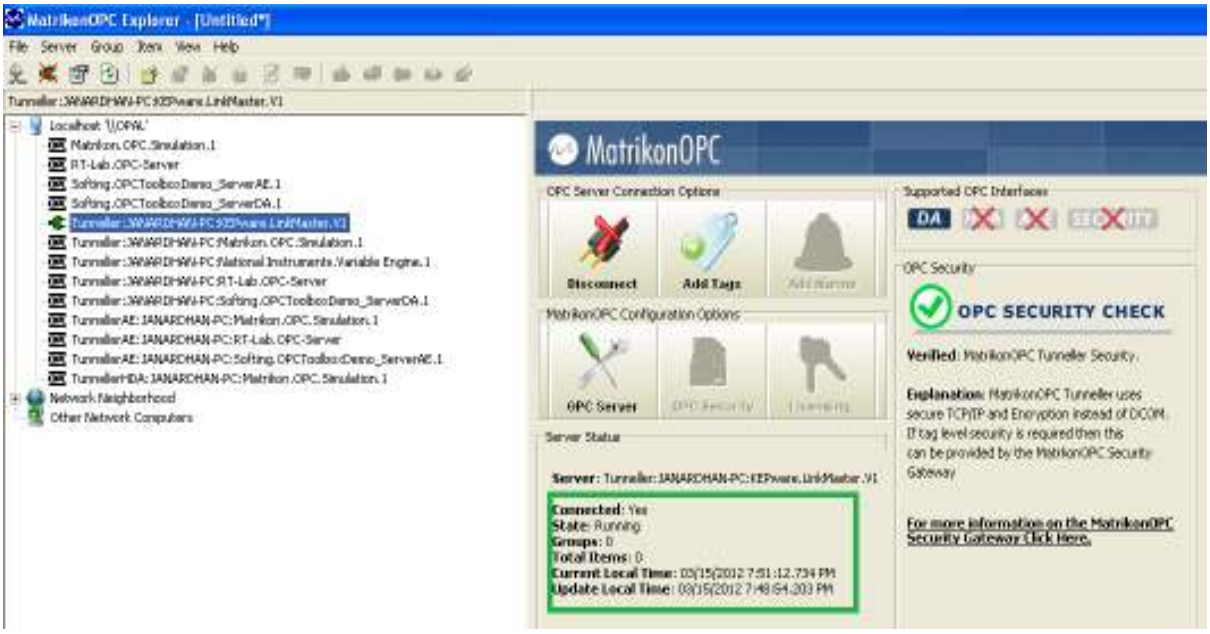

Figure 25: Matrikon OPC server – successful configuration

- Check if state says "*Running*". If State reads "*Failed*" it means that the connection is not good with the host computer.

- Select "*Add Tags*" to add the parameter and signal tags from LinkMaster bridging software.

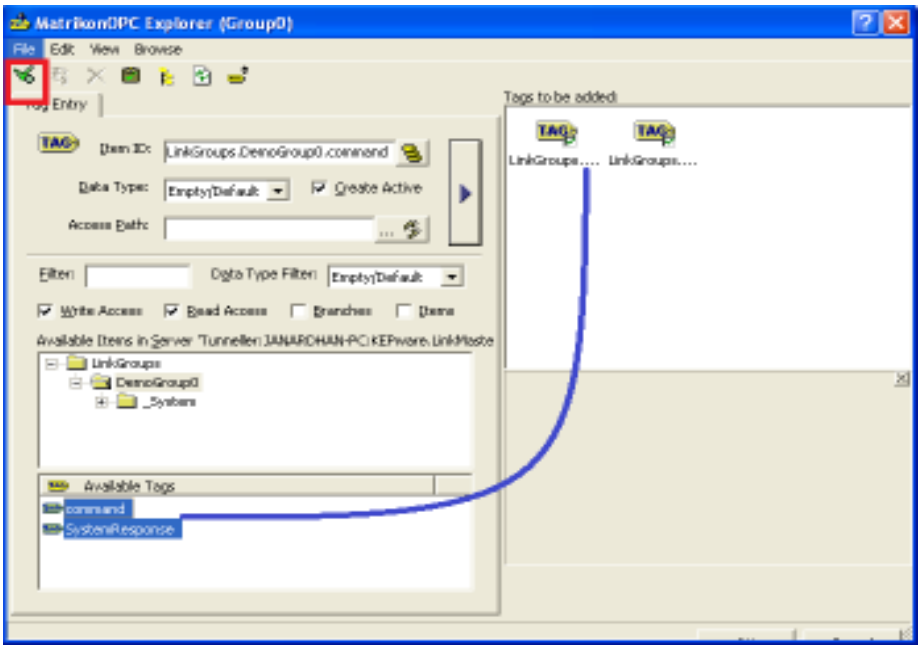

Figure 26: Matrikon OPC server - Adding Tags

- If we expand the Link groups tree then we could find the tags below. Click – Drag – Drop the tag to "*Tags to be added*" white space. And select the check (tick) mark to add them into the explorer.

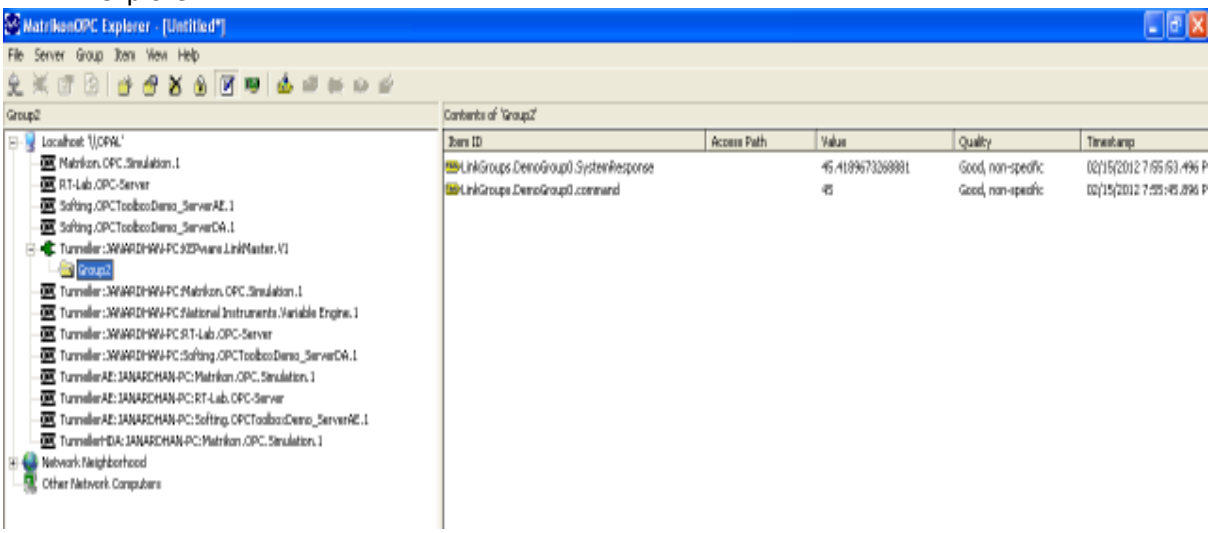

Figure 27: Matrikon OPC server – Viweing the contents of the Tags

- Now we could observe that both the tags added in LinkMaster is now seen on Matrikon OPC server.

- We could change the parameter value and see the effect on RT-LAB OPC explorer, Matrikon OPC OPC server explorer and as well as on LinkMaster user interface.

10 Frequently Asked Questions

Q) Even though I have successfully compiled and model, and have configured RT-LAB OPC server according to the instructions, why am I not able to see a successful run of OPC server.

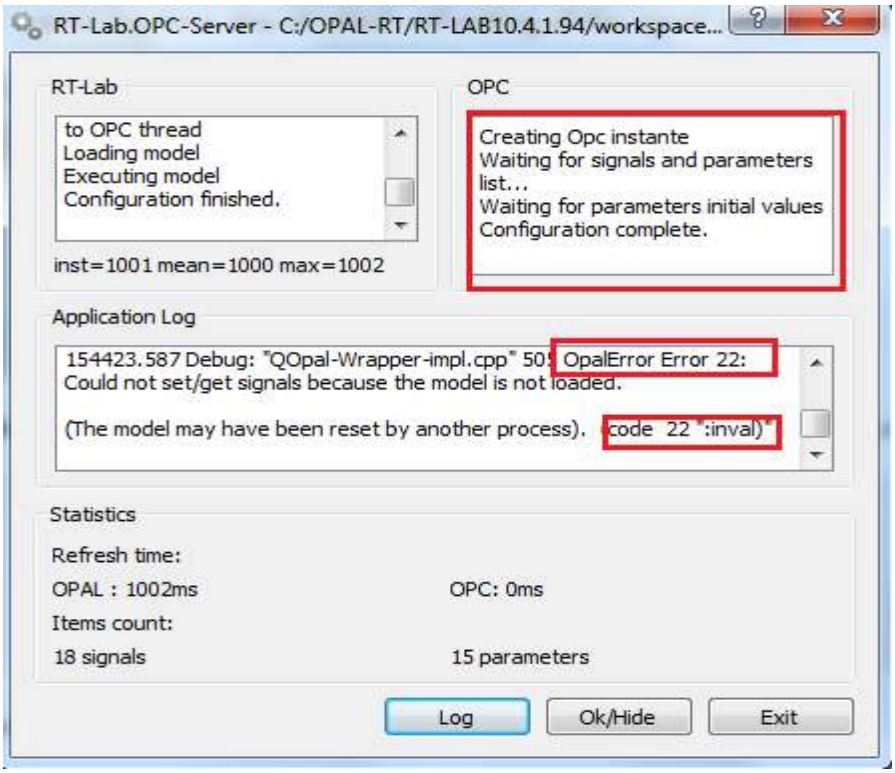

Figure28: FAQ – RT-LAB OPC server

A) There could be many reasons for this to happen.

- ✓ Check if the connectivity with the target is good. You could do it by pinging the target from the host computer.
- ✓ If the connectivity is good, make sure that the target is free and is not loaded with any other model at that point of time.

- ✓ Check if MetaController is running in the system tray – because MetaController is the RT-LAB server.
- ✓ Next cross verify if the version of MetaController running in the system tray is same one that was used for compiling the model.
- ✓ If you are using Windows7 please see if RT-LAB (metacontroller & RT-LAB s/w), Matlab, OPC server configuration and OPC explorer are all set to run in Administrative mode.

Q) I am not able to see the expected outputs at the signals. All I see is "*-1*" or some junk value like "1.*76E-314*".

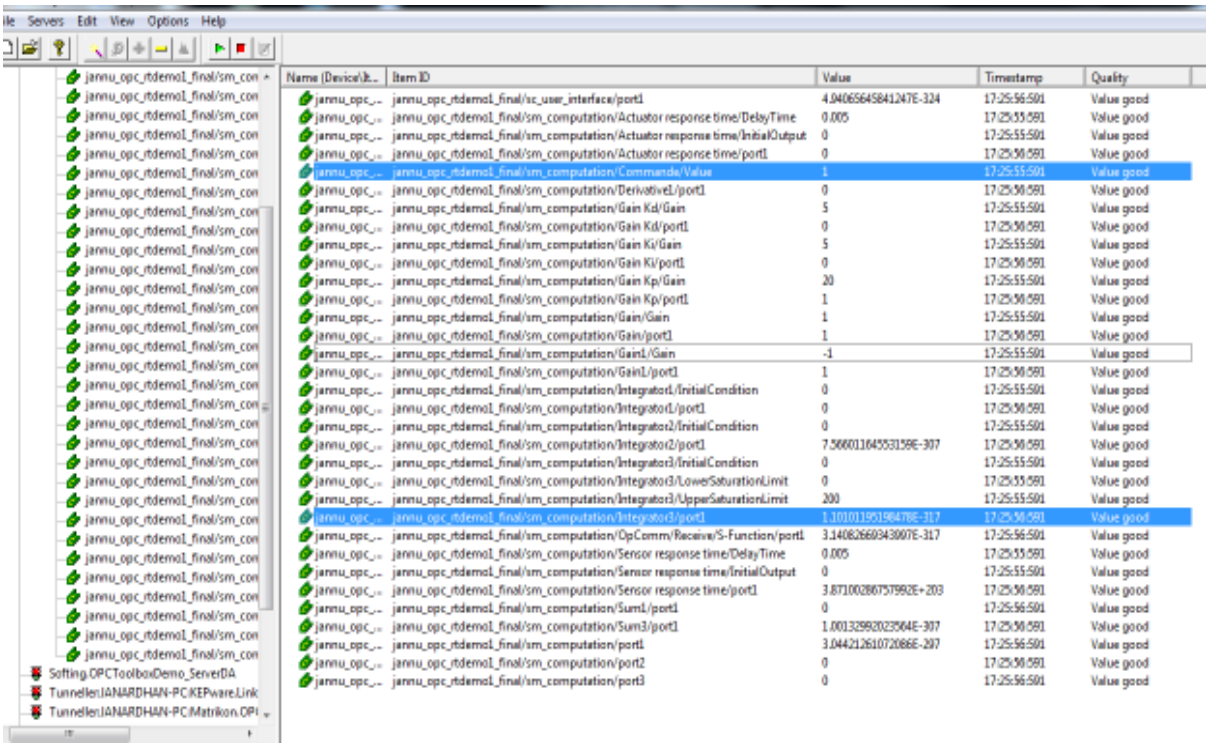

Figure 29: FAQ – RT-LAB OPC explorer

A) There could be many reasons for this.

- ✓ Most likely that you do not have good connection with the target.
- ✓ Maybe another model is already running in the target that you are trying to use.
- ✓ You could check if you are running the RT-LAB (MetaController & RT-LAB s/w), RT-LAB OPC server and RT-LAB OPC server explorer are set to be run as "*Admin mode*".

- ✓ Also you could check if the right version of MetaController (version you used for compiling the model) is running in the background. If you do not use the correct version, then you are most likely to see "*-1*" on all your signals.

Q) When I expand the RT-LAB OPC server I see infinite folder tree. Configuration I have made is a good one, and I have seen it working on RT-LAB OPC server Explorer. But when I want to select the signal and parameters in LinkMaster, I only see infinite folder tree.

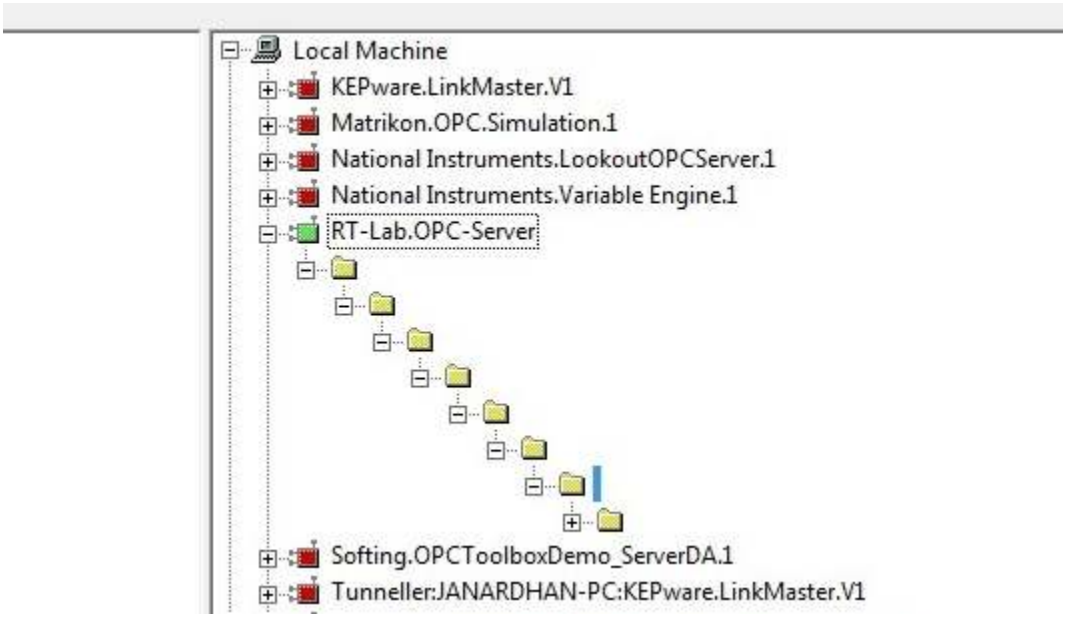

Figure 30: FAQ – Kepware – LinkMaster

A) This happens because, while creating the .ogp file in RT-LAB OPC server, you might have chosen to pick individual signals and parameters and create a XML file for holding the signal/parameter Database.
You need to make a new configuration without creating any XML file, and select "*all*" for parameters and signals.