

BridgeWorX Training Manual

Version 9.22

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BridgeWorX *Introduction*

1

1.1 Introduction to BridgeWorX

Looking for a data integration and interface management product that requires no programming, automatically collects all pertinent information from the source and target systems and exchanges data to and from the device to the enterprise? Look no further than **BridgeWorX™**. This user friendly, easy-to-configure, transaction-based product works with OPC as well as most databases, such as Microsoft® SQL Server®, Microsoft Access, Oracle, SAP and other ODBC-compliant databases.

BridgeWorX is designed from the ground up based on Microsoft .NET technologies, and is written in the Microsoft C# (C-Sharp), VB.NET and ADO.NET programming languages. Connecting to source and target systems is fast, efficient, and easy to configure. ICONICS brings you the most advanced data integration and interface management tool available today, taking maximum advantage of Microsoft's most powerful technologies. **BridgeWorX** uses Microsoft.NET technology to move data from the source systems to targets systems.

BridgeWorX can move data from any database platform to another, as well as transform data to and from the manufacturing floor to Manufacturing Execution System (MES) solutions and Enterprise Resource Planning (ERP) applications by making use of open standards, OPC, and ODBC compliant data sources.

1.1.1 Open Database Connectivity

Microsoft .NET technology allows the data mining of virtually any corporate database. **BridgeWorX** can integrate information from different data sources and move data to different target systems. Data sources such as Microsoft SQL Server, Microsoft Access, ODBC, OLEDB, MSDE, Oracle, AspenTech, OSI PI, OPC HDA (Historical Data Access), OPC A&E (Alarm and Events) and OPC real-time information can all be accessed and moved. **BridgeWorX** uses web services technology to data mine other web services over the Internet or intranets.

This data integration and interface management product connects with any data source and any customer database using powerful data integrator technology, enabling you to move information from real-time OPC data sources as well as historical data sources. **BridgeWorX** integrates with OPC, most databases, and others such as:

- Most SCADA and DCS Systems
- Maintenance Systems
- MES, ERP and Plant Historians
- LAB Information Systems
- Custom Corporate Databases

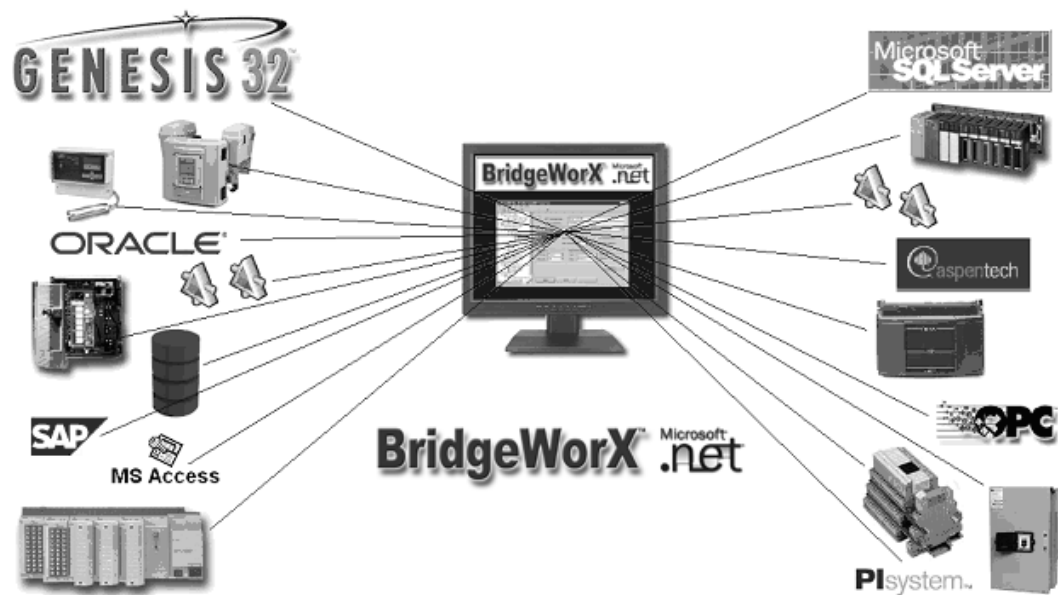


Figure 1-1 - BridgeWorX Open Database Connectivity

1.1.2 BridgeWorX Applications

BridgeWorX includes the following basic components for creating, configuring, and executing transactions:

- Configurator
- Unified Web Interface
- BridgeWorX Service

1.1.2.1 BridgeWorX Configurator

The BridgeWorX Configurator, shown in Figure 1-2, is the primary interface that you use to create and configure your transactions. The Configurator enables you to:

- Create transaction configurations.
- Create data connectors for transactions. The BridgeWorX Configurator provides several example templates to help you get started.
- Create new transactions. In the folder in which the transaction is created, you can also set up user access permissions for viewing, executing, and managing transactions.
- Create transaction diagrams.
- Define post-transaction tasks.
- Create transaction triggers (schedules) to define when transactions will be executed, or specify that the transactions will be executed on demand.
- Activate the configuration database.
- Start the BridgeWorX service.
- Execute any "on demand" transactions.

For more information, please see the BridgeWorX Configurator help documentation.

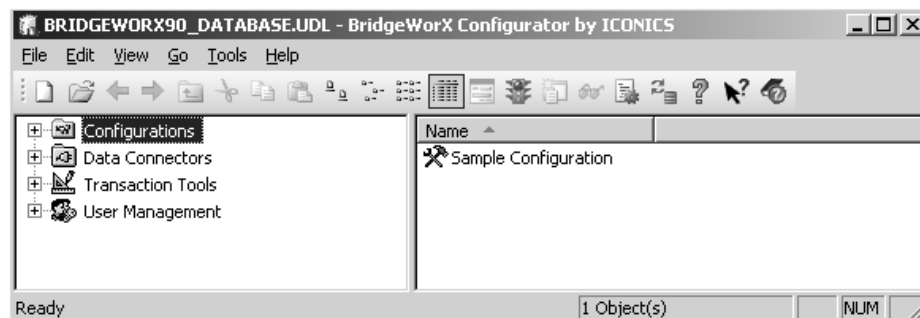


Figure 1-2 - BridgeWorX Configurator Screen

1.1.2.2 Unified Web Interface

The Unified Web Interface (UWI) enables you to execute transactions on demand and browse transaction tracing information from any client Internet Explorer browser. Transactions can be accessed over company intranets or over the Internet. The Unified Web Interface allows you to:

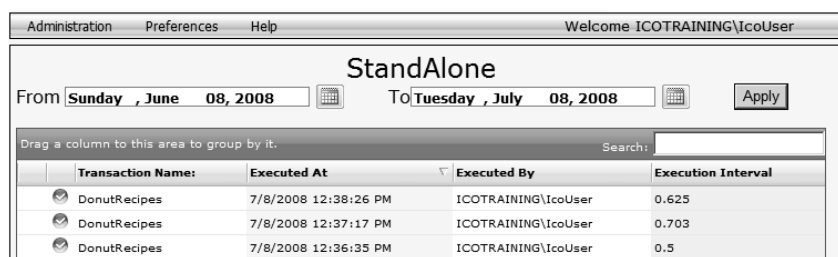
- Execute transactions.
- Visualize transactions.
- Manage transactions.

The Unified Web Interface displays configuration information from the active configuration database, and it enables you to modify the configuration information. Any configuration changes that you make in the Unified Web Interface are updated in the active transaction configuration database. Similarly, all changes that are made to the active configuration database using the BridgeWorX Configurator are reflected in the BridgeWorX Unified Web Interface.

The Unified Web Interface also features Windows NT® integrated security. Only registered users or groups with access rights may view, execute, and manage transactions.

NOTE: The Unified Web Interface allows you to modify existing transactions in the active configuration database from the client side. You can modify transaction configuration and transaction scheduling, but you cannot create new transactions. Transactions can be created only through the BridgeWorX Configurator on the server.

For more information, please see the BridgeWorX Unified Web Interface help documentation.



The screenshot shows the BridgeWorX Unified Web Interface. At the top, there are tabs for 'Administration', 'Preferences', and 'Help', and a welcome message 'Welcome ICOTRAINING\IcoUser'. The main title is 'StandAlone'. Below the title, there are date pickers for 'From' (Sunday, June 08, 2008) and 'To' (Tuesday, July 08, 2008), with an 'Apply' button. A search bar is also present. Below the search bar, there is a table with the following data:

Transaction Name:	Executed At	Executed By	Execution Interval
DonutRecipes	7/8/2008 12:38:26 PM	ICOTRAINING\IcoUser	0.625
DonutRecipes	7/8/2008 12:37:17 PM	ICOTRAINING\IcoUser	0.703
DonutRecipes	7/8/2008 12:36:35 PM	ICOTRAINING\IcoUser	0.5

Figure 1-3 - Unified Web Interface: Visualizing Transitions

1.1.2.3 BridgeWorX Service

The central module of BridgeWorX is the BridgeWorX service, which is responsible for managing:

- Transaction data source connectivity
- Transaction execution
- Transaction schedules
- Completed transaction post-transaction task processing
- Performance monitoring
- NT event reporting and integration
- Transaction management administrative tasks
- Product license

For more information, please see the BridgeWorX help documentation.

1.2 Installing BridgeWorX

This section describes the system requirements and steps for installing BridgeWorX. Be sure to close all other applications before installing BridgeWorX.

1.2.1 System Requirements

To use this software, you must have the following *minimum* system requirements:

- **BridgeWorX Lite:** 1.0 GHz processor with 256 MB RAM.
- **BridgeWorX Standard:** 2.0 GHz processor with 512 MB - 1 GB RAM.
- **BridgeWorX Enterprise:** 3.0 GHz processor with 2 GB RAM.

NOTE: It is recommended that your total system paging file size be set to at least four times the size of physical RAM. The above requirements assume that ONLY BridgeWorX is running on the PC (with Microsoft SQL Server or MSDE). If other applications will be running, then additional resources must be allocated.

- At least 300 MB of free hard disk space is required to install BridgeWorX (does not include space required for prerequisite components, Microsoft .NET Framework, or GENESIS32).
- DVD drive for installation.
- SVGA Video Card; 256 or more colors for best results.

- Microsoft Windows® 2000, Windows XP Professional, Windows Server 2003 with latest service packs, Windows Server 2008, Windows Vista

NOTE: PortalWorX, Unified Web Interface, and MobileHMI will be installed in 32-bit compatibility mode on the 64-bit versions of these operating systems, and due to limitations in Internet Information Services (IIS) 5.1 and 6.0, they may not be capable of running side-by-side with 64-bit applications such as GENESIS64 or other third party applications.

- Microsoft® Internet Information Services (IIS) 5.0 or later (requires approximately 20 MB disk space).

NOTE: If IIS is installed after Microsoft .NET Framework is installed, you must run the **aspnet_regiis.exe** file in the **Microsoft.NET\Framework\v1.1.4322** directory in the Windows folder for your operating system. For example, on Windows 2000, this file is located in the "[Windows Path]\Microsoft.NET\Framework\v1.1.4322" directory.

- Microsoft .NET Framework Version 3.0

NOTE: If Microsoft .NET Framework is not detected on your machine during BridgeWorX installation, it will be installed.

- Microsoft® SQL Server® 2000, MSDE 2000, SQL Server Express, or SQL Server 2005 with latest service packs.

NOTE: If Microsoft SQL Server is not detected on your machine during BridgeWorX installation, SQL Server Express 2005 will be installed. You also have the option of designating a remote SQL Server, in which case you will not be forced to install SQL locally.

- ICONICS BridgeWorX license. For more information, see the **BridgeWorX Licensing** section of this document.

NOTE: In order to run BridgeWorX, you need a BridgeWorX license, which is based on the number of enabled transactions and transaction diagrams. Please see the ICONICS Software Licensing documentation for information about how to authorize an ICONICS software license. You can also register for a license online at www.iconics.com/support/licenseproduct.asp. Without a valid BridgeWorX license, your BridgeWorX Service will only run in two-hour demo mode.

1.2.2 Pre-Installation System Setup

Before installing BridgeWorX, you should complete the following steps:

- Update your Windows operating system with the latest service packs.
- Update your Web browser application with the latest service packs.
- Update Microsoft SQL Server or MSDE with the latest service packs.

1.2.3 BridgeWorX Installation Procedure

To install BridgeWorX, insert the product DVD and select the **BridgeWorX** installation from the software selection menu. If this is the first time you try to install one of the BizViz products, you will be prompted to install the BizViz FrameWorX, as shown in Figure 1-.

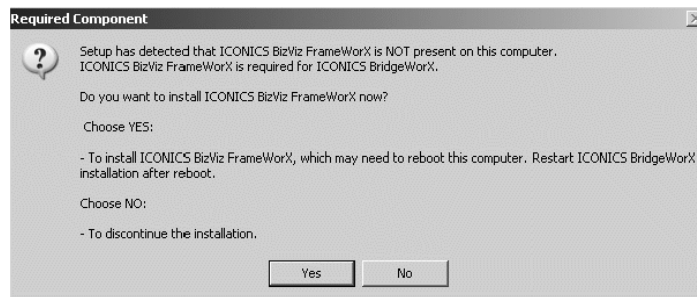


Figure 1-4 - Prompt to Install BizViz FrameWorX

NOTE: If Microsoft .NET Framework version 3.0 is not detected on your machine during the installation, it will be installed. The installation of the .NET Framework may take 5-10 minutes.

The **BridgeWorX Installation Wizard** appears, as shown in Figure 1.. Click on the **Next** button to continue.



Figure 1.5 - BridgeWorX Installation Wizard

The **License Agreement** dialog appears, as shown in Figure 1.. Select I accept the terms of the license agreement, and then click on the **Next** button to continue.

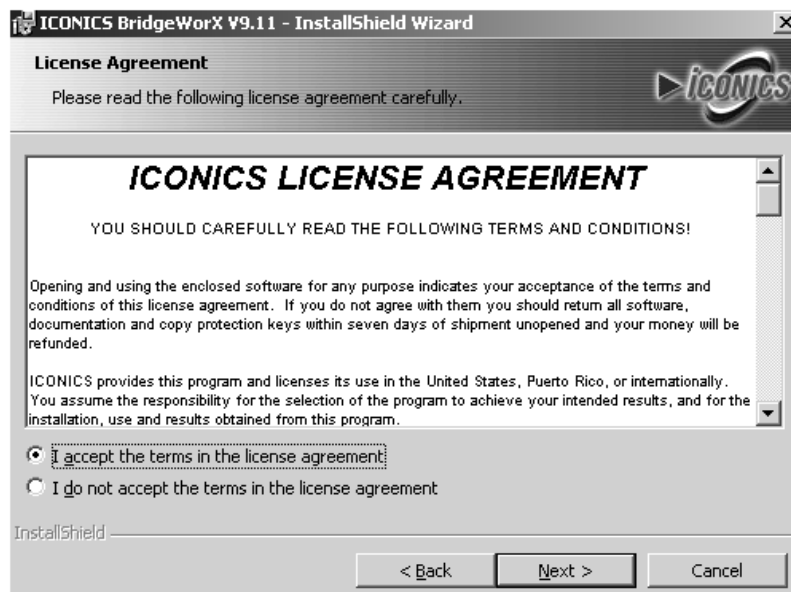


Figure 1.6 - License Agreement

The **Customer Information** dialog box appears, as shown in Figure 1.. Enter your User Name and company name, and then click on the **Next** button to continue the installation.

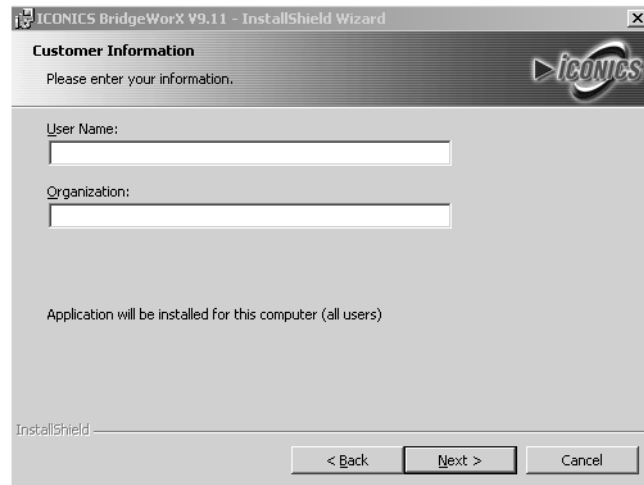


Figure 1.7 - Customer Information

The next screen shows the Destination Folder dialog box. If you want to change the location of the installed files, you can do that in this dialog. When you are satisfy with the installation location, click on the **Next** button to continue the installation.

Finally, click on the **Install** button to proceed with installation, as shown in Figure 1..



Figure 1.8 - Confirming Installation

The **BridgeWorX Customization Wizard** comes up to help us with configuring a user to run the BridgeWorX Service as well as creating the new BridgeWorX configuration database, as shown in Figure 1.. Click on the **Next** button to continue.



Figure 1.9 - BridgeWorX Customization Wizard

The **BridgeWorX User Configuration Wizard** dialog box appears, as shown in Figure 1.. Here you can create a user account or you can choose an existing one for running the BridgeWorX service. This completes the User Configuration Wizard. Click the **Next** button to continue.

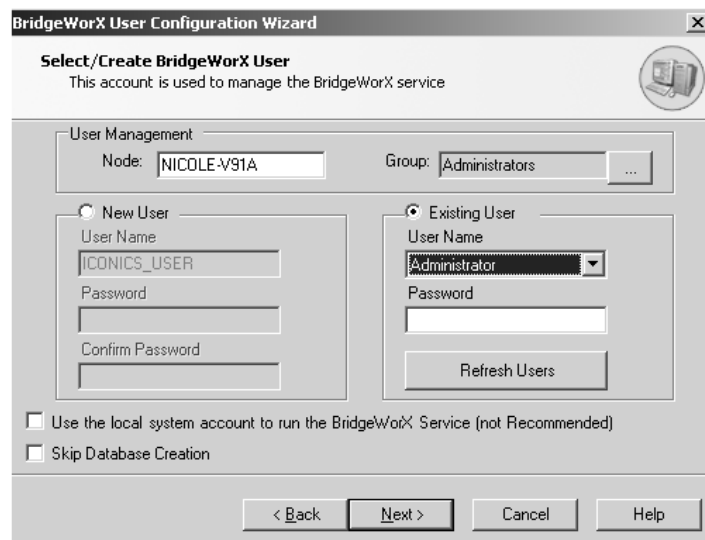


Figure 1.10 - BridgeWorX Configuration Wizard

The **Configuration Database Wizard** helps you create a new configuration database, as shown in Figure 1.. Select the location of your SQL Server; it can be either on your local computer or on a remote computer. Click on the **Next** button to continue.

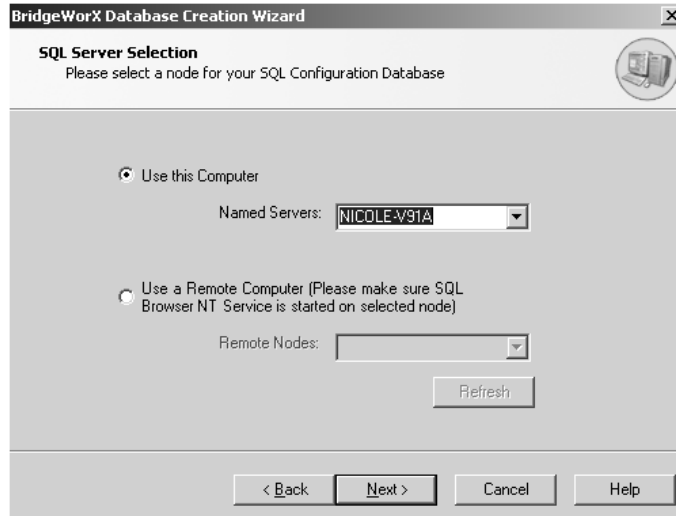


Figure 1.11 - Selecting the Location of SQL Server

Select the proper authentication mode to log into your SQL Server, as shown in Figure 1.. Click on the **Next** button to continue.

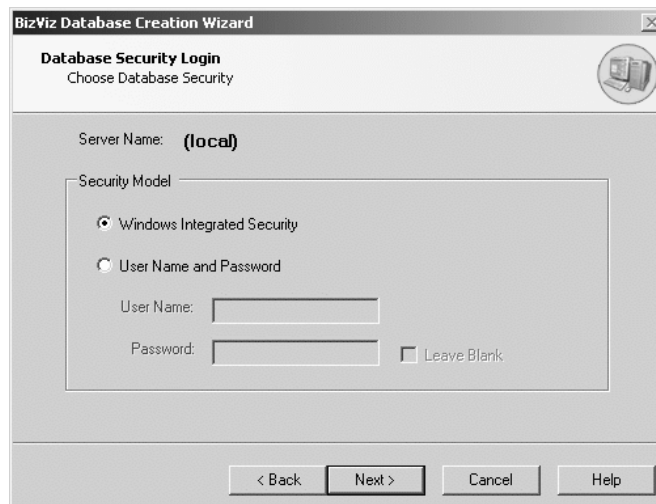


Figure 1.12 - Logging Into the SQL Server

You have two options for creating your new database, as shown in Figure 1.. You can either create a new Microsoft SQL Database, or you can add the BridgeWorX configuration database structure to an existing Microsoft SQL Database. There is also an option to include or exclude the BridgeWorX samples in the configuration database.

Here we will assume that you will choose the first option (to create a new database). Select **I want to create a new Microsoft SQL Server database** (recommended), and then click on the **Next** button to continue.

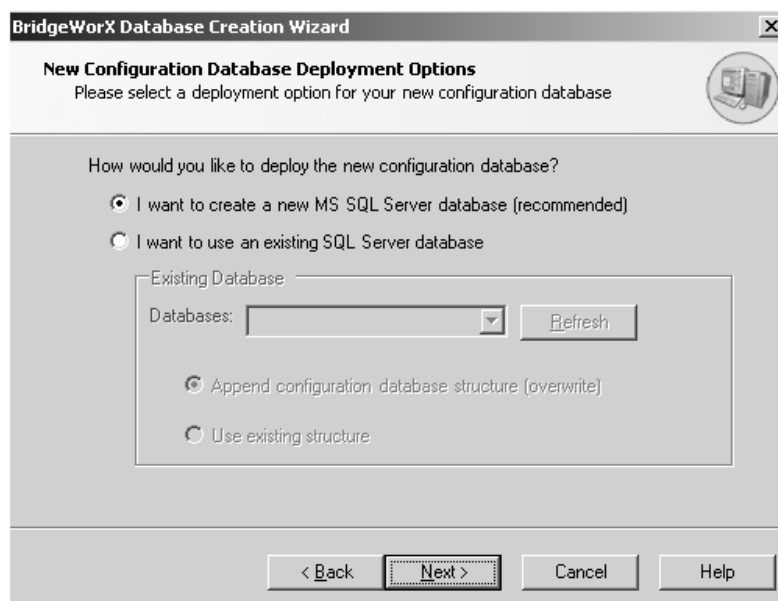


Figure 1.13 - Creating a New MS SQL Database

Choose the settings for the SQL Server database parameters, as shown in Figure 1.. The default options should be adequate for most applications with a small to medium size load. Type a name for the database in the **Database Name** field. In the **Database Path** field, you can choose a directory path for the new database. You can browse for a directory by clicking the ... button to the right of this field. Or you can use the default database file path.

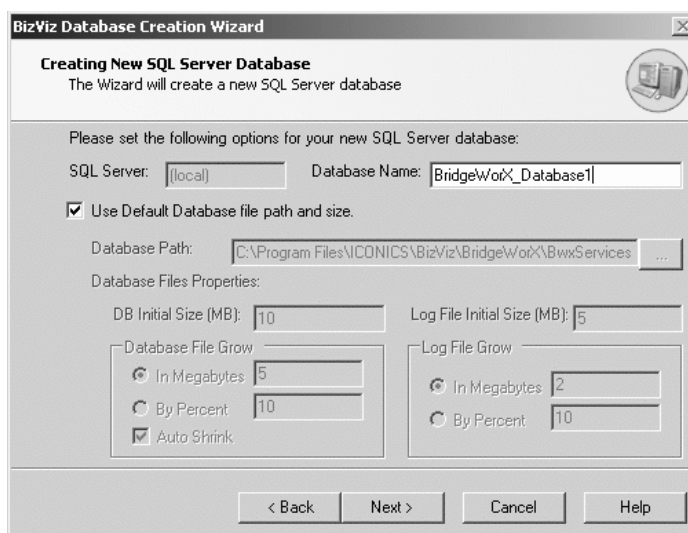


Figure 1.1: Setting the Database Parameters

Under the **Database File Properties** section, you can specify an initial size for the database, which should be as large as possible. You can also specify a **Database Growth** option (in megabytes) or as a percentage of the total size. MSDE servers are capable of increasing the database size on the fly to store more data. However, if this operation is performed frequently, the overall system performance may decrease. Choosing an initially large database size and a corresponding database growth option can drastically improve system performance. To shrink the size of the new database, check the **Auto Shrink** check box.

Under the **Log File Properties** section, you can also modify the settings for the database transaction log file. Specify a **Log File Growth** option (in megabytes) or as a percentage of the total size. Again, a sufficient initial size setting can greatly improve performance.

When you are satisfied with the database configuration, click on the **Next** button to create the new SQL Server database.

The wizard creates a new SQL Server database, as shown in **Error! Reference source not found..** When it is finished, it will tell you whether or not the operation has completed successfully. Click the **Next** button to continue.

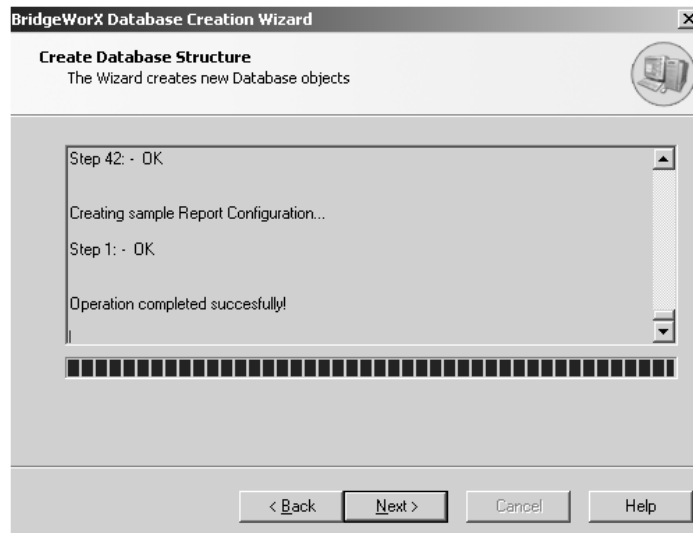


Figure 1.15 - Creating a New Configuration Database

The BridgeWorX Configurator uses Universal Data Link (.udl) files to connect to the Microsoft SQL Server database. These .udl files contain OLE database connection information that allows the Configurator to create and manage connections to OLE databases. Enter a name and directory path for the new .udl file in the **Data Link File Name** field, as shown in Figure 1..

You can browse for a directory by clicking on the ... button to the right of this field. If you want this new database to be the active configuration database, check **Make Database Active**. Click on the **Next** button to continue.

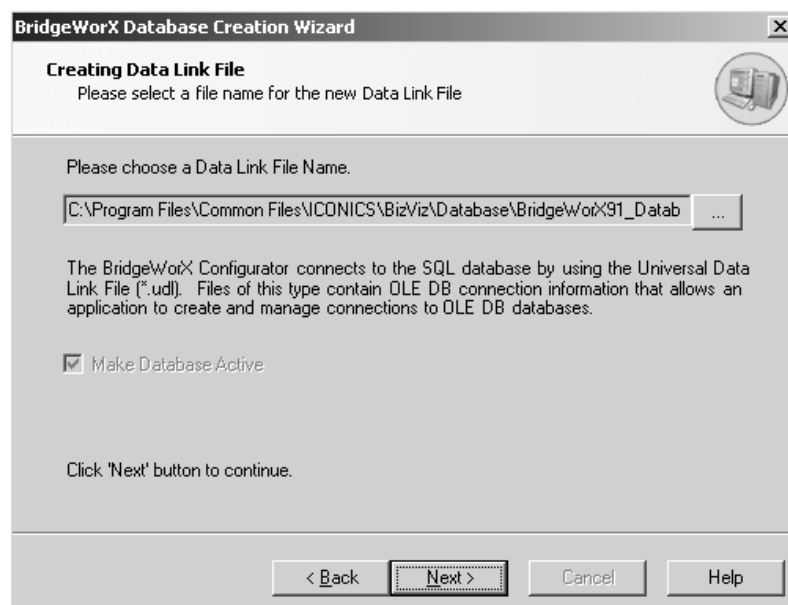


Figure 1.16 - Selecting UDL File Location

Once the Universal Data Link has been created, a summary appears, as shown in Figure 1.. Click on the **Finish** button to complete the database creation.



Figure 1.17 - Completing the Database Creation

When the installation has finished, click on the **Finish** button as shown in Figure 1.. You will be prompted to restart your computer. You must restart your computer before working with the application.



Figure 1.18 - BridgeWorX Installation Completed

After restarting, the **Post-Installation Steps** wizard will run automatically, as shown in Figure 1..

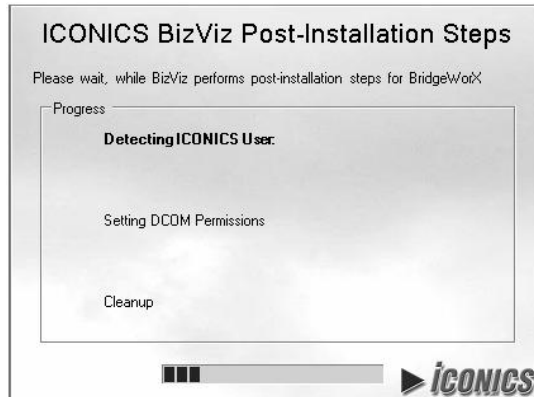


Figure 1.19 - BridgeWorX Post-Installation Steps

The Post-Installation takes the following steps:

- **Detecting BizViz User:** BridgeWorX verifies that your BridgeWorX Service account has been added. You can verify this yourself if you go to the Windows **Control Panel** and select **Administrative Tools** → **Services**. This opens the Windows Services Control Manager. Right-click the **ICONICS BridgeWorX** service and select **Properties** from the pop-up menu. Go to the **Log On** tab in the **Properties** dialog box to view the current user account.

- **Setting DCOM Permissions:** The BridgeWorX Service will interface to the ICONICS GenRegistrar Server for licensing and event reporting tasks. It is important that the user account under which the BridgeWorX Service is running has access to the GenRegistrar server as well to other COM servers such as OPC, ICONICS Language Server, etc. BridgeWorX makes the necessary changes to the default DCOM settings to give the BridgeWorX Service account the required DCOM rights.

1.3 BridgeWorX Licensing

In order to run BridgeWorX, you need a valid BridgeWorX license, which is based on the number of enabled transactions and transaction diagrams.

BridgeWorX is available in several different versions to fit your needs, as shown in Table 1.1. You can also run BridgeWorX in demo mode for up to two hours without an authorized license.

Table 1.1 - Different BridgeWorX Versions

Version	Unified Web Interface	Number of Enabled Transactions	Number of Transactions Diagrams
Enterprise	Yes	Unlimited	Unlimited
Standard	Yes	15	100
Lite	No	5	25
2hr Demo	Yes	5	25

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You can view your BridgeWorX license in the BridgeWorX Configurator, by going to the **Tools** menu, and then select **Options**. The **License Monitor** tab of the **Options** dialog, shown in Figure 1., displays the following information about your BridgeWorX license:

- **Current License Mode:** Displays the BridgeWorX license type (i.e. Demo, Lite, Standard, Enterprise, etc.).

- **Number of Enabled Transactions:** Shows the number of enabled transactions in the active configuration that are currently being used, as well as the maximum number of enabled transactions that your BridgeWorX license allows. Only one configuration can be active, but there can be many active transactions in the configuration.
- **Number of Diagrams:** Shows the number of transaction diagrams in the active configuration that are currently being used, as well as the maximum number of transaction diagrams that your BridgeWorX license allows.

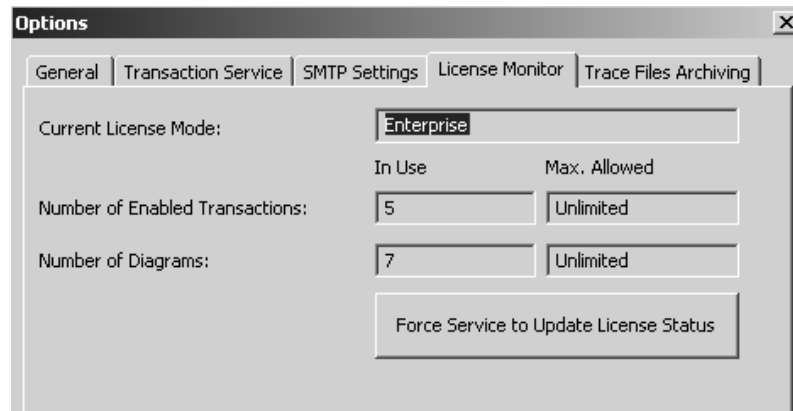


Figure 1.20 - Options Dialog Box: License Monitor Tab

1.4 Using BridgeWorX Configurator in ICONICS Workbench32 Tool

Workbench32 is ICONICS' Web-based centralized environment for system configuration and monitoring, greatly saving time and money and streamlining project development and deployment.

This topic covers how to add ICONICS BridgeWorX Configurator Provider to the Workbench32 configuration/runtime tool. For additional information on how to add other Providers within Workbench32, consult the GENESIS32 V9.2/Workbench32 training or help documentation.

1. From the **Project** menu pull-down, select Add/Remove Providers.

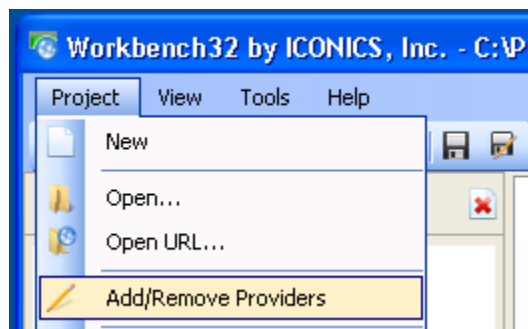


Figure 1.21 Adding Providers in Workbench32

-OR-

Click on the Add/Remove Providers icon () in the toolbars at the top of Workbench32.

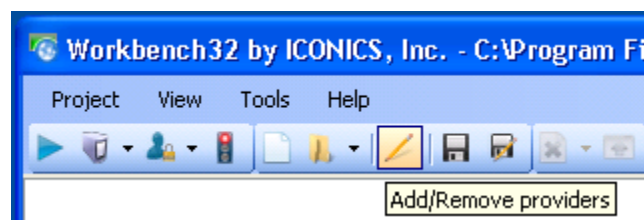


Figure 1.22 Toolbar in Workbench32

2. This will open the **Select Applications in the Project** dialog box, where you can choose your required Workbench32-integrated applications. Click the check box next to **BridgeWorX**. You'll also notice that **BridgeWorX Server** appears under the Runtime Providers section. You can select it, along with the main BridgeWorX Configurator, at this time.

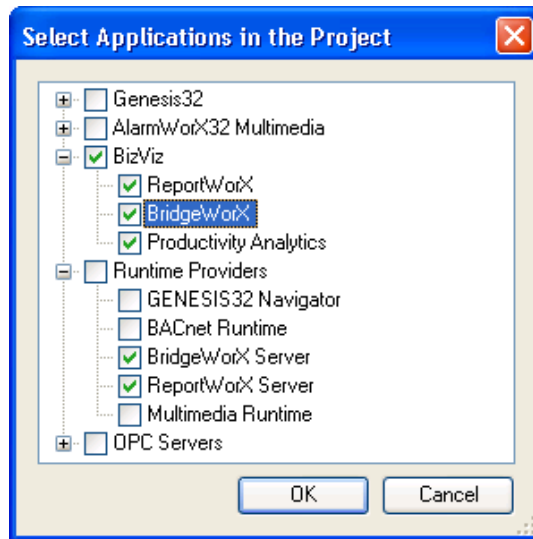


Figure 1.23 Provider Selection in Workbench32

Once your selected Providers are successfully loaded into Workbench32, their icons appear in the bottom left of the Tree Explorer.

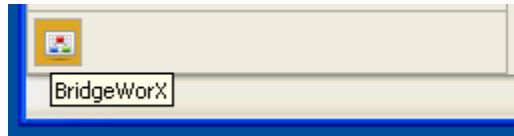


Figure 1.24 BridgeWorX Configurator Icon at Bottom of Tree Explorer in Workbench32

If you don't immediately see the Tree Explorer in Workbench32, you can make it appear by clicking View from the top menu, then click a check mark next to Tree Explorer.

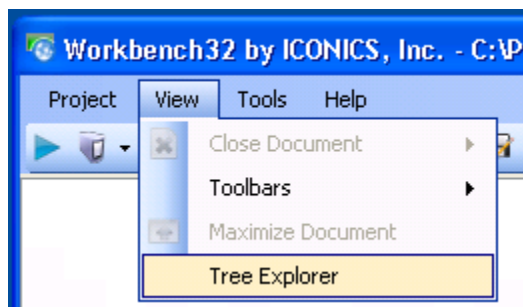


Figure 1.25 Selecting the Tree Explorer from Workbench32's View Menu

To start BridgeWorX Configurator, double-click the BridgeWorX Configurator icon at the bottom of the Tree Explorer in Workbench32. The configurator will load in the Tree Explorer, where you can expand its branches by clicking the plus signs (+) and collapse branches by clicking the minus signs (-).

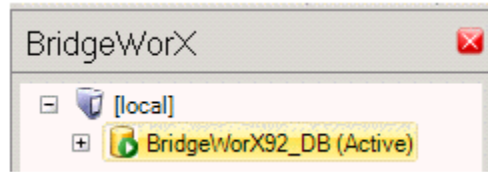


Figure 1.26 BridgeWorX in the Tree Explorer

In the BridgeWorX Configurator Provider in Workbench32, setting up your transactions requires the following basic steps:

1. Create a new configuration database.
2. Create a transaction configuration.
3. Create a data connector for the transaction. The BridgeWorX Configurator provides several example templates to help you get started.
4. Create a new transaction. In the folder in which the transaction is created, set up user access permissions for viewing, executing, and managing transactions.
5. Create a transaction diagram.
6. Define a post-transaction task.
7. Associate transaction triggers (schedules) a transaction to define when the transaction will be executed, or specify that the transaction will be executed on demand.
8. Activate the configuration database.
9. Start the BridgeWorX service.
10. Execute any "on demand" transactions by running them from the BridgeWorX Configurator or Web Interface.

Lab: BridgeWorX Introduction

1

1.1 Quick Lab Overview

Throughout this manual you will be asked to complete several exercises, or “labs”, in order to build your own BridgeWorX transactions. The labs will start very simple and they will build upon each other providing an advanced set of transactions by the end. This lab will take you through the steps of getting familiar with the BridgeWorX Configurator by running and understanding the examples that are available to you with the install. We will also introduce the project you will build in these labs.

1.1.1 Task Checklist

In this quick lab, you will complete the following tasks:

- Start the BridgeWorX Configurator
- Start the BridgeWorX engine
- Execute a transaction.

1.1.2 Support Files

To complete this lab you will need the following file:

- StoreAndForward.gdf

1.2 Store and Forward Overview

In this BridgeWorX course, we will solve some data-bridging problems for the company called **WaterOne**. This is a water-distribution company with many remote pump houses.



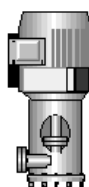
Figure L1.1 - WaterOne Headquarters Location

An example of a pump house is shown in Figure L1.2.



Figure L1.2 - Remote Pump House

The pump house has a pump that will keep the water pressure on a stable PSI for the region.



Capacity	85,31
Units Pumped	1031,00
Pump Speed	200,31
TimeStamp	9/6/2006 12:24:55

Figure L1.3 - Pump

The pump provides a few OPC tags that show the status. The headquarters wants to gather the OPC values for preventive maintenance. The challenge is to get the data to the headquarters every minute. The communication between the headquarters and remote pump house is via satellite connection. Their biggest problem is that the connection is not reliable. In the **StoreAndForward.gdf**, you can simulate the connection.

1.3 Starting BridgeWorX

The BridgeWorX Configurator is the interface that is used to configure how data and information will be bridged between different sources.

To launch the BridgeWorX Configurator, go to **Start → Programs → ICONICS BizViz → BridgeWorX → BridgeWorX Configurator**. The configurator will appear, and will look similar to Figure L1.4.

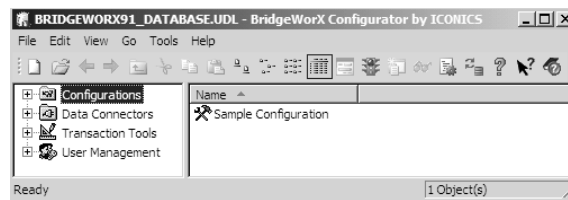


Figure L1.4 - BridgeWorX Configurator

1.3.1 Start the BridgeWorX engine

In this section, the transaction will be enabled and the BridgeWorX engine will be started.

1. Start the BridgeWorX engine by clicking on the traffic light  so it will become green.
2. Copy the \Program Files (x86)\ICONICS\BizViz\BridgeWorX\Examples StoreAndForward.gdf file to the C:\Training folder.
3. From the C:\Training folder, double click on the StoreAndForward.gdf file. This will launch GraphWorX32.

- From the GraphWorX32 Menu Bar, click on Runtime and the file will become active as shown in **Error! Reference source not found..**

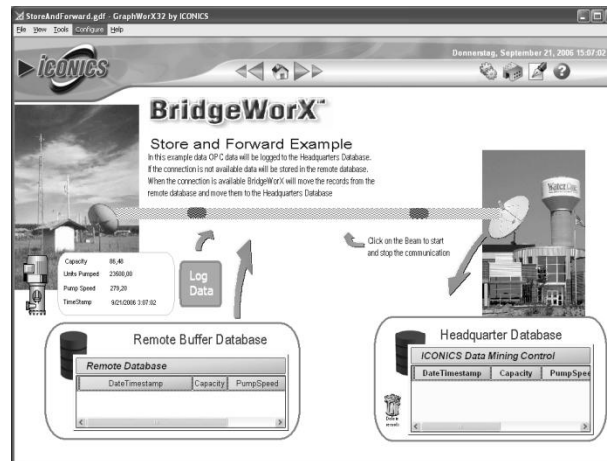


Figure L1.5 - Store and Forward

- With GraphWorX maximized and Store and Forward display in Runtime, launch the BridgeWorX Configurator. Expand the navigation tree on the left. Configurations → Sample Configuration → Gwx32 Transactions. Double click on the “**Store and Forward**” transaction. Overlay the BridgeWorX configurator on top of the StoreAndForward display. As seen in the following figure, position the configurator dialog so you can see the Remote Buffer Database in the display.

1.4 Executing the Transaction

In this section you will execute some default transactions. For the first test the trigger will be manual. In a later chapter, the automatic triggers will be explained.

With GraphWorX maximized and StoreAndForward display in Runtime, launch the BridgeWorX Configurator. Expand the navigation tree on the left. Configurations → Sample Configuration → Gwx32 Transactions. Double click on the “**Store and Forward**” transaction. Overlay the BridgeWorX Configurator on top of the Store and Forward display.

As seen in the figure below, position the configurator dialog so you can see the Remote Buffer Database in the display.

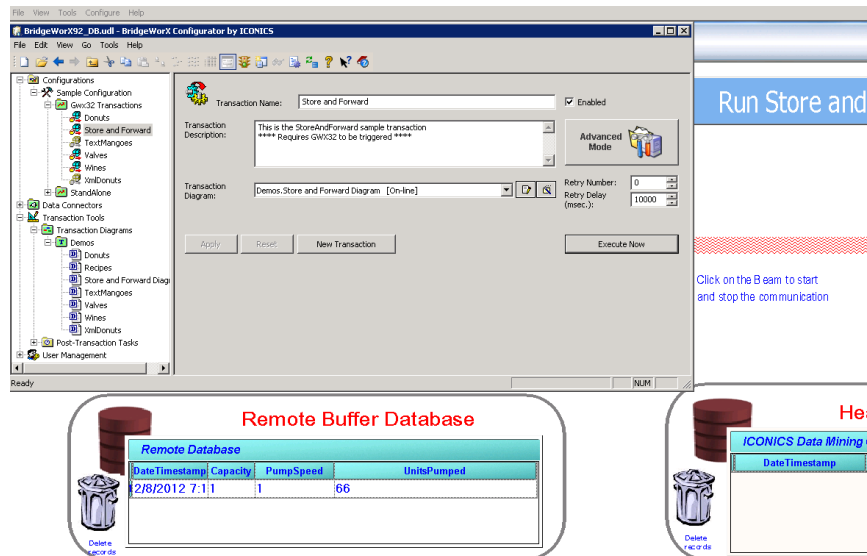


Figure L1.6 - Positioning the BridgeWorX Configurator

6. Click on the **Execute Now** button. When you see the dialog indicating success, click on the OK button to continue.

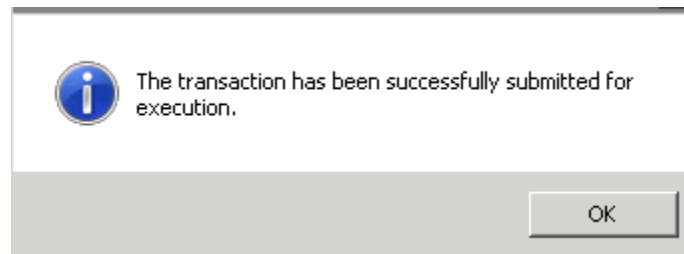


Figure L1.7 - Transaction Executed Successfully

7. As seen in the figure below, you should see a new entry in the Remote Buffer Database table. You can click the **Execute Now** button again and watch for a new entry if you like.

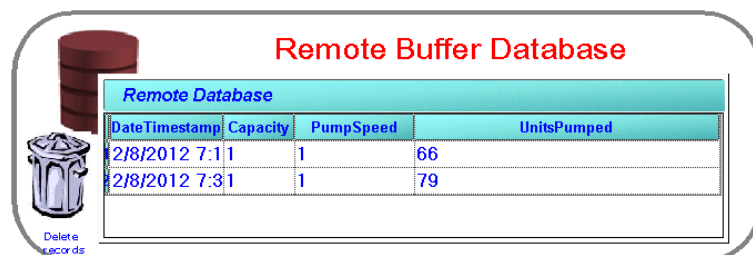


Figure L1.8 - New Entry in the Remote Buffer Database

8. Confirm that the stoplight icon at the top of the configurator dialog is green and minimize the BridgeWorX Configurator. In the Store and Forward runtime display, click on the red **X** in the connection beam. This will simulate establishing a connection between the remote site and the headquarters.
9. In the upper right hand section of the Store and Forward runtime display, click on the “Run Store and Forward Transaction” button. Note that with the remote to headquarters connection established, that a single transaction will be moved from the Remote Buffer Database to the Headquarters Database.

BridgeWorX Configuration

2

2.1 The BridgeWorX Configurator

The BridgeWorX Configurator is the interface that you use to configure transactions. In this interface, you can create your transactions, database connectors, and transaction diagrams. You can also start the BridgeWorX service inside this interface. In this chapter, we will go over some general options in the BridgeWorX Configurator.

Before you can begin to configure BridgeWorX transactions, you must create a database to store the configuration information. You can create a new configuration database or add the configuration database structure to an existing Microsoft SQL Server database by using the BridgeWorX Configuration Database Wizard. Both processes are as simple as running the new configuration wizard and specifying the proper option. For more information, please refer to the BridgeWorX help files.

Once you have a configuration database, the BridgeWorX Configurator opens, as shown in Figure 2.1. The configurator consists of a split window with a tree control view in the left-hand pane and a configuration view in the right-hand pane. The name of the .udl file that you created appears in the title bar of the window. Depending on your database creation, the configuration may include a sample (default) BridgeWorX configuration project.

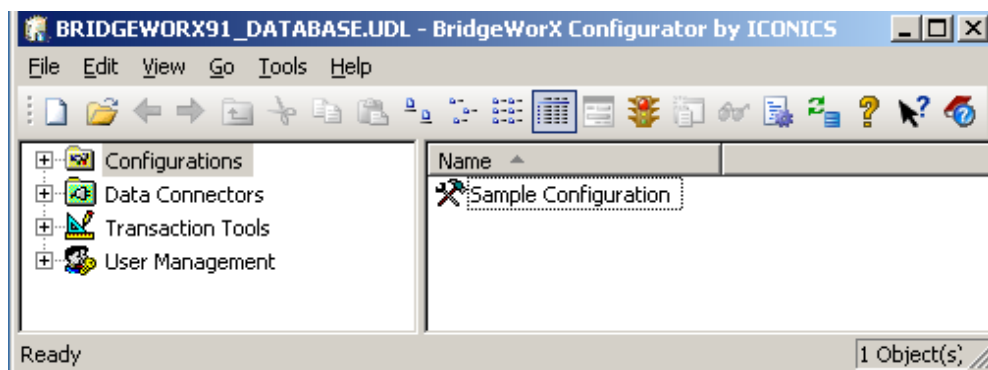


Figure 2.1 - BridgeWorX Configurator

2.2 The Toolbar

At the top of the configurator, there is a toolbar with options. You can show or hide the toolbar by selecting **Toolbars → Standard Buttons** from the **View** menu. The options in the standard buttons toolbar are:

-  **New:** create a new configuration database
-  **Open:** open an existing configuration database through a unified data link (UDL) file
-  **Back:** moves the selection back to the previously selected item
-  **Forward:** moves the selection to the next item in the tree view
-  **Up One Level:** moves up one level in the tree view
-  **Cut:** deletes the current selection, sending it to the clipboard
-  **Copy:** copies the current selection, sending it to the clipboard
-  **Paste:** pasts the current contents of the clipboard to the desired destination
-  **Large Icons:** displays items as large icons
-  **Small Icons:** displays items as small icons
-  **List:** displays items as a list
-  **Details:** displays items as a list with details
-  **Dialog View:** displays additional configuration options
-  **Start/Stop:** starts and stops the BridgeWorX Transaction Service
-  **Reload Schedules:** updates scheduling information in the BridgeWorX engine
-  **Monitor View:** currently, this is not enabled as an option
-  **Visualize Transaction:** Launches the BridgeWorX Web Interface
-  **Global Refresh:** refreshes the data for the entire configurator screen
-  **About:** displays information about the application
-  **Help:** displays context-sensitive help

2.3 Menus

The menu bar of the BridgeWorX Configurator contains the following menu items:

- File
- Edit
- View
- Go
- Tools
- Help

2.3.1 File Menu

The File menu commands are listed in Table 2.1.

Table 2.1 - File Menu Commands

Command	Shortcut Keys	Function
New Configuration Database	CTRL+N	Opens the Configuration Database Wizard. You can use the wizard to create a new Microsoft SQL Configuration database and a Microsoft Data Link (.udl) database file.
New Link File for existing Database	CTRL+L	Opens the Data Link Properties dialog box to create a new Microsoft Data Link(.udl) file.
Open	CTRL+O	Opens a Microsoft Data Link (.udl) database file, which allows you to connect to any OLE database source, such as a Microsoft SQL Server database
Connection Properties		Displays the current database connection properties
Export Data		Exports configuration data from your database to a single .bex file. You can export all configuration data, or just the transactions, transactions diagrams, data connectors, post transaction tasks, or users and groups. You can specify the delimiter to use inside the export file.
Import Data		Imports data into your configuration database from a .bex file. You can then specify the delimiters and choose from the import settings.
Make Active		Activates the current database; if this command is not available, then the current database is already the active database.
Exit		Closes the application; the current configuration database is automatically saved.

2.3.1.1 Database Connection Properties

Selecting the **Connection Properties** from the **File** menu opens the **Database Connection Properties** dialog box, as shown in Figure 2.2, which lists the initialization properties for the current database connection.

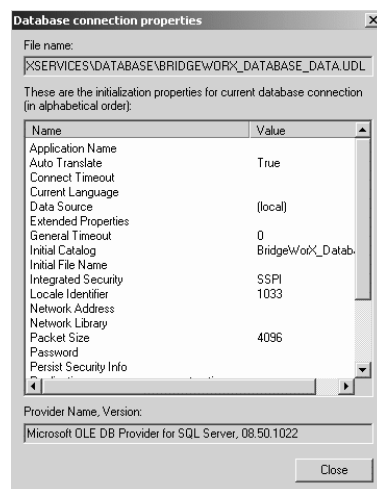


Figure 2.2 - Database Connection Properties Dialog

2.3.1.2 Exporting Configuration Data

The Configurator offers the flexibility of exporting data from your configuration database to a BridgeWorX Export (.bex) file. To export data, select **Export Data** from the **File** menu. The **Export Configuration Data to File** dialog box is shown in Figure 2.3. You can specify the delimiters for exporting the data if you choose; the file uses **Commas** as delimiters by default. Each group contains headings and columns that provide information about each item, such as descriptions, associated translations, and expressions. It also provides the "tree" pathway for each item. In the **Save As Type** field, you can choose .bex for a file type.

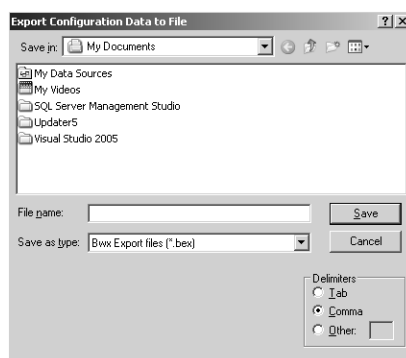


Figure 2.3 - Exporting Configuration Data

2.3.1.3 Importing Configuration Data

The Configurator also offers the ability of importing data from a BridgeWorX Export (.bex) file to your configuration database. To import data, select **Import Data** from the **File** menu. The **Import Configuration Data From File** dialog opens for you to select the file to import. You can specify the delimiters and choose from the following import settings:

- **Create new items:** when the import file contains items that are not yet in the configuration database, then it creates them. Otherwise it skips these items.
- **Update existing items:** when the import file contains items that are in the configuration database, then it updates them using data from the import file. Otherwise it skips these items.

NOTE: Either **Create new items** or **Update existing items** must be selected. Otherwise there is nothing to import.

- **Display errors:** when this item is checked, the Configurator shows a dialog box if an error occurs, and then asks you if you want to proceed with the import. When it is not checked, it skips all items where an error occurred.

When the import completes, the **File Import Results** dialog, shown in Figure 2.4, displays the import settings, including the input file name. It also provides a summary of the import, including how many items were inserted, updated, or rejected, as well as reveal how many errors occurred if any.

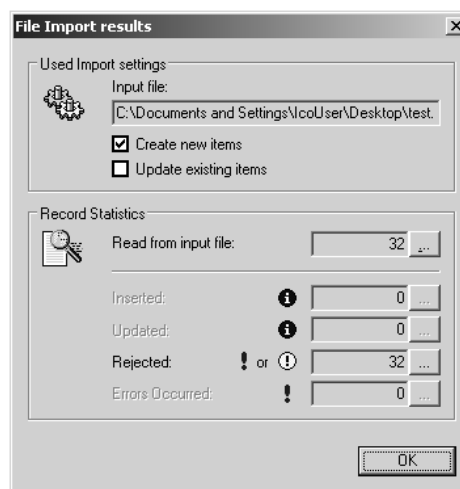


Figure 2.4 - File Import Results Dialog Box

2.3.1.4 Activating the Database

Once your configuration is complete, you need to make sure that it is the active database. The currently active database is the one that the BridgeWorX server uses. To make the current database active, select **Make Active** from the **File** menu. If the **Make Active** selection is grayed out, then the opened configuration database is already the active configuration database.

When you try to activate a configuration database, a dialog box like the one shown in Figure 2.5, comes up to confirm that you want to change the active configuration database.

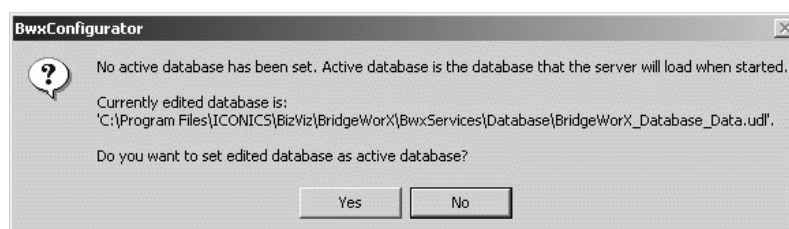


Figure 2.5 - Activating the Database

2.3.2 Edit Menu

The Edit menu commands are listed in Table 2.2.

Table 2.2- Edit Menu Commands

Command	Shortcut Keys	Function
New		Creates a new configuration
Rename	CTRL+R	Renames the selected item
Multiply	CTRL+M	Opens the Multiply Item dialog box, which allows you to multiply an item in the tree control
Delete	CTRL+DEL	Deletes the selected object
Cut	CTRL+X	Cuts the selected object from the view and places it on the clipboard
Copy	CTRL+C	Copies the selected object to the clipboard
Paste	CTRL+V	Pastes the last object placed on the clipboard
Select All	CTRL+A	Selects all objects in a list; the selection is shown in the upper-right-hand section of the viewer
Invert Selection		Unselects all selected items and selects all unselected items
Export Configurations		Exports the current configuration to a .bex file

2.3.2.1 Multiplying Items

The Configurator allows you to multiply items in the tree control. Multiplication provides a simple way of duplicating configurations where there are many similar items in a given category.

To multiply an item, either right-click on the item and select **Multiply** from the pop-up menu, or select **Multiply** from the **Edit** menu. The **Multiply Item** dialog box is shown in Figure 2.6.

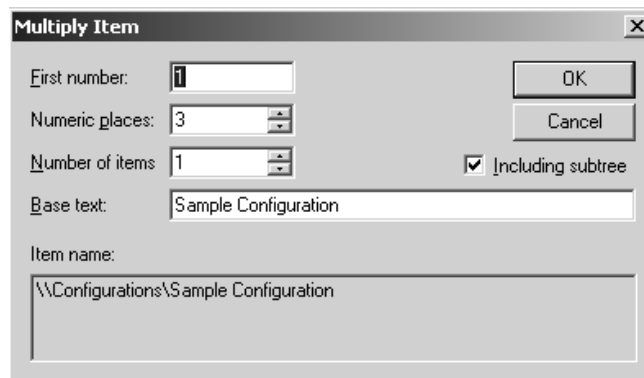


Figure 2.6 - Multiplying Item

When the items are multiplied, they are all given a base name followed by a number. The default **Base Text** is the name of the item selected for multiplication. The **First Number** field specifies the number to appear next to the first multiplied item. The **Number of Items** field specifies how many items you wish to create. The **Numeric Places** field specifies the minimum length of each number to append. Values that take up less space than the specified amount of numeric places will have zeros before the number. If you want to multiply all subfolders as well, check the **Including subtree** check box.

2.3.2.2 Search and Replace

The **Search and Replace** on the right-click menu for the applicable tree control items allows you to search for and replace the following items in the configuration database:

- Database Trigger Connection String
- File System Trigger Path
- Connector Connection String
- Task Action Connection String
- Diagram Action Connection String
- Input Data Access Tag

- Input Text Alias
- Input Expression
- Output Tag
- Output Text Alias
- Task Action OPC Data Access Tag
- Task Action ICONICS Text Alias

NOTE: Replacing information in the database might be dangerous. It is recommended that you make a backup copy of your configuration before attempting to perform a search and replace operation.

Search and replace operations can be performed from many areas in the Configurator on both single items and on folders. To perform a search and replace operation, select an item in the tree control and select **Search & Replace** from the pop-up menu. You can search and replace single or multiple objects.

If you perform the operation on a folder that contains multiple items, the **Multiple Selection** dialog box, shown in Figure 2.7, lists all the objects in the selected folder. This way, you can choose the items on which you want to perform the search and replace operation.

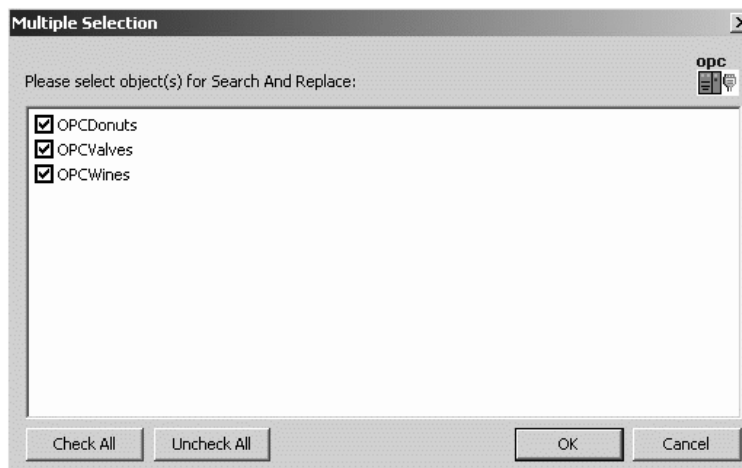


Figure 2.7 - Multiple Selection for Search and Replace

The **Search and Replace** dialog box, shown in Figure 2.8, enables you to specify which objects will be replaced and to select the new objects to replace them. The **Object Type** column lists the item(s) that you selected for replacement. The **Original Value** column lists the value of the selected item(s). The **New Value** column displays whatever is shown in the **New Value** edit box at the bottom of the dialog.

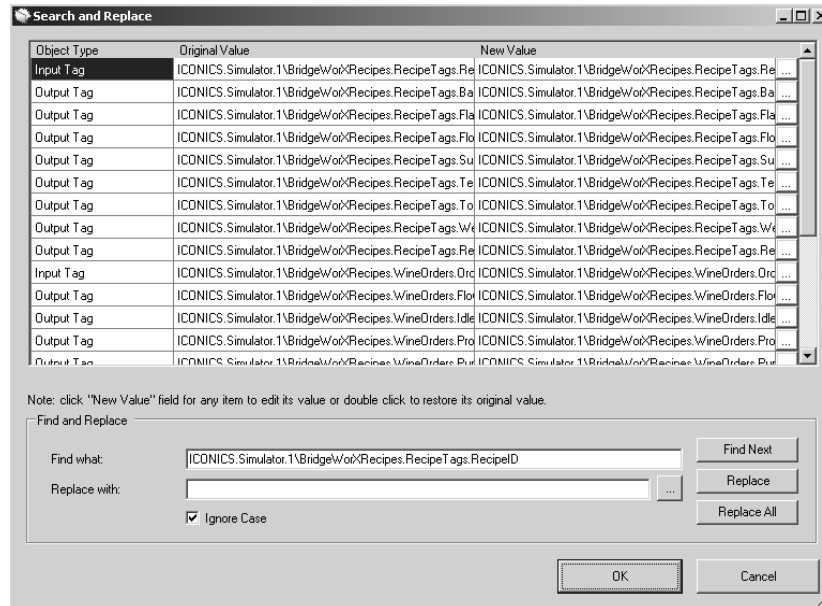


Figure 2.8 - Search and Replace

You can either type the new value into the **New Value** edit box at the bottom of the dialog, or click the ... button to browse for a new value. The browse button opens the relevant selection tool (e.g. the Unified data browser, for tags and aliases, the Expression Editor for expressions, etc.).

NOTE: You can click on any item to edit its value, or double-click to restore its value.

2.3.3 View Menu

The **View** menu commands are listed in Table 2.3.

Table 2.3- View Menu Commands

Command	Shortcut Keys	Function
Toolbars		Allows for Standard Button, Data Manipulation Buttons or both toolbars
Status Bar		Toggles the status bar
Large Icons	F7	Displays items as large icons
Small Icons	F8	Displays items as small icons
List	F9	Displays items as a list
Details	F10	Displays items as a list along with detailed information about the configuration of each item

Dialog View	F11	Toggles the configuration window (right-hand pane)
Sort By		Displays a list of options for sorting the columns in the right-hand pane of the screen: the options listed depend on the level within the view
Show/Hide Columns		Displays a list of options that you can choose to show or hide in the view
Select Language		Opens the Select Language dialog box: choose the language you wish to use for your system and click OK . For navigation purposes, use the buttons and check boxes in the List section.
Global Refresh	F5	Refreshes the data for the entire Configurator screen
Subtree Refresh	CTRL+F5	Refreshes only the data contained in the currently selected sub-tree

2.3.3.1 Selecting Languages

The **Select Language** function on the **View** menu allows you to choose which language to use in your display. Choosing **Select Language** from the **View** menu opens the **Select Language** dialog box, shown in Figure 2.9.

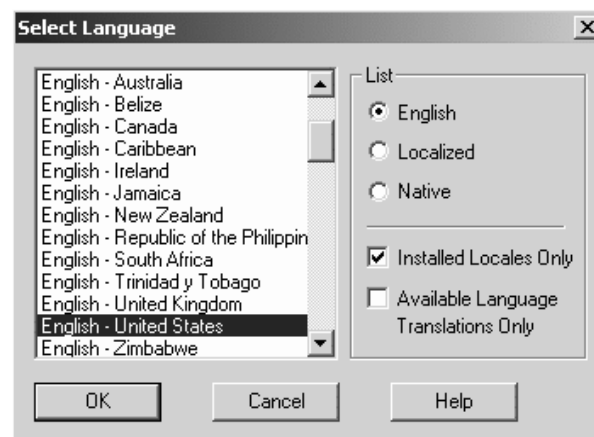


Figure 2.9 - Select Language

NOTE: A language resource .dll is required for language switching.

You can define the parameters of the languages, then click on **OK** to return to the work area. The parameters are:

- **List:** lists available languages: depending on which item you have selected, the view on the left will change.
 - If English is checked, the languages will appear as their English name.

- If Localized is checked, the languages will appear with the native country in parentheses (for languages with several dialects only).
- If Native is checked, the languages are displayed the way they would be written in that language.
- **Installed Locales Only:** if this is checked, local languages appear in the list of languages.
- **Available Languages Transactions Only:** checking this box allows you to choose from available language translations only.

2.3.4 Go Menu

The **Go** menu commands are listed in Table 2.4.

Table 2.4 - Go Menu Commands

Command	Shortcut Keys	Function
Back	CTRL+ALT+ Left Arrow	Moves the cursor back to the previously selected item in the tree control
Forward	CTRL+ALT+ Right Arrow	Moves the cursor forward to the previously selected item in the tree control
Up One Level		Moves the cursor up one level in the tree control
Next Item	ALT+Down Arrow	Moves the cursor to the next visible item in the tree control
Previous Item	ALT+Up Arrow	Moves the cursor to the previous visible item in the tree control
Expand Item	ALT+Left Arrow	Expands an item that contains a submenu
Collapse Item	ALT+Right Arrow	Collapses an item that contains a submenu
Page Up	ALT+PgUp	Moves the cursor up to the first visible item in the tree
Page Down	ALT+PgDown	Moves the cursor down to the last visible item in the tree
Home	ALT+Home	Moves the cursor up to the first item in the tree
End	ALT+End	Moves the cursor down to the last visible item in the tree
Next Pane	F6	Moves the cursor to the next pane in the window
Previous Pane	SHIFT+F6	Moves the cursor to the last pane used

2.3.5 Tools Menu

The **Tools** menu commands are listed in Table 2.5.

Table 2.5 - Tools Menu Commands

Command	Function
Options	Launches the Options dialog box
Update Transaction Service Status	Refreshes the BridgeWorX Transaction Service status (if the service is currently running)
Attach Database (Local Servers)	Attaches an existing SQL Server database to the BridgeWorX Configurator
Detach Database (Local Servers)	Detaches a SQL Server database from the BridgeWorX Configurator
Configuration Activity Log	Launches the Configurator's Log , which displays all the actions in the Configurator, including the time of each action, the action type, and the user who performed the action. (Please refer the Activity Log section of the help menu for more information)
Run UDM Configurator	Launches the Unified Data Manager

2.3.5.1 Attaching a Database to Local Server

To attach an existing SQL Server database to the BridgeWorX Configurator, select **Attach Database (Local Servers)** from the **Options** menu. This opens the **Attach SQL Server Database** dialog box, as shown in Figure 2.10:

- **Attach to Server:** The local database is selected
- **MDF File of Database To Attach:** Click the ... button to browse for a database file.
- **Attach As:** Specifies a name for the database.
- **Specify Database Owner:** Select the database user from the drop-down list.
- **Data Link File (UDL):** When **Create Data Link File** is checked, you can click the ... button and specify a name for the Universal Data Link (UDL) file. To open the file in the BridgeWorX Configurator, click on the **Load Data Link File in BridgeWorX** check box and click on **OK**.

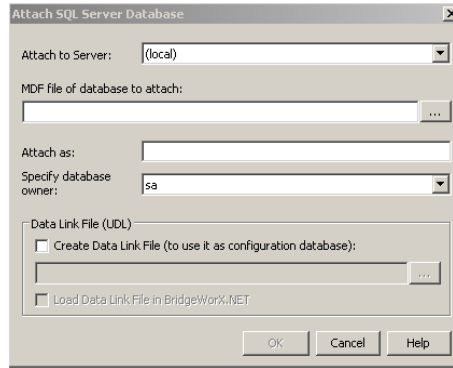


Figure 2.10 - Attaching an SQL Server Database

2.3.5.2 Detaching a Database from Local Server

To detach a SQL Server database from the BridgeWorX Configurator, select **Detach Database (Local Servers)** from the **Options** menu. This opens the **Detach SQL Server Database** dialog box, as shown in Figure 2.11. Under **Choose SQL Server**, the local database is selected. Select a database to detach from the list of databases shown in the dialog box and click on **OK**.

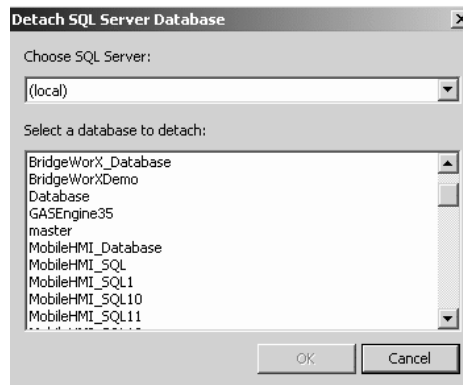


Figure 2.11 - Detaching an SQL Server Database

2.3.6 Help Menu

The **Help** menu commands are listed in **Error! Reference source not found..**

Table 2.6 - Help Menu Commands

Command	Shortcut Keys	Function
Help Topics	F1	Launches the online Help for the Configurator.
About Application		Launches the About Box , which contains information about the product version number, copyright, and available disk space. It also contains contact information.

2.4 Options

To choose additional settings, select **Options** from the **Tools** menu. This opens the **Options** dialog box, which contains the following tabs:

- General
- Transaction Service
- SMTP Settings
- License Monitor
- Trace Files Archiving

2.4.1 General Tab

The **General** tab of the **Options** dialog box, shown in Figure 2.12, contains the following options:

- **Save regional settings in registry:** Checking this option allows you to save regional settings in the registry so that they are applied each time you start the configuration application. This applies to the language settings as well as time and date settings.
- **Automatically apply changes when selection is changed:** Checking this option allows changes to the configuration database to be saved each time you switch dialogs without clicking on the **Apply** button or being shown a message asking if you would like to apply changes.
- **Enable hover selection:** Checking this option allows you to highlight an item by moving the mouse pointer over that item and keeping it there for a specified **Hover Time** (in milliseconds).

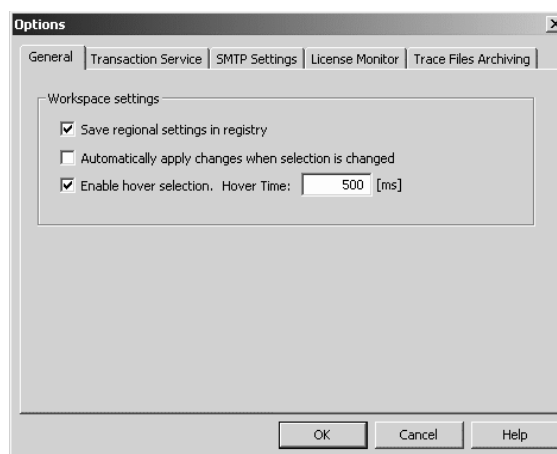


Figure 2.12 - Options Dialog: General Tab

2.4.2 Transaction Service Tab

The **Transaction Service** tab of the **Options** dialog box, shown in Figure 2.13, specifies TCP/IP and FTP ports to use for the Transaction Service status updates. The default TCP port number is 8086. The default FTP port is 21.

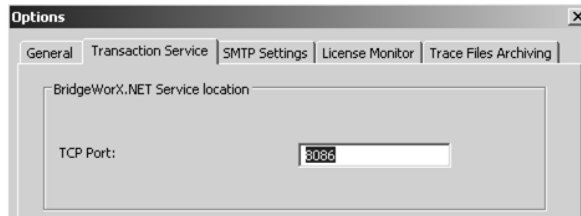


Figure 2.13 - Options Dialog: Transaction Service Tab

2.4.3 SMTP Settings Tab

The **SMTP Settings** tab of the **Options** dialog box, shown in Figure 2.14, sets the secure connection access parameters for the Transaction Service.

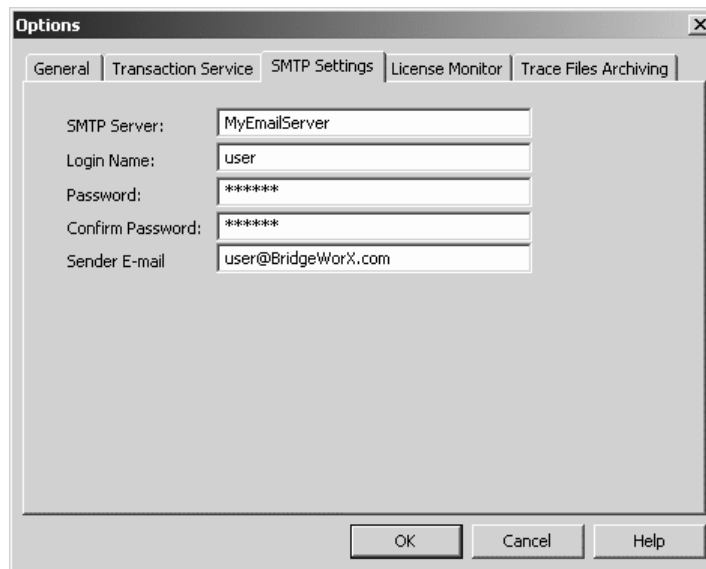


Figure 2.14 - Options Dialog: SMTP Settings Tab

- **SMTP Server:** Specifies the name of the e-mail server used to send the e-mail message. A server name must be entered in this field in order for e-mail notification messages to be sent. It is recommend that you create an e-mail account to be used specifically for e-mailing transactions.
- **Login Name** and **Password:** Enter a valid, alphanumeric user name and password.

- **Confirm Password:** Re-enter your password for confirmation.
- **Sender E-Mail:** Enter the e-mail address of the sender of the e-mail message.

2.4.4 License Monitor Tab

The **License Monitor** tab of the **Options** dialog box, shown in Figure 2.15, displays the following information about your BridgeWorX license:

- **Current License Mode:** Displays the BridgeWorX license type (e.g. Demo, Lite, Standard, Enterprise, etc.).
- **Number of Enabled Transactions:** Shows the number of enabled transactions in the active configuration that are currently being used, as well as the maximum number of enabled transactions that your BridgeWorX license allows. Only one configuration can be active, but there can be many active transactions in the configuration.
- **Number of Diagrams:** Shows the number of transaction diagrams in the active configuration that are currently being used, as well as the maximum number of transaction diagrams that your BridgeWorX license allows.

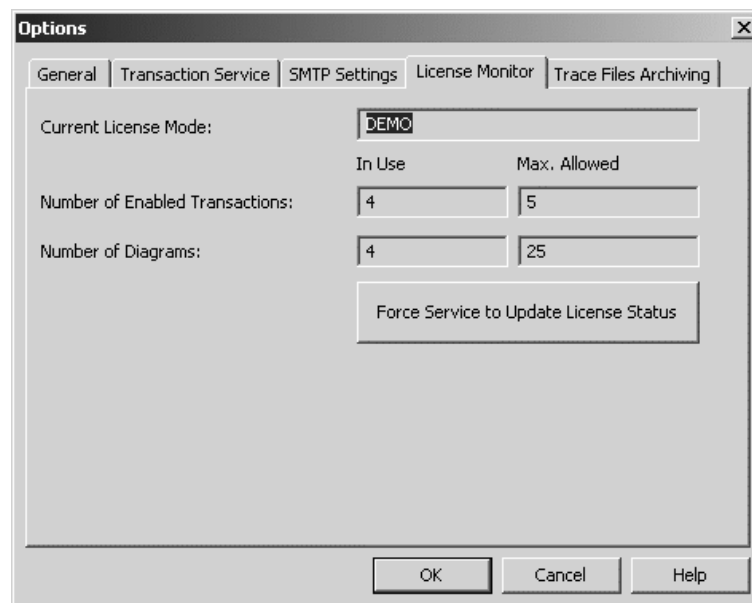


Figure 2.15 - Options Dialog: License Monitor Tab

2.4.5 Trace Files Archiving Tab

The **Trace Files Archiving** tab of the **Options** dialog box, shown in Figure 2.16, enables periodic archiving of all transactions.

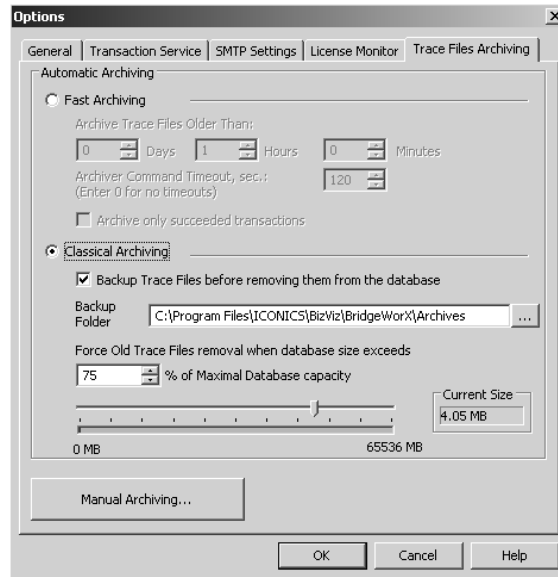


Figure 2.16 - Options Dialog: Trace Files Archiving Tab

- **Fast Archiving:** Fast Archiving limits the Trace files that are archived to only those files that are newer than the time interval you set in the Tools Options dialog box on the Trace Files Archiving tab.
- **Classical Archiving:** By default, the Classic archive option is enabled. To enable transaction archiving, check the **Backup Trace Files** check box. When this box is checked, transactions will be backed up before being removed from the database. If this box is not checked, transactions will be removed from the database but not backed up. The Backup Folder field specifies the name of the directory where archived transactions will be stored.
- **Manual Archiving:** This section enables you to archive transactions immediately based on a specified time period. All transactions within a specified time settings will be archived. Selecting **Archive Trace Files Older Than** archives the executed transaction to a user-specified directory after a user-specified time period (days, hours, minutes). You can also specify an archiving time range in the **From and To** fields (month, day, year). If the BridgeWorX Service is currently running, you can click the **Archive Now** button to begin archiving your transaction files immediately.

Lab: BridgeWorX Configuration

2

2.1 Quick Lab Overview

Throughout this lab, you will create new configuration databases and start creating your Store and Forward project.

2.1.1 Task Checklist

In this lab, you will complete the following tasks:

- View your BridgeWorX License
- Create new (empty) configuration database
- Create a new Transaction Folder
- Set the security for the Transaction Folder
- Create a new Transaction and a new Transaction Diagram

2.1.2 Support Files

To complete this lab, you will need the following support files:

- BufferDatabase.mdb
- HeadquarterDatabase.mdb
- StoreAndForward.gdf

2.2 View Your BridgeWorX License

To view your BridgeWorX license in the BridgeWorX Configurator:

1. Open BridgeWorX **Configurator** and select **Options** from the **Tools** menu.
2. The **License Monitor** tab of the **Options** dialog box, shown in Figure L2.1, displays information about your BridgeWorX license.

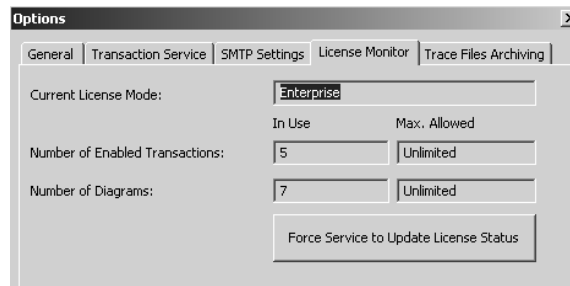


Figure L2.1 - Options Dialog: License Monitor Tab

2.3 Create a New Configuration Database

To create a new configuration database (empty, without examples):

1. Open the BridgeWorX Configurator and select New Configuration Database... from the File menu.
2. The **BizViz Database Creation Wizard** dialog box appears, as shown in Figure L2.2.



Figure L2.2 - Database Creation Wizard

3. Select **Use this computer**, as shown in Figure L2.3 and click on the **Next** button to continue.

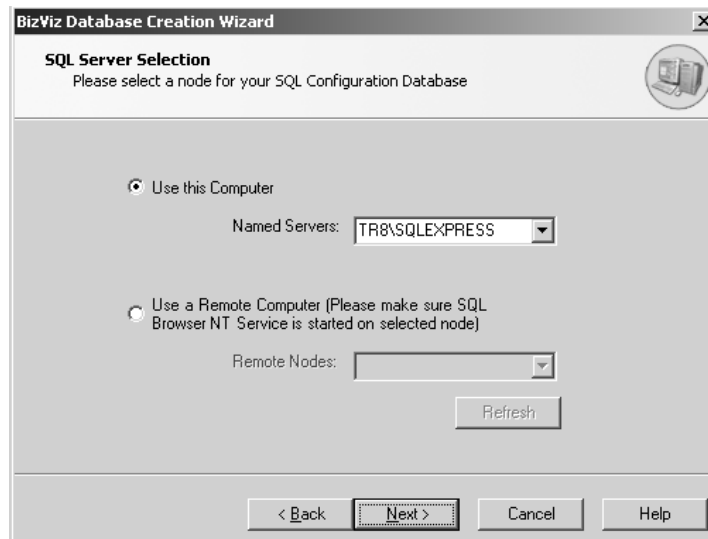


Figure L2.3 - Selecting Local SQL Server

4. Select the proper authentication mode to log into your SQL Server, as shown in Figure L2.4 and click on the **Next** button to continue.

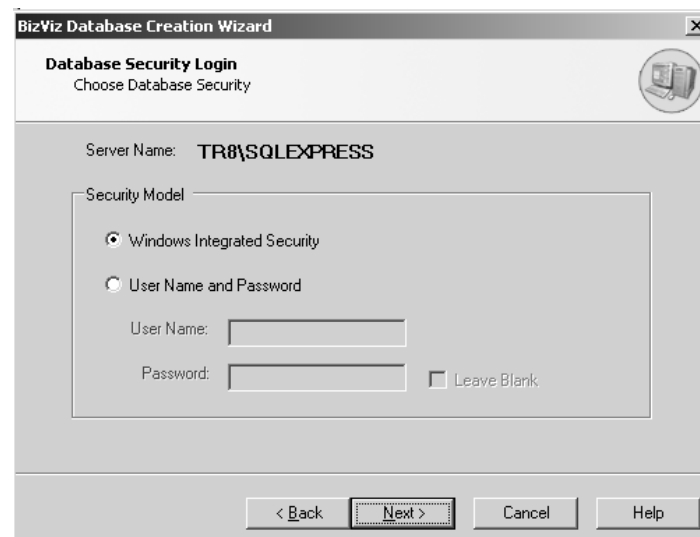


Figure L2.4 - Logging into SQL Server

5. Select **I want to create a new Microsoft SQL Server database [recommended]**. There is also an option to include or exclude the **BridgeWorX samples**. Make sure that this option is unchecked, as shown in Figure L2.5, and then click on the **Next** button to continue.

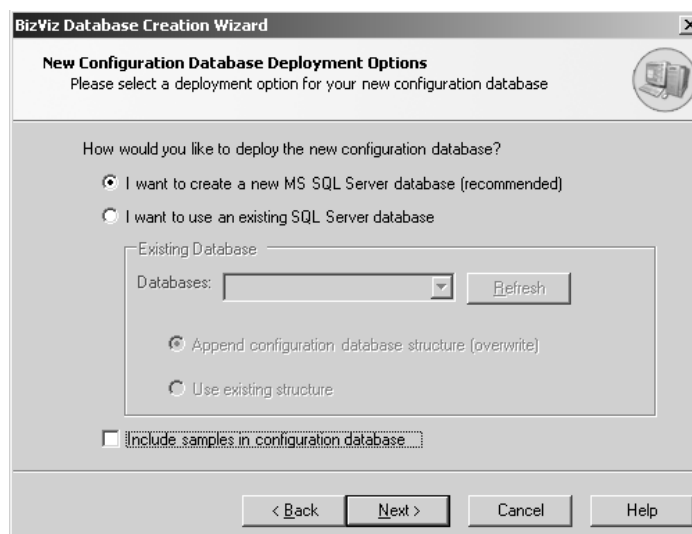


Figure L2.5 - Creating a New Microsoft SQL Server Database

6. Type in the **Name** of the database, as shown in Figure L2.6, then click on the **Next** button to create the new SQL Server database.

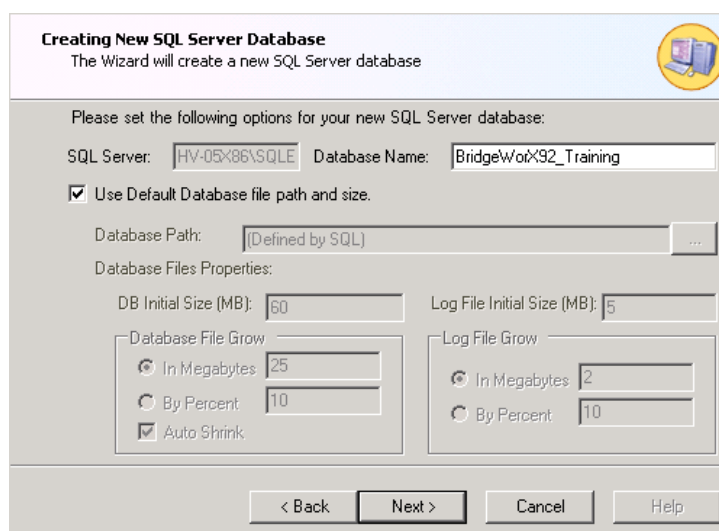


Figure L2.6 - Setting the Database Parameters

7. The Wizard displays the steps it takes to create the new SQL Server database, as shown in Figure L2.7. Click on the **Next** button to continue.

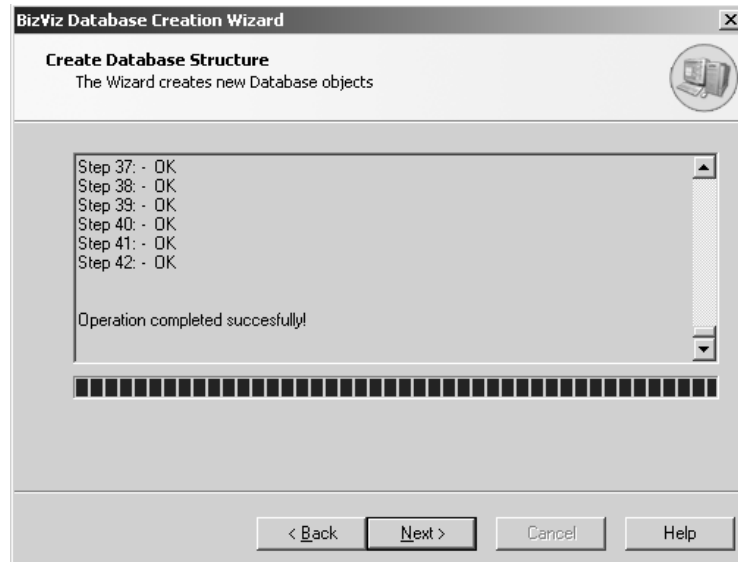


Figure L2.7 - Status of Database Creation

8. The wizard then creates a data link file to the database at the path shown. Make sure that **Make Database Active** option is checked, as shown in Figure L2.8; click on the **Next** button to continue.

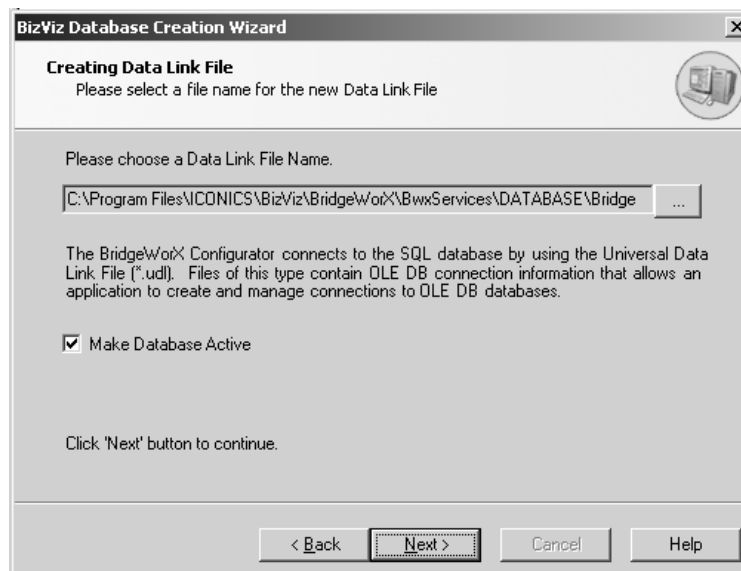


Figure L2.8 - UDL File Creation

9. A summary appears, as shown in Figure L2.9. Click on the **Finish** button to complete the database creation.



Figure L2.9 - Completing the Database Creation

10. When the database is created, go to the **File** menu in the BridgeWorX Configurator and make sure that **Make Active** option is greyed out (this indicates the current database is active). If possible, click on the Make Active option..

2.4 User Management

1. From the BridgeWorX Configurator, select **User Management** from the tree in the left hand pane
2. Click on the **User Account Registration** button in the pane on the right.
3. We will register to groups. Double click on the group \Administrators and the group \Users.

4. In the Account(s) selected for Import section at the bottom you will see several user accounts. Similar to the figure below. Click OK to return to the configurator.

4 Account(s) selected for Import:

User Account	Group Name
HV-05X86\admin	HV-05X86\Users
HV-05X86\admin	HV-05X86\Administrators
HV-05X86\Administrator	HV-05X86\Administrators
HV-05X86\ICONICS_USER	HV-05X86\Administrators

Figure L2.10 - User accounts selected for import

5. Within the Folder Permissions dialog, select each user individually and assign All Transaction Permissions. See the example in the figure below.

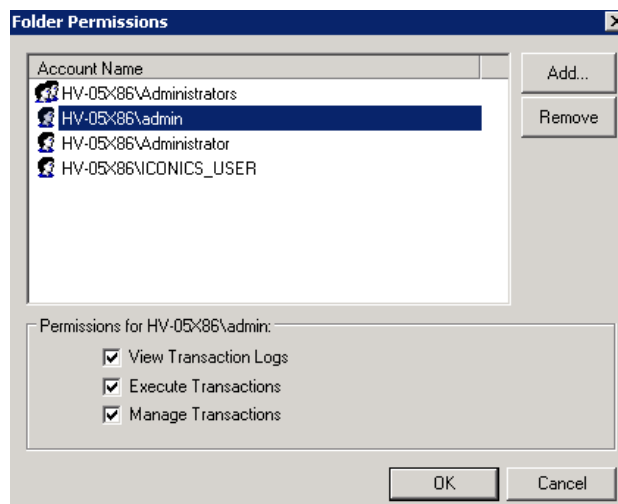


Figure L2.11 - BridgeWorX assigned folder permissions

2.5 Creating a New Configuration

In this section, you will learn how to create a new BridgeWorX configuration.

1. Open the BridgeWorX Configurator and right click on **Configurations** in the tree control on the left side, then choose **New → Configuration**.
2. Name this configuration **Training Configuration**.

- Click on **Set As Active Configuration** button. If you get the warning as indicated in the figure below, click OK. Click on the traffic light icon at the top of the configurator dialog. The icon should turn from green to red.

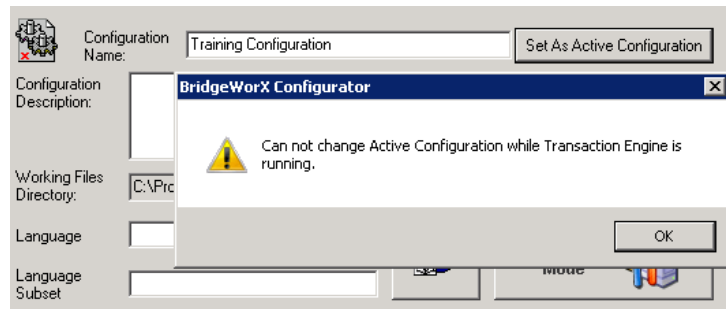


Figure L2.12 – Active Configuration Warning

2.6 Creating a New Transaction Folder

In this section, you will learn how to add a new transaction folder to the configuration and how to set the permissions for this folder.

- Right-click on Training Configuration you created and select **New → Transaction Folder**.
- Name the folder **WaterOne** and click on **Apply**. After that, the **Permission** button will appear.
- Click on the **Permission** button and the Folder Permissions dialog box will appear. Make sure that your currently logged-in user has View, Manage, and Execute permissions, as shown in Figure L2..

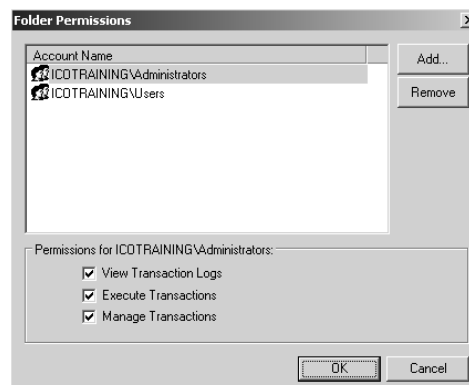


Figure L2.13 - Folder Permissions

- Click on **OK** and the WaterOne transaction folder is ready to be used.

2.7 Creating a New Transaction

In this section, you will learn how to set up a new transaction.

1. Right click on the WaterOne folder under Training Configuration and select New → Transaction
2. Name this Transaction **Store and Forward**.
3. Click on the **Create New Diagram**  button to the right of the Transaction Diagram field and a new window appears. Name the diagram **Store and Forward Diagram** and name the folder **WaterOne**, as shown in Figure L2.10.

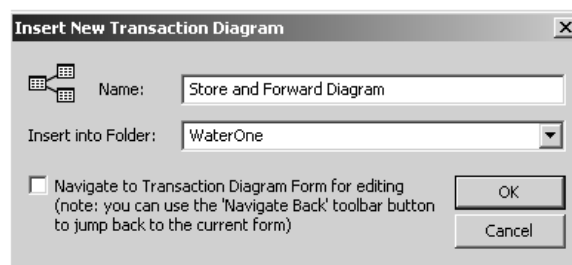


Figure L2.10 - Insert New Transaction Diagram

4. Click on **OK**, and then click on **Apply** to save the configuration. We will build upon this transaction in subsequent labs.

Data Connectors

3

3.1 Introduction to Data Connectors

A Data Connector is an object that contains the connection path to the source of data. Whether you want to connect to a table in a database, or to a tag in an OPC server, you must create a connector to your data first. This is the first step to bridging any data. The **Data Connectors** tree control in the Configurator, shown in Figure 3.1, allows you to create and configure connectors for your data transactions.

The Configurator provides several sample data connectors. You can configure the following types of data connectors for transactions:

- **OPC Connectors:** defines OPC read/write connection parameters for OPC data.
- **Database Connectors:** defines read/write parameters for different types of databases.
- **Global Variables:** defines global variables for data transactions. If two transactions use the same global variable, the value of the variable will be the one set by the transaction last ran.
- **Local Variables:** defines local variables for data transactions. If two transactions use the same local variable, the variable will have different values, local to the transaction.

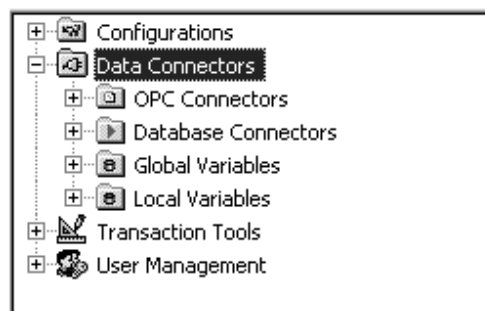


Figure 3.1 - Data Connectors Tree Control

3.2 Creating a New Data Connector

To create a new Data Connector, right-click on the type of connector you want to create in the **Data Connectors** tree control and select **New → Data Connector** from the pop-up menu, as shown in Figure 3.2.

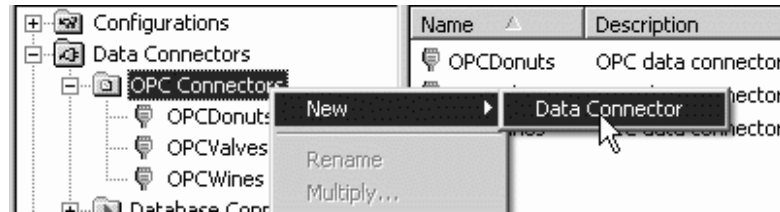


Figure 3.2 - Creating a New OPC Connector

The properties dialog for a data connector is in the right-hand pane of the Configurator, and is shown in Figure 3.3. Every data connector needs a **Connector Name**, a **Data Type**, and a **Data Direction**.

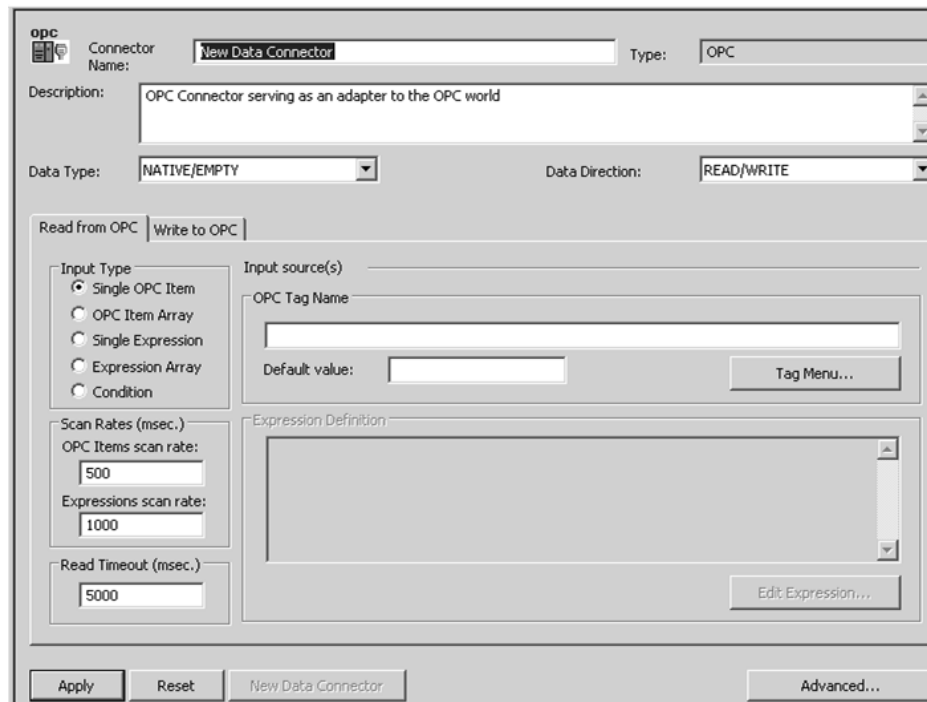


Figure 3.3 - New OPC Connector Properties

The data type specific properties of a data connector are explained in the following sections.

3.2.1 OPC Connectors

The **OPC Connectors** tree control, shown in Figure 3.4, allows you to create and configure connectors for your OPC data transactions. The OPC connector configuration defines OPC read and write connection parameters for OPC data transactions. The Configurator provides several sample OPC connectors.

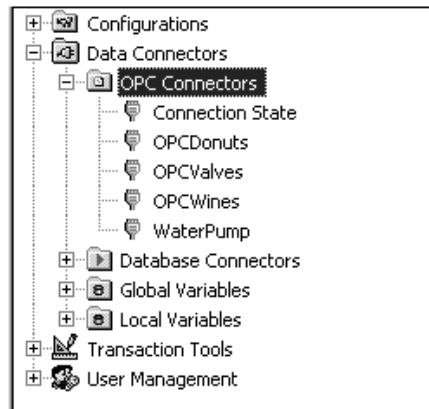


Figure 3.4 - OPC Connectors Tree Control

The following are the settings necessary for an OPC connector:

- **Connector Name:** enter a name for the OPC connector; this is the identifier of the connector
- **Connector Description:** enter an optional description for the OPC connector.
- **Type:** displays the data connector type.
- **Data Type:** choose a data type (e.g. native, float, double, bool, etc.) from the dropdown list. See the Data Types table that follows for details.
- **Data Direction:** choose a data direction (i.e. READ/WRITE, ONLY READ, or ONLY WRITE) from the dropdown list.
- **Apply:** saves all changes to the configuration database.
- **Reset:** clears all recently added information.
- **New Data Connector:** creates a new OPC connector to be configured.

In addition, the properties dialog box for an OPC connector has the following tabs, which are described in greater detail in the sections that follow:

- **Read from OPC:** specifies an input type for reading from an OPC data source.
- **Write to OPC:** specifies OPC tag names for writing to an OPC data source.

3.2.1.1 Read From OPC

The **Read from OPC** tab in the **OPC Connector** properties specifies an input type for reading from an OPC data source, as shown in Figure 3.5.

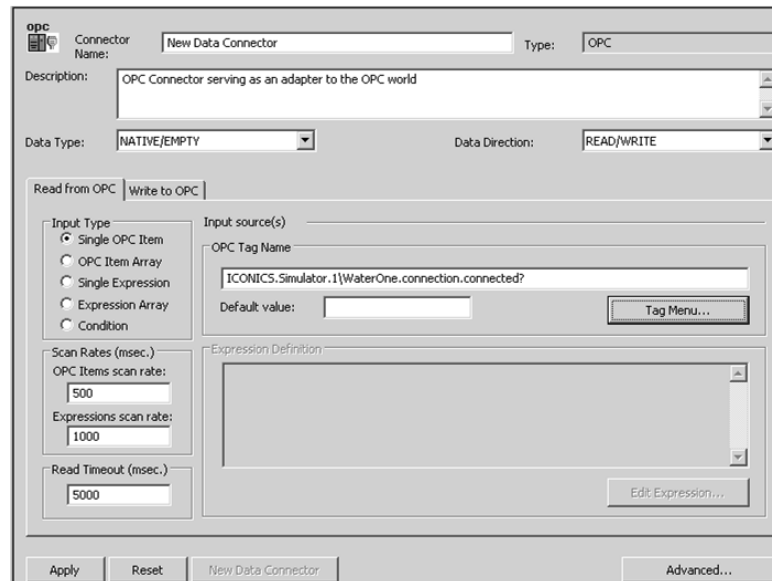


Figure 3.5 - OPC Connector Properties: Read From OPC

Under **Input Type**, there are the following radio buttons. The configuration interface varies with each selection:

- Single OPC Item
- OPC Item Array
- Single Expression
- Expression Array
- Condition

3.2.1.1.1 Single OPC Item

A **Single OPC Item** specifies a single OPC tag or data item to read from the OPC server. Clicking on the **Tag Menu** button opens the Unified Data Browser, which enables you to browse for OPC tags. The selected tag is displayed in the **OPC Tag Name** field.

3.2.1.1.2 OPC Item Array

An **OPC Item Array** specifies multiple OPC tags or data items to read from OPC servers. Clicking the **Add** button opens the Unified Data Browser, which enables you to browse for OPC tags. The selected tags are displayed in the **OPC Tag Names** field. To delete tags from the list of tag names, select the tag for deletion and click on the **Remove** button. You can also click the **Up** and **Down** buttons to change the order in which the tags are displayed in the list.

The screenshot shows the 'Read from OPC' dialog box. On the left, under 'Input Type', the 'OPC Item Array' radio button is selected. Below this, there are input fields for 'Scan Rates (msec.)': 'OPC Items scan rate' is set to 500 and 'Expressions scan rate' is set to 1000. At the bottom left, the 'Read Timeout (msec.)' is set to 5000. The main area on the right is titled 'Input source(s)' and contains a table with two columns: 'OPC Tag Names' and 'Default Value'. The table lists three tags: 'ICONICS.Simulator.1\WaterOne.pump.Capacity', 'ICONICS.Simulator.1\WaterOne.pump.PumpSpeed', and 'ICONICS.Simulator.1\WaterOne.pump.UnitsPumped'. To the right of the table are buttons for 'Add...', 'Remove', 'Up', and 'Down'.

Figure 3.6 - Read from OPC: OPC Item Array

3.2.1.1.3 Single Expression

A **Single Expression** specifies one expression to read. Clicking the **Edit Expression** button opens the Expression Editor, which enables you to define OPC expressions. The expression tag is displayed in the **Expression Definition** field.

The screenshot shows the 'Read from OPC' dialog box with the 'Single Expression' radio button selected under 'Input Type'. The 'Scan Rates (msec.)' and 'Read Timeout (msec.)' settings are the same as in Figure 3.6. The 'Input source(s)' section now shows a single 'OPC Tag Name' field containing 'ICONICS.Simulator.1\BridgeWorXRecipes.RecipeTags.RecipeID' and a 'Tag Menu...' button. Below this is a large 'Expression Definition' text area and an 'Edit Expression...' button.

Figure 3.7 - Read from OPC: Single Expression

3.2.1.1.4 Expression Array

An **Expression Array** specifies multiple OPC expressions to read. Clicking on the **Add** button opens the Expression Editor, which enables you to define OPC expressions. The selected tags are displayed in the **Expressions** field. To delete expressions from the list of expression names, select the expression and click on the **Remove** button. You can also use the **Up** and **Down** buttons to change the order in which the expressions are displayed in the list.

The screenshot shows the 'Read from OPC' dialog box with the 'Write to OPC' tab selected. On the left, under 'Input Type', the 'Expression Array' radio button is selected. Below this, 'Scan Rates (msec.)' are set to 500 for 'OPC Items scan rate' and 1000 for 'Expressions scan rate'. The 'Read Timeout (msec.)' is set to 5000. The main area, 'Input source(s)', contains a list box labeled 'Expressions' which is currently empty. To the right of the list box are buttons for 'Add...', 'Edit...', 'Remove', 'Up', and 'Down'.

Figure 3.8 - Read from OPC: Expression Array

3.2.1.1.5 Condition

The **Condition** option bases the OPC read operation on filtering criteria and the resulting values.

The screenshot shows the 'Read from OPC' dialog box with the 'Write to OPC' tab selected. On the left, under 'Input Type', the 'Condition' radio button is selected. Below this, 'Scan Rates (msec.)' are set to 500 for 'OPC Items scan rate' and 1000 for 'Expressions scan rate'. The 'Read Timeout (msec.)' is set to 5000. The main area, 'Input source(s)', contains a list box labeled 'OPC Tag Names' which is currently empty. To the right of the list box are buttons for 'Add...', 'Edit...', 'Remove', 'Up', and 'Down'. Below the list box, there are two sections: 'Criteria' and 'Result'. The 'Criteria' section has radio buttons for 'First with Good Quality' (selected), 'First with Good or Uncertain Quality', 'First Non-Zero', 'Highest value', 'Highest absolute value', 'Lowest value', and 'Lowest absolute value'. The 'Result' section has radio buttons for 'The Value itself' (selected), 'Zero-based index', and 'Input Name'.

Figure 3.9 - Read from OPC: Condition

The filtering criteria for OPC read operation are based on the following attributes:

- First with good quality
- First with good or uncertain quality
- First non-zero
- Highest value
- Highest absolute value
- Lowest value
- Lowest absolute value

You can also choose one of the following results for the OPC read operation condition:

- The value itself
- Zero-based index
- Input name

3.2.1.1.6 Scan Rates and Timeouts

You can also specify the following individual scan rates for the data you are reading from:

- **OPC Items Scan Rate:** scan rate (in milliseconds) for OPC tags
- **Expressions Scan Rate:** scan rate (in milliseconds) for OPC expressions
- **Read Timeout:** specifies the amount of time to wait (in milliseconds) for a response before timeout.

3.2.1.2 Write to OPC

The **Write to OPC** tab in the **OPC Connector** properties specifies OPC tag names for writing to an OPC data source.

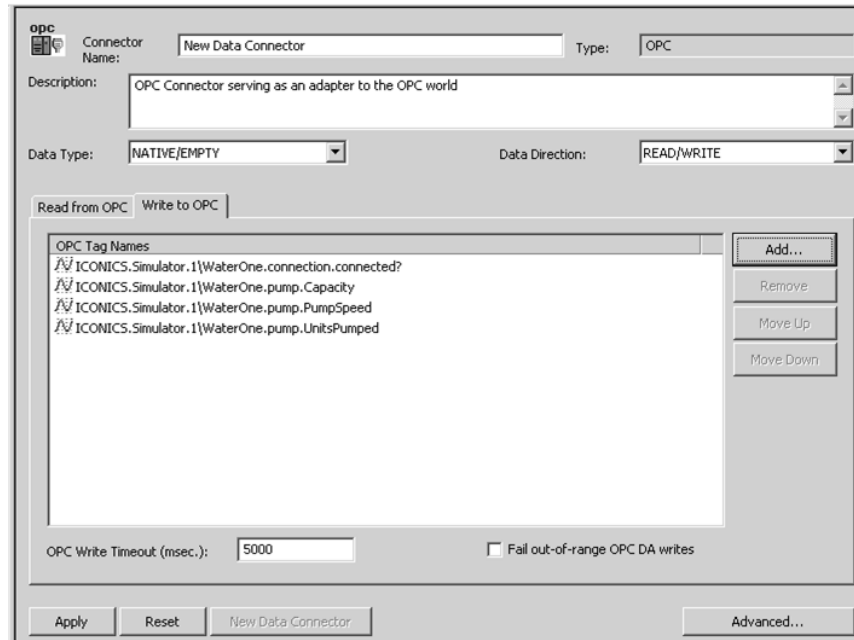


Figure 3.10 - OPC Connector Properties: Write to OPC

You can choose multiple OPC tags or data items to write values to from different sources. Clicking the **Tag Menu** button opens the Unified Data Browser, which enables you to browse for OPC tags. The selected tags are displayed in the **OPC Tag Names** field. To delete tags from the list of tag names, select the tag to delete and click on the **Remove** button. You can also use the **Move Up** and **Move Down** buttons to change the order in which the tags are displayed in the list.

The **OPC Write Timeout** specifies the amount of time to wait (in milliseconds) for a response before timeout.

When the **Fail out-of-range OPC DA writes** check box is checked, attempts to write OPC Data Access tags that are out of range will be terminated.

3.2.2 Database Connectors

The **Database Connectors** tree control of the Configurator, shown in Figure 3.11, allows you to create and configure connectors for your database transactions. The database connector configuration defines read and write parameters for data transactions between different types of databases. The Configurator provides several sample database connectors.

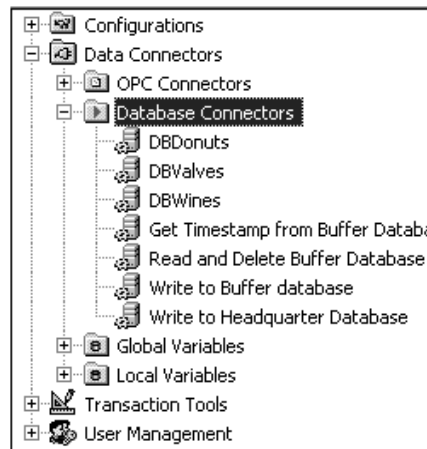


Figure 3.11 - Database Connectors Tree Control

You can configure the following settings for a database connector, as shown in Figure 3.12:

- **Connector Name:** enter a name for the database connector.
- **Connector Description:** enter a description for the database connector.
- **Type:** displays the data connector type.
- **Data Type:** this field is not available in database connectors.
- **Data Direction:** choose a data direction (e.g. READ/WRITE, ONLY READ, or ONLY WRITE) from the dropdown list.
- **Apply:** saves all changes to the configuration database.
- **Reset:** clears all recently added information.
- **New Data Connector:** creates a new database connector to be configured.

In addition, the properties dialog box for a database connector has the following tabs, which are described in greater detail in the sections that follow.

- **Database Connection:** click on the **Database Login** button to connect to a database server.
- **Reading from Database:** specifies an SQL read statement, a stored procedure, or a custom SQL command.
- **Writing to Database:** specifies which databases write operation type to execute.

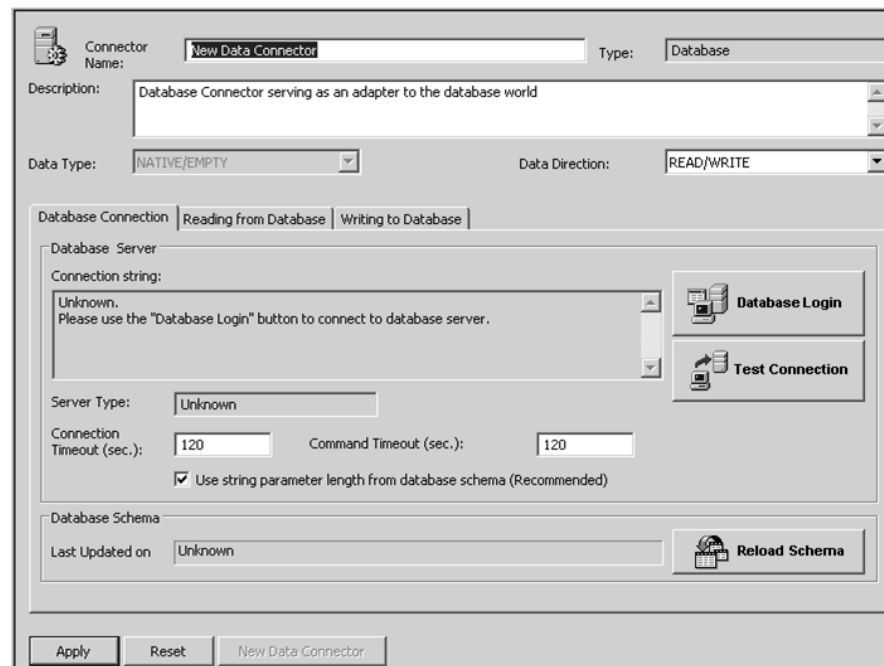


Figure 3.12 - Database Connector Properties

3.2.2.1 Database Connection

The Database Connection tab in the Database Connector properties enables you to connect to a database server, as shown in Figure 3.12.

3.2.2.1.1 Connecting to a Database Server

In the **Database Connection** tab, click on the **Database Login** button and select a database type from the **Database Connection Browser** dialog box, as shown in Figure 3.13:

- **SQL Server:** connects to a Microsoft SQL Server database.
- **MS Access:** connects to a Microsoft Access database.
- **Oracles:** connects to an Oracle database.
- **ODBC:** connects to an ODBC data source.
- **Generic OLEDB:** connects to any OLEDB data source.
- **Excel:** connects to a Microsoft Excel spreadsheet.
- **SAP:** connects to an SAP database.

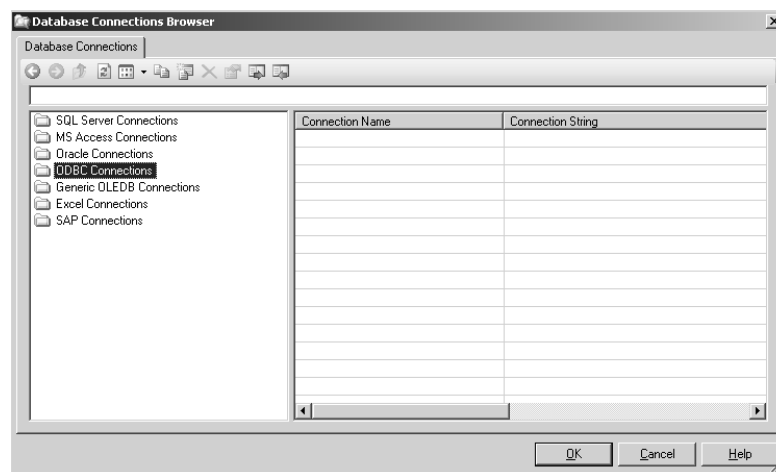


Figure 3.13 - Database Server Type

The database connections are global. This means that if you need to create a different connector that uses the same database, you do not need to create another database connection. Furthermore, once you create the database connection, you can use it throughout other BizViz products such as ReportWorX.

Once you have established a connection with the database, click on the **Test Connection** button to make sure the connection is valid. The data provider information is displayed in the **Connection String** field. The database server type you selected is displayed in the **Server Type** field.

The **Connection Timeout** specifies the amount of time to wait (in milliseconds) to connect to the database before timeout.

The **Command Timeout** specifies the amount of time to wait (in milliseconds) for a response from the connected database before the connection times out.

3.2.2.1.2 Database Schema

When you connect to a database server, the database schema may take several minutes to load depending on the size and location of the selected database. The **Last Updated on** field shows the date and time of the most recent database schema. If any changes have been made to the database, click the **Reload Schema** button to update the database schema.

3.2.2.2 Reading from Database

The **Reading from Database** tab in the **Database Connector** properties specifies a SQL read statement, a stored procedure, or a custom SQL command, as shown in Figure 3.14.

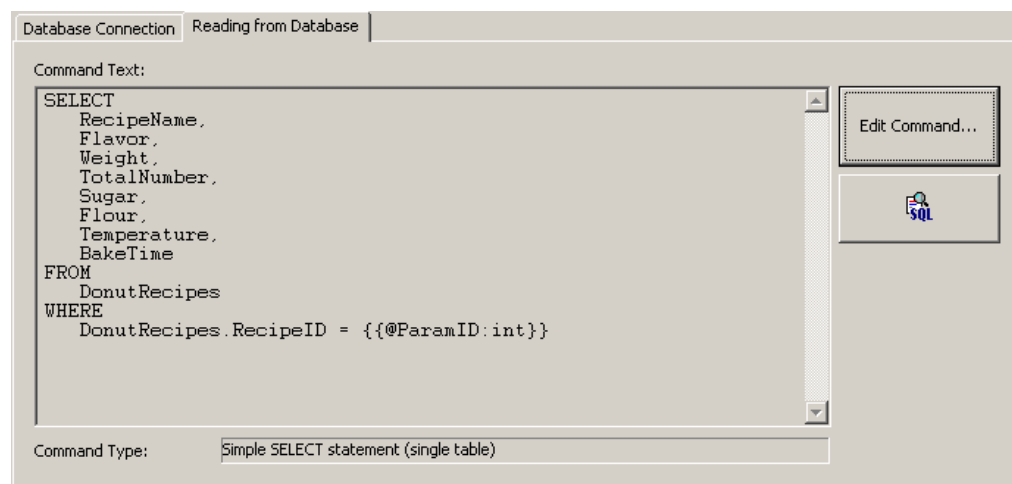


Figure 3.14 - Reading From Database

Choose one of the following options for reading data from the connected database by clicking on the **Edit Command** button:

- Simple SQL Query Wizard
- Advanced SQL Query Wizard
- Stored Procedure Call
- Edit SQL Query Manually

3.2.2.2.1 Simple SQL Query Wizard

The **Simple SQL Query Wizard** option allows you to build an SQL read query by choosing from columns in a database table and filtering records from those columns.

You can click the **Edit Command** button to open the **SQL Query Builder**, as shown in Figure 3.14. The **Table Name** ... button contains all the tables (e.g. "BufferTable") in the connected database. Select a table from the Single Table Selection dialog box.

The **Column Selection** field lists the names of all the columns (e.g. Capacity, DateTimeStamp, etc.) in the selected table. Check all columns from which you want to read data. You can change the column order by highlighting the column names and clicking on the **Move Up** or **Move Down** buttons.

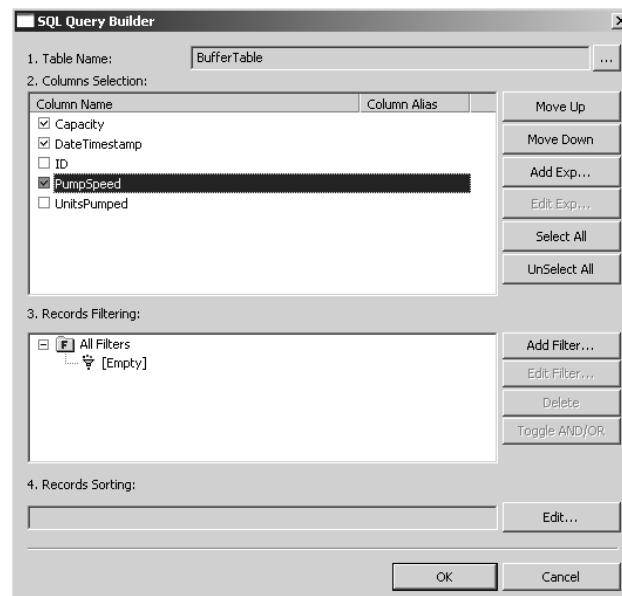


Figure 3.15 - Simple SQL Query Builder

Once you have selected the database column information to display, you can now define parameters for filtering or restricting data from those columns. Click on the **Add Filter** button to enter any filters you would like to apply to the data. In the **Filter Criteria** dialog, shown in Figure 3.16, you can define a **Relational Filter** by relating different columns in the database table. In the **Column Name to Filter On** field, select a column name from the dropdown list (e.g. Capacity). Under **Relates To**, select a column or a constant value with which the column name is associated. Under **Relation Type**, you can select a relational filter expression (i.e. Equal To, Greater Than, Less Than, etc.) from the dropdown list to define the relationship between the values.

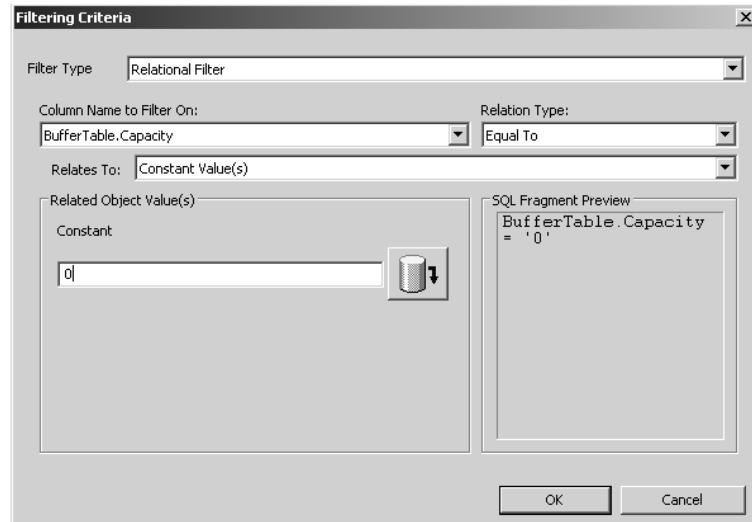


Figure 3.16 - Filtering Database Records

You can alternatively build an **Expression Filter**, which allows you to edit SQL filtering expressions manually, as shown in Figure 3.17. You can use the **Columns** button (lists column names from database), **Operators** button (i.e. addition, subtraction, multiplication, etc.), or **Functions** button (mathematical, string, date/time, etc.) button to browse for the corresponding SQL elements.

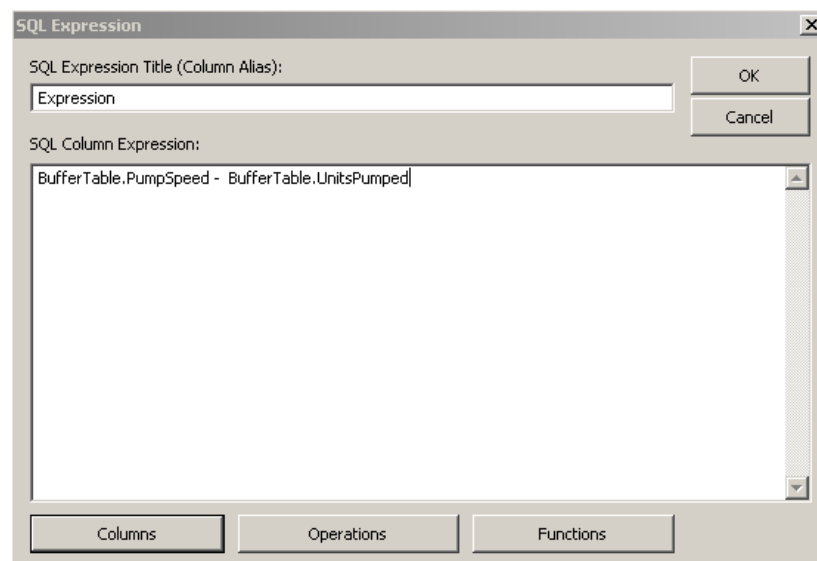


Figure 3.17 - Expression Filter

NOTE: Please refer to the SQL documentation for details about SQL expressions.

To sort the database records, click on the Edit button on the SQL Query Builder dialog box. The **Sort Records** dialog box appears, as shown in Figure 3.18. Now that you have defined parameters for filtering or restricting data from columns, here you can specify the priority, in which the columns and the records in each column are sorted.

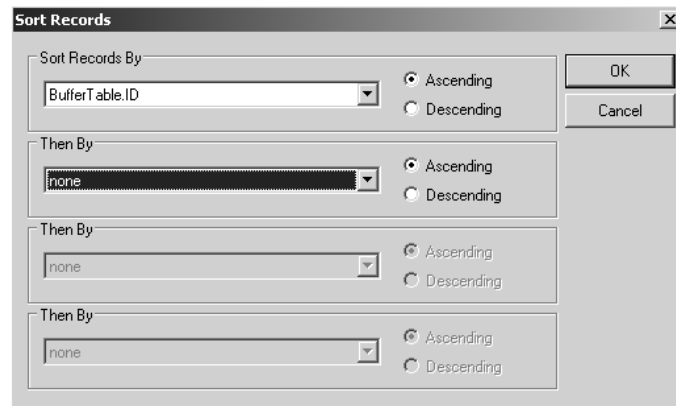


Figure 3.18 - Sort Records

In the first dropdown list, select the column that you would like to sort on first. To determine the order in which the data will be displayed within in the column, select one of the following sorting options:

- **Ascending:** sorts the data in the column in ascending order (i.e. from least to greatest).
- **Sort Descending:** sorts the data in the column in descending order (i.e. from greatest to least).

When you are finished editing your SQL query, click on the **OK** button on the **SQL Query Builder** dialog box. The SQL statement is shown in the **Reading from Database** tab, as shown in Figure 3.19. Click the test button to test your SQL query.

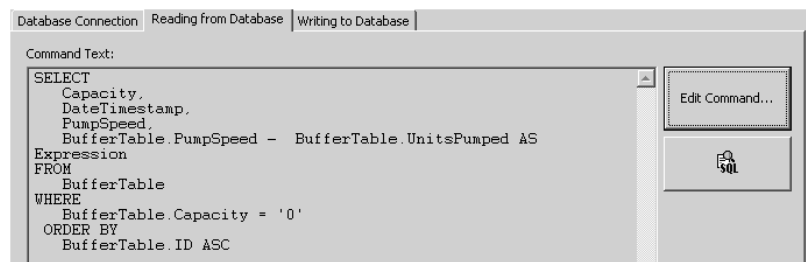


Figure 3.19 - SQL Statement in the Database Connector

3.2.2.2.2 Stored Procedure Call

The database connector can also run a stored procedure. Stored procedures are usually precompiled; therefore, they are executed much faster than ordinary SQL queries. Select a stored procedure from Select stored procedure dialog box, which lists all stored procedures in the connected database, as shown in Figure 3.20.

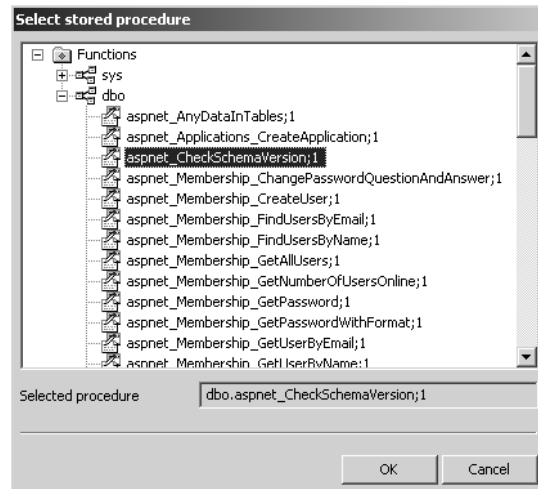


Figure 3.20 - Selecting an SQL Stored Procedure

3.2.2.2.3 Edit SQL Query Manually

The database connector also allows you to manually create and edit SQL queries for your databases, as shown in Figure 3.21. You can type in SQL commands directly in the edit box.

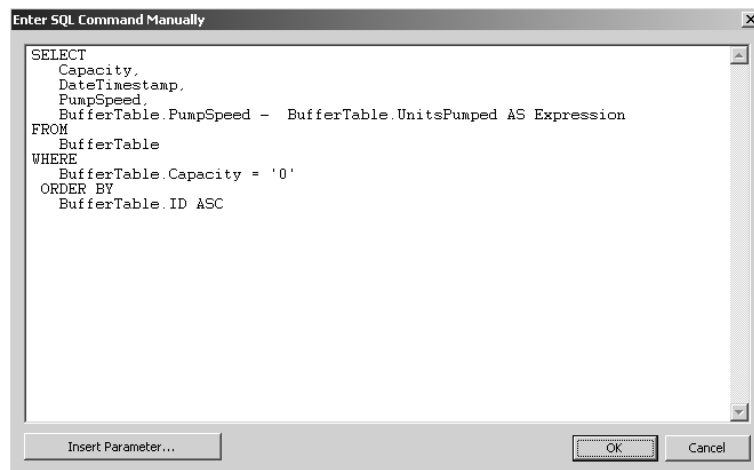


Figure 3.21 - Creating a Custom SQL Query

Clicking on the **Insert Parameter** button opens the **Insert SQL Parameter** dialog box, as shown in Figure 3.22. Enter a **Parameter Name**, choose a **Parameter Data Type** from the dropdown list (e.g. string, integer, double, or date/time), and then enter the **Parameter Length**. The **Unicode** check box is used if you have strings that contain utf-8 characters. When you are done, click on **OK**. The parameter is added to the custom SQL command in the edit box.

NOTE: Please refer to the SQL language documentation for details about SQL expressions.

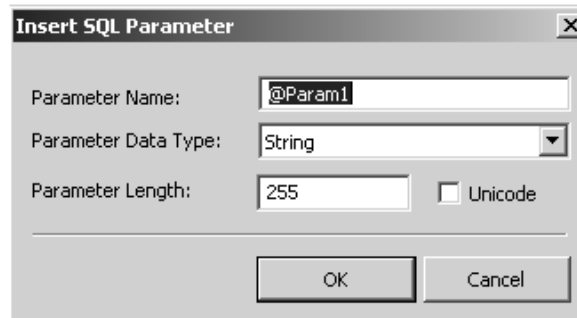


Figure 3.22 - Insert SQL Parameter

3.2.2.3 Writing to Database

The **Writing to Database** tab in the **Database Connector** properties specifies which databases write operation type to execute, as shown in Figure 3.23.

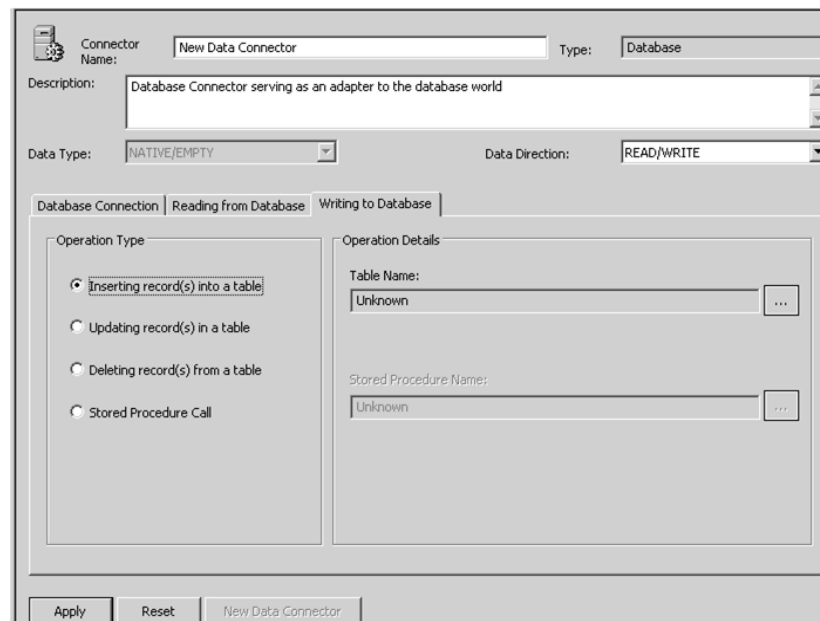


Figure 3.23 - Writing to Database

Choose one of the following options for writing data to the connected database:

- Inserting record(s) into a table
- Updating record(s) in a table
- Deleting record(s) from a table
- Stored procedure call

3.2.2.3.1 Inserting Record(s) into a table

To add new records into a connected database table, select the **Inserting records into a table radio** button. Then select a table from the  button to the right of the **Table Name** field to open the Single Table Selection dialog box, which contains all tables in the connected database.

3.2.2.3.2 Updating Records in a Table

To update existing records in a connected database table, select the **Updating records in a table radio** button. Then select a table from the  button to the right of the **Table Name** field to open the Single Table Selection dialog box, which contains all tables in the connected database.

3.2.2.3.3 Deleting Records from a Table

To remove records from a connected database table, select the **Deleting records from a table radio** button. Then select a table from the  button to the right of the **Table Name** field to open the Single Table Selection dialog box, which contains all tables in the connected database.

3.2.2.3.4 Stored Procedure Call

To execute a stored procedure call in the connected database, select the **Stored Procedure Call radio** button. Then select a table from the  button to the right of the **Stored Procedure Name** field to open the Select stored procedure dialog box, which contains all stored procedures in the connected database.

3.2.3 Global Variables

The **Global Variables** tree control of the Configurator, shown in Figure 3.24, allows you to create and configure global variables for your database transactions. Global variables are organized into folders. The Configurator provides a sample global variable.

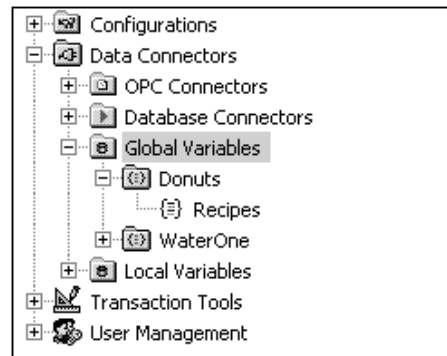


Figure 3.24 - Global Variables Tree Control

Configure the following settings for a global variable, as shown in Figure 3.25:

- **Global Variable Name:** enter a name for the database connector.
- **Variable Type:** choose a type (automatic or static register). These are described in greater detail later.
- **Data Type:** choose a data type (e.g. byte, float, double, bool, etc.). See the Data Type table that follows for more information.
- **Apply:** saves all changes to the configuration database.
- **Reset:** clears all recently added information.
- **New Variable:** creates a new global variable to be configured.

Figure 3.25 - Global Variable Properties

3.2.3.1 Automatic Global Variable

If you select **Automatic** under **Global Variable Type**, the following configuration options appear for automatic numeric value, as shown in Figure 3.26:

- **Value Type:** select a type from the dropdown list. If you select **Randomly Generated Value Within Specified Limits**, then each reading of this global variable will return a random value within the specified range. If you select **Auto Increment Value**, then each reading of this global variable will cause the current value to increase by one. When the current value exceeds the maximum specified value, it resets to the minimum specified value.

NOTE: If you select STRING as the data type, the Value Type is "Server Name." If you select Date/Time as the data type, you can specify a date/time for the Automatic Value. When Use Offset check box is checked, you can select a time offset (e.g. "Backward" or "Forward") from the dropdown list, and then specify the amount of time to offset (days, hours, minutes, and seconds).

- **Min. Value:** specifies a minimum value for the range.
- **Max. Value:** specifies a maximum value for the range.

Automatic Numeric Value Options

Value Type: Randomly Generated Value within specified limits

Min. Value: 0

Max. Value: 255

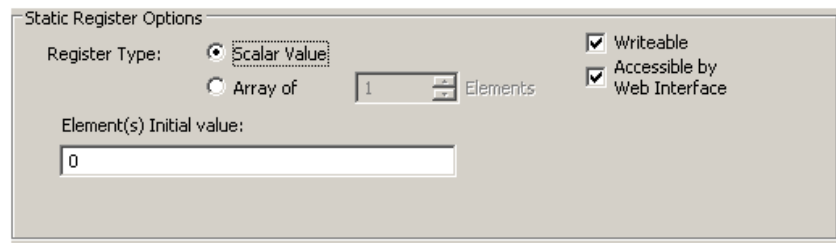
Each reading of this Global Variable will return a random value within the specified range.

Figure 3.26 - Automatic Global Variable

3.2.3.2 Static Global Variable

If you select **Static Register** under **Variable Type**, the following configuration options appear for static register, as shown in Figure 3.27:

- **Register Type:** the register type can be either a **Scalar Value** or an **Array** of a specified number of elements.
- **Writeable:** enables write access.
- **Accessible by Web interface:** when checked, data will be available through the Unified Web interface.
- **Element(s) Initial value:** specifies the initial/reset value for the elements. If you selected **Date/Time** as the data type, you can specify a date/time for the Initial or Reset Value.



The image shows a dialog box titled "Static Register Options". It contains the following controls:

- Register Type:** Two radio buttons. The first is labeled "Scalar Value" and is selected. The second is labeled "Array of".
- Array of:** A numeric input field containing the value "1", followed by the text "Elements".
- Writeable:** A checked checkbox.
- Accessible by Web Interface:** A checked checkbox.
- Element(s) Initial value:** A text input field containing the value "0".

Figure 3.27 - Static Global Variable

Lab: Data Connector 3

3.1 Quick Lab Overview

The first step in configuring a transaction is to configure data connectors for later use in that transaction. You must first decide where your information is coming from and where it will go.

In this lab we are going to configure the following data connectors:

- **Global variables:** These connectors will be used to read and write temporary data.
- **Database connectors:** These connectors will be used to read from and write to databases.
- **OPC connectors:** These connectors will be used to get pump information from OPC tags.

3.1.1 Task Checklist

In this lab you will complete the following tasks:

- Learn how to configure Global Variable connectors.
- Learn how to configure Database connectors.
- Learn how to configure OPC connectors.

3.1.2 Support Files

To complete this quick lab, you will need the following files:

- BufferDatabase.mdb
- HeadquarterDatabase.mdb
- These files will be installed in the following folder:
C:\Program Files (x86)\ICONICS\BizViz\BridgeWorX\Examples

3.2 Creating a Global Variable Connector

We will begin with the configuration of **Global Variables**. The following steps will help you create two variables. The first variable will store temporary information from the database and the second variable will provide a timestamp for the database.

3.2.1 Creating the Database Information Global Variable

1. Open the BridgeWorX configurator and expand the **Data Connectors** tree control one level. Right click on the **Global Variables** folder and select **New → Folder**, as shown in Figure L3.1.

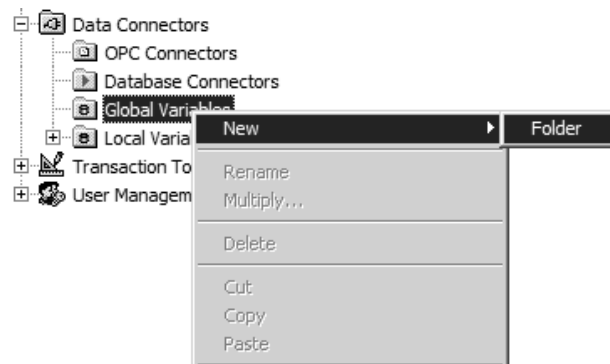


Figure L3.1 - Database to OPC transaction overview

2. Name the new folder **WaterOne** and click **Apply**.
3. Under the **Global Variables** tree control, right click on the new **WaterOne** folder and select **New → Global Variable**, as shown in Figure L3.2.

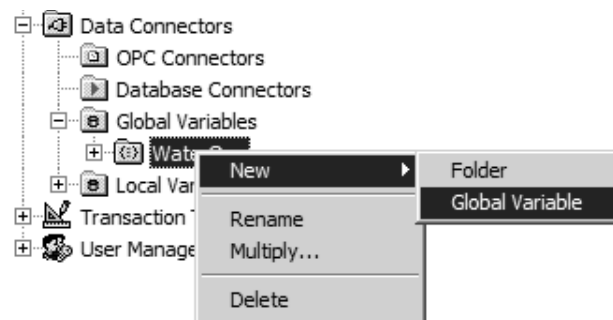


Figure L3.2 - Creating a new global variable

- The properties dialog for the new global variable will appear in the right-hand pane of the Cconfigurator. Name the new global variable **PumpRecordID**, and select **String** as **Data Type**, as shown in Figure L3.3. Click **Apply** when finished.

Figure L3.3 - PumpRecordID Configuration

3.2.2 Creating the Timestamp Global Variable

- Click on the **New Variable** button at the bottom of the PumpRecordID configuration dialog box.
- Name the connector **Timestamp**, then select a Variable Type of **Automatic**, a Data Type of **Date/Time** and under the Automatic Date/Time Options select **Current timestamp**. Your finished configuration should resemble Figure L3.4. Click **Apply** when finished.

Figure L3.4 - Timestamp global variable configuration

3.3 Creating a Database Connector

The next step is to configure the database connectors. Your instructor should have provided you with the WaterOne example access databases (HeadquarterDatabase.mdb and BufferDatabase.mdb) . For the complete exercise we will need four database connectors.

- **Write to Buffer Database**

This connector will be used to write the OPC information into the Remote Buffer database.

- **Write to Headquarters**

This connector will be used to write the OPC information into the Headquarter database.

- **Get Timestamp from Buffer Database**

This connector will query the database and look for records in the Buffer database. If records exist, this connector will get the timestamp from the record and this time reference will be used by other connectors.

- **Read and Delete Buffer Database**

This connector will return the record information from the buffer database and delete the record from the buffer database.

3.3.1 Write to Buffer Database connector:

1. Under Data Connectors, right-click on the **Database Connectors** folder under Data Connectors and select **New → Data Connector**, as shown in Figure L3.5.



Figure L3.5 - Creating a new database connector

2. The properties dialog for the new data connector will appear in the right-hand pane of the Configurator. Name the new database connector **Write to Buffer Database**.

3. Choose **Only Write** from the **Data Direction** drop-down list, as shown in Figure L3.6.

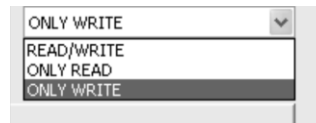


Figure L3.6 - Database Connector Configurations

4. Click the **Database Login** button and right-click on MS Access Connections. Select **Insert New Connection**. The **Data Link Properties** dialog, shown in Figure L3.7, will appear.

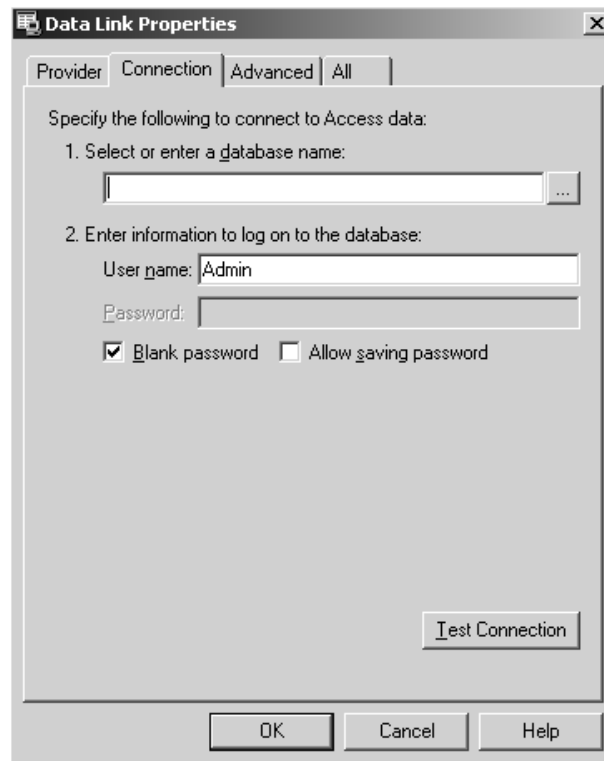


Figure L3.7 - Data Link Properties

5. Browse for the C:\Training\BufferDatabase.mdb file. This database can also be found in the C:\Program Files (x86)\ICONICS\BizViz\BridgeWorX\Sample Database Files folder. Click on **OK**, and the connector will appear in the Database Connection Browser list as BufferDatabase.mdb.
6. Double-click on the BufferDatabase.mdb database connector from the list in the right hand pane.
7. We are now connected to the Buffer database and ready to configure the data that will be written to the database.

8. Click on the **Writing to Database** tab of the database connector properties.
9. Select **Inserting record(s) into a table**, and click this button  to the right of the Table Name: field to select a table. Expand the Tables folder and select **BufferTable**, as shown in Figure L3.8 then click on **OK**.



Figure L3.8 – Selecting BufferTable table

10. Click on **Apply**, and the connector is ready.

3.3.2 Write to Headquarters database connector

1. The **Write to Headquarters** database connector is identical to the **Write to Buffer Database** connector. The only big difference is the database.
2. Once again, right-click on Database Connectors and select New → Data Connector.
3. The properties dialog for the new data connector will appear. Name the new database connector **Write To Headquarters**.
4. Choose **Only Write** from the **Data Direction** drop-down list, as shown in Figure L3.6.
5. Click the **Database Login** button and right-click on MS Access Connections. Select **Insert New Connection**. The **Data Link Properties** dialog, shown in Figure L3.7, will appear.

6. Browse for the C:\Training\HeadquarterDatabase.mdb. This database can also be found in the C:\Program Files (x86)\ICONICS\BizViz\BridgeWorX\Sample Database Files folder. Click on **OK** and the connector will appear in the Database Connection Browser list as HeadquarterDatabase.mdb.
7. Double-click on the HeadquarterDatabase.mdb database connector from the list.
8. We are now connected to the HeadquarterDatabase database, and ready to configure the data that will be written to the database.
9. Click on the **Writing to Database** tab of the database connector properties.
10. Select **Inserting record(s) into a table**, and click this button  to select a table. Expand the Tables folder and select **PumpStatusTable**, as shown in Figure L3.9 then click on **OK**.

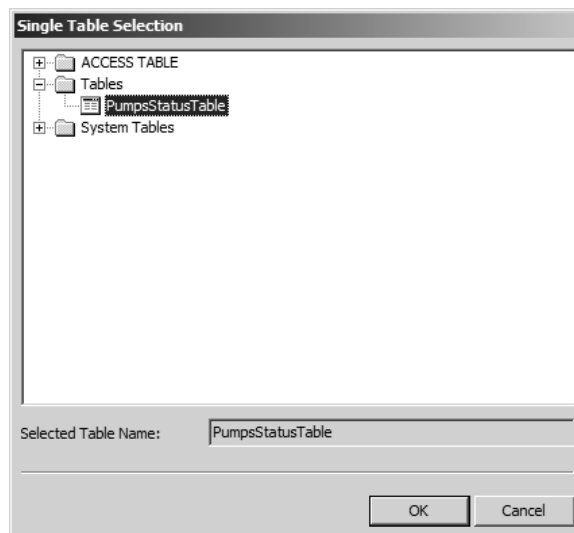


Figure L3.9 - Selecting PumpStatusTable table

11. Click on **Apply** and the connector is ready.

3.3.3 Get Timestamp from Buffer Database connector

1. The **Get Timestamp from Buffer Database** connector will be used to check if there are any records in the BufferDatabase that have to be transferred to the HeadquarterDatabase.
2. Again, right-click on Database Connectors and select New → Data Connector.
3. The properties dialog for the new data connector will appear. Name the new database connector **Get Timestamp from Buffer Database**.
4. Choose **Only Read** from the **Data Direction** dropdown list.
5. Click the **Database Login** button, click on the MS Access Connections folder and double click on BufferDatabase.mdb in the right hand pane. Click OK.
6. Click on the **Reading from Database** tab of the database connector properties. Click on the **Edit Command** button and select **Simple SQL Query Wizard**.
7. The SQL query builder window will appear. Click on  and select **BufferTable** from the Tables folder.
8. Then select the Column Name **DateTimestamp** as shown in Figure L3.10 and click OK. Click Apply

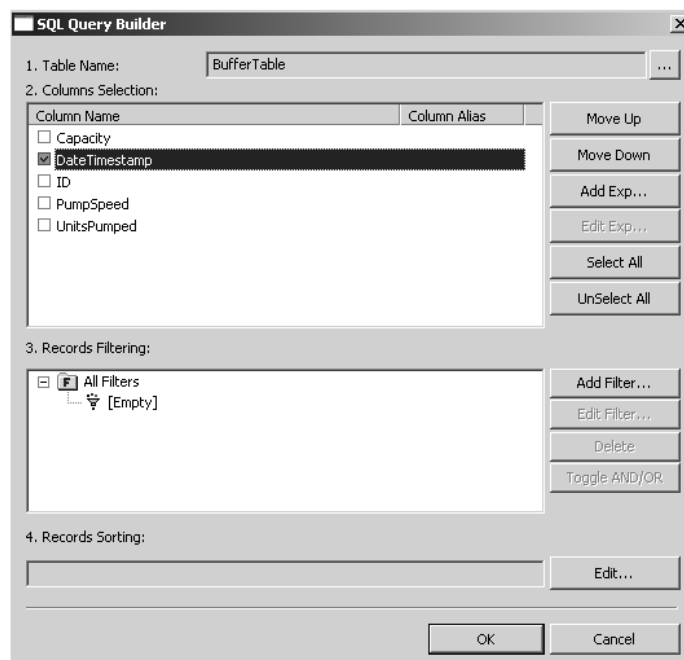


Figure L3.10 - SQL Query Builder

3.3.4 Read and Delete Buffer Database Connector

9. In this section we are going to configure the **Read and Delete Buffer Database** connector which has both read and write connections.
10. One more time, right-click on Database Connectors and select New → Data Connector. The properties dialog for the new data connector will appear. Name the new database connector **Read and Delete Buffer Database**. Choose **Read/Write** from the **Data Direction** drop-down list.
11. Click the **Database Login** button and double click on **BufferDatabase.mdb** from the MS Access Connections folder.
12. Click on the **Reading from Database** tab of the database connector properties. Click on **Edit Command** and select **Simple SQL Query Wizard**.
13. The SQL query builder window will appear. Select **BufferTable** from the Tables folder by clicking on . Then select the columns:
 - Capacity
 - DateTimeStamp
 - Pumpspeed
 - UnitsPumped
14. Click on Records Filtering tab. Click on the green plus sign to define a new filter. Set the fields as follows.
 - Filter Type: = **Relational Filter**
 - Column Name to filter on: = **BufferTable.DateTimeStamp**
 - Relation Type: = **Equal To**
 - Relates to: = **Parameter**

15. Under the Related Values(s) section of the dialog box, click on  to add a new input parameter. Name the input parameter **@DateTimeStamp**, as shown in Figure L3.11.

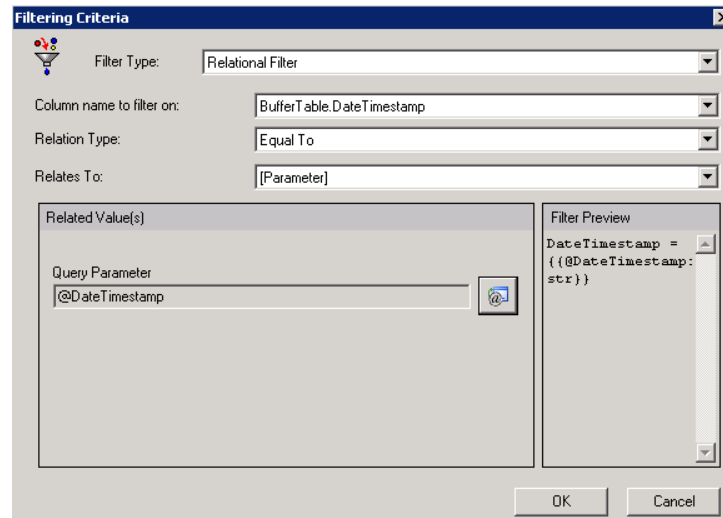


Figure L3.11 - SQL Query Builder

16. Click on **OK** twice to return to the BridgeWorX configurator. Click Apply.
17. Click on the **Writing to Database** tab of the database connector properties.
18. Select **Deleting record(s) from a table** and click this button  to select the table.
19. Select the **BufferTable** from the Tables folder and click on **OK**.
20. Click on **Apply** and the connector is ready.

3.4 Creating an OPC Connector

In this last part of the data connector lab we are going to configure the OPC connectors. Your instructor will provide you with an OPC simulator file. This file contains the pump parameters.

1. Right-click on **OPC Connectors** under Data Connectors in the tree control and select **New → Data Connector**, as shown in Figure L3.12.



Figure L3.12 - Creating a new OPC connector

2. The properties dialog for the new data connector will appear in the right-hand pane of the Configurator. Enter **WaterPump** in the **Connector Name** field. Enter a description, such as “Pump OPC information.”
3. Choose **ONLY READ** from the **Data Direction** dropdown list, as shown in Figure L3.13.



Figure L3.13 - OPC Connector Configurations

4. Click on **OPC Item Array**, and click on the **Add** button. This launches the unified data browser.
5. Browse to **My Computer → ICONICS.Simulator.1 → WaterOne → pump** and select the following items (while holding the **CTRL** key):
 - Capacity
 - UnitsPumped
 - Pump Speed

6. Right-click on the selected items and select Enter Up. This places the selected tags into the top pane, selected items list. Click on **OK** and the selected tags will populate the center dialog as shown in Figure L3.14. Click on **Apply** when finished.

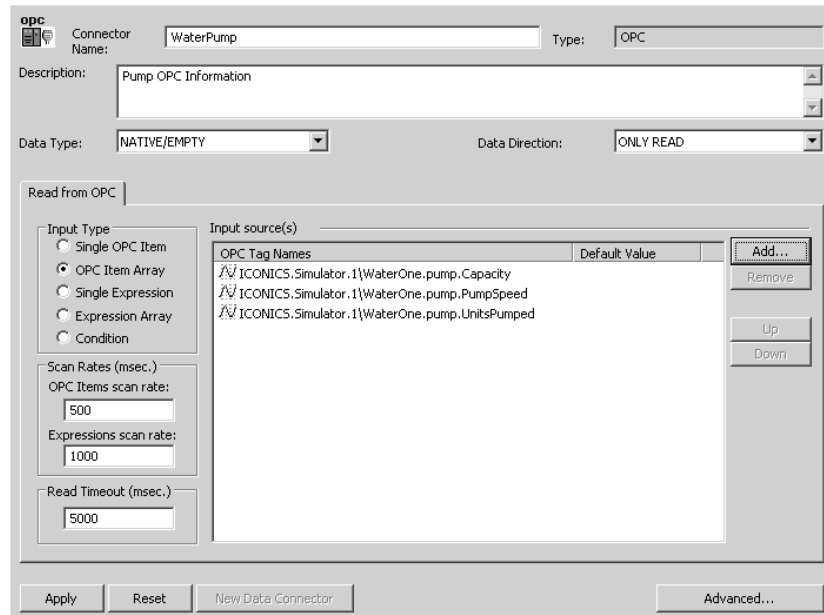


Figure L3.14 - OPC Input Tags

7. We are going to add another OPC data connector to test the connection between the pump and the Headquarter database. This is a Boolean tag that will return a '0' when there is no connection and a '1' when the connection is established..
8. Click on New Data Connector from the WaterPump OPC connector configuration.
9. The properties dialog for the new data connector will appear. Enter **Connection State** in the **Connector Name** field. Enter a description, such as "This OPC tag will show if there is a connection."
10. Choose **ONLY READ** from the **Data Direction** drop-down list.
11. Click on Single OPC item and click on the **Tags Menu** button.
12. Browse to My Computer → ICONICS.Simulator.1 → WaterOne → connection and select the connected? OPC tag. Click OK and then click on Apply and the connector is ready.

Transaction Diagrams 4

4.1 Introduction

The **Transaction Tools** tree control of the BridgeWorX Configurator, shown in Figure 4.1, allows you to create and configure **transaction diagrams** and **post-transaction tasks** for your transactions.

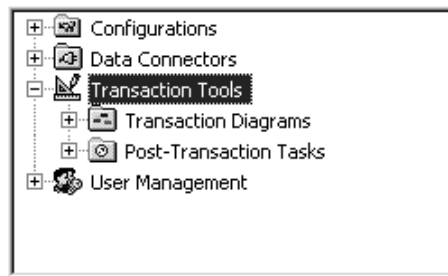


Figure 4.1 - Transaction Tools Tree Control

4.2 Transaction Diagrams

The **Transaction Diagrams** tree control of the BridgeWorX Configurator, shown in Figure 4.2, allows you to create and configure **transaction diagrams** for your transactions. A transaction diagram consists of one or more transaction blocks with sequential logic implemented to outline the flow of execution.

NOTE: You must have a transaction diagram in order to execute a transaction.

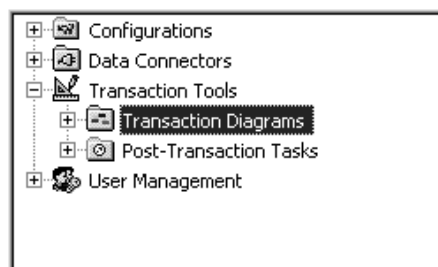


Figure 4.2 - Transaction Diagrams Tree Control

4.2.1.1 Creating a Transaction Diagram Folder

To create a new transaction diagram folder, right-click on **Transaction Diagrams** in the **Transaction Tools** tree control and select **New → Diagram Folder** from the pop-up menu, as shown in Figure 4.3.



Figure 4.3 - Creating a Transaction Diagram folder

Transaction Diagram Folders are simply a way of organizing your Transaction Diagrams into logical groups.

4.2.1.2 Creating a New Transaction Diagram

To create a new transaction diagram, right-click on a transaction diagram folder and select **New → Transaction Diagram** from the pop-up menu, as shown in Figure 4.4.

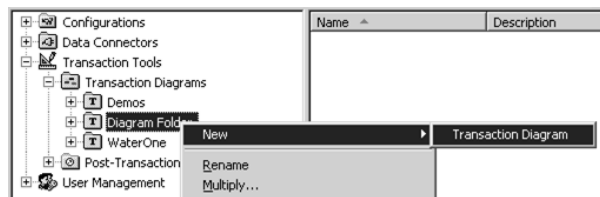


Figure 4.4 - Creating a New Transaction Diagram

The properties dialog for a transaction diagram is in the right-hand pane of the Configurator, as shown in Figure 4.5. Since the majority of the configuration is done inside the Transaction Diagram Designer, all that needs to be specified at this level is the name of the diagram.

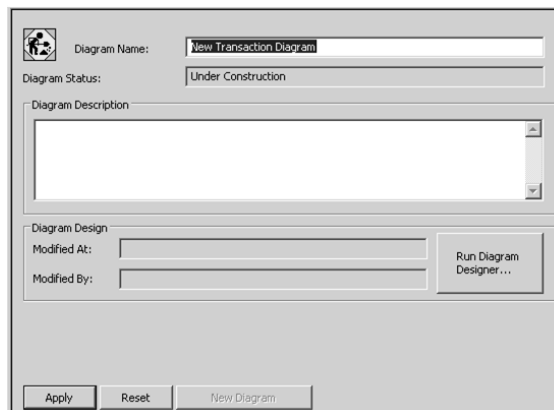


Figure 4.5 - Transaction Diagram Properties

The Run Diagram Designer button launches the **Transaction Diagram Designer**, explained more in the following section.

4.2.2 Transaction Diagram Designer

The BridgeWorX Configurator provides a **Transaction Diagram Designer** for configuring your transactions, and is launched from within the Transaction Diagram configuration.

The Transaction Diagram Designer, shown in Figure 4.6, has a very simple Layout. The BridgeWorX Configurator temporarily moves to the background while you are working inside the designer.

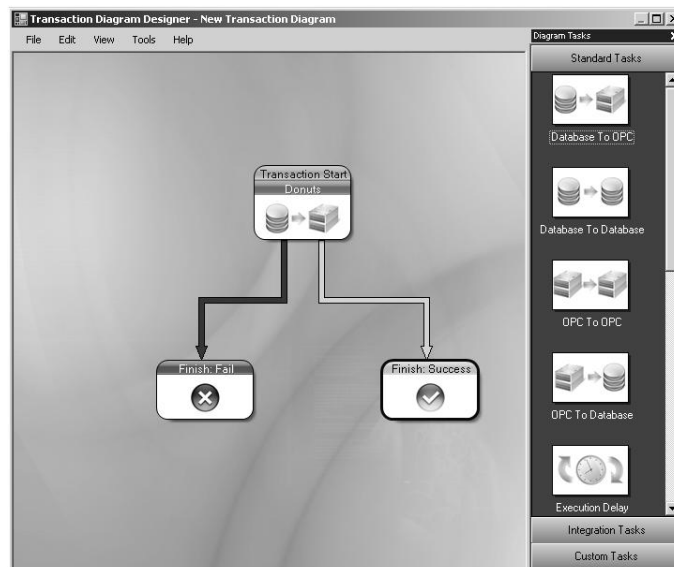


Figure 4.6 - Transaction Diagram Designer

4.2.2.1 Transaction Diagram Designer Features

The Transaction Diagram Designer is divided into two panes, as shown in **Error! Reference source not found.** The left pane is a graphical component that allows you to create and visualize the data connections in your transactions. BridgeWorX comes with several transaction blocks that can be configured to carry out data integration and interface management among automation systems, MES, and ERP applications. One of unique features is the definition of the user defined “Logic” and diagram “Flow.”

The right pane allows you to choose from the following types of **Transaction Tasks**:

- Database to OPC
- Database to Database
- OPC to OPC
- OPC to Database
- Execution Delay
- Conditional Branch
- Event Generation
- File Transfer Task
- SQL Command Task
- Web Service Task
- Custom Task

4.2.2.2 Adding Transaction Tasks to the Transaction Diagram

Transaction tasks can be dragged from the right pane into the graphical part of the designer, serving as the "building blocks" for your transactions, as shown in Figure 4.6. You can also double-click a transaction task to add it to the diagram. You can define relationships between the different types of blocks by drawing arrows between them. The "Donuts" example transaction diagram in Figure 4.6 shows a basic database-to-OPC configuration that consists of a **Transaction Start** block and two different blocks for the **Transaction Finish**: success and failure.

4.2.2.3 Tooltips for Transaction Tasks

Tooltips are a key feature of the Transaction Diagram Designer. When you hover the mouse pointer over a block in the graphical portion of the Designer, as shown in Figure 4.7, a Tooltip displays important information about the block, including the block type, block name, and description.

NOTE: You can also view Tooltips for connections between different transaction tasks by hovering the mouse pointer over the connecting arrows.

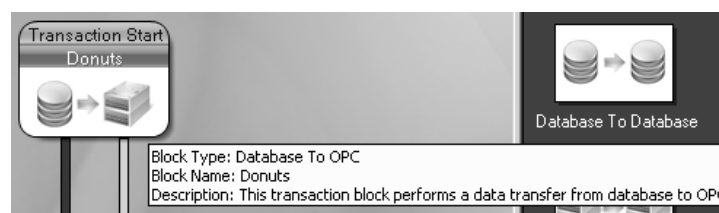


Figure 4.7 - Tooltip for Transaction Tasks

4.2.2.4 Editing Transaction Task Properties

To view or edit the properties for a transaction task in the transaction diagram, right-click on the transaction task and select **Properties** from the pop-up menu, as shown in Figure 4.8. You can also double-click on the block to bring up the properties dialog.

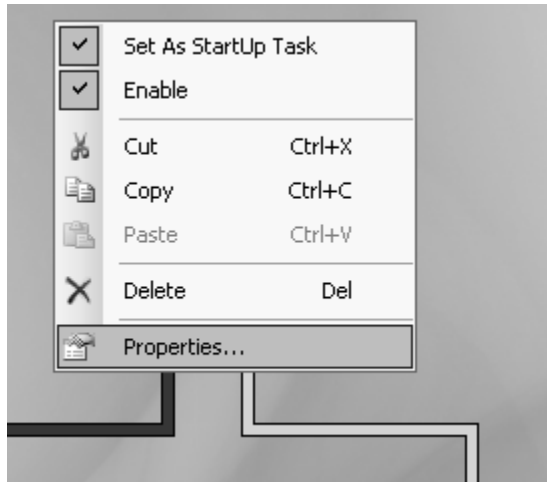


Figure 4.8 - Editing Transaction Task Properties

The **Transaction Task Properties** dialog box is shown in Figure 4.9, which allows you to edit the task configuration. The properties in this dialog will vary depending on the type of transaction task.

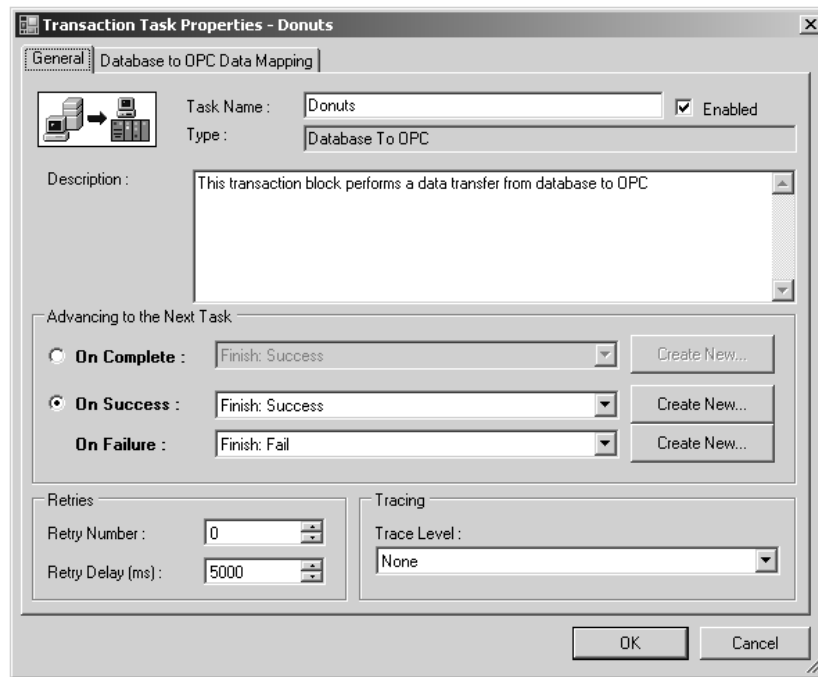


Figure 4.9 - Transaction Task properties

4.2.2.5 Specifying a Startup Transaction Task

Each transaction that you configure in the Transaction Diagram Designer must have a starting point. To designate a transaction task as the startup task, right-click on the transaction task block and select **Set As Startup Task** from the pop-up menu, as shown in Figure 4.10.

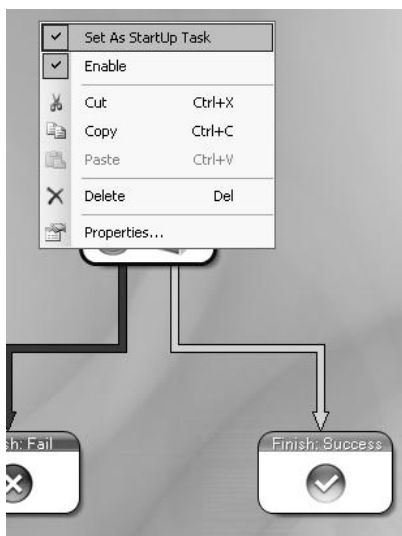


Figure 4.10 - Specifying a Startup Transaction Task

4.2.2.6 Linking Transaction Tasks

Another key feature of the Transaction Diagram Designer is that it enables you to connect to different transaction tasks with easy. You can define relationships between the different types of blocks by drawing arrows between them. In a connection between two transaction tasks, there is a **Source Block** (the task you are connecting from) and a **Destination Block** (the task you are connecting to).

To link two different transaction tasks, click on the arrow within a transaction task source block, and then simply drag the arrow onto the destination block, as shown in Figure 4.11.

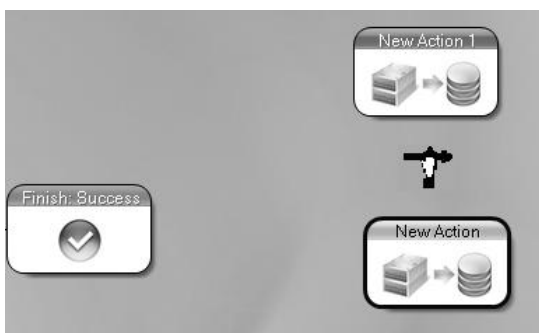


Figure 4.11 - Linking Transaction Blocks

You will always be asked to choose a connector type as shown in Figure 4.12. Most blocks will have connector types **On Complete**, **On Success**, or **On Fail**.

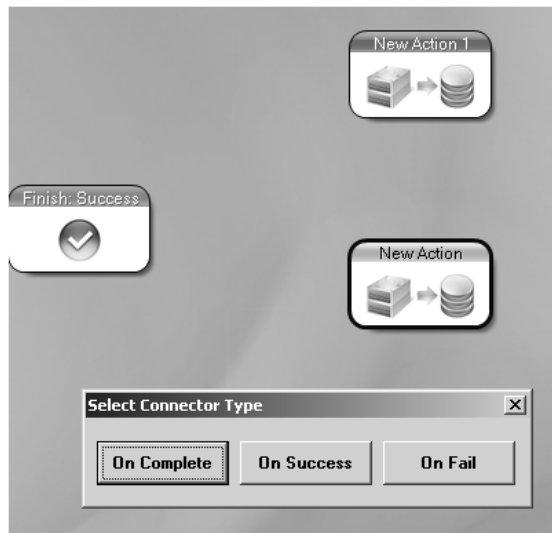


Figure 4.12 - Selecting a Connector Type

An arrow is drawn between the two task blocks, indicating that a connection has been established. The Tooltip that is displayed when you hover the mouse pointer over the arrow lists the source block, the destination block, and the connector type, as shown in Figure 4.13.

NOTE: The arrows are color-coded to help you identify which type of links you created. A legend is available to distinguish between the connector types.

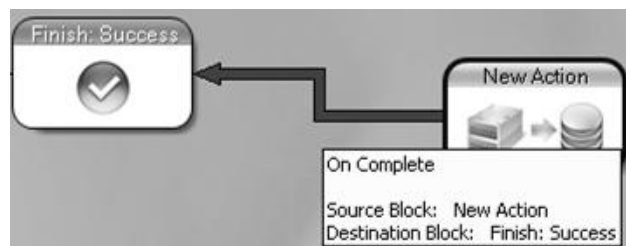


Figure 4.13 - Transaction Link Tooltip

4.2.2.7 Validating Transaction Diagrams

The Transaction Diagram Designer includes a debugging and analysis tool that checks the transaction data in your diagrams. Clicking the **Validate Diagram** button from **Files** → **Validate** displays validation results in the bottom pane of the window, as shown in Figure 4.14. If you get any errors or warnings, you must fix them before clicking **OK**. The Designer will let you save the diagram as under construction if there are errors, but you will not be able to use this diagram until the errors are fixed.

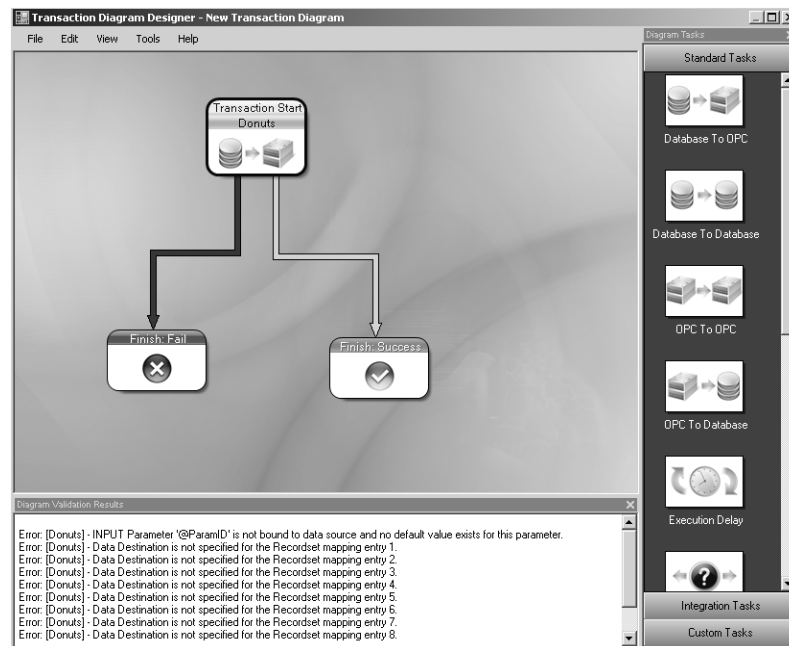


Figure 4.14 - Validating Transaction Diagram

4.2.2.8 Disabling Transaction Tasks

To disable a transaction block in a transaction diagram, right-click on the block and select **Enable** so that it has no check mark next to it, as shown in Figure 4.15. When a task is disabled, it will be ignored for validation and runtime.

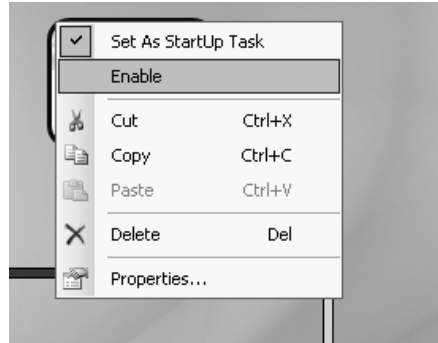


Figure 4.15 - Disabling a Transaction Task

4.2.3 Transaction Tasks

BridgeWorX comes with several transaction blocks that can be configured to carry out data integration and interface management among automation systems, MES, and ERP applications. One unique features is the definition of the user defined “Logic” and diagram “Flow.”

The right pane of the Transaction Diagram Designer, allows you to choose from the following types of **Transaction Tasks**:

- Database to OPC
- Database to Database
- OPC to OPC
- OPC to Database
- Execution Delay
- Conditional Branch
- Event Generation
- File Transfer Task
- SQL Command Task
- Web Service Task
- Custom Task

4.2.3.1 Common Transaction Task Properties

Most of these transaction tasks have common properties. We will describe these common properties here. For information on the individual properties of each of the transaction tasks, you can read the appropriate sections.

4.2.3.1.1 General Tab

Most transaction task includes a **General tab** in the Properties dialog box that looks similar to Figure 4.17; you can enter the name of the task in the Task Name field.

If you choose to, you can select the appropriate follow-up task from the **Advancing to the Next Task** option. Each transaction task reaches one of three states, and a set of follow-up tasks can be associated with it. The states are:

- **On Complete:** select the task to go to when the data transaction operation finishes, regardless if the task completes successfully or not.
- **On Success:** select the task to go to when the data transaction operation finishes successfully.
- **On Failure:** select the task to go to when the data transaction operation fails.

NOTE: You do not need to define the follow-up task here if you prefer to do so by linking transaction tasks by dragging arrows. See Section 4.2.2.6 for more information. Linking Transaction Tasks with arrows will automatically fill in the **Advancing to the Next Task** information for the transaction task involved.

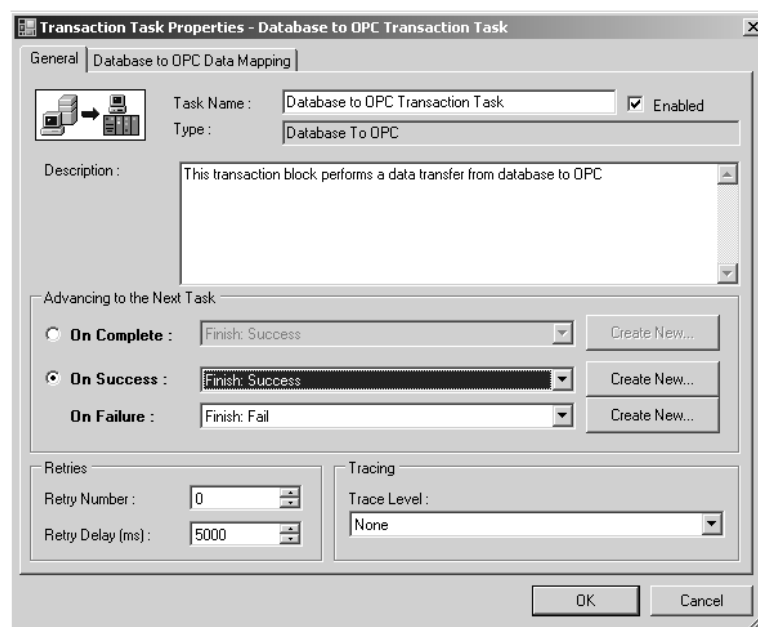


Figure 4.16 - Database to OPC Transaction Task: General Tab

The BridgeWorX Web Interface includes a tracing feature that allows you to view execution details for transactions in the transaction log. If you want to track the status of transactions, select a **Trace Level** from the dropdown list. You can choose to trace transaction tasks only (generic errors and success or failure) or, if you want the greatest level of detail, both transaction tasks as well as each data mapping step in the transaction diagram.

NOTE: If you are using the Lite version of BridgeWorX, you will not be able to get to the trace data in the Unified Web Interface.

4.2.3.2 Database to OPC Transaction Task

A Database to OPC Transaction Task, shown in Figure 4.17, transfers data from a connected database to a target OPC source.



Figure 4.17 - Database to OPC Transaction Task Block

The **Database to OPC Data Mapping** tab of the Database to OPC Task Properties dialog box is shown in Figure 4.18. Here, you start by selecting the appropriate database connector from the Database Connector to read data from list.

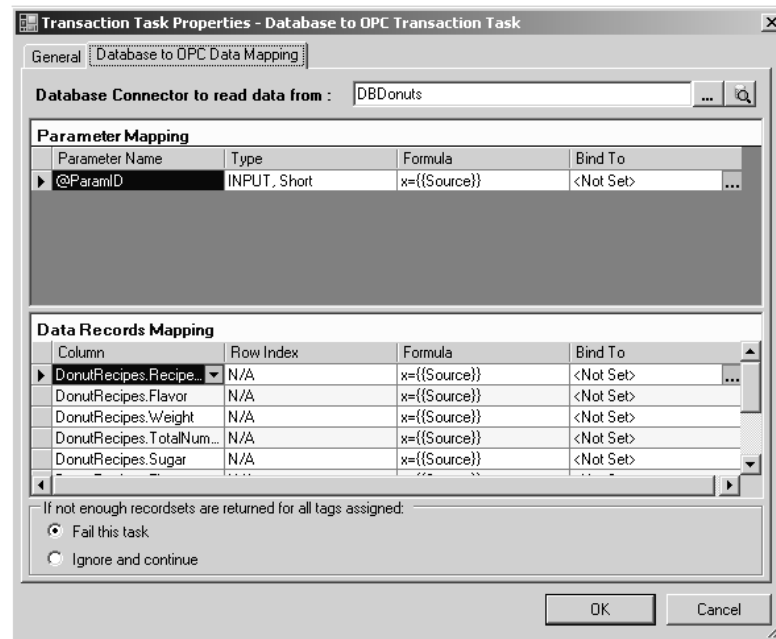


Figure 4.18 - Database to OPC Data Mapping Tab

Once the database connector is selected, the parameters for that particular database connector will be shown under **Parameter Mapping**. The parameter mapping enables you to assign values to a stored procedure or query input parameters, as well as to bind to a destination for output parameters. Click on the dotted button under the **Bind To** field to select an appropriate **OPC Connector**. Finally, select the **OPC Tag** that you want to bind to the selected **Parameter**.

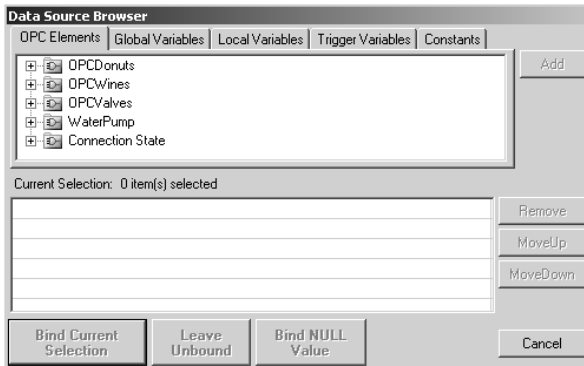


Figure 4.19 - Selecting OPC Connector or Global Variables

Data records mapping allows you to configure how data from the database records are mapped into the destination connectors. Under **Data Records Mapping**, you can click on the **Column** field and then the down arrow to view the drop down list of **Table Columns** of the selected **Database**. You can choose a **Column** that you want to configure, and then assign **Row Indexes** and a **Formula** to the column if applicable. By default the raw records are read ($x = \{\{Source\}\}$), however, you can manipulate that data with a formula before sending it to its destination.

NOTE: The **Formulas** section uses the Expression Editor. For more information, please see the Expression Editor Help documentation.

After selecting the **Column**, you must use the **Bind To** field to select the appropriate **OPC Connector** and then the **OPC Tag** that you want to bind to the selected **Column**. Each row in the **Data Records Mapping** table, shown in Figure 4.20, represents the mapping of one column in the database to one OPC tag defined in the OPC Connector.

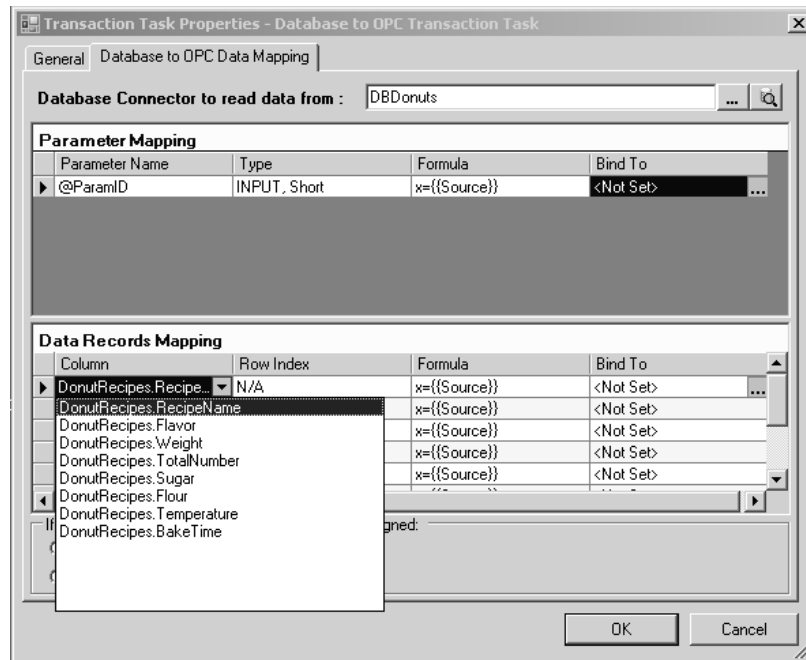


Figure 4.20 - Database to OPC Data Records Mapping

4.2.3.3 Database to Database Transaction Task

A Database to Database Transaction Task, shown in Figure 4.21, transfers data from a connected database to another target database.



Figure 4.21 - Database to Database Transaction Task

The Database to Database Mapping tab of the Database to Database Task Properties dialog box is shown in Figure 4.22.

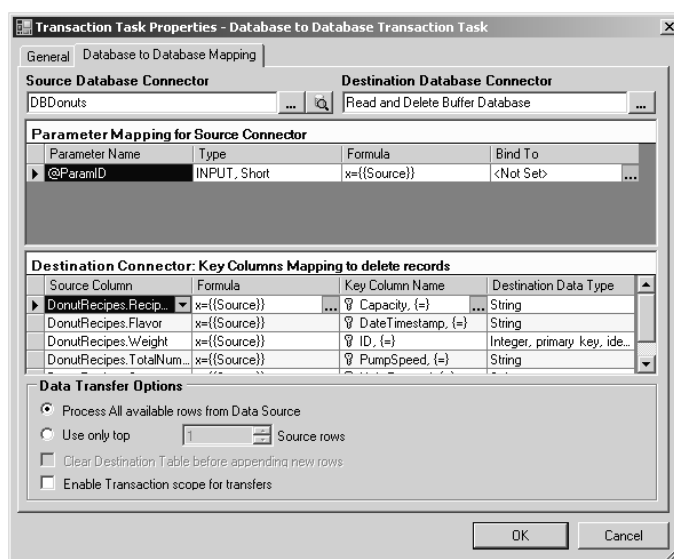


Figure 4.22 - Database to Database Mapping Tab

Under the **Source Database Connector**, select a source database connection from which to read the data. Under the **Destination Database Connector**, select a target database to which the data will be written (transferred). Under **Key Columns Mapping to delete records**, map the source database row-set columns to the destination database table columns to enable data transfer from the source data connector to the destination database connector.

You can also select from the following **Data Transfer Options**:

- **Process All available rows from Data Source:** this writes all available rows from the source connector to the destination connector.
- **Use only top x source rows:** uses only a specified number of mapping rows first returned from the source table.

- **Clear destination table:** this purges the destination tables before writing new data to the database.
- **Enable transaction scope for transfers:** the term "transaction scope" refers to the database operation involving multiple steps. If any single step fails, the entire operation is "rolled back," thus undoing other steps within that operation that may have succeeded. In the case of the BridgeWorX database-to-database task (when multiple rows are transferred), "transaction scope" means that if a single data row fails to insert into the destination database, the entire "block" will roll back, therefore either all requested rows are inserted or none.

4.2.3.4 OPC to OPC Transaction Task

An **OPC to OPC Transaction Task**, shown in Figure 4.23, transfers data from a connected OPC data source to a target OPC source.



Figure 4.23 - OPC to OPC Transaction Task

The OPC to OPC Mapping tab is shown in Figure 4.24. Under the **Source Element** column, click on the ellipse (...) button to select an OPC source from which to read the data. Under the **Destination Element** column, click on the ellipse (...) button to select a target OPC source to which the data will be transferred.

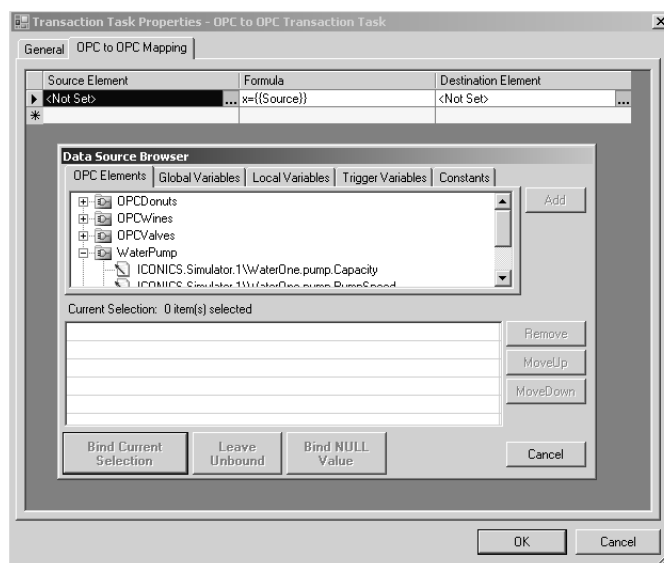


Figure 4.24 - OPC to OPC Mapping Tab

4.2.3.5 OPC to Database Transaction Task

An **OPC to Database Transaction Task**, shown in Figure 4.25, transfers data from a connected OPC data source to a target database.



Figure 4.25 - OPC to Database Transaction Task

The **OPC to Database Mapping** tab is shown in Figure 4.26. For this task, you need to first select the appropriate destination database connector from the **Destination Database Connector** list.

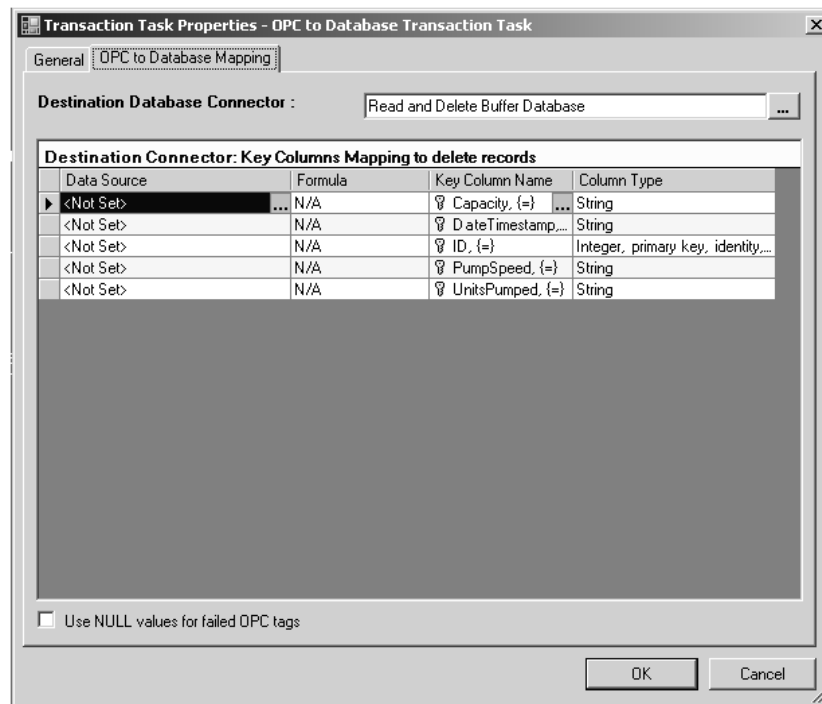


Figure 4.26 - OPC to Database Mapping Tab

Under **Data Columns Mapping for New Database Record**, you must determine where the data will be written to the destination database. Map the OPC source(s) to the destination database table columns to enable data transfer from the OPC source connector to the selected columns in the destination database. Under **Data Source**, click on the ellipse (...) button to select an OPC connector, as shown in Figure 4.27. You can also write a **Formula** if applicable.

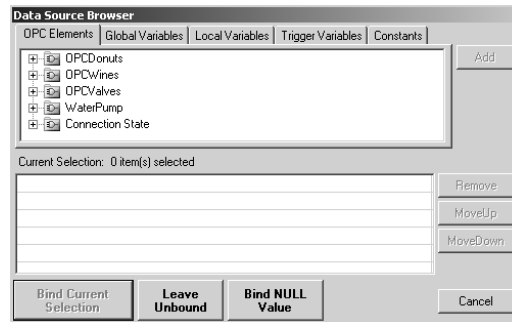


Figure 4.27 - Selecting OPC Connector or Global Variable

4.2.3.6 Execution Delay Transaction Task

An **Execution Delay Transaction Task**, shown in Figure 4.28, delays the next transaction task execution by a specified time interval.



Figure 4.28 - Execution Delay Transaction Task

In the **Execution Delay Transaction Task Properties** dialog box, shown in Figure 4.29, you can start by entering the name of the task in the Task Name field.

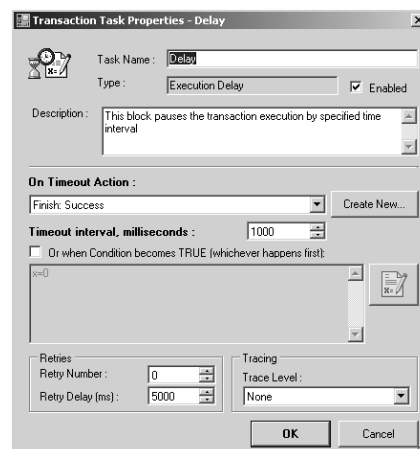


Figure 4.29 - Execution Delay Transaction Task Properties

For this task, you will need to select the appropriate **On Timeout Action** (e.g. finish transaction with success code or fail code), and a timeout interval or condition. The timeout interval specifies the amount of time (in milliseconds) that this transaction will wait before continuing to the next one. You can also specify a timeout condition that delays the execution based on a specific expression. For more information, please see the Expression Editor Help documentation.

4.2.3.7 Conditional Branch Transaction Task

A **Conditional Branch Transaction Task**, shown in Figure 4.30, represents a logical branch in the transaction execution path based on a specified expression.



Figure 4.30 - Conditional Branch Transaction Task

In the Conditional Branch Transaction Task dialog box, shown in Figure 4.31, you can start by entering the name of the task in the Task Name field.

 The dialog box is titled "Transaction Task Properties - Condition". It contains several fields and sections:

- Task Name:** A text field containing "Condition".
- Type:** A dropdown menu set to "Conditional Branch".
- Enabled:** A checked checkbox.
- Description:** A text area with the text "This block represents a logical branch in transaction execution path based on the specified expression".
- Expression:** A text field containing "x=1".
- Advancing to the Next Task:**
 - On True:** A dropdown menu set to "Finish: Success" with a "Create New..." button.
 - On False:** A dropdown menu set to "Finish: Success" with a "Create New..." button.
- If failed to evaluate Expression:**
 - Follow "On False" path:** A radio button that is selected.
 - Proceed To:** A dropdown menu set to "Finish: Fail" with a "Create New..." button.
- Retries:**
 - Retry Number:** A spinner box set to 0.
 - Retry Delay (ms):** A spinner box set to 5000.
- Tracing:**
 - Trace Level:** A dropdown menu set to "None".
- Buttons:** "OK" and "Cancel" buttons at the bottom right.

Figure 4.31 - Conditional Branch Transaction Task Properties

In the **Expression** field, define an expression to include in the transaction execution path. For more information, please see the Expression Editor Help documentation.

If you choose to, you can select the appropriate follow-up task from the **Advancing to the Next Task** option. Each transaction task reaches one of three states, and a set of follow-up tasks can be associated with it. The states are:

- **On True:** Select the task to go to when the expression is true.
- **On False:** Select the task to go to when the expression is false.
- **On Failure:** Select the task to go to if the expression fails to evaluate.

4.2.3.8 Event Generation Transaction Task

An **Event Generation Transaction Task**, shown in Figure 4.32, generates an event that could be handled by GenEvent Server subscribers.



Figure 4.32 - Event Generation Transaction Task

In the **Event Generation Transaction Task** dialog box, shown in Figure 4.33, you can start by entering the name of the task in the **Task Name** field. In the **Event Text** field, type the content of the event description that will appear in the event properties.

Figure 4.33 - Event Generation Transaction Task Properties

NOTE: In the text of an event message, you can use the following shortcuts: **/T** for transaction name, **/B** for the block name in which the last error occurred, **/E** for the last error description, and **/L** for the last executed block name.

In the **Event Severity** field, specify the severity level of the event (Normal, Warning, Severe Error, or Error).

NOTE: If you want to send this event to both the GenEvent Server and the Windows NT Event Log, make sure to configure the NT Event Log settings on the **Events** tab of the License Monitor. To open the License Monitor, select **Start → Programs → ICONCS Tools → License Monitor**. For additional information about NT events, please go to the Windows Event Viewer, which is accessible through the Administrative Tools section in the Windows Control Panel.

If you choose to, you can select the appropriate follow-up task from the **Advancing to the Next Task** option. This allows you to select the task to go to **On Complete**; when the data transaction operation finishes (regardless of the success or failure status).

4.2.3.9 File Transfer Transaction Task

A **File Transfer Transaction Task**, shown in **Error! Reference source not found.**, performs a file transfer from one location to another.



Figure 4.34 - File Transfer Transaction Task

The **File Transfer Options** tab is shown in Figure 4.35. Select a **Source Type** (local directory or Internet/network site) from which the source file will be transferred. Under the **Source Directory**, you can click the on the ellipse (...) button to browse for a directory of the specified source type. If necessary, enter a **User Name** and **Password** to access the selected directory. Under the **Source File Name**, click on the ellipse (...) button to select a source file.

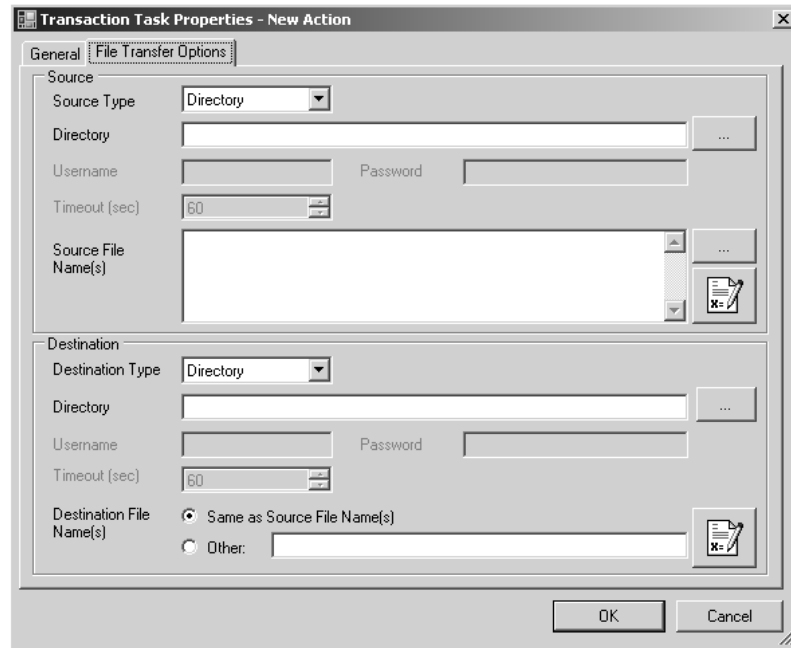


Figure 4.35 - File Transfer Options Tab

You will also need to select a **Destination Type** (local directory or Internet/network site) to which the source file will be transferred. Under the **Destination Directory**, you can click on the ellipse (...) button to browse for a directory of the specified destination type. If necessary, enter a **User Name** and **Password** to access the selected directory.

4.2.3.10 SQL Command Transaction Task

An **SQL Command Transaction Task**, shown in Figure 4.36, executes a data manipulation command for the specified database. It could be an INSERT, UPDATE, or DELETE SQL query or a stored procedure call.



Figure 4.36 - SQL Command Transaction Task Block

The **SQL Command** tab is shown in Figure 4.37. Under **Database Connection**, click on the **Create Database Connection** button to connect to a database server.

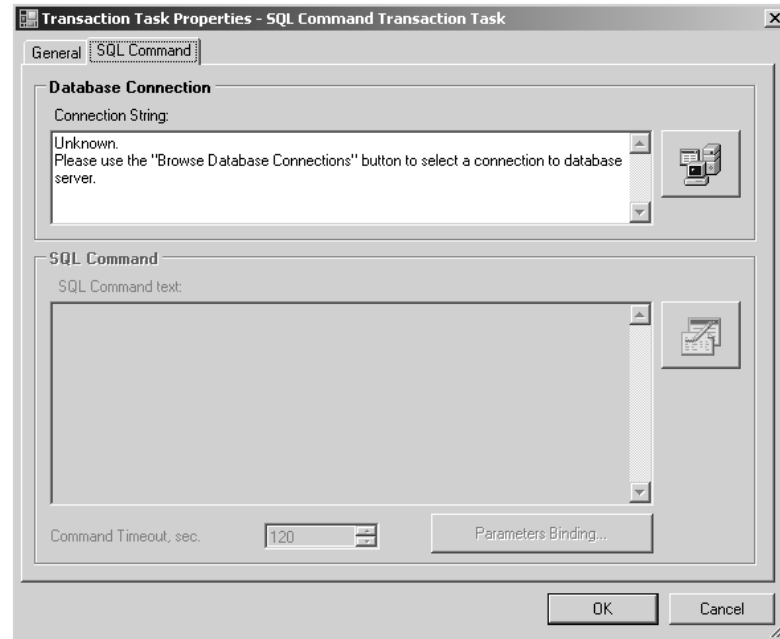


Figure 4.37 - SQL Command Tab

The **Database Connection Browser** dialog box, shown in Figure 4.38, allows you to select a database type. You saw this same browser in the data connector configuration. This supports the same database types as discussed in the “Data Connectors” chapter. Once you have established a connection with the database, you can test the connection if you like.

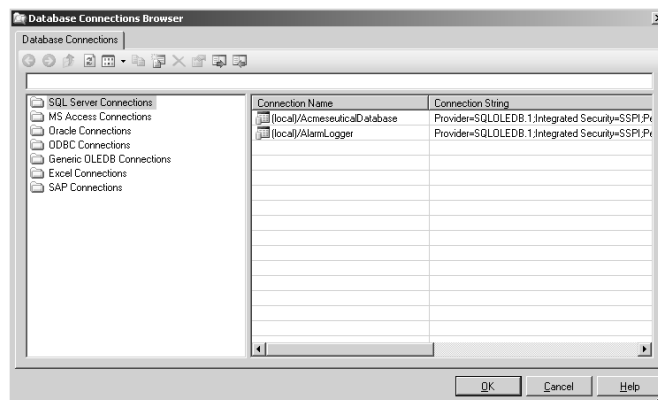


Figure 4.38 - Database Connection Browser

After connecting to a database, you can click on the **Build SQL Command** button next to the **SQL Command Text** field. This wizard helps you to create SQL commands of the following types, shown in Figure 4.39:

- **Inserting Statement for Table:** will add new records into a connected database table. Then select a table from the dropdown list, which contains all tables in the connected database.
- **Updating Statement for Table:** will update existing records in a connected database table. Then select a table from the dropdown list, which contains all tables in the connected database.
- **Deleting Statement for Table:** will delete an existing record in a connected database. Then select a table from the dropdown list, which contains all tables in the connected database.
- **Executing Stored Procedure Call:** will execute a stored procedure call in the connected database. Then select a stored procedure from the dropdown list, which contains all stored procedures in the connected database.

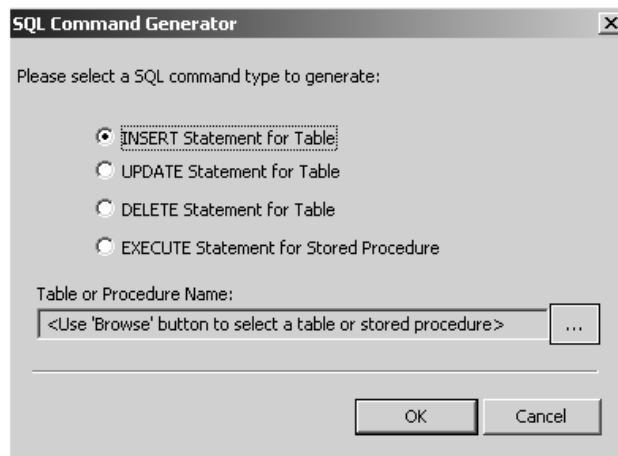


Figure 4.39 - SQL Command Generator

An example of a SQL command generated is shown in Figure 4.40. This command inserts records into a table.

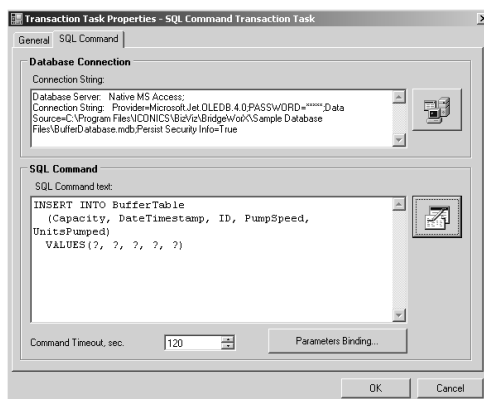


Figure 4.40 - Generated SQL Command

4.2.3.11 Web Service Task

A **Web Service Transaction Task**, shown in the Figure 4.41, makes a web service call. You can assign parameter values as well as the return value(s) mapping.



Figure 4.41 - Web Service Task

In the **Web Service Connection** tab, click on the **Browse Web Service** button. This launches the **Configure Web Service Connection** dialog box. Type in the URL address of the web service under **Web Service URL**. Enter a login **User Name**, **Password**, and a **Domain** name if necessary to log in to the web service. Click on the **Connect** button to connect to the web service.

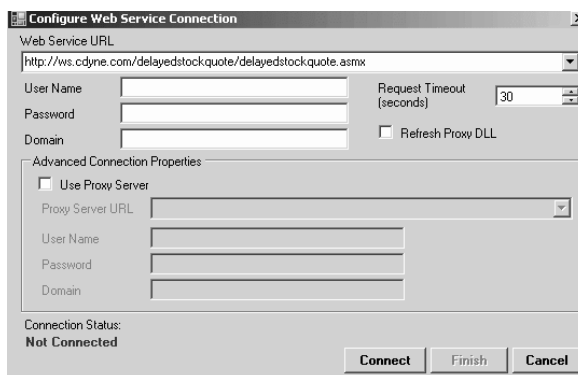


Figure 4.42 - Web Service Connection

Other options in this dialog include:

- **Request Timeout:** time (in seconds) that the BridgeWorX Service will wait for a response from the web service
- **Use Proxy Server:** when this check box is checked, you can select a **Proxy Server URL** from the dropdown list to access a web service. Enter a login **User Name**, **Password**, and a **Domain** name if necessary to log in to the proxy server.
- **Refresh Proxy:** when a connection to a web service is made, a proxy .dll file is automatically created. If multiple transactions are connected to the same web service, they will use the same proxy .dll file. Checking the **Refresh Proxy** check box will update the .dll, and all transactions will use that proxy .dll file.

The **Web Service Method** displays the Microsoft Windows application programming interface (API) operations or methods that BridgeWorX supports for the connected web service. For example, Figure 4.43 shows methods for a web service that generates stock quotes. Select the method that you want to call.

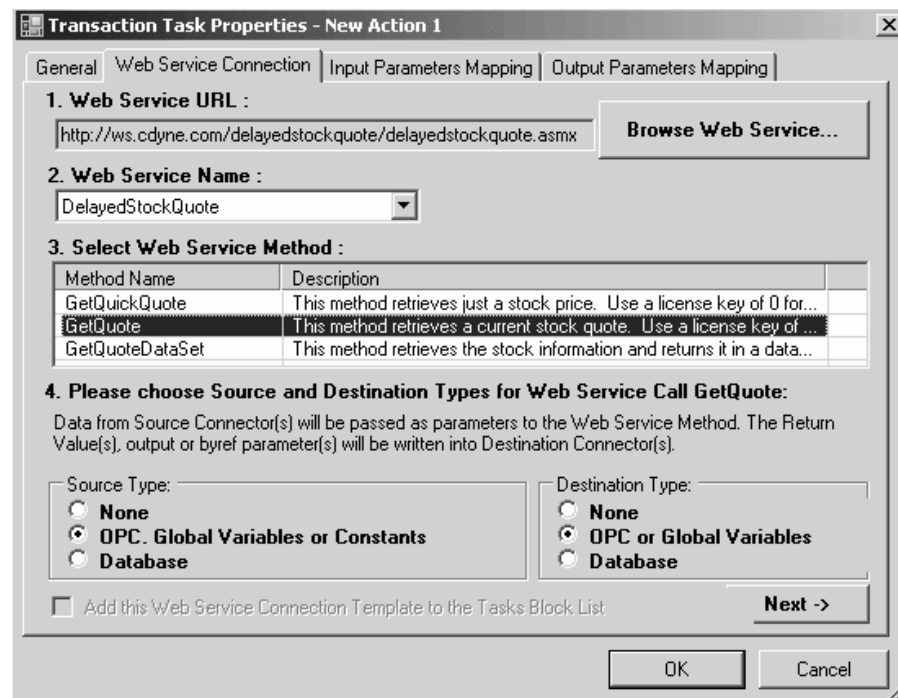


Figure 4.43 - Web Service Connection Tab

4.2.3.12 Custom Transaction Task

A **Custom Transaction Task**, shown in Figure 4.44, calls a public class method from a custom .NET assembly. You can assign parameter values as well as the return value(s) mapping.



Figure 4.44 - Custom Transaction Task

Custom blocks configured in the BridgeWorX Configurator require the assistance of external libraries (.NET assemblies contained in .dll files) in order to perform their custom tasks. These libraries contain resource information, such as icons and strings that the BridgeWorX Configurator uses to represent the custom task in its configuration dialogs. More importantly, the libraries contain custom C# (C-Sharp) managed code that the BridgeWorX runtime engine uses to perform the task. The BridgeWorX Custom Component Toolkit takes the form a Microsoft Visual Studio .NET Project Wizard in C# and therefore, requires that Microsoft Visual Studio .NET be installed on your PC.

NOTE: For additional information, Please see the "BridgeWorX Custom Component Toolkit" application note on the BizViz product DVD.

The **Custom Task Properties** tab is shown in Figure 4.45. You can click on the **Browse Custom Assembly** button to select an assembly .dll file. Select a **Custom Task Class** and a **Custom Task Method** from the respective dropdown list. Choose the Source and Destination types for the custom task.

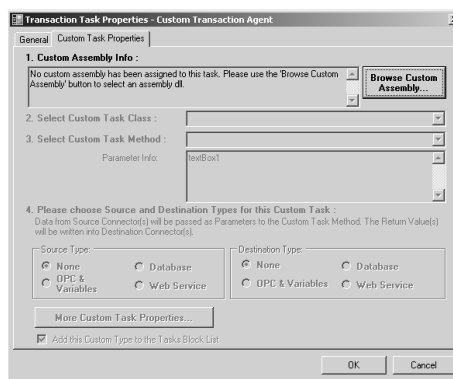


Figure 4.45 - Custom Task Properties Tab

NOTE: Checking the **Add This Custom Type to the Tasks Block List** check box saves the custom transaction task block in the Transaction Diagram Designer so it will be available to use with other transaction diagrams.

Lab: Transaction Diagram

4

4.1 Lab Overview

The complete transaction will be split into two labs. In this lab the basic Transaction will be built and it will insert the pump data into the Buffer database or into the Headquarter database depending on the connection status.

When there is no connection, the data should be sent to the Buffer database as shown in Figure L4.1.

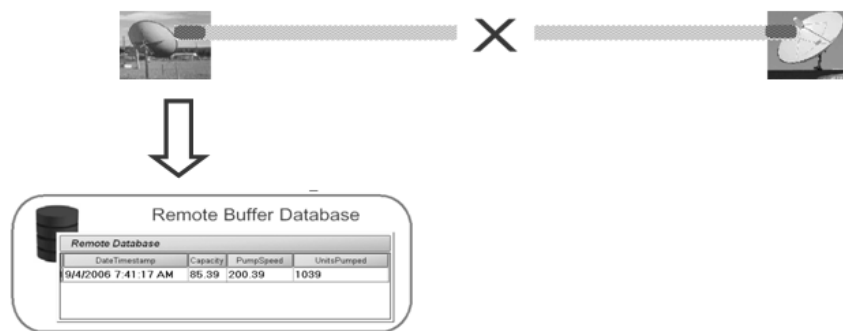


Figure L4.1 - Write to Buffer Database

When there is a connection it should be sent to the Headquarter database as shown in Figure L4.2.

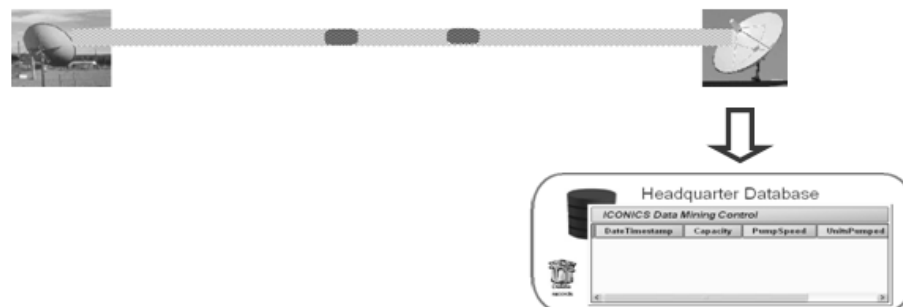


Figure L4.2 - Write to Headquarter Database

4.1.1 Task Checklist

In this quick lab, you will complete the following tasks:

- Create transaction diagrams
- Add blocks to a transaction diagram
- Create logic between the blocks
- Execute a transaction

4.1.2 Support Files

To complete this lab you will need the following files:

- StoreAndForward.gdf

4.2 Opening the Transaction Diagram

1. Open the **Store and Forward** transaction in the **WaterOne** configuration folder as shown in Figure L4.3.

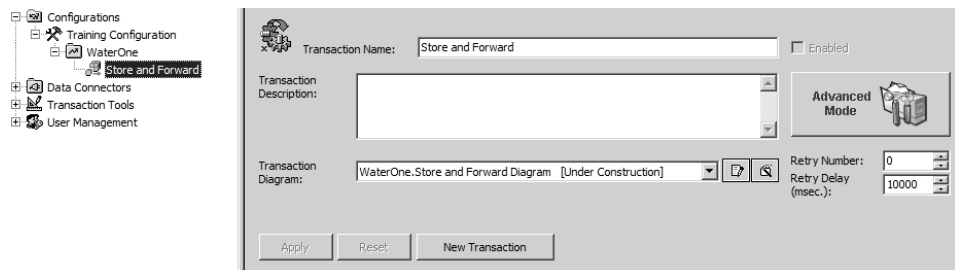


Figure L4.3 - WaterOne Folder with the Store and Forward Configuration

2. Go to the transaction diagram by clicking on the **Edit Selected Diagram Object**  button.
3. The transaction diagram **Store and Forward Diagram** will open. Open the diagram designer by clicking on the **Run Diagram Designer** button.
4. A new window will appear. In this window we are going to add the logic blocks and create the diagram.

4.3 Adding Conditional Branch block

1. The first block that needed is the **Conditional Branch** block. This block will determine if the data will be logged to the Buffer database or the Headquarter database. Drag and drop the conditional branch block from the list on the right side to the work area, which is the designer area.
2. Configure the block by double-clicking on it. Name the block **OPC tag Connection Test**. Click on the Expressions Editor  button to configure the connection. This will open the Expression Editor. In the Expression Editor we are going to create an expression that will return a true when there is a connection and a false when there is no connection.
3. Click on **Variables** in the expression editor. The Data Source Browser will open. Go to the **OPC Elements** tab, open the **Connection State** folder and double-click on the tag in the folder. The tag will appear in the Current Selection box in the bottom.
4. Click on **Bind Current Selection** to use this in the Expression Editor. Because the OPC tag will return a 1 or 0, we don't have to create a complete expression. Otherwise the expression will be `x= {{OPC tag}} == 1`.
5. Under the "If failed to evaluate Expression" section, click on **Follow "On False" path**
6. Right-click on the red **Finish Fail:** block and select delete. Confirm the deletion if necessary.

- Click on OK and the **Transaction Task Properties** will look like Figure L4.4. Click on OK to return to the transaction diagram.

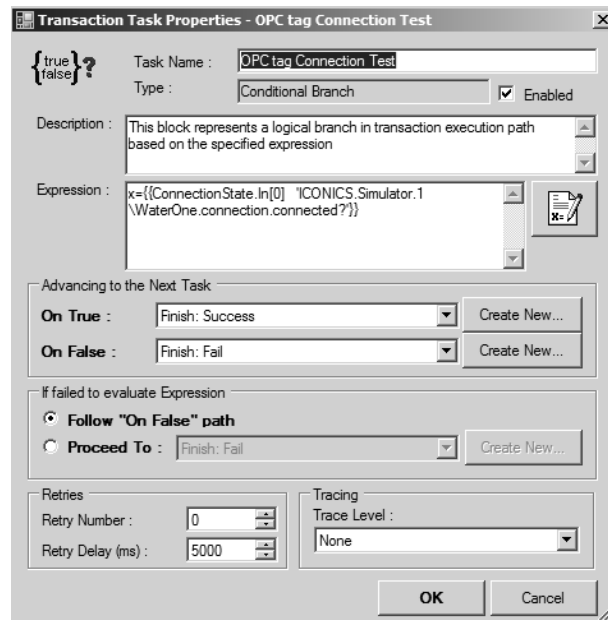


Figure L4.4 - Transaction Task Properties

4.4 Adding OPC to Database blocks

- In this section, the OPC to Database blocks are added. These blocks will get the OPC pump information and insert it in the correct database.
- The block we are going to add now will insert the data into the Remote Buffer Database. Go to the list of blocks and drag and drop the **OPC to Database** block to the designer area.
- Double-click on the block and name the block **Buffer Data to Remote Database**.
- Click on the **OPC to Database Mapping** tab. The first thing to choose is the correct Destination Database Connector.
- Click on the ellipsis button  to the right of the Destination Database Connector and select the **Write to Buffer Database** from the list. Click on the Select button.
- In the next step we are going to bind the OPC tags to the correct columns. Click on the ellipsis button,  for the first row in the Data Source list.

7. The Data Source Browser will appear. Double-click on the **WaterPump** folder. The three OPC tags will appear in the Current Selection list. Click on the **Global Variable** tab and expand the **WaterOne** folder. Double-click on **Timestamp** so this will be in the Current Selection List as well.
8. Select **Timestamp** from the Current Selection list and use the **MoveUp** button to make it the second in the list. Move the window so you can check if the order of OPC tags is the same as the column list shown in Figure L4.5.

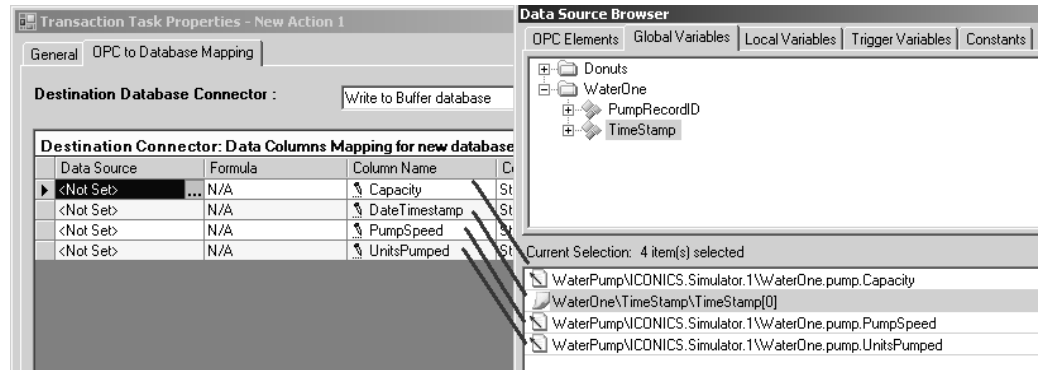


Figure L4.5 - Mapping of data

9. Click on **Bind Current Selection** and the block is now configured. Click on **OK** to go back to the Transaction Designer.

4.5 Implementing the Logic

1. There are a lot of arrows in the diagram so now it's time to implement the logic.
2. Go to the blue question mark in the **OPC tag Connection Test** block. You will see the cursor will change to a pointing finger. Left-click and drag the arrow to the **Buffer Data to Remote Database** block.
3. A **Select Connector Type** window will appear. Select **On False**. There will be a gray line between the blocks; rearrange the blocks now so they look like Figure L4.6.

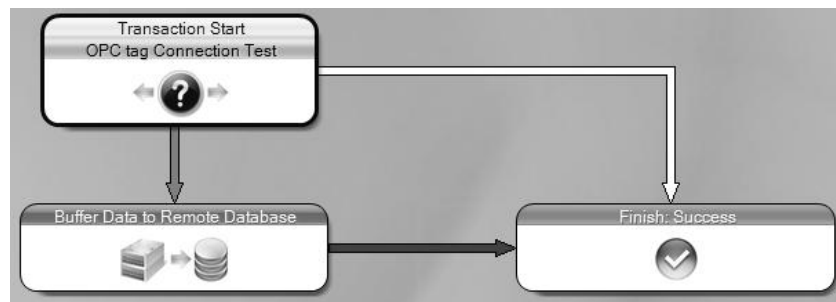


Figure L4.6 - Transaction Diagram

4.5.1 Adding the OPC to Database block

1. In the following steps the other database block will be added, similar to the previous one.
2. The block we are going to add now will insert the data into the Headquarter Database. Go to the list of blocks and drag and drop the **OPC to Database** block to the designer area.
3. Double-click on the block and name the block **Copy Data to Headquarter Database**.
4. Click on the **OPC to Database Mapping** tab. The first thing to choose is the correct Destination Database Connector.
5. Click on the ellipsis button  to the right of the Destination Database Connector, and then select **Write to Headquarters** from the list. Click on the **Select** button.

6. In the next step we are going to bind the OPC tags to the correct columns.
Click on the ellipsis button  for the first row in the Data Source list.
7. The Data Source Browser will appear. Double-click on the **WaterPump** folder. The three OPC tags will appear in the Current Selection list. Click on the **Global Variable** tab and open the **WaterOne** folder. Double-click on **Timestamp** so this will be in the Current Selection list as well.
8. Select **Timestamp** from the Current Selection list and use the **MoveUp** button to make it the second in the list. Move the window so you can check if the order of OPC tags is the same as the column list as shown in Figure L4.5.
9. Click on **Bind Current Selection** and the block is now configured. Click on **OK** to go back to the Transaction Designer.
10. Now we will add logic to the block. Drag and drop the arrow from the **OPC tag Connection Test** block to the **Copy Data to Headquarter Database** block, and select **On True**. A white line will appear between the blocks. Rearrange the block so it looks like Figure L4.7.

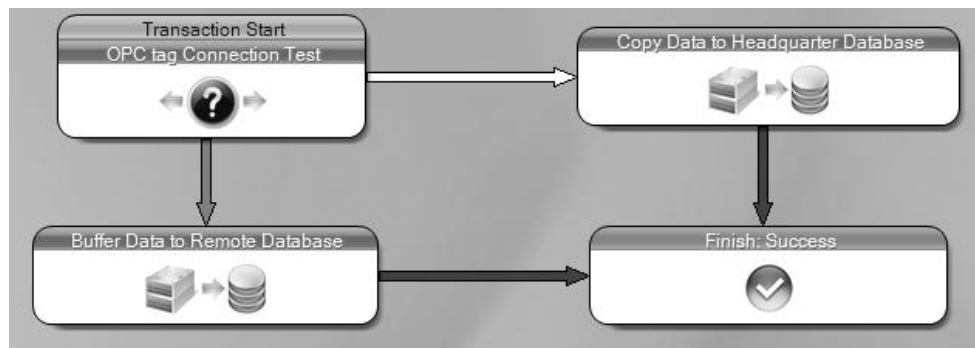


Figure L4.7 – Completed Transaction

11. The basic diagram is now ready to be tested. Click on the File menu and select save. Acknowledge any warnings that may appear. Close the transaction diagram window.

4.6 Executing the transaction

With the transaction diagram created we are now ready to execute the transaction.

1. Back in the BridgeWorX configurator, click on the Store and Forward transaction under the WaterOne folder
2. The transaction configuration should appear at the right pane as shown in Figure L4.8.

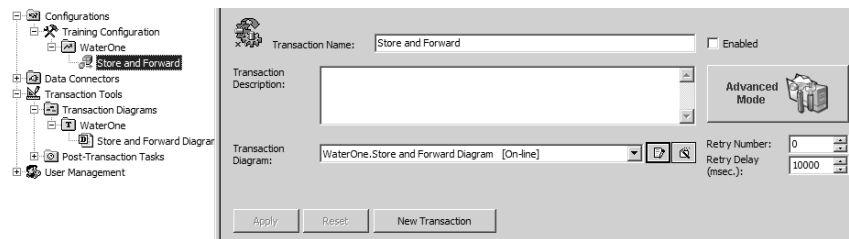


Figure L4.8 - Store and Forward transaction

3. Enable the transaction by checking the Enabled checkbox and you should see an Execute Now button appear in the lower right.
4. Click on Apply. Your final configuration should resemble Figure L4.9.

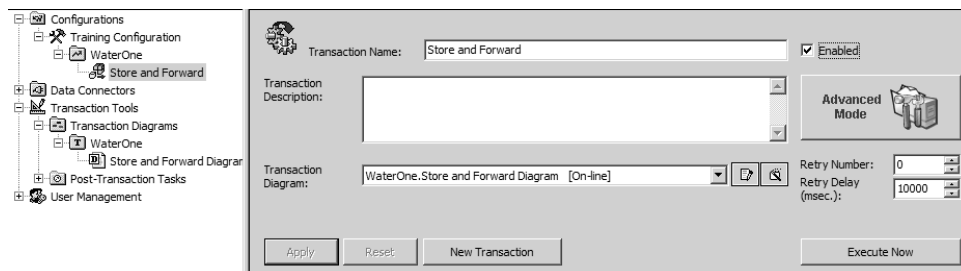


Figure L4.9 - Enabled transaction

5. Click on Execute Now to execute the transaction.
6. To visualize the effects of this transaction, open the StoreAndForward.gdf file from the C:\Training folder.
7. Change the connection status and execute the Store and Forward transaction manually to see the results of the transaction.

Post-Transaction Tasks

5

5.1 Post-transaction Tasks

Post-transaction tasks (actions) define how transactions will be delivered to recipients. Post-transaction actions are configured under the **Post-transaction Tasks** tree control. BridgeWorX uses the following methods for transaction execution and delivery:

- NT Event Log
- OPC Write
- E-mail
- Database

5.2 NT Event Log Actions

An **NT Event Log action** enables you to post new entries to the Windows NT Event log with a specified severity level. The available settings for an NT Event Log action are:

- **Post-transaction Action Name:** enter a name for the post-transaction action.
- **Action Type:** displays the post-transaction action type (e.g. combined action, e-mail, etc.).
- **Retry Number:** sets the number of attempts to write to the NT event log if the initial attempt fails.
- **Retry Delay:** sets delay time (in seconds) between subsequent retry attempts.
- **Severity:** specifies the severity level of the event (Normal, Warning, Severe Error, or Error).

NOTE: For additional information about NT events, please go to the Windows Event Viewer, which is accessible through the Administrative Tools section in the Windows Control Panel.

- **Event Message:** type in the content of the event description that will appear in the event properties.

NOTE: In the text of an event message, you can use the following shortcuts: **/T** for transaction name, **/B** for the block name in which the last error occurred, **/E** for the last error description, and **/L** for the last executed block name.

- **Apply:** saves all changes to the configuration database.
- **Reset:** clears all recently added information.
- **New Action Object:** creates a new NT Event Log action to be configured.

The screenshot shows a dialog box titled "NT Event Log Action Properties". At the top, there is a "Post Transaction Action Name:" label followed by a text box containing "New Post-Transaction Action". Below this, the "Action Type" is set to "NT EventLog Action". To the right, under "On Errors", there are two settings: "Retry Number:" with a value of "0" (noted as "0 - no retries") and "Retry Delay:" with a value of "30" seconds. The "Action Settings" section contains a "Severity:" dropdown menu and a large "Event Message:" text area. Below the text area, a note states: "Use the following shortcuts for the Event Message field:" followed by a list: "/T - Transaction name;", "/B - Block name in which last error occurred;", "/E - Last Error description;", and "/L - Last executed block name". At the bottom of the dialog, there are three buttons: "Apply", "Reset", and "New Action Object".

Figure 5.1 - NT Event Log Action Properties

5.3 OPC Write Actions

An **OPC Write action** enables you to write a value to an OPC tag. The available settings for an OPC write action are:

- **Post-transaction Action Name:** enter a name for the post-transaction action.
- **Action Type:** displays the post-transaction action type (e.g. combined action, e-mail, etc.).
- **Retry Number:** sets the number of attempts to deliver the write action to the connected OPC data source if the initial attempt fails.
- **Retry Delay:** sets delay time (in seconds) between subsequent retry attempts.
- **OPC Tag:** click the ... button to select an OPC tag to write to from the Unified Data Browser.
- **Value to Write:** specify a value to write to the selected OPC tag.
- **Data Type:** choose a data type (e.g. native, float, double, bool, etc.) from the dropdown list. See the table below for details.
- **Apply:** saves all changes to the configuration database.
- **Reset:** clears all recently added information.
- **New Action Object:** creates a new e-mail action to be configured.

The screenshot shows the 'OPC Write Action Properties' dialog box. At the top, there is a text field for 'Post Transaction Action Name' containing 'New Post-Transaction Action'. Below this is the 'Action Type' section with a dropdown menu set to 'OPC Write Action'. To the right of the 'Action Type' is the 'On Errors' section, which includes 'Retry Number' (set to 0) and 'Retry Delay' (set to 30 seconds). The 'Action Settings' section contains an 'OPC Tag' field with a browse button (...), a 'Value to write' field (set to 0), a 'Data type' dropdown (set to 'NATIVE/EMPTY'), and an 'OPC Write Timeout (msec.)' field (set to 5000). There is an 'Advanced...' button to the right of the 'Data type' dropdown. Below the 'OPC Write Timeout' field, there is a note: 'Use the following shortcuts for the Value Message field:' followed by a list of shortcuts: /T - Transaction name; /B - Block name in which last error occurred; /E - Last Error description; /L - Last executed block name. At the bottom of the dialog are three buttons: 'Apply', 'Reset', and 'New Action Object'.

Figure 5.2 - OPC Write Action Properties

5.4 E-Mail Actions

An **E-mail action** enables you to send out transactions to one or more recipients via e-mail. Before you can send transactions via e-mail you must specify your e-mail settings in the **SMTP Settings** tab of the **Options** dialog box (under the **Tools** menu), shown in Figure 5.3, which sets the secure connection access parameters for the Transaction Service.

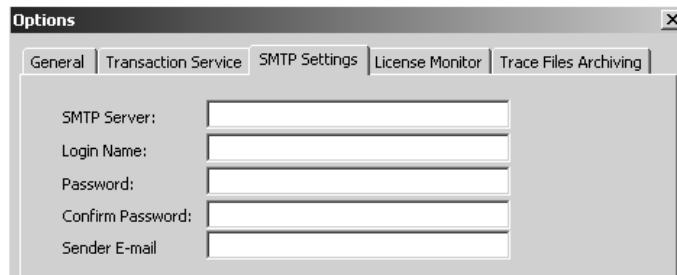


Figure 5.3 - Options Dialog: SMTP Settings Tab

- **SMTP Server:** specifies the name of the e-mail server used to send the e-mail message. A server name must be entered in this field in order for e-mail notification messages to be sent. It is recommend that you create an e-mail account to be used specifically for e-mailing transactions.
- **Login Name** and **Password:** enter a valid, alphanumeric user name and password (specified in the Security Server configuration settings).
- **Confirm Password:** re-enter your password for confirmation.
- **Sender E-Mail:** enter the e-mail address of the sender of the e-mail message. (The Transaction Service is the default.)

The settings available for an e-mail action are:

- **Post-transaction Action Name:** enter a name for the post-transaction action.
- **Action Type:** displays the post-transaction action type (e.g. combined action, e-mail, etc.).
- **Retry Number:** sets the number of attempts to deliver the message to the specified recipient if the initial attempt fails.
- **Retry Delay:** sets delay time (in seconds) between subsequent retry attempts.
- **Mail To:** specifies the recipient(s) to whom you wish to send the e-mail message.
- **CC:** sends a "carbon copy" of the e-mail to another recipient.

- **BCC:** sends a "blind carbon copy" of the e-mail message to another recipient.
- **Subject:** specifies the subject line of the e-mail message.
- **Body:** type in the content of the e-mail message.

NOTE: In the subject and body text of an e-mail message, you can use the following shortcuts: **/T** for transaction name, **/B** for the block name in which the last error occurred, **/E** for the last error description, and **/L** for the last executed block name.

- **Apply:** saves all changes to the configuration database.
- **Reset:** clears all recently added information.
- **New Action Object:** creates a new e-mail action to be configured.

The screenshot shows a dialog box titled "Post Transaction Action Name: New Post-Transaction Action". It has a tabbed interface with "Email Action" selected. The "On Errors" section includes "Retry Number: 0 (0 - no retries)" and "Retry Delay: 30 Sec.". The "Action Settings" section contains fields for "Mail To:", "CC:", "BCC:", "Subject:", and "Body:". Below these fields is a note: "Use the following shortcuts for the Subject or Body field: /T - Transaction name; /B - Block name in which last error occurred; /E - Last Error description; /L - Last executed block name". At the bottom are three buttons: "Apply", "Reset", and "New Action Object".

Figure 5.4 - E-mail Action Properties

5.5 Database Actions

A **Database action** enables you to execute a database command or query. The available settings for a database action are:

- **Post-transaction Action Name:** enter a name for the post-transaction action.
- **Action Type:** displays the post-transaction action type (e.g. combined action, e-mail, etc.).
- **Retry Number:** sets the number of attempts to execute the database command to the connected data source if the initial attempt fails.
- **Retry Delay:** sets delay time (in seconds) between subsequent retry attempts.
- **Database Connection Info:** connects to a database server. See below for details.
- **SQL Command to Execute:** creates a SQL database query using the **SQL Command Generator**. See below for details.
- **Command Timeout:** specifies the amount of time to wait (in milliseconds) to wait for a response from the connected database before the connection times out.
- **Apply:** saves all changes to the configuration database.
- **Reset:** clears all recently added information.
- **New Action Object:** creates a new database action to be configured.

The screenshot shows a dialog box titled "Post Transaction Action Name: New Post-Transaction Action". It contains several sections: "Action Type" with a dropdown menu set to "Database Action"; "On Errors" with "Retry Number: 0 (0 - no retries)" and "Retry Delay: 30 Sec."; "Action Settings" which includes "Database Connection Info:" with a text area containing "Unknown. Please use the 'Database Login' button to connect to database server." and a "Database Login" button; "SQL command to execute:" with a large text area and a "SQL Command Generator" button; and "Command Timeout (sec.):" with a value of "120". At the bottom are three buttons: "Apply", "Reset", and "New Action Object".

Figure 5.5 - Database Action Properties

5.5.1 Connecting to a Database Server

Under **Database Connection Info**, you can click the button, which allows you to connect to the following database types, as shown in Figure 5.6:

- **SQL Server Connections:** connects to a Microsoft SQL Server database.
- **MS Access Connections:** connects to a Microsoft Access database.
- **Oracle Connections:** connects to an Oracle database.
- **ODBC Connections:** connects to an ODBC data source. box.
- **Generic OLEDB Connections:** connects to any OLEDB data source.
- **Excel Connections:** connects to a Microsoft Excel spreadsheet.
- **SAP Connections:** Connects to a SAP.

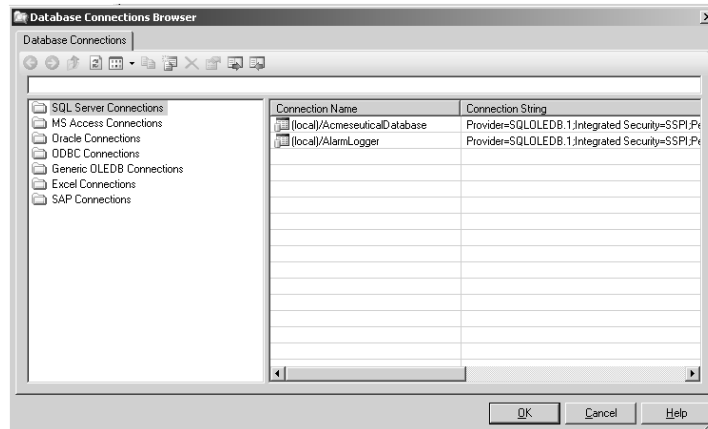


Figure 5.6 - Database Server Type

Once you have established a connection with the database, you can test the connection if desired.

5.5.2 SQL Command Generator

After connecting to a database, you need to create an SQL command to execute as a post-transaction task. For your convenience, you can click the button to use the **SQL Command Generator**, shown in Figure 5.7, to help you create common SQL commands:

- **Inserting Statement for Table:** will add new records into a connected database table. Select a table to perform this action on from the dropdown list, which contains all tables in the connected database.
- **Updating Statement for Table:** will update existing records in a connected database table. Select a table to perform this action on from the dropdown list, which contains all tables in the connected database.

- **Deleting Statement for Table:** will delete an existing record in a connected database table. Select a table to perform this action on from the dropdown list, which contains all tables in the connected database.
- **Executing Stored Procedure Call:** will execute a stored procedure call in the connected database. Select a stored procedure to run from the dropdown list, which contains all stored procedures in the connected database.

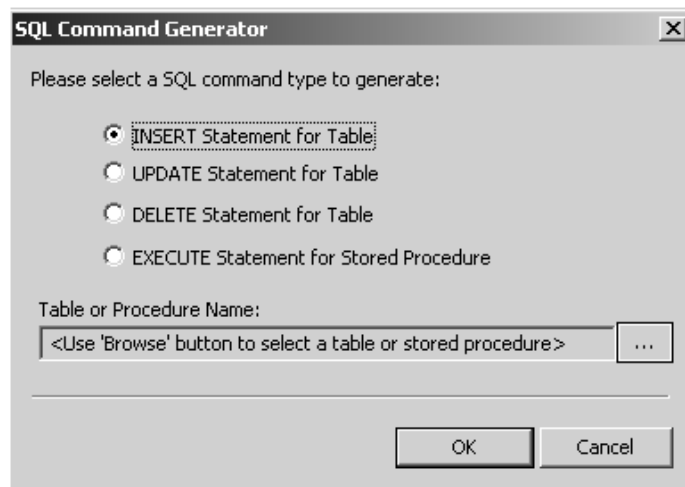


Figure 5.7 - SQL Command Generator

An example SQL command generated by the Command Generator is shown in Figure 5.8. This SQL command will insert records into a table when triggered.

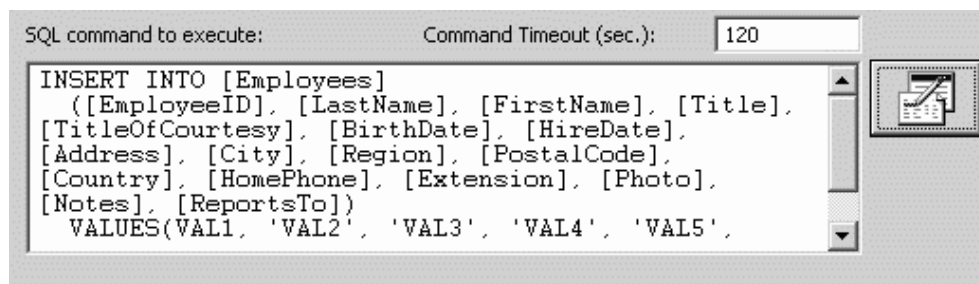


Figure 5.8 - SQL Command Generated for Database Action

Lab: Advanced Transaction Diagram 5

5.1 Quick Lab Overview

In this chapter you will build the advanced transaction, which is an enhancement of the basic transaction you made in the previous lab.

In the transaction diagram that you have already created the records are stored in the Buffer Database but they are not moved to the Headquarter Database when there is a connection.

The Diagram will be enhanced with three blocks as shown in Figure L5.1:

1. The first block will read if there are records in the buffer database and will return the Timestamp of the record.
2. The second will get the record of the timestamp and move it to the Headquarter Database.
3. The third block will delete the record with the Timestamp.

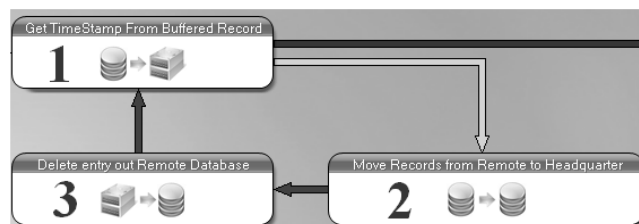


Figure L5.1 - Enhancement to Basic Diagram

5.1.1 Task Checklist

In this quick lab, you will complete the following tasks:

- Enhance the current transaction diagram
- Practice building logic with the transaction blocks

5.1.2 Support Files

To complete this quick lab you will not need any support files.

5.2 Enhancing the Transaction Diagram

In this lab the Transaction Diagram will be enhanced as follows:

1. Open the **Store and Forward** transaction in the WaterOne Configuration Folder, as shown in Figure L5.2.

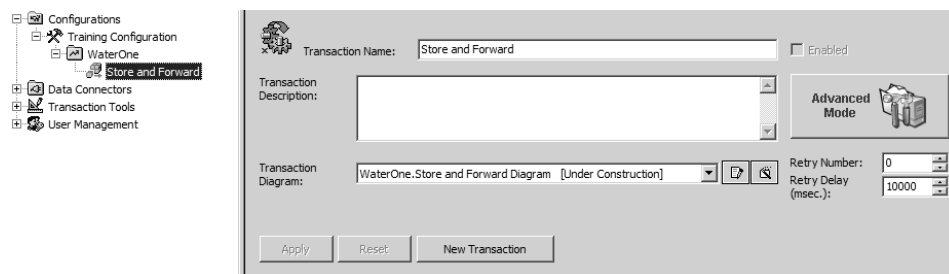


Figure L5.2 - WaterOne Folder with the Store and Forward Configuration

2. Open the transaction diagram by clicking on the Edit Selected Diagram Object  button.
3. Click on the **Run Diagram Designer** button to open the **Store and Forward Diagram** in the diagram designer.

5.2.1 Get Timestamp from Buffered Database Block

1. The first block we are going to add is the **Database to OPC** block. This will query the BufferDatabase for any records in the database. If records exist, this block will put the timestamp information into a Global Variable.
2. Add the **Database to OPC** block to the designer area and double-click on it. Name it **Get TimeStamp from Buffered Database** and then click on the **Database to OPC Data Mapping** tab.
3. Click on the ellipsis button  next to the “Database Connector to read data from” field and select **Get Timestamp from Buffer Database**. Click on the select button.

- Click on the ellipsis button  under the **Bind To** column to open the Data Destination Browser. Click on the **Global Variables** tab and expand the WaterOne folder. Double-click on **PumpRecordID** and click on the **Bind Current Selection** button. The data mapping should be the same as in Figure L5.3.

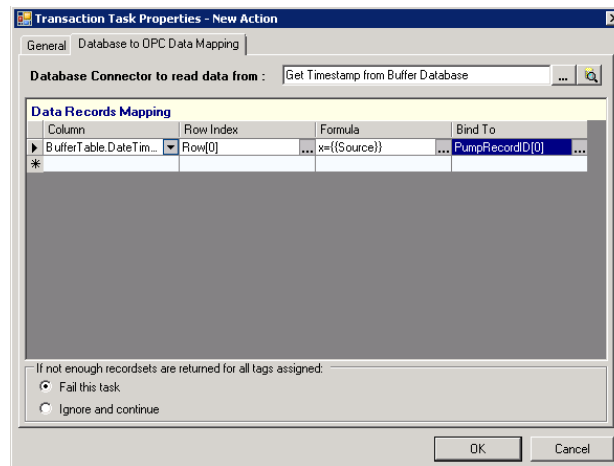


Figure L5.3 - Data Mapping of the Get TimeStamp from Buffered Database

NOTE: if you have extra fields like Field1 to Field7, you **MUST** delete the extra fields otherwise the transaction will fail.

- Click on **OK** to go back to the Transaction Designer.
- Drag an arrow from the **OPC tag Connection Test** block to the **Get TimeStamp from Buffered Database** and then choose **On True**. Then drag an arrow from the **Get TimeStamp from Buffered Database** to **Copy data to Headquarter Database**. Then select **On Fail**. The transaction should look like Figure L5.4

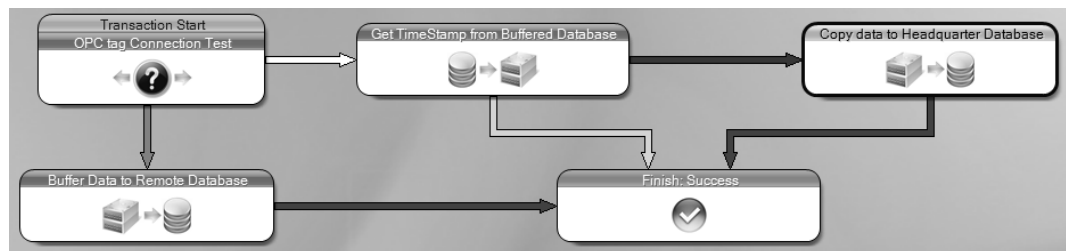


Figure L5.4 - Transaction Diagram with Get Timestamp from Buffered Database

5.2.2 Move Record from Buffer to Headquarter Block

1. Next, we will add the block that will move the record from the buffer database to the headquarter database. The timestamp will be used to move only this unique record. Add a **Database to Database** block to the designer area. Name the block **Move Record from Buffer to Headquarter**.
2. Click on the **Database to Database Mapping** tab. Select **Read and Delete Buffer Database** as Source Database Connector and **Write to Headquarters** as destination database connector.
3. Click on the ellipsis button **...** in the **Bind To** column of the **Parameter Mapping for Source Connector** section, as shown in Figure L5.5 to open the Data Source Browser.

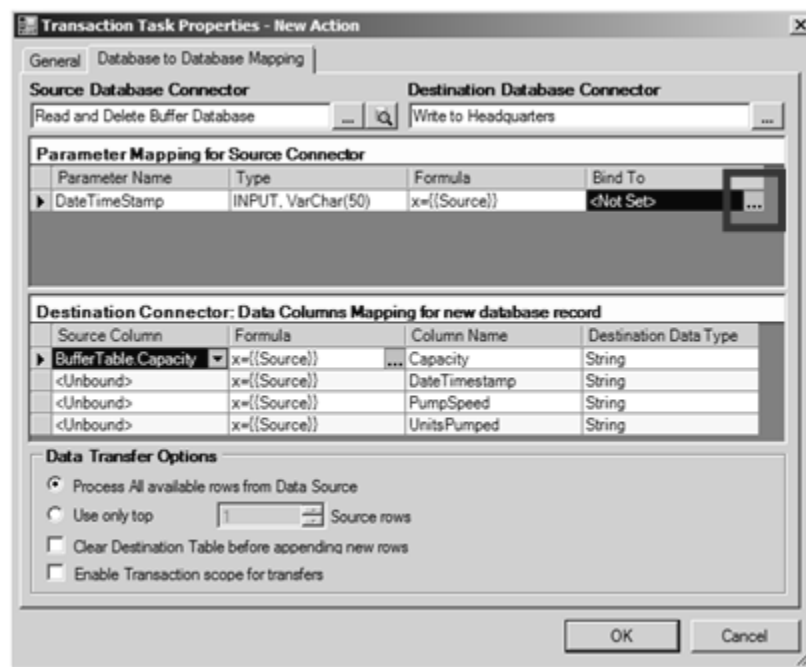


Figure L5.5 - Database to Database Mapping

- Click on the **Global Variables** tab and expand the **WaterOne** folder. Double-click on **PumpRecordID[0]**, and click on **Bind Current Selection**. The whole display will look like Figure L5.6.

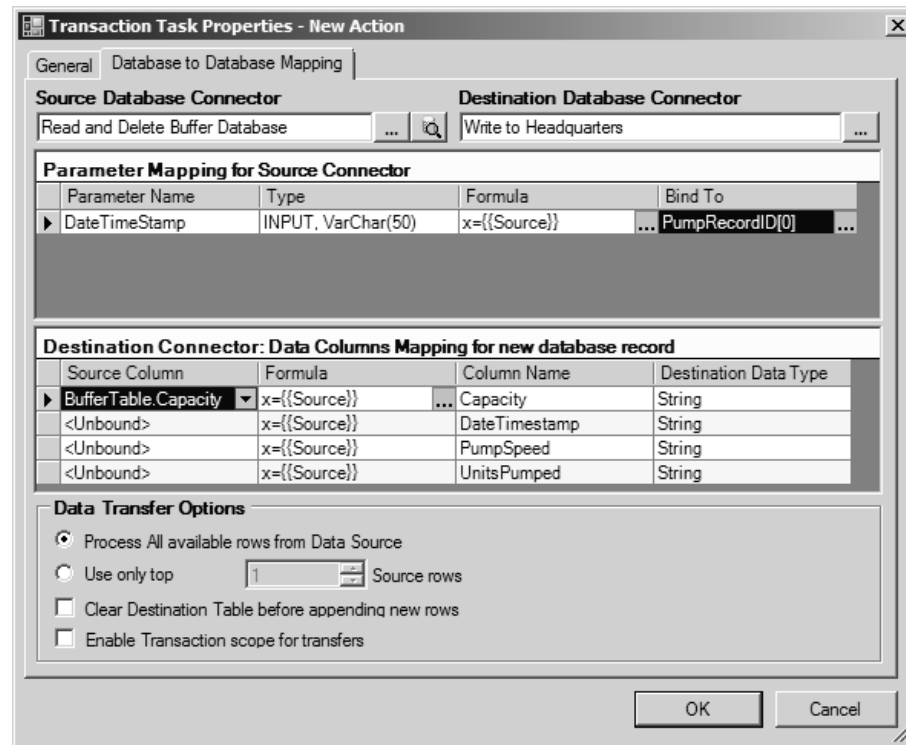


Figure L5.6 - Database to Database Mapping with parameter

- Click OK to close the transaction task properties

5.2.3 Delete Record from Remote Database Block

- We will now add the final block to our diagram. This will delete the record in the Buffer Database that was moved to the Headquarter Database.
- Add an **OPC to Database** block to the diagram and name this block **Delete Record from Remote Database**.
- Click on the **OPC to Database Mapping** tab and select **Read and Delete Buffer Database** for the Destination Database Connector.

- In the Key Column Name column, select the **DateTimeStamp** entry. In the **Data Source** column click on the ellipsis button **...** in the column DateTimeStamp row as shown in Figure L5.7 This will open the Data Source Browser dialog.

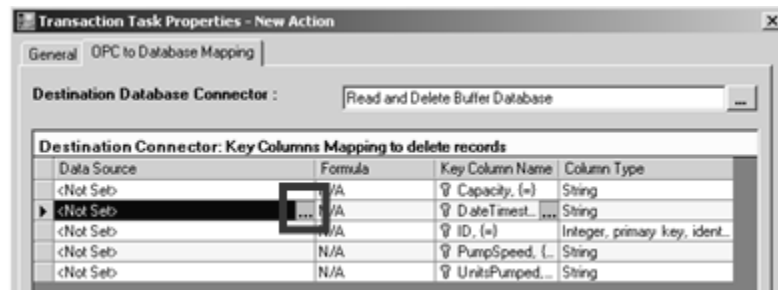


Figure L5.7 - OPC to Database Mapping

- Click on the **Global Variables** tab and expand the **WaterOne** folder. Double-click on **PumpRecordID[0]** and click on the **Bind Current Selection** button.
- By clicking on the ellipsis button **...** in the **Key Column Name** column, you will be able to choose which record you want to remove, as shown in Figure L5.8.

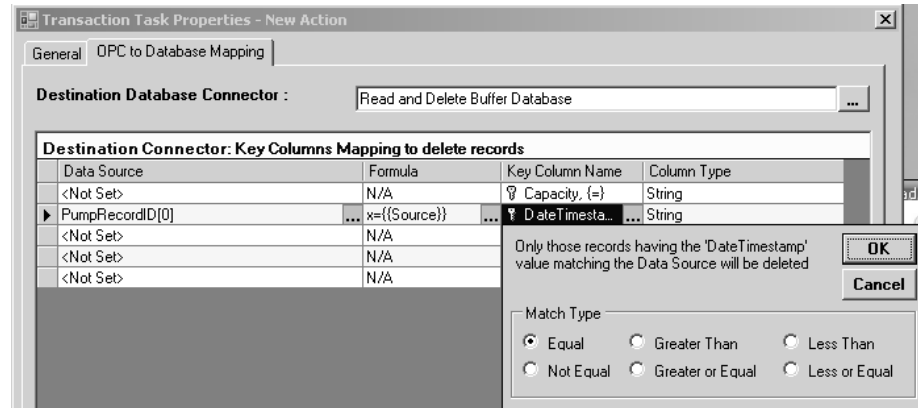


Figure L5.8 - Data Mapping for DateTimeStamp

- Select **Equal** and click on OK. Click on OK again to close this transaction task properties.

5.2.4 Implementing the Logic

1. Now we will implement the logic for the diagram. To put the arrows in the right order, drag an arrow from the **Get TimeStamp from Buffered Database** to the **Move Record from Buffer to Headquarter**, and select **On Success**.
2. Drag an arrow from the **Move Record from Buffer to Headquarter** block to the **Delete Record from Remote Database** block, and then select **On Complete**.
3. Drag an arrow from the **Delete Record from Remote Database** block to the **Get TimeStamp from Buffered Database** block, and then select **On Complete**.
4. Move the block so the logic is more visible, as shown in Figure L5.9.

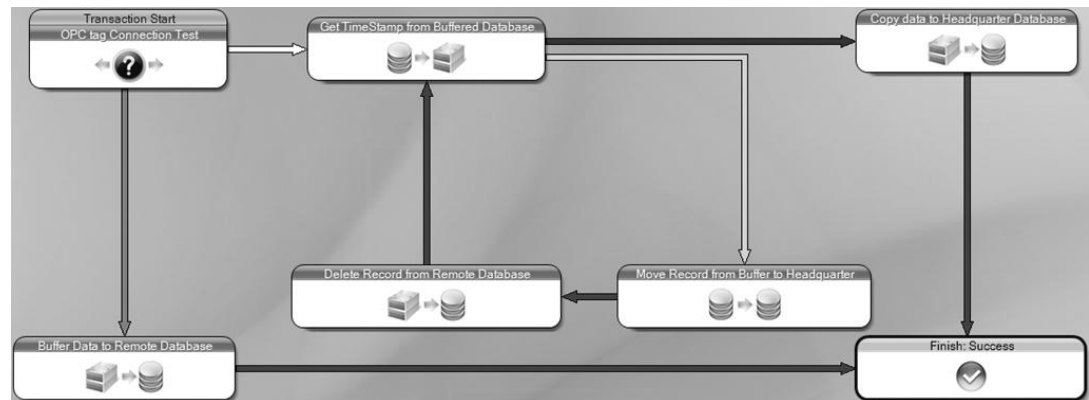


Figure L5.9 - Transaction Overview

5. Save the diagram and close the Diagram Designer window.
6. In the configurator, select the Store and Forward transaction and click on the Execute button to see the effects of the newly added blocks.

Transaction Schedules and Triggers 6

6.1 Introduction to Schedules and Triggers

You can create triggers to schedule the execution of your transactions through the BridgeWorX Service. You can add triggers to any transaction by going into the **Advanced Mode** of the transaction. The available types of triggers are:

- Event Groups
- Event Switches
- Data/Time Triggers
- Data Triggers
- Alarm Triggers
- File Triggers
- NT Event Triggers
- Database Triggers

You can create these triggers in the Unified Data Manager. This provides a universal location to store the triggers so that you can use them throughout the BizViz and GENESIS32 Suite. From the BridgeWorX Configurator, you can launch the Unified Data Manager by clicking on the **New...** button in the Scheduling tab as shown in Figure 6.1.

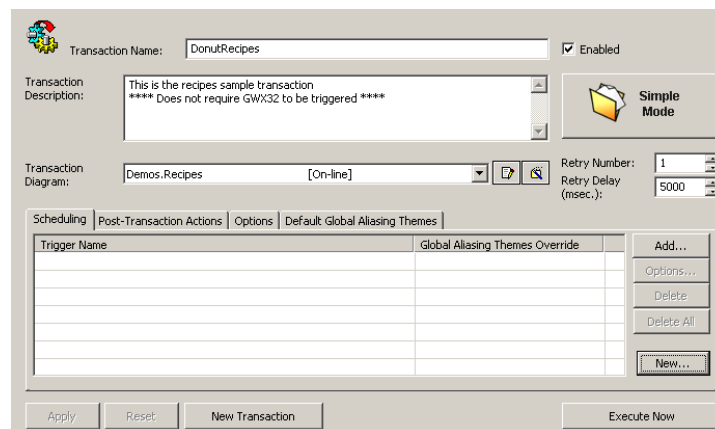


Figure 6.1 - Advanced BridgeWorX Transaction Properties

6.2 Event Groups

An **Event Group** simplifies work with a large set of triggers, which determine when (or on what condition) events will be executed. The **Event Group Properties** tab, shown in Figure 6.2, configures the following setting:

- **Name:** Enter a name for the event group.
- **Description:** Enter a description for the event group (optional).
- **Enable on Tag:** Checking this box links the activation of the event group to a specified data tag value. Enter the tag name in the **Enable Tag** field.
- **Enable Tag:** Specify a tag on which to enable the event group. Clicking on the ... button allows you to select a tag from the Unified Data Browser. The trigger will be disabled if Enable Tag has a value of 0, FALSE, or BadQuality.
- **Apply:** Saves all changes to the configuration database.
- **Reset:** Clears all recently added information.
- **Add New:** Creates a new event group item to be configured.

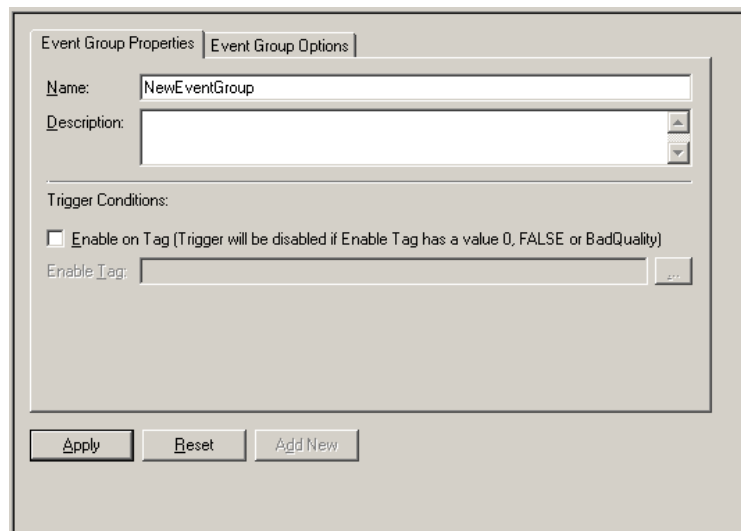


Figure 6.2 - Event Group Properties

An **event group data tag** can contain an unlimited number of event trigger tags. Each event group is represented as a data tag. In **Event Group Options** tab, shown in Figure 6.3, you can specify a list of trigger tags that will be included in the event group data tag.

Click on the **Add** button to launch the **Unified Data Browser**, which enables you to choose different event trigger tags. Once a trigger tag is added to the list, you can click on the **Remove** button to delete the tag from the list, or you can click the **Edit** button to change the selected tag. You can also use the **Move Up** and **Move Down** buttons to change the order of the tag in the list.

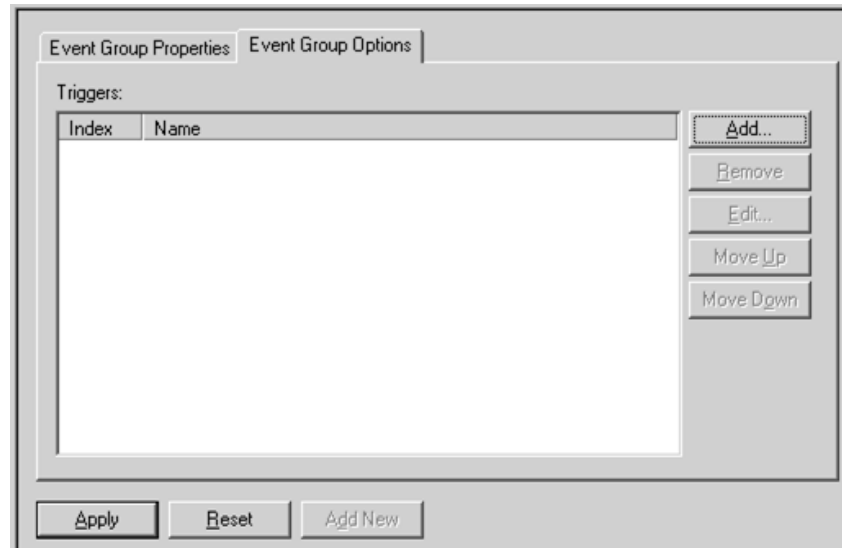


Figure 6.3 - Event Group Options Properties

NOTE: For more information about the Unified Data Browser, please refer to the Unified Data Browser help documentation.

6.3 Event Switches

An **Event Switch** is a simple connection object with one input data tag and one output data tag. Each event switch will manage a connection between one input and output data tag (i.e. will read data from the input tag and write it to the output tag). Since these event switches are implemented as Boolean data tags, other applications can switch their connection to on/off states. In the **Even Switch Properties** tab, as shown in Figure 6.4, you can configure the following settings:

- **Name:** Enter a name for the event switch.
- **Description:** Enter a description for the event switch(optional)
- **Enable on Tag:** Checking this box links the activation of the event switch to a specified data tag value. Enter the tag name in the **Enable Tag** field.
- **Enable Tag:** Specify a tag on which to enable the event switch. Clicking the ... button allows you to select a tag from the Unified Data Browser.

- The trigger will be disabled if **Enable Tag** has a value of 0, FALSE, or Bad Quality.
- **Apply:** Saves all changes to the configuration database.
- **Reset:** Clears all recently added information.
- **Add New:** Creates a new event switch item to be configured.

Figure 6.4 - Event Switch Properties

An event switch reads data from one input data tag (trigger tag) and writes it to one output data tag (index tag). In the **Event Switch Options** tab, as shown in Figure 6.5, you can specify a list of input tags that can be read by the switch and the output tag to which the switch will write data.

In the **Index Tag** field, you must specify an output data tag that will be read by the event switch. Click the **Add** button to launch the **Unified Data Browser**, which enables you to choose different input tags. Once an input tag is added to the list, you can click on the **Remove** button to delete the tag from the list, or you can click on the **Edit** button to change the selected tag. You can also click on the **Move Up** and **Move Down** buttons to change the order of the tags in the list.

NOTE: You can specify multiple input tags from which the event switch can read, but each input tag is written to only one output tag.

Figure 6.5 - Event Switch Options

6.4 Date/Time Triggers

A time trigger executes an event periodically according to a specified recurrence pattern (i.e. daily, weekly, monthly, or yearly). The configuration settings for a time trigger are in the **Time Trigger Options** tab as shown in **Error! Reference source not found.6**.

- **Name:** Enter a name for the time trigger.
- **Description:** Enter a description for the time trigger (optional)
- **Start Date/Time:** Specifies a start date and a start time for trigger execution. Click the down arrow to select a date from the calendar.
- **Recurrence Pattern:** Specifies the frequency of the periodic event execution (daily, weekly, monthly, or yearly). See other sub-sections in this section for information about recurrence patterns.
- **Enable on Tag:** Checking this box links the activation of the event switch to a specified data tag value. Enter the tag name in the **Enable Tag** field.
- **Enable Tag:** Specify a tag on which to enable the event switch. Clicking the ... button allows you to select a tag from the Unified Data Browser. The trigger will be disabled if **Enable Tag** has a value of 0, FALSE, or BadQuality.
- **Apply:** Saves all changes to the configuration database.
- **Reset:** Clears all recently added information.
- **Add New:** Creates a new event switch item to be configured.

The screenshot shows the 'Time Trigger Options' dialog box. It has two tabs: 'Time Trigger Options' and 'Related Values'. The 'Time Trigger Options' tab is active. It contains the following fields and controls:

- Name:** A text box containing 'NewTimeTrigger'.
- Description:** A text box with a small up/down arrow on the right.
- Recurrence Pattern:** A group box containing four radio buttons: 'Daily' (selected), 'Weekly', 'Monthly', and 'Yearly'. To the right of these is a 'Recur every' section with a numeric input '1' and a dropdown menu set to 'Days'. Below this is a note: '(Start time will specify exact second/minute within minute/hour interval)'.
- Recurrence Conditions:** A group box containing a checkbox labeled 'Enable on Tag (Trigger will be disabled if Enable Tag has a value 0, FALSE or BadQuality)'. Below the checkbox is an 'Enable Tag' text box and a small button with three dots.
- Start Date:** A date picker showing '6/30/2008'.
- Start Time:** A time picker showing '12:00:00 AM'.
- Buttons:** At the bottom are three buttons: 'Apply', 'Reset', and 'Add New'.

Figure 6.6 - Time Trigger Options

In the **Related Values** tab allows tags to be read when the Date/Time Trigger is executed.

- **Add Tag:** Add a new tag to the related values.
- **Add Value:** Add a new value to the related values.
- **Remove:** Remove a tag or Value from the related values.
- **Edit:** Change a selected tag or Value.
- **Apply:** Saves all changes to the configuration database.
- **Reset:** Clears all recently added information.
- **Add New:** Creates a new event switch item to be configured.

6.4.1 Daily Recurrence Pattern

The daily recurrence pattern allows you to set up a time block for a daily recurring period for event execution, as shown in Figure 6.7. Specify a start date and start time for trigger execution, and then specify the frequency of daily execution every weekday or every X number of days.

The screenshot shows a dialog box titled "Time Trigger Options" with a "Related Values" tab selected. The "Name" field contains "NewTimeTrigger". The "Description" field is empty. The "Recurrence Pattern" section has four radio buttons: "Daily" (selected), "Weekly", "Monthly", and "Yearly". Next to the "Daily" radio button is a "Regur every" field with a value of "1" and a "Days" dropdown menu. Below this is a note: "(Start time will specify exact second/minute within minute/hour interval)". The "Recurrence Conditions" section has a checkbox labeled "Enable on Tag (Trigger will be disabled if Enable Tag has a value 0, FALSE or BadQuality)". Below this is an "Enable Tag" field. The "Start Date" is set to "6/30/2008" and the "Start Time" is set to "12:00:00 AM". At the bottom are three buttons: "Apply", "Reset", and "Add New".

Figure 6.7 - Daily Recurrence Pattern

6.4.2 Weekly Recurrence Pattern

The weekly recurrence pattern allows you to set up a time block for a weekly recurring period for event execution, as shown in Figure 6.8. Specify a start date and start time for trigger execution, and then check the day on which you want to execute the event.

The dialog box titled 'Time Trigger Options' and 'Related Values' contains the following fields and controls:

- Name:** NewTimeTrigger
- Description:** (empty text box)
- Recurrence Pattern:**
 - ☒ **Weekly**
 - ☐ Daily
 - ☐ Monthly
 - ☐ Yearly

Recur every week on:

 - ☐ Sunday
 - ☐ Monday
 - ☐ Tuesday
 - ☐ Wednesday
 - ☐ Thursday
 - ☐ Friday
 - ☐ Saturday
- Recurrence Conditions:**
 - ☐ Enable on Tag (Trigger will be disabled if Enable Tag has a value 0, FALSE or BadQuality)
 - Enable Tag:** (empty text box)
 - Start Date:** 7/ 3/2008
 - Start Time:** 12:00:00 AM
- Buttons:** Apply, Reset, Add New

Figure 6.8 - Weekly Recurrence Pattern

6.4.3 Monthly Recurrence Pattern

The monthly recurrence pattern allows you to set up a time block for a monthly recurring period for event execution, as shown in Figure 6.9. Specify a start date and start time for trigger execution, and then specify the frequency of monthly execution (i.e. which day each month).

The dialog box titled 'Time Trigger Options' and 'Related Values' contains the following fields and controls:

- Name:** NewTimeTrigger
- Description:** (empty text box)
- Recurrence Pattern:**
 - ☒ **Monthly**
 - ☐ Daily
 - ☐ Weekly
 - ☐ Yearly

Day 1 of every 1 month(s)

The first day of every 1 month(s)
- Recurrence Conditions:**
 - ☐ Enable on Tag (Trigger will be disabled if Enable Tag has a value 0, FALSE or BadQuality)
 - Enable Tag:** (empty text box)
 - Start Date:** 7/ 3/2008
 - Start Time:** 12:00:00 AM
- Buttons:** Apply, Reset, Add New

Figure 6.9 - Monthly Recurrence Pattern

6.4.4 Yearly Recurrence Pattern

The yearly recurrence pattern allows you to set up a time block for a yearly recurring period for event execution, as shown in Figure 6.10. Specify a start date and start time for trigger execution, and then specify the frequency of yearly execution (i.e. which day of a certain month).

The screenshot shows a dialog box titled "Time Trigger Options" with a tab labeled "Related Values". The dialog contains the following fields and options:

- Name:** A text field containing "NewTimeTrigger".
- Description:** An empty text field.
- Recurrence Pattern:** A section with radio buttons for "Daily", "Weekly", "Monthly", and "Yearly". The "Yearly" option is selected. To the right of the "Yearly" option are two sub-options: "Every" and "The". The "Every" option is selected, followed by a dropdown menu showing "January" and a numeric field showing "1". The "The" option is followed by a dropdown menu showing "first", the word "day", another dropdown menu showing "of", and a final dropdown menu showing "January".
- Recurrence Conditions:** A section with a checkbox labeled "Enable on Tag (Trigger will be disabled if Enable Tag has a value 0, FALSE or BadQuality)". Below this checkbox is a text field labeled "Enable Tag".
- Start Date:** A dropdown menu showing "7/ 3/2008".
- Start Time:** A time selection field showing "12:00:00 AM".

At the bottom of the dialog are three buttons: "Apply", "Reset", and "Add New".

Figure 6.10 - Yearly Recurrence Pattern

6.5 Data Triggers

A **Data Trigger** executes an event when the data in the monitor tag changes. In the **Data Trigger Properties** tab, you can configure the following settings:

- **Name:** Enter a name for the time trigger.
- **Description:** Enter a description for the time trigger (optional)
- **Enable on Tag:** Checking this box links the activation of the event switch to a specified data tag value. Enter the tag name in the **Enable Tag** field.
- **Enable Tag:** Specify a tag on which to enable the event switch. Clicking the ... button allows you to select a tag from the Unified Data Browser. The trigger will be disabled if **Enable Tag** has a value of 0, FALSE, or BadQuality.
- **Apply:** Saves all changes to the configuration database.
- **Reset:** Clears all recently added information.
- **Add New:** Creates a new event switch item to be configured.

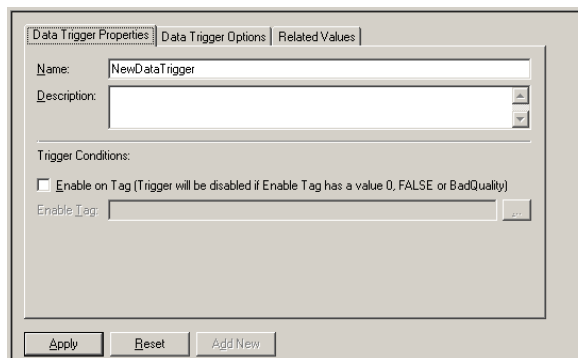


Figure 6.11 - Data Trigger Properties

In the Data Trigger Options tab, as shown in Figure 6.12, you can configure the following settings:

- **Execute Condition:** The trigger executes an event on any data tag change, or when the data tag changes to TRUE or FALSE.
- **Data Tag:** If the trigger executes on a data tag change, you can either type a data tag directly into this field, or you can click the ... button to the right of this field to open the Unified Data Browser, where you can select a data tag.

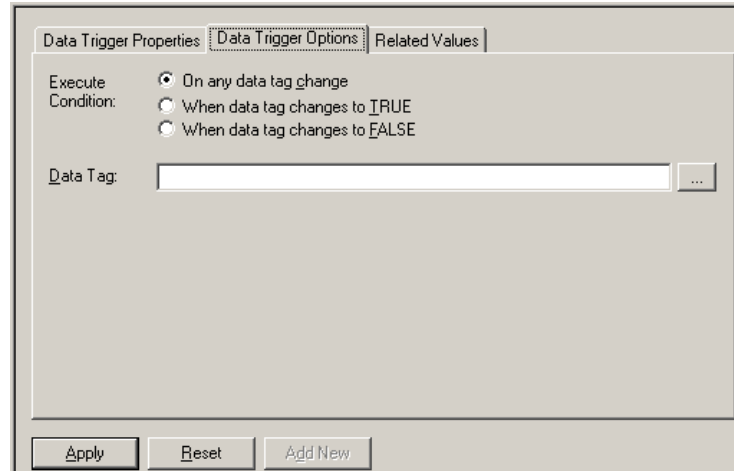


Figure 6.12 - Data Trigger Options

The **Related Values** tab allows tags to be read when the Data Trigger is executed.

- **Add Tag:** Add a new tag to the related values.
- **Add Value:** Add a new value to the related values.
- **Remove:** Remove a tag or Value from the related values.
- **Edit:** Change a selected tag or Value.
- **Apply:** Saves all changes to the configuration database.
- **Reset:** Clears all recently added information.
- **Add New:** Creates a new event switch item to be configured.

NOTE: For other triggers such as Alarm Triggers, File Triggers, NTEvent Triggers, and Database Triggers, please refer to the help documentation in the Unified Data Manager.

Lab: Transaction Triggers and Actions 6

6.1 Quick Lab Overview

This lab will explain how to add transaction triggers and post transaction tasks to a transaction.

In previous labs, we have started the transaction manually by clicking on the **Execute Now** button, but, in a real project, this should be done automatically. Transaction triggers would be used to achieve this.

One of the things that makes BridgeWorX unique is its post transaction actions. With these you can be notified if a transaction fails. The complete process of a transaction is shown in Figure L6.1. The transaction execution is started by a trigger. After the transaction is completed, it can perform a post transaction action.

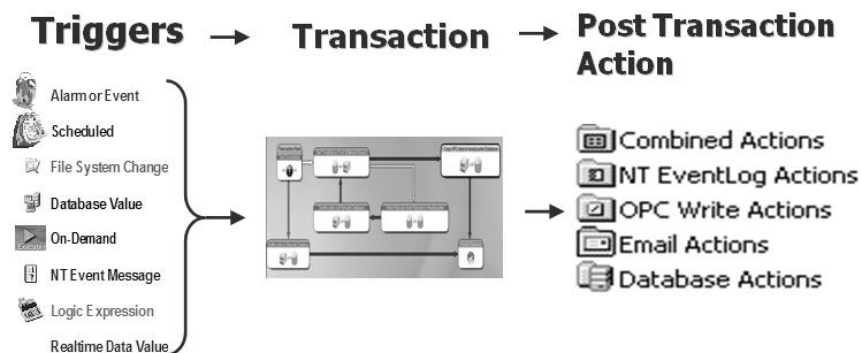


Figure L6.1 - Transaction Process Overview

6.1.1 Task Checklist

In this lab you will complete the following tasks:

- Add a trigger to the UDM.
- Add a trigger to the configuration.
- Add a post transaction action.

6.1.2 Support Files

To complete this lab you will not need any support files.

6.2 Triggers

The first section will explain how to configure a trigger in the Unified Data Manager (UDM). All triggers must be configured in the UDM. The next section will explain adding triggers to a transaction from the BridgeWorX Configurator or from the Unified Web Interface.

6.2.1 Adding a Trigger in Unified Data Manager (UDM)

1. Click on the Store and Forward transaction
2. Switch to Advanced mode by clicking on the Advanced Mode  button
3. With the Scheduling tab selected, click on the **New...** button as shown in Figure L6.2, to open the Unified Data Manager.

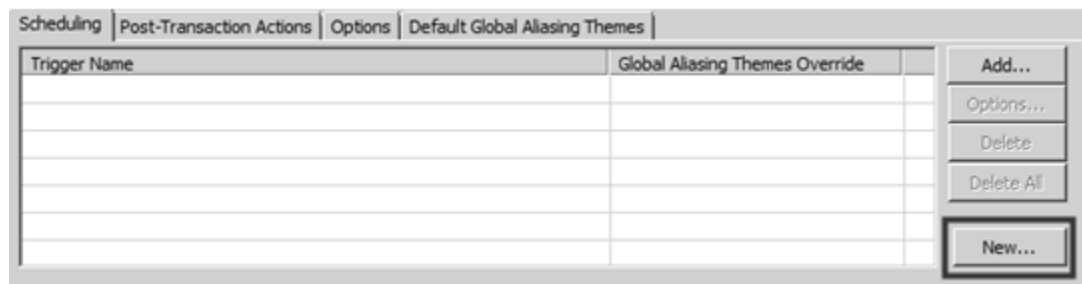


Figure L6.2 - New Trigger

4. Expand the **Event Triggers** folder in the tree control. You will see the different types of triggers that are available.

- Right-click on Date/Time Triggers and select **Time Trigger Item**, as shown in Figure L6.3.

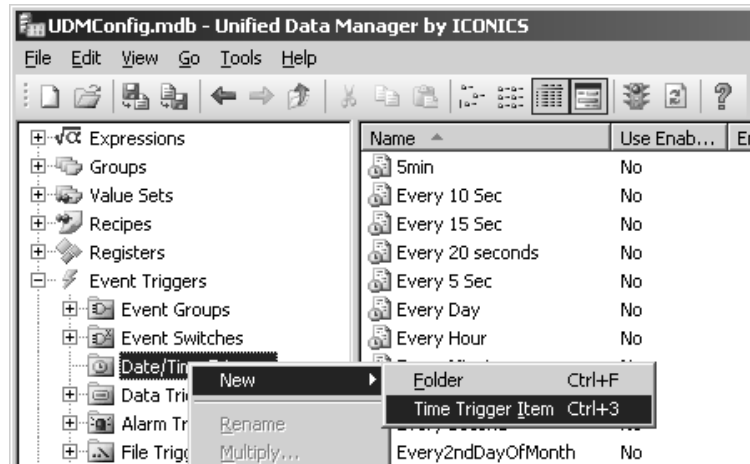


Figure L6.3 - Adding a Time Trigger

- Name the trigger **Every 20 seconds**, and set it to reoccur every 20 seconds daily.
- Click on **Apply** and the trigger is ready to be used. Close the Unified Data Manager (UDM) window.
- Return to the Store and Forward transaction's scheduling tab.
- Click on **Add** to open the Unified Data Browser. Click on the **UDM Data** tab and select the **Time Triggers** folder. Double-click on the **Every 20 seconds** trigger to add this trigger to the Selected Items at the top. Click **OK**.
- Click on **Apply**, and if your BridgeWorX engine is running you will get a warning asking if you want to notify the BridgeWorX engine with the new triggers. Select **Yes, notify Transaction Engine Now** as shown in Figure L6.4.

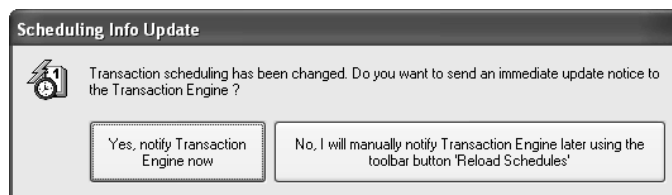


Figure L6.4 - Scheduling Info Update

- The BridgeWorX engine will now execute the transaction every 20 seconds.
- See the effects from the **StoreAndForward.gdf** file.

6.3 Post Transaction Actions

We are now going to add a Post Transaction Action to the Store and Forward configuration.

1. Open the BridgeWorX Configurator and go to the Store and Forward configuration. Make sure you are in the Advanced mode.
2. Click on the Post-Transaction Actions tab and with the “On Complete (regardless of the success or fail status): selected, click on the Create a New Action button .
3. Name the action **Write to String** and then select the OPC Write action. Click on OK.
4. Click on the ellipsis button  to the right of the OPC Tag: to open the Unified Data Browser.
5. Browse for the following folder: My Computer → ICONICS.Simulator.1 → SimulatePLC → OUTPUTS
6. In the right hand pane, double-click on **STRING**. This will bring you back to the BridgeWorX configuration.
7. In the Value to write box, type **/L**. This will write the name of the last executed block into the OPC tag when the transaction is completed. Click on **Apply**
8. In the **StoreAndForward.gdf** you will see the last block name appear in the upper right corner, as shown in Figure L6.5.

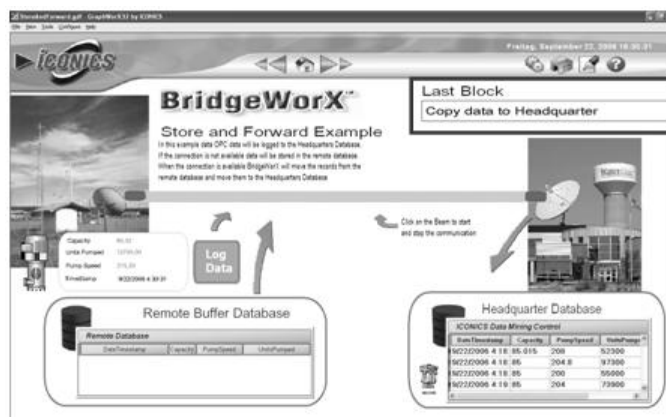


Figure L6.5 - Last Executed Block

Unified Web Interface 7

7.1 Introduction

The Unified Web Interface enables you to execute reports on demand and browse reports from any client computer with Internet Explorer 5.5 or above. Reports can be accessed over company intranets or over the Internet.

The Unified Web Interface allows you to:

- Execute reports
- Visualize reports
- Manage reports

The Unified Web Interface displays configuration information from the active configuration database, and it enables you to modify configuration information. Any configuration change that you make in the Unified Web Interface is updated in the active configuration database. Similarly, all changes that are made to the active configuration database using the BridgeWorX Configurator are reflected in the Unified Web Interface.

The Unified Web Interface also feature Windows NT integrated security. Only registered users or groups with access rights may view, execute, and manage transactions.

NOTE: The Unified Web Interface allows you to modify existing transactions in the active configuration database from the client side. You can modify transaction configuration and scheduling, but you cannot create new transactions. Transactions can only be created through the BridgeWorX Configurator on the server side.

7.1.1 Launching the Unified Web Interface

You can launch the Unified Web Interface from the BridgeWorX Configurator on the server by clicking on the **Visualize Transactions** button on the Configurator toolbar, as shown in Figure 7.1.



Figure 7.1 - Starting the Unified Web Interface

The Unified Web Interface opens in Internet Explorer. You can also launch the ReportWorX Unified Web Interface from a client machine on a company intranet or over the Internet. Open Internet Explorer and go to the following URL address:

<http://<mywebserver>/Main/Secured/LayoutProcessor.aspx>

where <mywebserver> should be the actual server's computer name or IP address. The Unified Web Interface opens in Internet Explorer. You can use the same URL to open the Unified Web Interface on the server machine.

7.1.2 The User Interface

Once the Unified Web Interface opens, you will notice that it is organized into three main sections:

- **Navigation Tree:** Contains providers, groups, and tabs.
- **Command Bar:** This menu bar in the header above the work area allows you to configure administration settings and user preferences.
- **Content Area:** Here, you can manage and visualize all aspects of the Unified Web Interface plug-ins.

7.1.2.1 Navigation Tree

The **Navigation Tree** contains the provider, groups, and tabs configured by the subscription. By default, if ReportWorX and BridgeWorX were installed before your Unified Web Interface installation, both providers are in the navigation tree as shown in Figure 7.2.



Figure 7.2 - Navigation Tree

Providers are available for ReportWorX, BridgeWorX, Productivity Analytics, and Custom XML. The **Custom XML Provider** can be used for adding additional content such as external links to the Navigation Tree.

7.1.2.2 Command Bar

The **Command Bar**, shown in Figure 7.3, is a menu bar that allows you to get to the Unified Web Interface's Administration and User Preferences page. There, you can change some settings for the Unified Web Interface. For more information on the options, please refer to the Unified Web Interface documentation.



Figure 7.3 - Command Bar

7.1.2.3 The Content Area

The Content Area, shown in the Figure 7.4, is the main work area for the Unified Web Interface. What you see in the Content Area varies according to which provider link item is selected in the Navigation Tree. Here you can manage and visualize all aspects of a report, including report configuration, execution, and management.

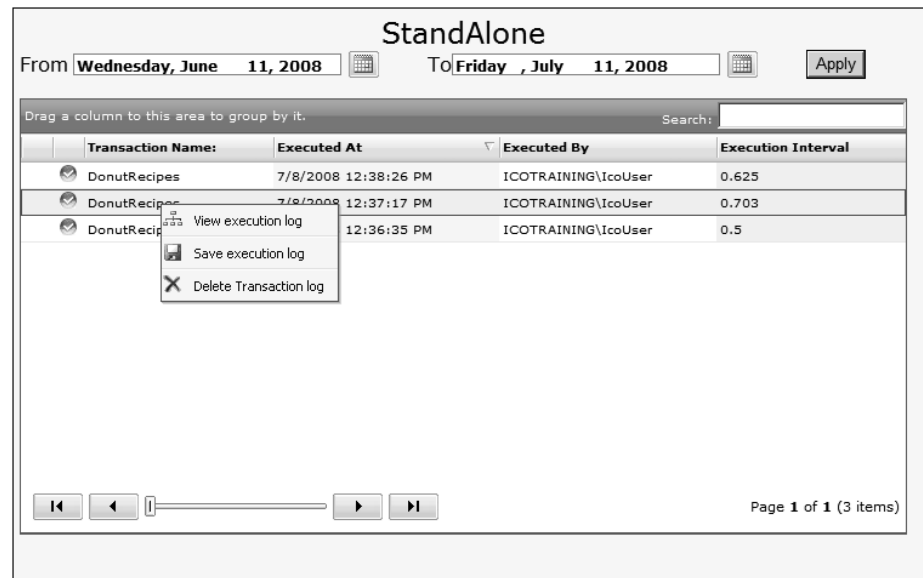


Figure 7.4 - The Content Area

Features of the Content Area include:

- Context-sensitive menus that provide shortcuts to the most common functionality for visualizing data
- Support for item sorting and grouping, enabling easier analysis and retrieval of data
- Filtering data by time range
- Paging slider bar for easy navigation between pages
- A search field that enables full-text search of all data items and columns

7.1.3 Transactions in the Unified Web Interface

The Unified Web Interface allows users with appropriate access right to view transactions over the Internet and intranets. Windows integrated security is used to authenticate user identity. Once a user's identity is known, the BridgeWorX security engine establishes which reports can be generated, viewed, or modified by the user. (See the BridgeWorX Configurator documentation for details.)

In order to visualize transactions using the Unified Web Interface, you must first create and configure your transactions in the BridgeWorX Configurator on the server side. Transactions can be created only through the BridgeWorX Configurator. From the client side, the Unified Web Interface only allows you to modify existing transactions in the active configuration database.

To view your transactions through the Unified Web Interface, you will need to first start the BridgeWorX Service on the server side. Once it is started, launch the Unified Web Interface from your web browser. When you see the BridgeWorX provider in the main page, you can navigate to the desired transaction for execution.

NOTE: Without a valid BridgeWorX license your BridgeWorX Service will only run in two-hour demo mode.

Viewing your transactions through the Unified Web Interface requires the following basic steps:

- Start the BridgeWorX Service on the server side.
- Launch the Unified Web Interface in your web browser.
- Execute the selected transaction.
- View the executed transaction.

7.1.4 Executing Transactions

By selecting the **BridgeWorX** folder in the Navigation Tree, you will be able to expand the proper folder and select the transaction that you want to execute as shown in Figure 7.5.

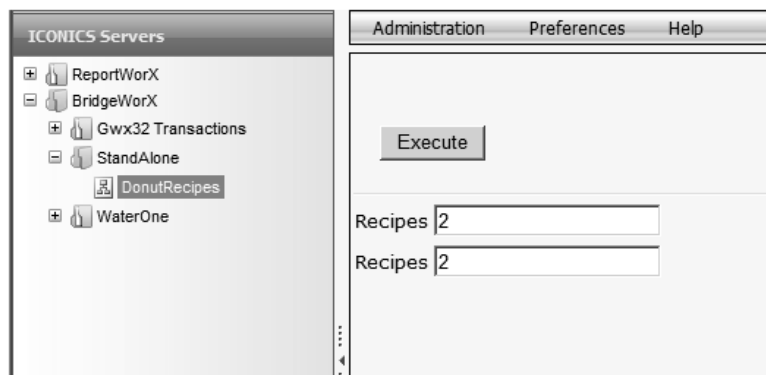


Figure 7.5 - Execute Transaction Page

7.1.4.1 Parameters and Execution Options

You can select a transaction to run from the appropriate Transaction Folder, which lists all enabled transactions (to which you have permissions) in the active configuration database, as shown in Figure 7.6.



Figure 7.6 - Unified Web Interface: Transaction Folder

The Unified Web Interface will take display all possible parameter selections necessary to run the transaction. Parameters are configured on the server side to allow you to refine the data in the transaction, as shown in Figure 7.7.

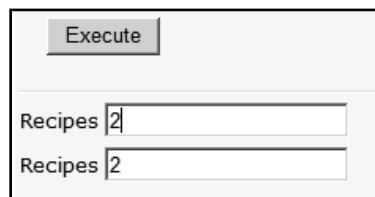


Figure 7.7 - Parameter Options for the Donut Recipe Transaction

When you run (execute) a transaction, there may be a delay as the Web Interface receives data from the active configuration database and the BridgeWorX transaction service. If the transaction is successfully executed, then you will be notified. The execution time in the message is the time that the transaction took to be processed on the server side. This does not include the time required to execute the transaction or to perform any of the redirector actions.

NOTE: In order to execute a transaction, you must have permission for transaction execution for the folder in which the selected transaction is located. Please refer to the User Management Chapter for information about configuring transaction folder permissions.

Sometimes the transaction may take longer than expected to execute due to the amount of data in it or due to the time required to convert it into HTML. If the transaction takes too long to execute, then you will be notified with a message. In this case, the transaction will keep executing, but the Web Interface will stop waiting for it.

7.1.5 Visualizing Transactions

The **Content Area** of the Unified Web Interface, shown in Figure 7.8, is the main page for viewing data for transactions executed. All executed transactions can be viewed from this page. The page also shows the currently logged user account. Click on the folder icons to expand or collapse the folders. To view tracing information about an executed transaction, simply click on the icon in the right-hand column for that particular execution of your transaction.

Transaction Name	Executed At	Executed By	Execution Interval
DonutRecipes	7/11/2008 11:16:02 AM	ICOTRAINING\IcoUser	1.093
DonutRecipes	7/8/2008 12:38:26 PM	ICOTRAINING\IcoUser	0.625
DonutRecipes	7/8/2008 12:37:17 PM	ICOTRAINING\IcoUser	0.703
DonutRecipes	7/8/2008 12:36:35 PM	ICOTRAINING\IcoUser	0.5

Figure 7.8 - Visualizing Transactions

NOTE: Only registered users or groups with access rights may view transactions. In order to view a transaction, you must have permission for transaction viewing for the folder in which the selected transaction is located. Please refer to the BridgeWorX Configurator documentation for information about configuring transaction permissions.

The transaction data are sorted according to the transaction folders in the active transaction configuration. Within each folder, you can sort the data in each column in ascending or descending order by clicking on the column heading.

Each transaction folder lists the following data columns:

- **Transaction Name:** Displays the transaction names as shown in the configuration database. The **Transaction Name** column in the **Visualize Transactions** page of the Unified Web Interface lists both transactions that were executed successfully as well as transactions that failed to execute. To view an executed transaction, simply click on the transaction name. If the transaction does not have an icon or the transaction name does not have a hyperlink, then it means that the transaction is not available on the web server. This may occur when the transaction does not have an action associated with it.
- **Executed At:** Lists the date and time each transaction was executed.
- **Executed By:** Displays the user who executed the transaction.
- **Execution Interval:** Displays the amount of time (in seconds) that the transaction took to execute.

7.1.5.1 Viewing Transactions

After a transaction has been executed, you can click on the green check icon to the left of the transaction to go to the **Visualize Transactions** page to view the transaction, as shown in **Error! Reference source not found.10**.

	Transaction Name:	Executed At	Executed By	Execution Interval
	DonutRecipes	7/11/2008 11:16:02 AM	ICOTRAINING\IcoUser	1.093

Figure 7.9 - Link to Visualize Transaction Page

The **Transaction Name** column in the **Content Area** of the Unified Web Interface lists both transactions that were executed successfully as well as transactions that failed to execute.

7.1.5.2 Transaction Icons

In the column to the left of the **Transaction Name** resides an icon that indicates the status of the executed transaction. You can click on the icon to view the transaction. If you have multiple actions for the same transaction, the transaction will be executed in multiple locations, and you will see multiple icons, each representing a single action. Each icon is described below.

- **No Icons:** When a transaction appears in the visualization page but there is no icon associated with the transaction, it means that the transaction does not have an action associated with it. The user name or the password may be wrong, or the target URL may be incorrect. It could also simply mean that the web server may deny the "writing" access permission for the specific location and user. In this case, check your web server access rights for the target URL.
-  **Cancelled:** Transaction has been cancelled during execution; execution was never completed.
-  **Failed:** Transaction has failed to execute for some unknown reason.
-  **Succeeded:** Transaction was completed successfully.

7.1.5.3 Filtering Transaction Data

The **Content Area** page of the Unified Web Interface allows you to filter transactions by their date of execution, as shown in Figure 7.10.

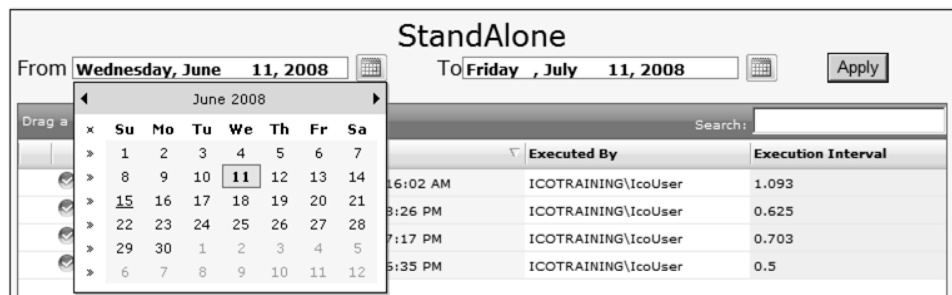


Figure 7.10 - Filtering Transaction Data

You can manually enter a Start and End date (From and To) or click on the calendar button to bring up a calendar and select the date.

7.1.5.4 Transaction Tracing

To view tracing information about an executed transaction, simply click on the green check icon to the left of your transaction.

You can view the **Execution Log** for the transaction, as shown in Figure 7.11. This log shows the execution statistics as well as the tracing diagram that tracks the steps in the transaction. The execution log can be used to troubleshoot and diagnose problems.

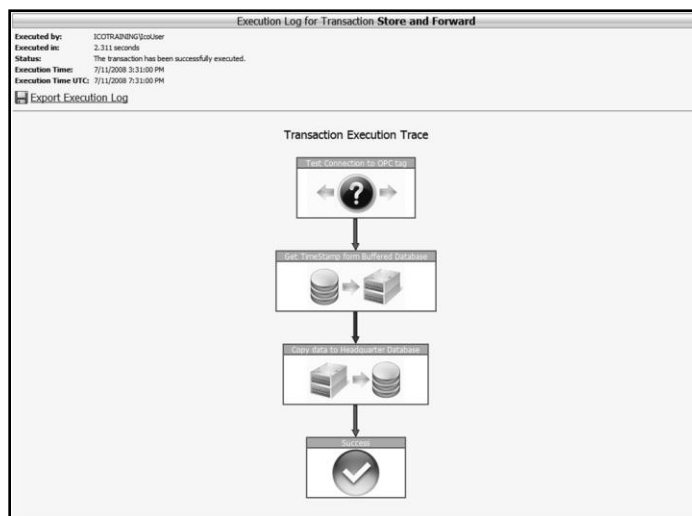


Figure 7.11 - Transaction Execution Log

If preferred, clicking the **Export Execution Log** link will allow you to save the log in XML format, as shown in Figure 7.12.

```
<?xml version="1.0" encoding="UTF-8" ?>
<xsd:schema id="NewDataSet" xmlns:xsi="http://www.w3.org/2001/XMLSchema" xmlns:msdata="urn:schemas-microsoft-com:xml-msdata">
  <xsd:element name="NewDataSet" msdata:IsDataSet="true" msdata:UseCurrentLocale="true">
    <xsd:complexType>
      <xsd:choice minOccurs="0" maxOccurs="unbounded">
        <xsd:element name="TransactionTrace">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="TransID" msdata:ReadOnly="true" type="xs:int" />
              <xsd:element name="TransName" msdata:ReadOnly="true" type="xs:string" />
              <xsd:element name="TransExecDateUTC" msdata:ReadOnly="true" type="xsd:dateTime" />
              <xsd:element name="TransExecTime" msdata:ReadOnly="true" type="xsd:double" minOccurs="0" />
              <xsd:element name="TransError" msdata:ReadOnly="true" type="xs:string" minOccurs="0" />
              <xsd:element name="TransErrorDescr" msdata:ReadOnly="true" type="xs:string" minOccurs="0" />
              <xsd:element name="TransUser" msdata:ReadOnly="true" type="xs:string" />
              <xsd:element name="TransStatus" msdata:ReadOnly="true" type="xs:int" />
              <xsd:element name="TransCurrTaskID" msdata:ReadOnly="true" type="xs:string" minOccurs="0" />
              <xsd:element name="TransRetrievalCount" msdata:ReadOnly="true" type="xs:int" minOccurs="0" />
              <xsd:element name="LastDiagramInError" msdata:ReadOnly="true" type="xs:string" minOccurs="0" />
              <xsd:element name="TransXMLVersion" msdata:ReadOnly="true" type="xs:string" />
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:choice>
    </xsd:complexType>
  </xsd:element>
  <xsd:element name="DiagramTrace">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="DiagramTraceID" msdata:ReadOnly="true" msdata:AutoIncrement="true" msdata:AutoIncrementSeed="1" type="xs:int" />
        <xsd:element name="TransID" msdata:ReadOnly="true" type="xs:int" />
        <xsd:element name="DiagramActionID" type="xs:string" />
        <xsd:element name="DiagramActionName" msdata:ReadOnly="true" type="xs:string" />
        <xsd:element name="DiagramActionDescr" msdata:ReadOnly="true" type="xs:string" minOccurs="0" />
        <xsd:element name="DiagramActionType" msdata:ReadOnly="true" type="xs:string" />
        <xsd:element name="DiagramActionStatus" msdata:ReadOnly="true" type="xs:string" />
        <xsd:element name="DiagramActionExecDate" msdata:ReadOnly="true" type="xsd:dateTime" />
        <xsd:element name="DiagramActionErrorDescr" msdata:ReadOnly="true" type="xs:string" minOccurs="0" />
        <xsd:element name="NextDiagramActionID" msdata:ReadOnly="true" type="xs:string" minOccurs="0" />
        <xsd:element name="DiagramCurrentRetrieval" msdata:ReadOnly="true" type="xs:int" />
        <xsd:element name="DiagramActionStartDate" msdata:ReadOnly="true" type="xsd:dateTime" />
        <xsd:element name="DiagramActionEndDate" msdata:ReadOnly="true" type="xsd:dateTime" />
        <xsd:element name="DiagramActionDuration" msdata:ReadOnly="true" type="xsd:double" />
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>
  <xsd:element name="DiagramMappingTrace">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="DiagramMappingID" msdata:ReadOnly="true" type="xs:int" />
        <xsd:element name="DiagramTraceID" msdata:ReadOnly="true" type="xs:int" />
        <xsd:element name="DiagramActionID" type="xs:string" />
        <xsd:element name="DiagramActionName" msdata:ReadOnly="true" type="xs:string" />
        <xsd:element name="DiagramActionDescr" msdata:ReadOnly="true" type="xs:string" minOccurs="0" />
        <xsd:element name="DiagramActionType" msdata:ReadOnly="true" type="xs:string" />
        <xsd:element name="DiagramActionStatus" msdata:ReadOnly="true" type="xs:string" />
        <xsd:element name="DiagramActionExecDate" msdata:ReadOnly="true" type="xsd:dateTime" />
        <xsd:element name="DiagramActionErrorDescr" msdata:ReadOnly="true" type="xs:string" minOccurs="0" />
        <xsd:element name="NextDiagramActionID" msdata:ReadOnly="true" type="xs:string" minOccurs="0" />
        <xsd:element name="DiagramCurrentRetrieval" msdata:ReadOnly="true" type="xs:int" />
        <xsd:element name="DiagramActionStartDate" msdata:ReadOnly="true" type="xsd:dateTime" />
        <xsd:element name="DiagramActionEndDate" msdata:ReadOnly="true" type="xsd:dateTime" />
        <xsd:element name="DiagramActionDuration" msdata:ReadOnly="true" type="xsd:double" />
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>

```

Figure 7.12 - Transaction Log in XML Format

You can view execution details for a particular transaction task by simply clicking on the task in the diagram, as shown in Figure 7.13. This displays information about the task properties, including name, type (e.g. database to OPC), execution time, data mapping details, data connector details, and global variables details.

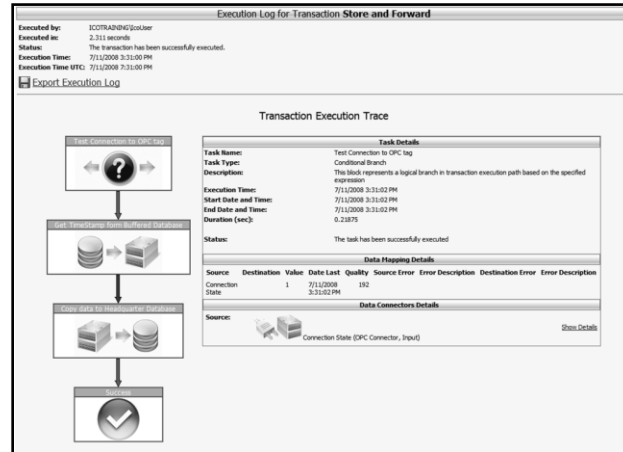


Figure 7.13 - Transaction Task Details

Clicking the **Show Details** links in the **Data Connectors Details** section displays specific information (e.g. operation, source, result, value, quality, date, etc.) about the source and destination of the data connectors.

Data Connectors Details								
Source:		Connection State (OPC Connector, Input)						
		Hide Details						
Operation	Source	Result	Value	Quality	Date Last	Msec	Error	
Update	ICONICS.Simulator.1 \\WaterOne.connection.connected?	Success	1	192	7/11/2008 3:31:02 PM	524		

Figure 7.14 - Data Connector Source Details

Clicking the Show Details link next to the Global OPC Connectors Information: text will display information about the Global OPC Connectors such as operation, source, result, value, quality, date last, Msec, and error, as shown in Figure 7.15.

Global OPC Connectors Information: Hide Details							
Operation	Source	Result	Value	Quality	Date Last	Msec	Error
Request	ICONICS.Simulator.1 \\WaterOne.connection.connected?	Success					
Request	ICONICS.Simulator.1\\WaterOne.pump.Capacity	Success					
Request	ICONICS.Simulator.1\\WaterOne.pump.PumpSpeed	Success					
Request	ICONICS.Simulator.1\\WaterOne.pump.UnitsPumped	Success					
Release	ICONICS.Simulator.1 \\WaterOne.connection.connected?	Success					
Release	ICONICS.Simulator.1\\WaterOne.pump.Capacity	Success					
Release	ICONICS.Simulator.1\\WaterOne.pump.PumpSpeed	Success					
Release	ICONICS.Simulator.1\\WaterOne.pump.UnitsPumped	Success					

Figure 7.15 - Data Connector Destination Details

NOTE: In order to view tracing information for a transaction, tracing must be enabled for those transactions.

User Management 8

8.1 Introduction to User Management

The BridgeWorX Configurator allows you to set transaction access permissions for Windows users and groups on the local computer or in a Windows NT domain over an intranet. The **User Management** tree control of the Configurator, shown in Figure 8.1, manages the registration of user and group accounts for the BridgeWorX Transaction Service. BridgeWorX can automatically detect the users and groups that are configured in your Windows system/NT domain and add them under the **User Management** tree control.



Figure 8.1 - User Management Tree Control

8.2 User Accounts Registration

The **User Accounts** tree control of the Configurator, shown in Figure 8.2, manages access permissions for Windows users, groups, and Windows NT domains.

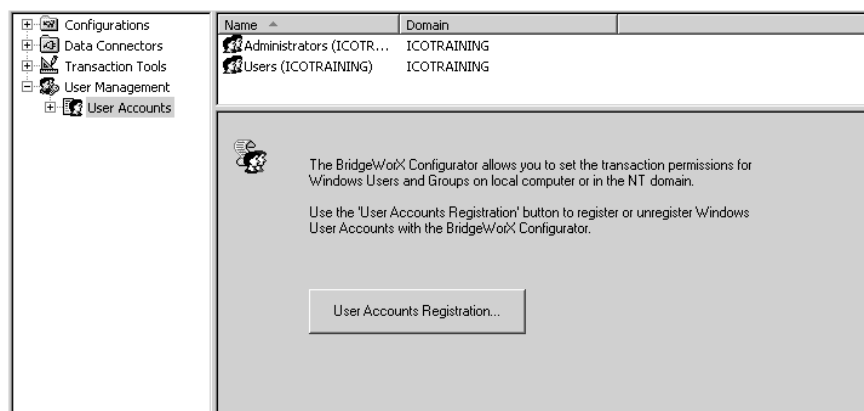


Figure 8.2 - User Accounts Configuration

To set up an account, click the **User Accounts Registration** button to open the **Accounts Registration** dialog box, as shown in Figure 8.3. All available users and groups for the local computer are listed in the top pane of the Window. You can choose the users/groups that you want to register with the transaction service at this point.

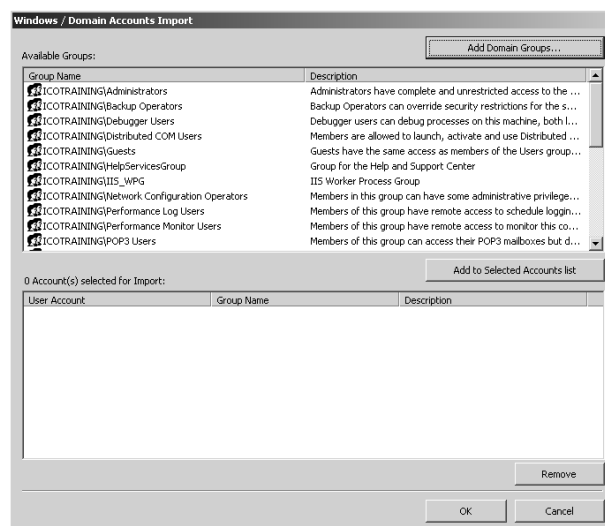


Figure 8.3 - Account Registration

NOTE: If you are on a network, you can select users and groups from other domains (computers) on the network by clicking on the **Add Domain Groups...** button.

All registered users and groups will appear in the **User Accounts** tree control of the Configurator.

8.2.1.1 Group Properties

The **User Accounts** tree control may contain various types of groups, including:

- **Administrators:** Administrators have complete and unrestricted access to the computer/domain.
- **Backup Operators:** Backup operators can override security restrictions for the sole purpose of backing up or restoring files.
- **Guests:** Guests have the same access as members of the Users group by default, except for the Guest account, which is further restricted.
- **Power Users:** Power users have most administrative powers with some restrictions. Thus, power users can run legacy applications in addition to certified applications.
- **Replicator:** Supports file replication in a domain.
- **Users:** Users are prevented from making accidental or intentional system-wide changes. Thus, users can run certified applications, but not most legacy applications.

The group properties dialog mostly contains fields that cannot be edited, as shown in Figure 8.4:

- **Group Name:** Displays the name of the registered group.
- **Description:** A description for each group type is provided.
- **Domain:** Displays the name of the computer on which the group is registered.
- **User Accounts Registration:** Clicking this button opens the **Accounts Registration** dialog box, which allows you to register users and groups. (Please see the "User Accounts Registration" section for more information.)

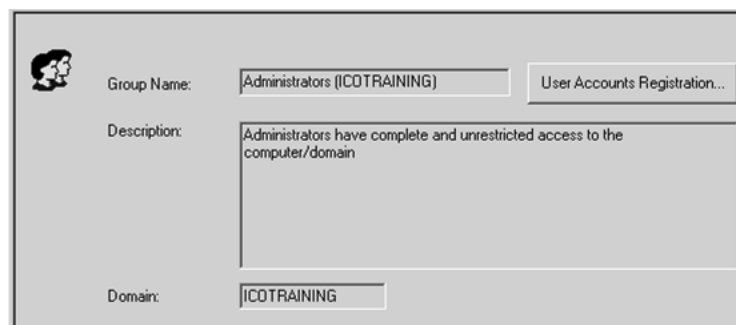


Figure 8.4 - Group Properties

8.2.1.2 User Properties

Each group in the **User Accounts** tree control of the Configurator, shown in Figure 8.5, may contain various types of users. The user properties are similar to the group properties, but you can also enter contact information for the user.

- **User Name:** Displays the name of the registered user.
- **Description:** A description for each user type is provided.
- **Domain:** Displays the name of the computer on which the user is registered.
- **User Accounts Registration:** Clicking this button opens the **Accounts Registration** dialog box, which allows you to register users and groups. (Please see the "User Accounts Registration" section for more information.)
- **E-mail Address:** Enter the user's e-mail address. An e-mail address must be specified if the user is to receive information via e-mail.
- **Apply:** Saves all changes to the configuration database.
- **Reset:** Clears all recently added information.

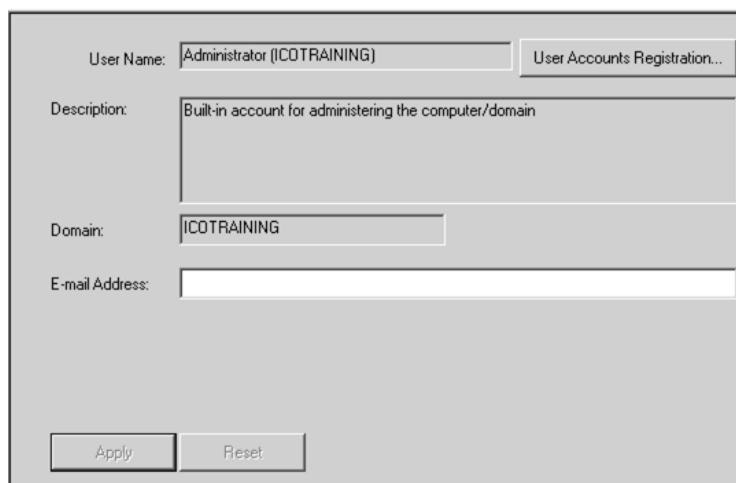


Figure 8.5 - User Properties

Troubleshooting 9

9.1 Introduction to Troubleshooting BridgeWorX

There are several options for troubleshooting your BridgeWorX applications:

- TraceWorX32 Utility
- Windows Event Viewer
- Performance Counters
- BridgeWorX Transaction Tracing

9.2 TraceWorX32 Utility

The ICONICS BizViz installation includes a utility called TraceWorX32, which has been incorporated into all ICONICS products to provide online diagnostics and tuning of applications running in the system. TraceWorX32 is designed expressly for systems integrators, OEMs, and customers who want to have tools for doing their own troubleshooting and diagnostics.

TraceWorX32 tracks the runtime activity for each BridgeWorX application and logs the runtime data to a log file based on user-configured trace levels. The log file provides a thorough, color-coded report detailing all activity for the application, including the time, date, severity level, and a description of the event or problem.

TraceWorX32 also features several options for reporting issues to technical support. If you are experiencing problems with any applications, the log file deployment options, such as compressing and e-mailing log files, are ideal for tracking and archiving data and sending detailed reports to technical support. Developers can use these reports to identify the source of the problems.

NOTE: For complete information about TraceWorX32, please see the TraceWorX32 Help documentation.

You can start the TraceWorX32 Configuration Utility by going to **Start → Programs → ICONICS Tools → TraceWorX32**. The **TraceWorX32.htm** file, which contains the Configuration Utility, is the TraceWorX32 user interface. Clicking on an application opens the Configuration Utility, shown in Figure 9.1, which consists of a table with the following columns:

- **Module:** Contains a button for each application. Clicking the button for an application opens the TraceWorX32 configuration dialog for that application.

NOTE: You can view Tooltips that contain information about a module by hovering the mouse pointer over the module's button. Each Tooltip lists the name of the binary file, the trace level, the trace log file size, and the maximum size of the trace log file.

- **Enabled:** Indicates whether tracing to a log file has been enabled for each module (**YES** in green, or **NO** in red). By default, tracing is not enabled. To enable tracing, you must specify a trace level in the module configuration.
- **Log File Size:** Lists the size (in bytes) of the current trace log file.
- **Binary File:** Lists the name of the .exe, .dll, or .ocx file for each application.

Module	Enabled	Log File Size	Binary File
Alarm Trigger	NO	0 bytes	AlarmTrigger.dll
AlarmWorX32 Logger	NO	0 bytes	AWXLog32.exe
AlarmWorX32 MDI Container	NO	0 bytes	Aw32.exe
AlarmWorX32 Multimedia Email	NO	0 bytes	MMXmailSMTP.exe
AlarmWorX32 Multimedia Fax	NO	0 bytes	MMXFax.exe
AlarmWorX32 Multimedia IPMarquee	NO	0 bytes	IPMarquee.exe
AlarmWorX32 Multimedia Marquee	NO	0 bytes	MMXMarquee.exe

Figure 9.1 - TraceWorX32: Summary Information

Once you click on a module, the TraceWorX32 Configuration Utility opens as shown in Figure 9.2. In this utility, you can set the trace level (from 0, meaning trace all, to 1000, trace is off). You can also set the maximum file size and the trace file location in here.

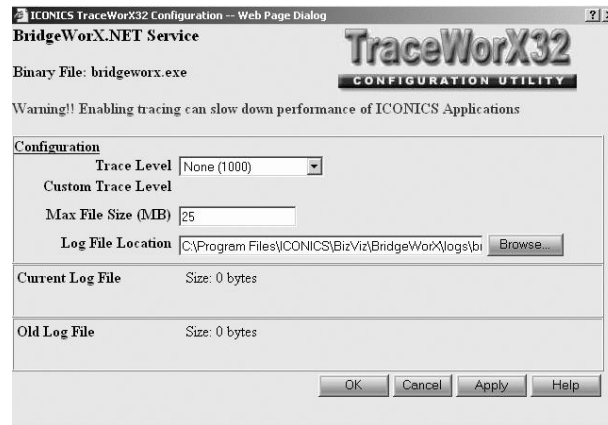


Figure 9.2 - TraceWorX32: Configuration Utility

Once you have some trace information, you can also click on the buttons in the Current Log File section to view the trace, delete it, email it, or zip it.

9.3 Windows Event Viewer

To facilitate deployment troubleshooting, BridgeWorX service posts a number of events to the Windows Event Viewer (Application Log). To enable this support, select **Programs → ICONICS Tools → License Monitor** from the start menu. On the **Events** tab of the License Monitor, you can enable event reporting for BridgeWorX and specify an appropriate level for filtering which events will be posted.

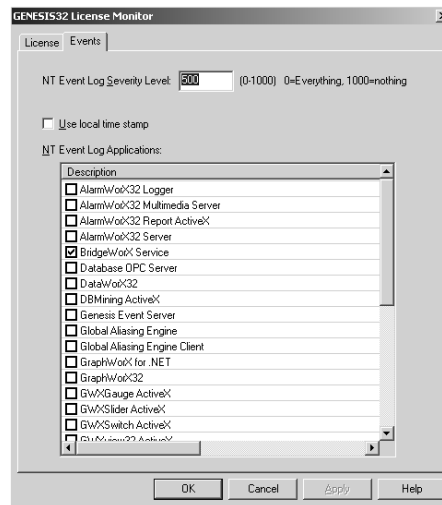


Figure 9.3 - Events in License Monitor

BridgeWorX will post a number of events to the Event viewer, relating to:

- Startup sequence of operations
- Shut down sequence of operations
- License status
- Scheduling configuration errors
- Transaction submission events
- Transaction completion events
- Transaction post-transaction task events
- Administrative types of events (such as schedule refreshes)

9.4 Monitoring BridgeWorX Performance Counters

The BridgeWorX service exposes performance counters, which are integrated natively within the Windows Performance counter monitoring system. The **BridgeWorX** category, shown in Figure 9.4, relates to performance counters associated with the core transaction execution activity, such as transaction execution interval, etc.

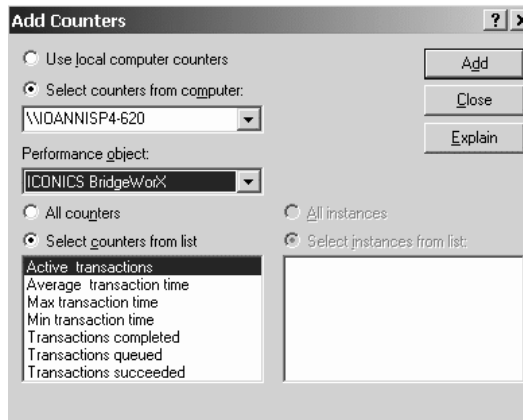


Figure 9.4 - Monitoring BridgeWorX Performance Counters

The above tools can be used to diagnose possible issues and improve overall system performance by analyzing task execution times, identifying long running transactions, which may take longer processing time than expected due to some configuration or setup issue.

You can control the amount of resources utilized by the BridgeWorX service by configuring the number of concurrent transactions enabled to run in the system, as shown in Figure 9.5.

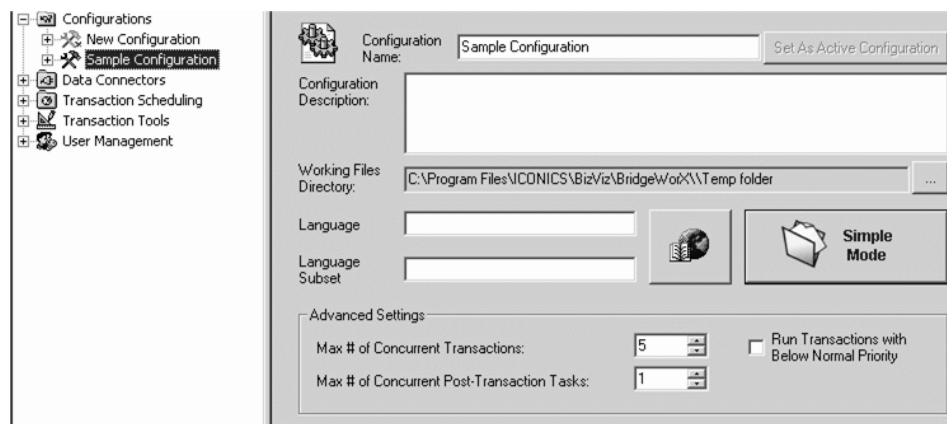


Figure 9.5 - Advanced Transaction Configuration Settings

By setting the **Maximum Number of Concurrent Transactions**, you have a direct way of controlling the system resources utilized while processing transactions. As each transaction is tasked for execution, it is submitted to a queue where it will be processed in the order in which it was submitted to the queue. Increasing the default setting to a higher value will require more CPU and memory resources.

In addition, you can set the **Maximum Number of Concurrent Post-Transaction Tasks** to reduce the amount of CPU required. Enabling the **Run Transactions with Below Normal Priority** option causes all transactions to be processed in the background with lower priority.

9.5 BridgeWorX Transaction Tracing

A powerful method for debugging your transactions is **BridgeWorX Transaction Tracing**. This lets you visualize the exact flow of your transaction, including what path it followed (if there was more than one possible path), and what errors occurred in which blocks. There are two levels of tracing: **Task only** or **Task and each Data Mapping step**. The latter covers more detail by tracing each and every read and write that takes place.

Transaction tracing is turned off by default, so the first thing you need to understand is how to enable it. Depending on how detailed you want your trace information to be, there are a few different places from which you can enable tracing. At the most basic level, you should go into the transaction diagram for the transaction that you want to trace. In the Properties dialog of each transaction block (e.g. OPC to OPC, Database to OPC, Conditional Block, etc.) there is a dropdown list at the bottom that allows you to specify the trace level, as shown in Figure 9.6.

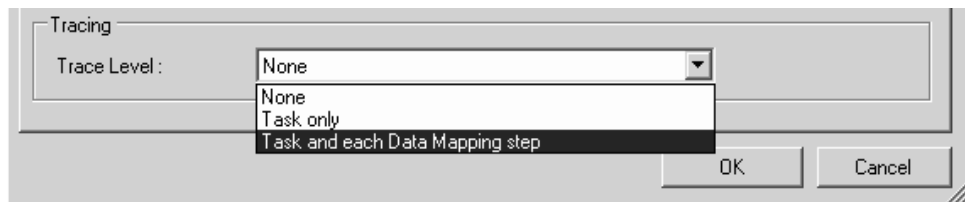


Figure 9.6 - Enabling Tracing at the Transaction Block Level

To get into more detail about the data mapping steps, the Options tab in **Advanced Mode** for a transaction has the **Enable transaction tracing** check box, as shown in Figure 9.7. Unless this check box is checked, you will not see any details about the data mapping, even if you have selected **Task and each Data Mapping step** in the transaction block properties.

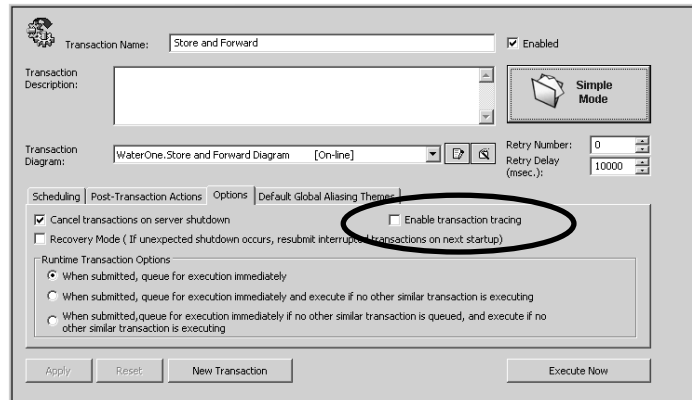


Figure 9.7 - Enabling Tracing at the Transaction Level

9.5.1 Visualizing Trace Information

Once you have enabled tracing in all of the appropriate locations, the next time you execute that transaction it will have a trace file associated with it. Currently the only way to view this trace file is through the **Unified Web Interface**, which you can launch by clicking on the **Visualize Transactions** button in the BridgeWorX Configurator toolbar.

After the Web Interface has finished loading, you should see a list of all of the transactions that you have executed in the past. If you have not already executed your trace-enabled transaction before launching the Web Interface, you can execute your transaction now either from the configurator or through the **Execute** page of the Web Interface.

Each individual execution of each transaction is available for you to visualize through the Web Interface. However, only those transactions with tracing enabled will actually show you anything. To visualize the tracing information for a particular transaction, simply click on the icon at the far left, as shown in Figure 9.8.

Transaction Name:	Executed At	Executed By	Execution Interval
Transaction Name: : Store and Forward			
 Store and Forward	7/11/2008 12:28:53 PM	ICOTRAINING\IcoUser	0.531
 Store and Forward	7/11/2008 12:28:40 PM	BridgeWorX Service	6.718
 Store and Forward	7/11/2008 12:28:20 PM	BridgeWorX Service	9.921

Figure 9.8 - Launching the Tracing Information

It will launch another Internet Explorer window, with something that resembles your transaction diagram for that transaction. Figure 9.9 shows an example of the tracing information from the **Donut Recipes** example.

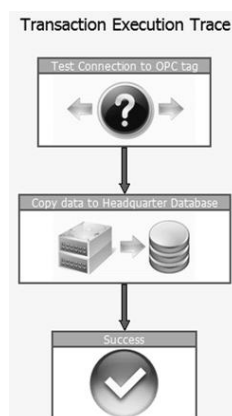


Figure 9.9 - Example of Transaction Tracing Information

You can click on the blocks in the trace file to reveal the task and data mapping details (if you have enabled them). Figure 9.10 shows an example of what happens when you click on a transaction block.

Execution Log for Transaction **Store and Forward**

Executed by: ICOTRAINING\jcoUser
 Executed in: 0.498 seconds
 Status: The transaction has been successfully executed.
 Execution Time: 7/11/2008 12:28:53 PM
 Execution Time UTC: 7/11/2008 4:28:53 PM
[Export Execution Log](#)

Transaction Execution Trace

Task Details

Task Name: Copy data to Headquarter Database
 Task Type: OPC to Database
 Description: This transaction block performs a data transfer from OPC to database
 Execution Time: 7/11/2008 12:28:53 PM
 Start Date and Time: 7/11/2008 12:28:53 PM
 End Date and Time: 7/11/2008 12:28:54 PM
 Duration (sec): 0.109375
 Status: The task has been successfully executed

Data Mapping Details

Source	Destination	Value	Date Last	Quality	Source Error	Error Description	Destination Error	Error Description
WaterPump	Write to Headquarter Database	1	7/11/2008 12:28:53 PM	192				
TimeStamp [0]	Write to Headquarter Database	7/11/2008 12:28:53 PM	7/11/2008 12:28:53 PM	192				
WaterPump	Write to Headquarter Database	1	7/11/2008 12:28:53 PM	192				
WaterPump	Write to Headquarter Database	30	7/11/2008 12:28:53 PM	192				

Figure 9.10 - Task and Data Mapping Details for Commuter's Special Block

If you have enabled tracing at the data connector level, there will also be a Show Details link for each data connector involved in the transaction. For Database data connectors it will show the database query and any relevant parameters that were used. Lastly, for OPC data connectors, it will show each OPC read or write request, complete with a result, value, quality, and timestamp.



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