

# DataWorX32 Professional – Getting Started with Redundancy



APPLICATIONS NOTE

April 2010

**Description:** Guide to setting up DataWorX32 Redundancy  
**OS Requirement:** Win 2000, XP Pro, Server 2003, Vista, Server 2008, Windows 7

**General Requirement:** GENESIS32 Version 9.2, DataWorX32 Professional Redundancy License on Primary and Secondary servers; Administrative rights on primary and secondary servers

## Introduction

DataWorX32 Professional Redundancy is a software solution running on two separate server machines, which facilitate redundancy for certain GENESIS32 Servers including:

- Redundant AlarmWorX32 Servers
- Redundant AlarmWorX32 Loggers
- Redundant TrendWorX32 Loggers
- Redundant TrendWorX32 HDA Servers

DataWorX32 Professional also facilitates redundancy for any OPC DA Server.

The above mentioned OPC servers are thus enabled to operate in redundant pairs. All current states, such as Active and Acknowledged Alarms and Logged Data, are shared between the primary and secondary nodes. Redundancy of OPC DA can be achieved if duplicate OPC servers are installed on both primary and secondary nodes.

## Scope of Redundancy Features

The DataWorX32 Professional Redundancy features can eliminate the redundant GENESIS32 servers as single points of failure in a system. If one of a redundant pair of servers loses power or stops running for any reason, the second server automatically takes over the task of the failed server. DataWorX32 itself does not provide any redundancy for the communications network. If DataWorX32 Professional is applied in a system where the communication networks are not redundant, then the network will present a single point of failure in the system.

## Considerations

Before you begin setting up redundancy on your machines, you should consider the following:

1. Which operating system will you use? Although our software works on most Windows operating system, you should consider installing on a server class operating system to achieve maximum performance.
2. Is there a need to set applications on these servers to run as a service? If so, you should follow our application note

entitled *GENESIS32 - Running Applications in an Unattended Environment* to prepare the services and setup DCOM. It is a general recommendation that you run ICONICS servers and applications as services. For an easy and proper way to configure your system, you can use the ICONICS Application Setup Utility.

**NOTE:** You can refer to the *GENESIS32 – Application Setup Utility Quick Start* Application note for details.

3. Even if you are not running applications as services, you should consider editing DCOM according to our application notes to ensure proper communication between applications.
4. If you want redundant logging (AlarmWorX32 Logger or TrendWorX32 Logging), how many databases will you have and how will they be setup? Depending on your system architecture, the setup of each logger could be different. This document will cover the recommended scenario - logging to a centralized database. However, should you really need, you can use the *secondary data source* feature and log to two separate databases as discussed later.
5. Your network should be redundant. This can be accomplished by adding a second NIC (Network Interface Card) to the server machines and setting up the machines to handle the redundant NICs via a MAC bridge as depicted below.

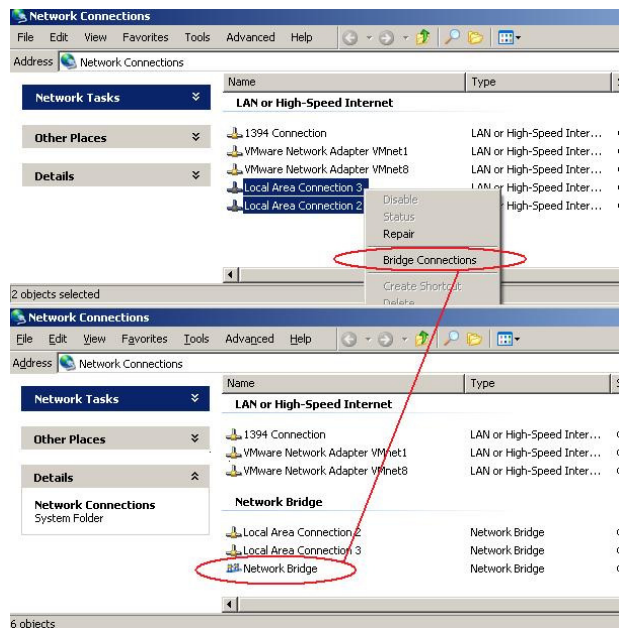


Figure 1 – Create MAC Bridge Miniport

Alternatively, there may be special NIC cards available that have dual Ethernet ports or driver based redundancy. In any case, your switches/routers/hubs should be also redundant and interconnected by redundant data cables.

## License

Please make sure that you have proper license for Redundancy available on your servers. To check this, go to Programs → ICONICS Software Licensing → License Utility and check the license. The “DataWorX32 Professional” option must be checked. If you enable our 30-Day, Temporary License, “DataWorX32 Professional” is NOT available. You need to have a valid “DataWorX32 Professional” License to have redundancy working.

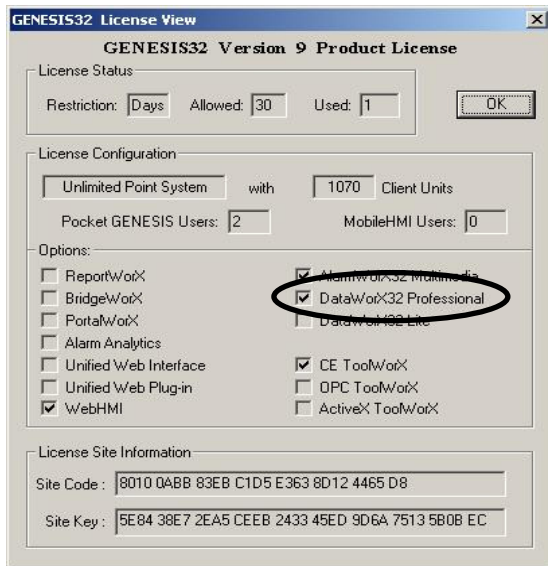


Figure 2 - GENESIS32 License View

## GenBroker Configuration on Servers

1. Open GenBroker Configurator from Start → Programs → ICONICS Tools
2. In the GenBroker Configurator Dialog, click on “New” to create a new GenBroker configuration.
3. In the GenBroker Configurator Window that comes up, click on “Channels” in the left-hand pane.
4. In the right-hand side, right-click on “OPC over TCP/IP Direct Channels” and select “Set as Default” so that the channel looks similar to Figure 3.



Figure 3 - Default TCP/IP Direct Channel

5. In the *Administrative servers* section you set the primary servers to <local> and secondary servers to the secondary server machine (IP address or Computer name).

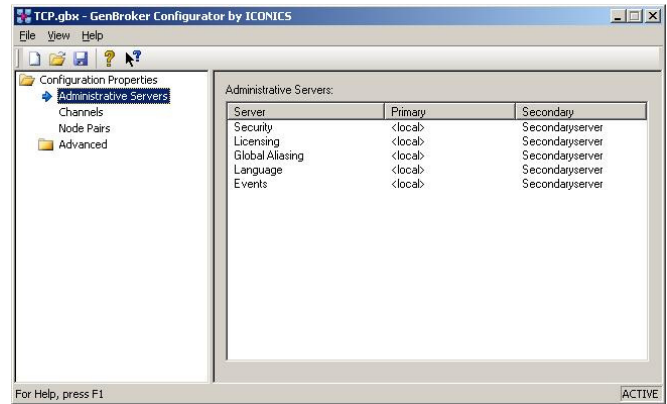


Figure 4 - Administrative Servers

**NOTE:** You can use either *IP address* or *Computer name* conventions to connect to your servers. However, if you choose one, you should use it in all settings (i.e. all GENESIS32 project data source connections, Node pair definition, ActiveX connections, etc.). If you combine use of IP addresses and Computer names, your system may not work properly. We will be using only Computer names in this application note as the server IP addresses may often change dynamically.

6. In the left-hand pane, click on “Node Pairs”
7. In the right-hand pane, enter the Computer Name or IP address for the primary and secondary servers respectively, then click on “Add New Node Pair”.

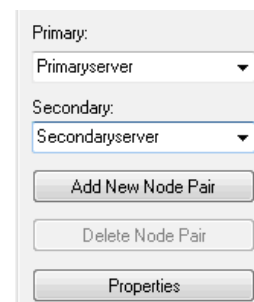


Figure 5 - Node Pair

8. You can click on “Properties” to edit some of the properties.

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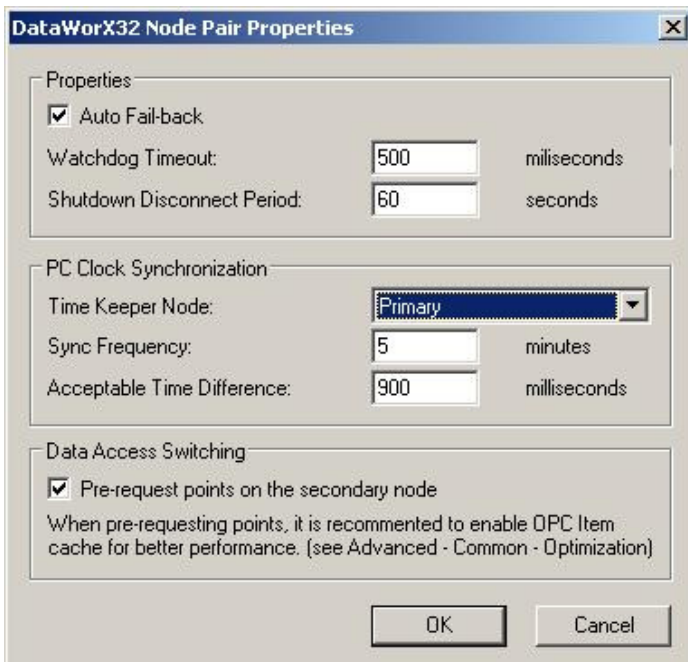


Figure 6 - Node Pair Properties

- We recommend that you change the Watchdog Timeout to at least 500 milliseconds and use either your primary or secondary server as the “Time Keeper node”.
- By default, the auto-failback option is checked. If you would like to disable this feature, you can uncheck the box here.

**NOTE:** We will not cover all the options of this property dialog in this application note. If you have any question on a specific option, please refer to the help files.

- Save this GenBroker configuration and exit.

## GenBroker Configuration on Clients

- Open GenBroker Configurator from Start → Programs → ICONICS Tools
- In the GenBroker Configurator Dialog, click on “New” to create a new GenBroker configuration.
- In the GenBroker Configurator Window that comes up, click on “Channels” in the left-hand pane.
- In the right-hand side, right-click on “OPC over TCP/IP Direct Channels” and select “Set as Default”
- In the left-hand pane, click on “Node Pairs”
- In the right-hand pane, enter the IP or Computer Name for the primary and secondary servers respectively, then click on “Add New Node Pair”.
- If you are getting license remotely from the primary and secondary server, you can follow the steps below; otherwise, you can save the configuration and skip to the next section.

**NOTE:** In order for redundancy to work, you must have DataWorX32 Professional licensing available (from a local or remote ICONICS license server) on your servers and clients.

- In the left-hand pane, click on “Administrative Servers” on the right-hand side.
- Double click on “Licensing” in the right-hand pane
- Enter the IP or Computer Name of the primary and secondary in their respective fields as shown in Figure 7.

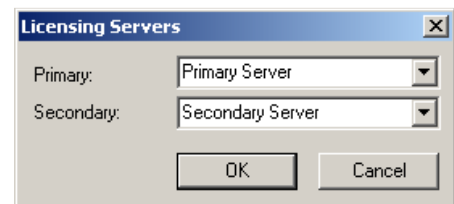


Figure 7 - Licensing Servers

- Click on “OK” when you are done.
- Save the GenBroker configuration and exit the configurator.

## Testing Redundant DA and A&E Servers

At this point, you have completed most of the process for setting up redundant DA servers. The one thing left to do is make sure that your primary and secondary servers have the same OPC DA server configuration.

For example, you could use the ICONICS.Simulator server that comes with your default installation. After installation, the configuration for both primary and secondary servers should be the same unless you have changed one of them. You can generally use a tag from the simulator to test your redundancy setup.

We provide redundancy with AlarmWorX32 in this version. After setting up GenBroker, your alarm server should be all set for testing provided that the configuration on the primary and secondary are exactly the same. For this reason, you may consider putting the configuration database in a centralized location where it can be accessed by both the primary and secondary servers. This way, you will not have to update two configurations when you need to make change.

**NOTE:** If your configurations are different on the primary and secondary servers, you will experience unpredictable behavior. Therefore, if you do keep the configuration in separate databases, please make sure that you update both when you make changes, and that the updates are exactly the same on both databases. The easiest way would be to copy the updated configuration database from the Primary to the Secondary server as you make changes.

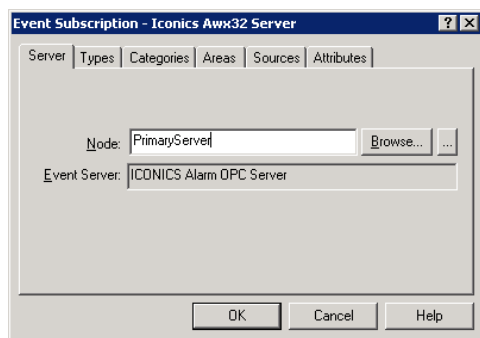
When you are ready to test your setup, you can use GraphWorX32 on a client machine. For the simplest test, you can browse to a point in the simulator. The syntax for this point

must start with the primary server name. For example, if you are using the simulated Sine tag, your tag path should be similar to **Error! Reference source not found.**, where “PrimaryServer” is either the name of your primary computer or its IP address.

`\\PrimaryServer\ICONICS.Simulator.1\SimulatePLC.Sine`

**Figure 8 - Tag Syntax**

Similar to the way tags are set up, in your alarm viewer you need to add the primary server as the node name. Your setup should look similar to **Error! Reference source not found.** where “PrimaryServer” is the name of your primary computer.



**Figure 9 - Alarm Viewer Subscription**

You can test that redundancy works with DA and A&E servers by shutting down the primary server and observe on the client machine that you are still getting data, from the secondary server though. Also notice the active server change in MonitorWorX of the client machine.

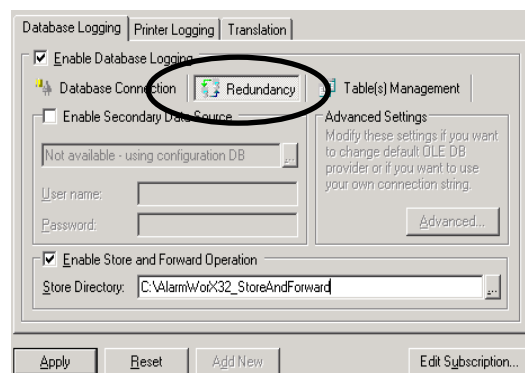
## Redundant Logger Setup – Using Central Database

As previously indicated, in this application note, we will assume that you are logging data to one centralized database first. Such a centralized database should be highly available in a sense of redundancy or fault tolerance (cluster, FT servers). In this scenario you would also use this highly available database server to host your project’s configuration databases. In further discussion we will also comment on using two separate database servers for logging OPC alarms and trends by ICONICS loggers.

You should setup all of your loggers as you would without redundancy. Nevertheless their configurations must be identical on the paired nodes. If you need more information on how to setup these loggers, you can refer to the respective application note or help file for more information. Once you have set up these loggers as normal, you can then follow the steps below.

## Redundant Alarm Logging

1. Open the Alarm Logger from Start → Programs → ICONICS GENESIS32 → AlarmWorX32 → Alarm Logger Configurator on the primary machine
2. Select your configuration on the tree-control on the left-hand side.
3. In the Database Logging tab, select the Redundancy button.



**Figure 10 - Alarm Logger Redundancy**

4. Since we are logging to the same database (there is no secondary database), we will not need to enable the secondary data source.
5. Check the “Enable Store and Forward Operation” option and specify a location on the primary computer. In **Error! Reference source not found.**, the location is C:\AlarmWorX\_StoreAndForward.

**NOTE:** Store and forward feature here serves to temporarily store logging data in the specified directory when connection to your destination database is not available or busy. After the connection is re-established, all stored data will be automatically forwarded to the database.

6. Apply the settings.
7. If your primary and secondary servers are using the same configuration database, all you have to do is make sure that the local directory, which in this case is C:\AlarmWorX\_StoreAndForward, exists on the secondary machine. You should also create an ODBC data source on the secondary machine that connects to your logging database.
8. If the configurations on your primary and secondary machines are using different database files, then you should copy the configuration database from the primary machine to the secondary machine. Make sure that the copied configuration database is active and that the local directory exists as in the previous step.
9. You have completed redundancy setup for your Alarm Logger.

**NOTE:** It is highly recommended to check that your ODBC connections are valid on both, primary and secondary server.

### Redundant TrendWorX32 Logging

1. Open the TrendWorX32 Logger from Start → Programs → ICONICS GENESIS32 → TrendWorX32 → TrendWorX32 Configurator on the Primary machine
2. In the tree-control on the left-hand side select your configuration and browse to your database group.
3. On the right-hand pane, select the Redundancy Tab.

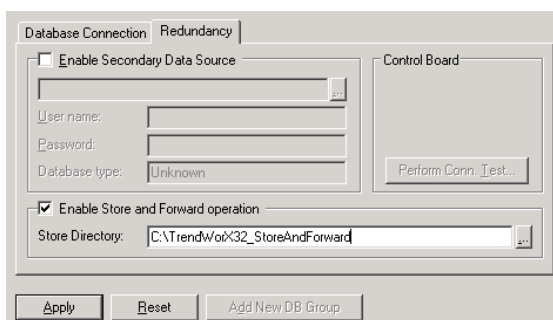


Figure 11 - TrendWorX32 Logger Redundancy

4. Check the “Enable Store and Forward Operation” option and specify a local directory on the primary machine for the Store Directory. In **Error! Reference source not found.**, this directory is C:\TrendWorX32\_StoreAndForward

**NOTE:** Store and forward feature here serves to temporarily store logging data in the specified directory when connection to your destination database is not available or busy. After the connection is re-established, all stored data will be automatically forwarded to the database.

5. Apply the settings.
6. If your primary and secondary servers are using the same configuration database, all you have to do is make sure that the local directory, which in this case is C:\TrendWorX32\_StoreAndForward, exists on the secondary machine.
7. If the configurations on your primary and secondary machines are using different database files, then you should copy the configuration database from the primary machine to the secondary machine. Make sure that the copied configuration database is active and that the local directory exists as in the previous step.
8. You have completed redundancy setup for your TrendWorX32 Logger.

**NOTE:** It is highly recommended to check that your ODBC connections are valid on both, primary and secondary server

### Redundant Logger Setup – Using Separate Databases

ICONICS recommends that users should use central, highly available database server to host all configuration databases (for easier project development/maintenance) and logging databases (to make also the databases easily redundant/fault tolerant). However, it may happen for a project that separate databases need to be put in place in a redundancy scenario.

The configuration of the Genesis32 system is quite easy and straightforward but high attention should be placed on redundant network settings as described in section “Considerations” to avoid data loss due to broken network communication.

On the primary server open either AlarmWorX32 or TrendWorX32 Logger Configurator and on the redundancy tab check “Enable Secondary Data Source” as shown in Figure 12. Then, as in the case of logging to a central database, you need to make sure that exactly the same logger configuration is placed on the secondary server. The easiest way is to copy the configuration database from the primary onto the secondary node. Check also if the Store and Forward folder exist on both servers. Then you need to make sure ODBC Data Sources to both Primary and Secondary databases have been created. If not, please create them on both servers. Note that on both redundancy servers you must configure the “Database Connection” (ODBC Data Source) to the same primary logger database. Similarly, “Enable Secondary Data Source” (secondary ODBC Data Source) on both redundant servers has to be configured for the same secondary logger database.

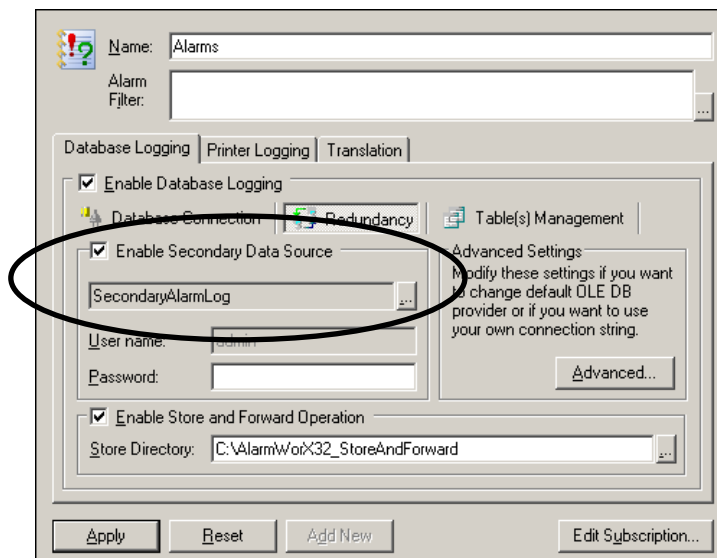


Figure 12 - AlarmWorX32 Logger Secondary Data Source

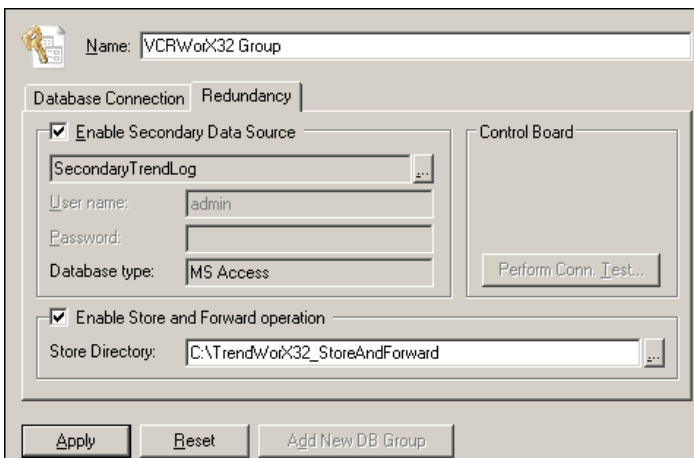


Figure 13 - TrendWorX32 Logger Secondary Data Source

## Connecting a Client to Logged Data

When a client (e.g. Trend Viewer) connects to get Historical data logged by Trend logger, OPC HDA server is used in the background to retrieve the data from the database. This server is also available in redundancy so there is no single point of failure. You do not need to manually start the Trend HDA server; it can start automatically be any client or you can set the Start-up type to automatic in GenTray.

## Getting Historical Trend Data

Now to check if you are getting the correct data open GraphWorX and insert a Trend Viewer ActiveX control on the display. Add a “Historical Pen” and make sure that the HDA Tags are also pointing to Primary Server.

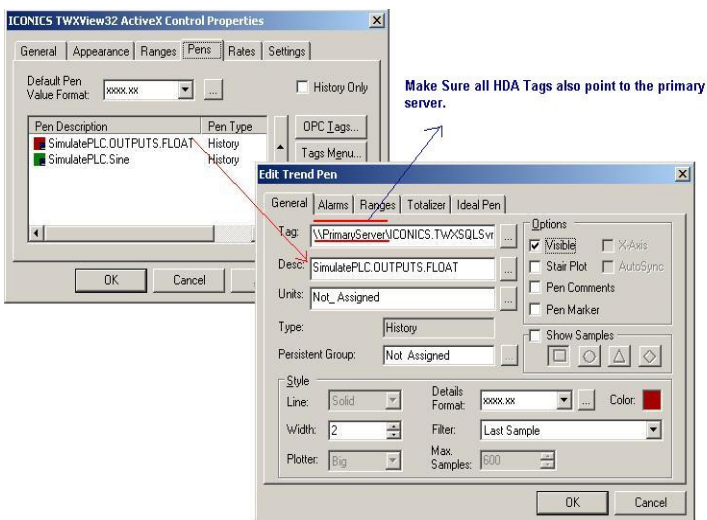


Figure 14 - TrendWorX32 Viewer Configuration

Go into GraphWorX32 runtime mode, and you should get data from TrendWorX32 HDA Server.

**NOTE:** You may see the TrendWorX32 HDA Server starting up in MonitorWorX of both primary and secondary server if not already started.

## About Store and Forward

As you may have notice, each of the loggers asks you to create a Store and Forward directory for redundancy. This directory is required regardless if you are logging data to a centralized database or to two different databases.

This directory stores information that may not be written to the database during a failure or synchronization of your machines. In a centralized data logging setup, you should not see many files in this directory. More files may accumulate if you are logging data to two different databases.

## MonitorWorX and Redundancy

If you open MonitorWorX viewer you can observe states of redundant ICONICS AlarmWorX32 Server, AlarmWorX32 Logger, TrendWorX32 Server and TrendWorX32 Logger and all OPC DA servers, including third-party OPC DA Servers. You will need to click the Redundancy tab.

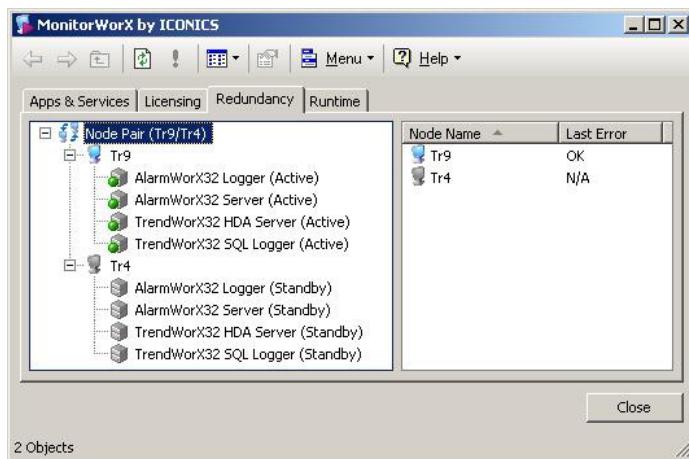


Figure 15 - MonitorWorX Viewer

MonitorWorX also allows you to switch the state of your servers on-demand. This is namely useful for planned maintenance on the server machines. You can manually set the secondary server to be active in preparation of performing routine maintenance tasks on the primary.

For more details about MonitorWorX, please refer to the appropriate application notes and help files.