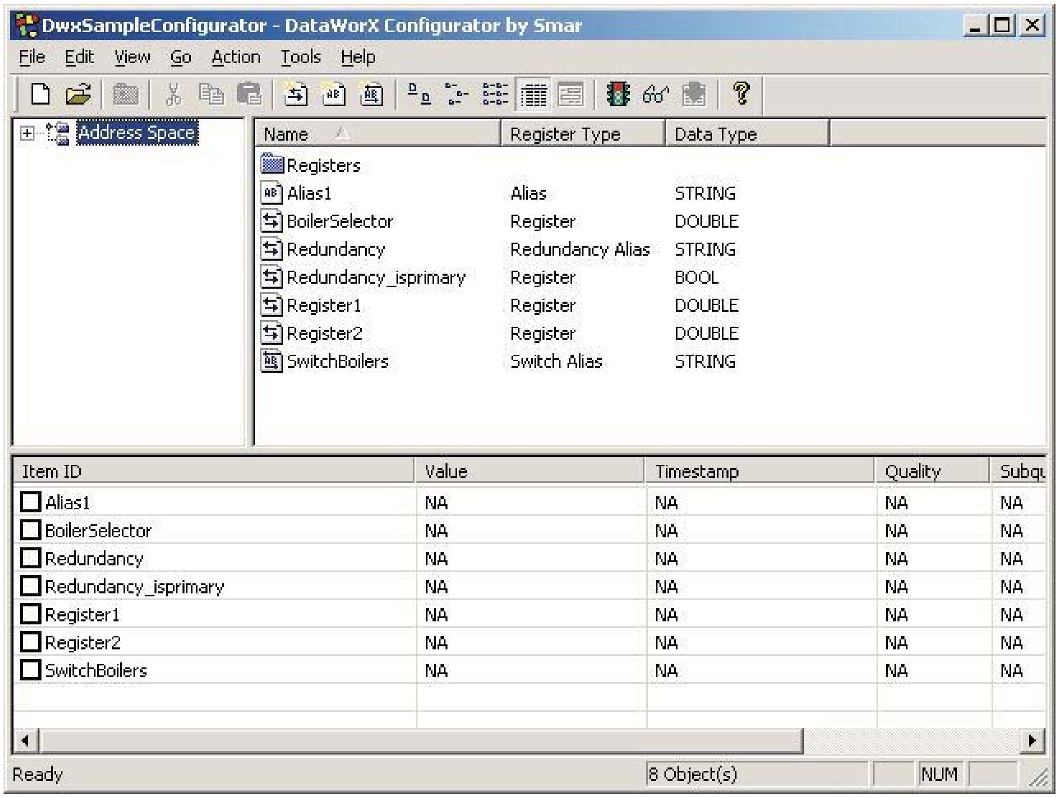
USER'S MANUAL

- DataWorX

smar
First in Fieldbus

DataWorX


DwxSampleConfigurator - DataWorX Configurator by Smar
File Edit View Go Action Tools Help
Address Space

Name	Register Type	Data Type
Registers		
Alias1	Alias	STRING
BoilerSelector	Register	DOUBLE
Redundancy	Redundancy Alias	STRING
Redundancy_isprimary	Register	BOOL
Register1	Register	DOUBLE
Register2	Register	DOUBLE
SwitchBoilers	Switch Alias	STRING

Item ID	Value	Timestamp	Quality	Subqu
□ Alias1	NA	NA	NA	NA
□ BoilerSelector	NA	NA	NA	NA
□ Redundancy	NA	NA	NA	NA
□ Redundancy_isprimary	NA	NA	NA	NA
□ Register1	NA	NA	NA	NA
□ Register2	NA	NA	NA	NA
□ SwitchBoilers	NA	NA	NA	NA

Ready 8 Object(s) NUM

MAY / 06

DataWorX

VERSION 8

FOUNDATION

PVI EWDWKME

smar
www.smar.com

Specifications and information are subject to change without notice.
Up-to-date address information is available on our website.

web: www.smar.com/contactus.asp

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Chapter 1

STARTING THE DATAWORX CONFIGURATION

Introduction to DataWorX

DataWorX is a 32-bit, multithreaded, OPC-compliant client and server application providing multiple functionality. DataWorX is a component of the ProcessView product family, and it serves as a project-level data system for ProcessView applications. Acting as a bridge between various OPC servers, DataWorX provides different OPC data channels. Once multiple I/O channels are established between PCs, DataWorX will switch between a primary PC (node) and a backup PC on the network. Should the primary PC be disabled, DataWorX will automatically (should the options be specified) default to the backup PC and vice versa. Another feature of DataWorX is the use of global variables that are accessible from multiple clients.

Software Licensing Protection Necessary for Runtime Mode

DataWorX is installable as a stand-alone COM component. It registers itself with the ProcessView license protection mechanisms. DataWorX permits unlimited configuration capabilities with or without the software license protection present. It requires software license protection to work in runtime mode. If such licensing is not present, DataWorX runs for two hours in runtime mode before timing out.

DataWorX Interface With the ProcessView Security Application

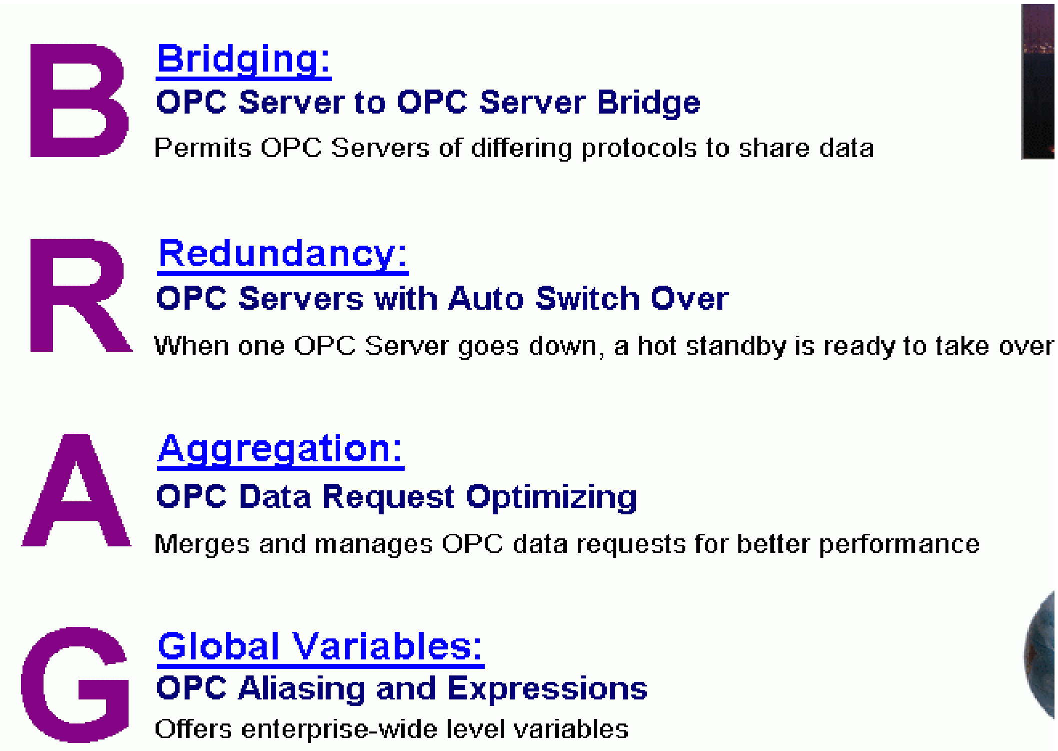
From within the security configuration application, you can restrict access to the various features and/or data available via DataWorX.

DataWorX supports multiple languages. That is, menu items, forms and various other text items are available for translation into other international languages through the ProcessView Language Configurator.

Key DataWorX Capabilities

DataWorX is an OPC-compliant server and client that conforms to Microsoft COM/DCOM program practice. The main features of DataWorX include:

- OPC data-bridging and sharing between OPC servers.
- OPC server redundancy with auto switchover.
- OPC data aggregation for better performance and more efficient data management.
- Global variables for OPC aliasing and expressions.



B **Bridging:**
OPC Server to OPC Server Bridge
Permits OPC Servers of differing protocols to share data

R **Redundancy:**
OPC Servers with Auto Switch Over
When one OPC Server goes down, a hot standby is ready to take over

A **Aggregation:**
OPC Data Request Optimizing
Merges and manages OPC data requests for better performance

G **Global Variables:**
OPC Aliasing and Expressions
Offers enterprise-wide level variables

DataWorX Features

Features of DataWorX

The main features of DataWorX include the following:

- Serves as an OPC data bridge between OPC servers.
- OPC server redundancy with auto-switchover performance.
- OPC client request aggregation.
- Global variables.
- Register grouping and organization.
- Can be run as a service.
- OPC interface on both the client side and server side.
- Switch alias functionality.
- OLE automation interface.
- Conditions that can be used as register inputs.
- Time stamp and quality to points accessed via automation.
- Output to NT Event Logger.
- Support for GenBroker OPC over TCP/IP and SOAP/XML communications.
- Filter support.
- Statistics and performance analyzer.
- Startup with a specified file.
- Primary node status register.
- CSV file import and export.
- XML file import and export.

- Runtime command line option.
- Global aliasing support for OPC inputs and outputs.
- Changes made to DataWorX registers that are made together (in a single call to the OPC interface) are also made together. OPC clients connected to DataWorX are notified about all the changes in a single update.
- NATIVE register type for array support.
- Optional refresh mechanisms.
- Integrated Expression Editor.
- Disable OPC propagation support.
- New way of registering running instances.

DataWorX As an "OPC Bridge"

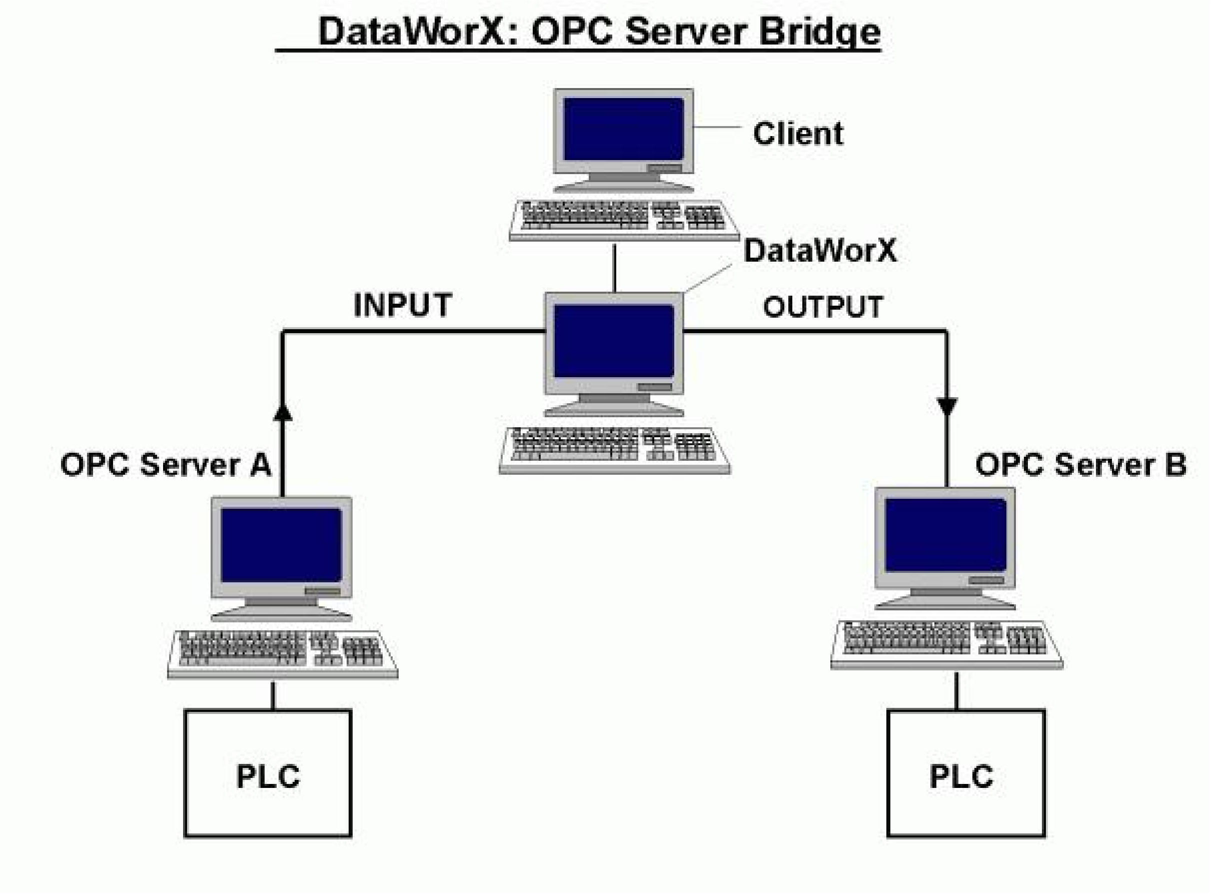
Customers sometimes need to pass information from one device on to another. For example, data from one brand of PLC need to be shared with another I/O device. In the past, users had to write their own programs to translate and move data from one server to another. DataWorX provides this server-to-server data exchange, serving as an "OPC bridge" between two or more servers.

OPC bridging is a unique and powerful feature of DataWorX. As its name suggests, its purpose is to provide "bridging" between OPC servers of various types.

Should you be required to scan input from one OPC server and supply it to another OPC server, you may "perform" expressions before sending the output to the other server via DataWorX.
OPC bridging in DataWorX involves the following:

- A register is defined in the DataWorX Configurator.
- The input and output for the register are defined in the register settings.
- This register is also available to other clients while, depending on the options specified for the register input, DataWorX continues to write values to output tags.
- There can be more than one output tag. This way DataWorX performs "bridging" between OPC servers by simultaneously reading values from one or more OPC servers and writing to one or more OPC servers.
- No scripting or programming is required for bridging.

The figure below illustrates the functionality of DataWorX as an OPC bridge between clients and servers. For another example of bridging, open the **DataWorX_Bridging.gdf** display in the "Smar\ProcessView \Examples\GenDemo" directory.

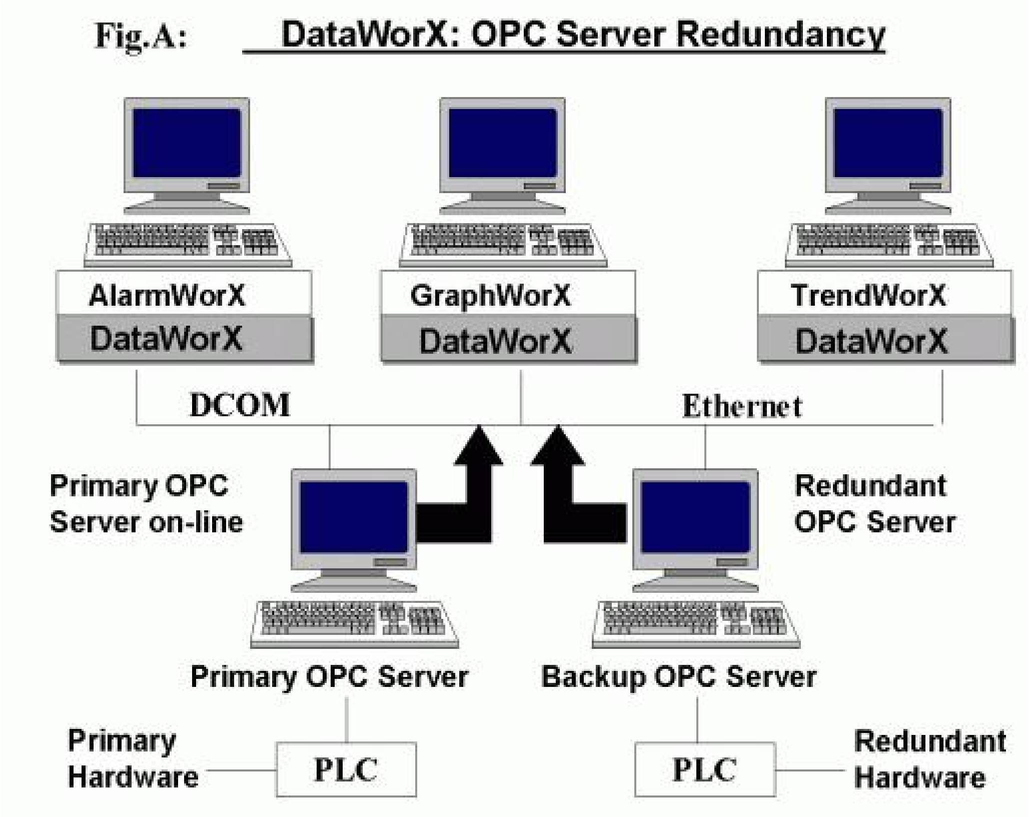


OPC Server Bridging

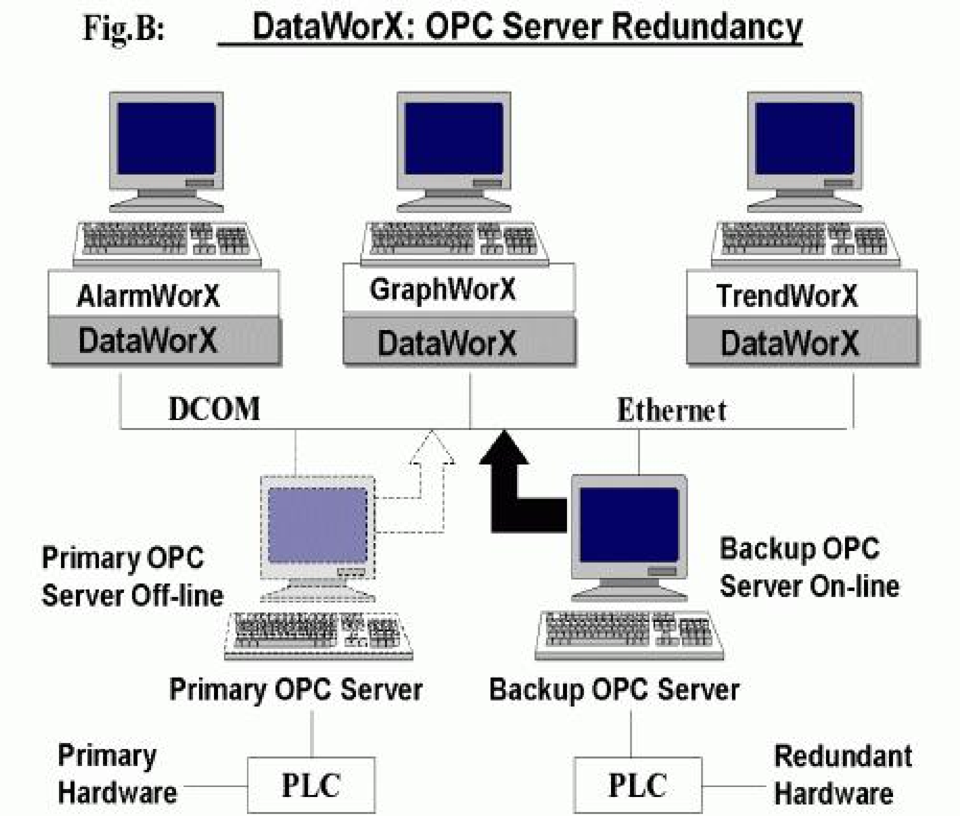
DataWorX OPC Server Redundancy

DataWorX provides 100 percent OPC server redundancy using OPC servers to any OPC client through the network. This means that users can designate alternative machines as backup servers should a designated Primary server go offline. DataWorX scans the OPC server status and switches to the Backup node in case of Primary node failure. This means that, once a Primary server does go offline, DataWorX will default to the Backup server or servers in the order in which the backup servers were designated. A special digital tag is provided to start events in case of a switchover from the Backup to the Primary server. If the **Automatic Switch Back to Primary Server** option is selected in the **Redundant Server Configuration** dialog box, DataWorX will default to the Primary server once it returns online.

Figure A and Figure B shown below illustrate DataWorX OPC Server Redundancy. For another example of redundancy, open the **DataWorX_Redundancy.gdf** display in the "Smar/ ProcessView /Examples" directory.



Redundancy When the Primary OPC Server Is Online



Redundancy When the Primary OPC Server Is Offline

1. You must designate one OPC server as the "Primary" server in each set.

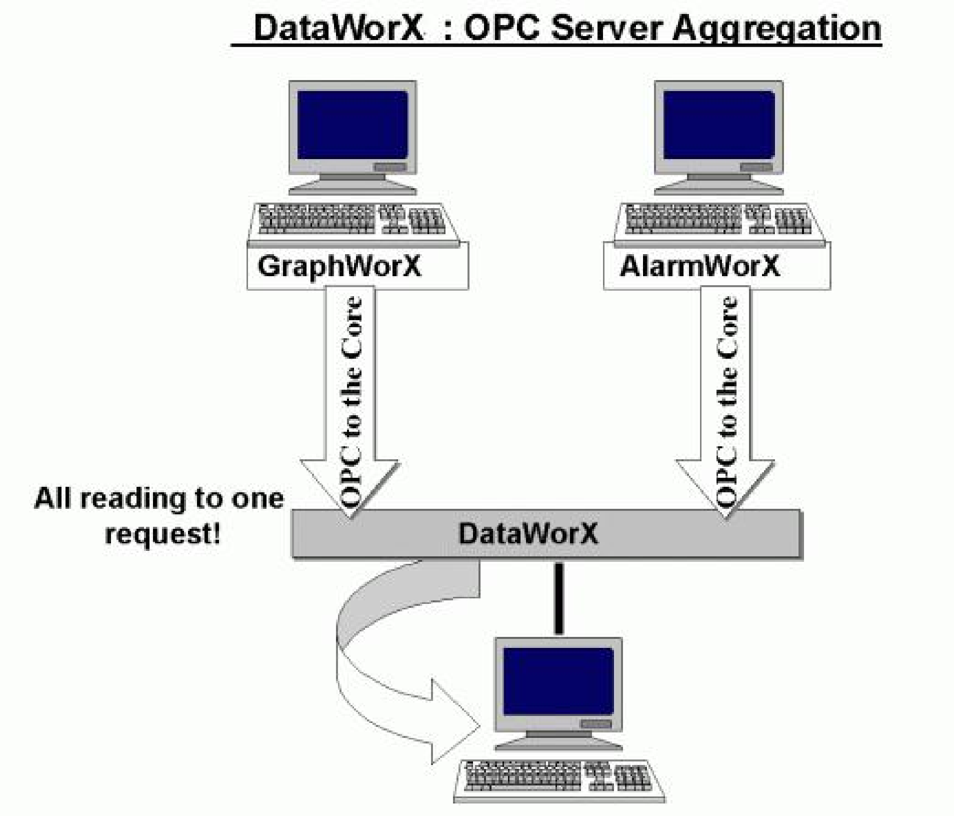
2. You may designate one or more OPC servers as the "Backup" servers in each set. (This number of servers is not restricted by DataWorX itself; rather it is limited only by system resources). If more than one backup server is specified, they should be ordered (2nd, 3rd, 4th, etc.) You will see a message outlining the details of the discrepancies, and will be allowed to either accept it as is or permit reconfiguration.

3. The various OPC client applications request data from DataWorX, rather than from the OPC server directly. This way if a Primary OPC server failure occurs (due to any number of conditions), an automatic switchover to the Backup OPC server occurs.

DataWorX OPC Aggregation

Often in very large projects, several OPC client applications request the same points from an OPC server. For example, GraphWorX may need to display a tank level value, and AlarmWorX may need to monitor and alarm that same value. This may increase the load of the OPC server, as it now has to provide the same data more than once. Thus, when multiple clients request data from an OPC server, DataWorX monitors the OPC server and aggregates the data to the requesting clients.

Often it is desirable to optimize the work performed by the lower-level I/O servers (for example, greater throughput can be achieved). DataWorX can serve as a "middle-man" between clients and servers and assist in this optimization process. This is beneficial especially with remote servers over the network. The figure below illustrates the DataWorX OPC client request aggregation. For another example of aggregation, open the **DataWorX_Aggregation.gdf** display in the "Smar/ ProcessView /Examples" directory.


DataWorX : OPC Server Aggregation
GraphWorX
AlarmWorX
OPC to the Core
OPC to the Core
All reading to one request!
DataWorX

OPC Server Aggregation

DataWorX Global Variables

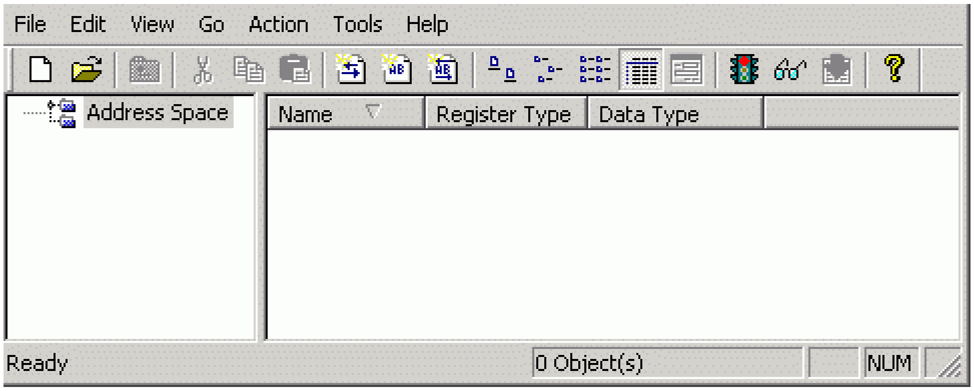
Many clients require a common variable to share values. DataWorX makes it possible to define many variables that are accessible to many clients simultaneously. The DataWorX registers can be used as global variables. These variables can also act as aliases for clients. You can create holding registers, data filters, global registers, and switches for your entire project, as well as define data types, ranges, read/write status, and more.

Starting the DataWorX Configurator

To start the DataWorX Configurator:

1. From the Windows **Start** menu, select **Programs > Smar ProcessView > ProjectWorX > DataWorX.**

2. This opens the DataWorX Configurator, as shown in the figure below. The screen 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 Configurator provides a standard format for the configuration database, as well as a sample (default) DataWorX configuration project. The Configurator also includes a toolbar and menus with many command functions.

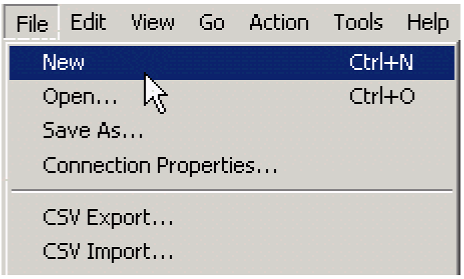


DataWorX Configurator Screen

Creating a New Configuration

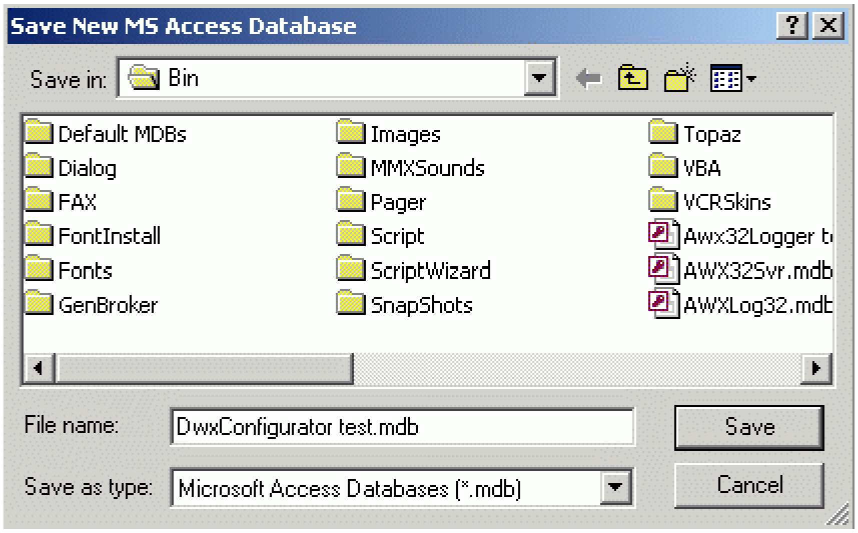
To create a new configuration database in the Configurator:

1. Select **New** from the **File** menu, as shown in the figure below**.**



Creating a Configuration Database

2. In the Save New Database dialog box, select the database type from the Save As Type drop-down list, as shown in the figure below. Browse for the target directory, give the file a name, and then click the Save button.



Save New MS Access Database

Save in: Bin

Default MDBs
Dialog
FAX
FontInstall
Fonts
GenBroker
Images
MMXSounds
Pager
Script
ScriptWizard
SnapShots
Topaz
VBA
VCRSkins
Awx32Logger t
AWX32Svr.mdb
AWXLog32.mdb

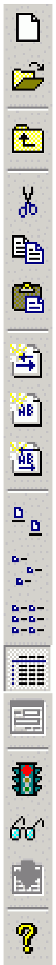
File name: DwxConfigurator test.mdb

Save as type: Microsoft Access Databases (*.mdb)

Saving the New Configuration Database

Toolbar

The Configurator toolbar, shown below, contains the following command buttons. To show or hide the **Standard** toolbar, select **Toolbars > Standard Buttons** from the **View** menu. The **Standard** toolbar, shown below, contains the following command buttons.



New: Creates a new configuration database.

Open: Opens an existing configuration database.

Up One Level: Moves up one level in the tree control.

Cut: Deletes current selection, sending it to the clipboard.

Copy: Copies the current selection to the clipboard.

Paste: Pastes the current contents of the clipboard.

New Register: Creates a new register under the **Address Space** tree control.

New Alias: Creates a new alias under the **Address Space** tree control.

New Switch: Creates a new switch under the **Address Space** tree control.

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.

Runtime: Starts/stops the DataWorX server.

Monitor View: Displays OPC data in a separate pane.

Update Runtime: Refreshes the DataWorX configuration during runtime.

About: Displays information about the application.

Menus

The menu bar of the Configurator contains the following menus:

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

NOTE
You can also access many of the menu commands by right-clicking items in the tree control of the Configurator and selecting command functions from the pop-up menus.

File Menu

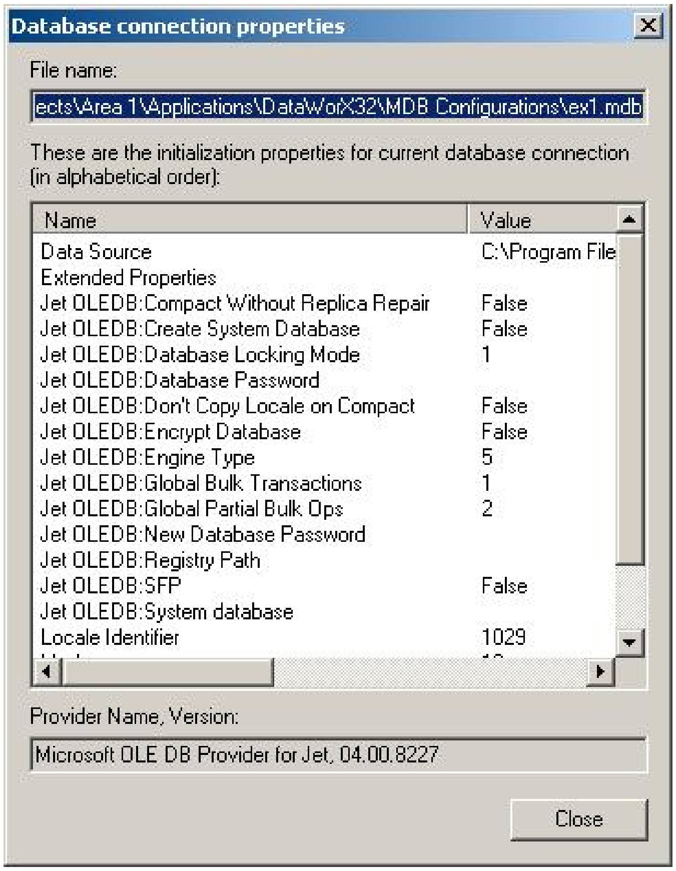
The **File** menu commands are listed in the table below.

File Menu Commands

COMMAND	SHORTCUT KEYS	FUNCTION
New	CTRL+N	Creates a new configuration database.
Open	CTRL+O	Opens an existing configuration database.
Save As		Saves the current database under a different name as a Microsoft Access (.mdb) file.
Connection Properties		Displays the current database connection properties.
Export CSV		Exports configuration data from your database to a text file (.txt) or a Microsoft Excel file (.csv). You can specify the delimiters and what to export.
Import CSV		Imports data into your configuration database from a text file (.txt) or a Microsoft Excel file (.csv). You can then specify the delimiters and choose from the import settings.
XML Export		Exports configuration data to an XML file.
XML Export Schema		Exports configuration data to an XML Schema file.
XML Import		Imports configuration data from an XML file.
XML Validate		This feature does not import an XML data file, but it will try to validate its structure using stored XML schema. Once it passes this validation, the XML file is acceptable for import by the Configurator.
DataWorX Binary Export		Exports configuration data to an older version of DataWorX (.dwx files).
DataWorX Binary Import		Imports configuration data from an older version of DataWorX (.dwx files).
Make Active		Activates the current database. If this command is not available, then the current database is already the active database.
Update Runtime Configuration		Refreshes the DataWorX configuration during runtime.
Exit		Closes the application.

Database Connection Properties

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



File name:

ects\Area 1\Applications\DataWorX32\MDB Configurations\ex1.mdb

These are the initialization properties for current database connection (in alphabetical order):

Name	Value
Data Source	C:\Program File
Extended Properties	
Jet OLEDB:Compact Without Replica Repair	False
Jet OLEDB:Create System Database	False
Jet OLEDB:Database Locking Mode	1
Jet OLEDB:Database Password	
Jet OLEDB:Don't Copy Locale on Compact	False
Jet OLEDB:Encrypt Database	False
Jet OLEDB:Engine Type	5
Jet OLEDB:Global Bulk Transactions	1
Jet OLEDB:Global Partial Bulk Ops	2
Jet OLEDB:New Database Password	
Jet OLEDB:Registry Path	
Jet OLEDB:SFP	False
Jet OLEDB:System database	
Locale Identifier	1029

Provider Name, Version:

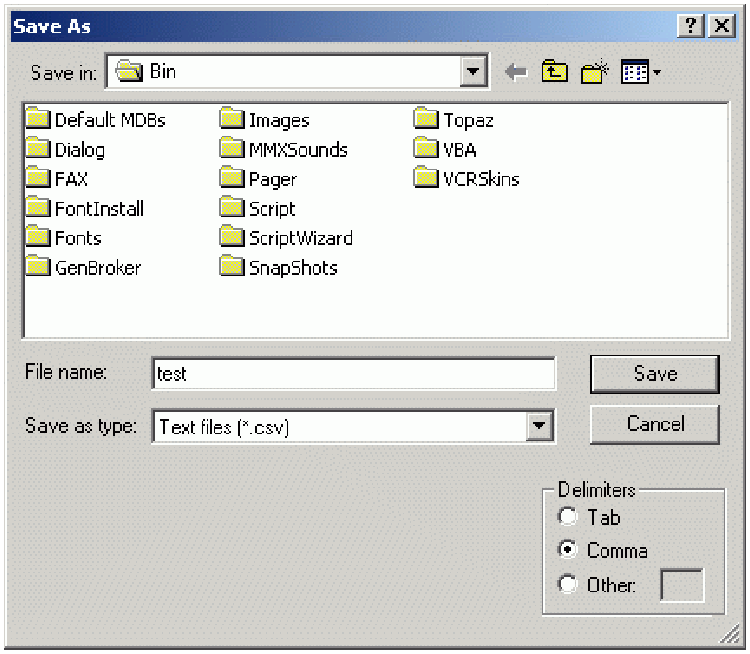
Microsoft OLE DB Provider for Jet, 04.00.8227

Database Connection Properties Dialog Box

Exporting Configuration Data

Exporting Data to a Text or CSV File

The Configurator offers the flexibility of exporting data from your configuration database to a text (.txt) file or a Microsoft Excel (.csv) file. To export data, select Export CSV from the File menu. This opens the Export Configuration Data to File dialog box, as shown in the figure below. You can then specify the delimiters for exporting the data. Unless you specify delimiters in the Export Configuration Data to File dialog box, the file uses Commas as delimiters by default. Each group contains headings and columns that provide information about each item, such as descriptions and associated translations and expressions. It also provides the "tree" pathway for each item. Choose the directory to which you want to export the data from your database. In the Save As Type field, choose the file type (.txt or .csv) that you would like to save.



Save in: Bin

File name: test

Save as type: Text files (*.csv)

Delimiters: ● Comma

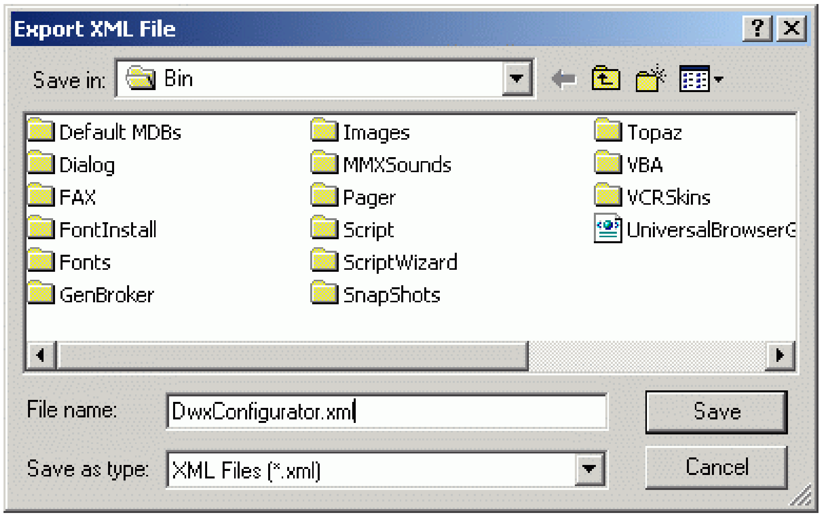
Exporting Configuration Data

Exporting Data to an XML File
The Configurator also allows you to export data from your configuration database to an XML file. The XML export/import functionality was mainly developed for Windows platforms that do not support databases (e.g. Windows CE and Windows Embedded). XML has the following advantages over the CSV import/export function:

- XML has a standardized format, unlike the text/CSV format, which uses various delimiters (e.g. TAB instead of commas, strings could not accept all characters, etc.)
- XML is language-independent, whereas CSV converts date/time, floats, and currency fields according to local settings in Windows. For example, using CSV, you cannot export data on German Windows and import it on English Windows without making changes
- Windows has an installed automation object that has the capability to work with XML. Thus, programmers can create/modify their configurations outside the Configurator using Visual Basic, if desired.
- XML supports schemas. A **schema** is a special XML file that specifies the data structure of an XML data file.

To export data, select **XML Export** from the **File** menu. This opens the **Export XML File** dialog box, as shown in the figure below. Give the file a name, and then choose the directory to which you want to export the data from your database. Click **Save.**

NOTE
You can also export configuration data to an XML schema file by selecting **XML Export** from the **File** menu.



File name: DwxConfigurator.xml

Save as type: XML Files (*.xml)

Exporting Configuration Data to an XML File

Importing Configuration Data

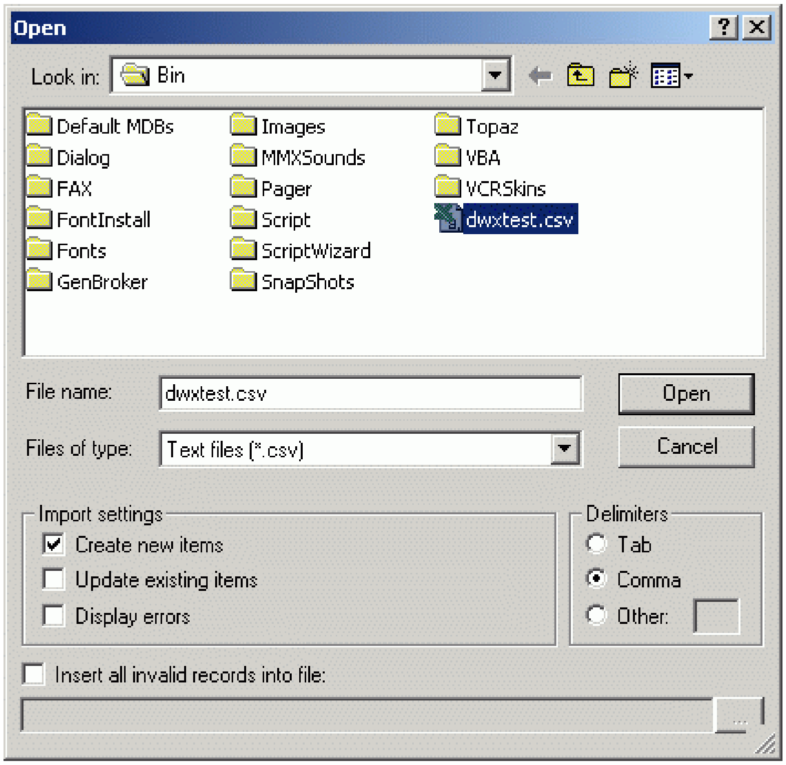
Importing Data From a Text or CSV File

The Configurator offers the flexibility of importing data from a text (.txt) file or a Microsoft Excel (.csv) file to your configuration database. To import data, select Import CSV from the File menu. This opens the Import Configuration Data From File dialog box, shown below. You can then 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.



Look in: Bin

File name: dwxtest.csv

Files of type: Text files (*.csv)

Import settings

☑ Create new items

□ Update existing items

□ Display errors

Delimiters

○ Tab

● Comma

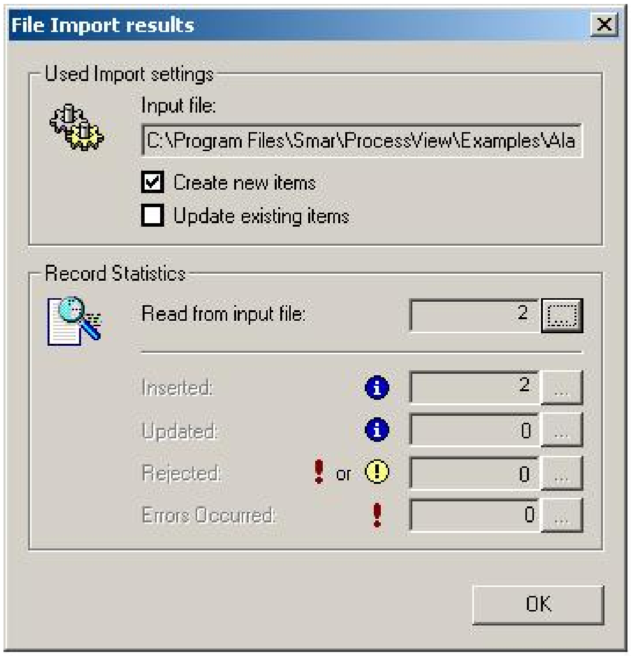
○ Other:

□ Insert all invalid records into file:

Import Configuration Data From File Dialog Box

When you have selected a file to import, click **Open.** When the import is completed, the **File Import Results** dialog box opens, as shown below. This shows 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, and shows how many errors occurred.

Click the **...** button to the right of each field to get the details view of the import results, as shown below. This view shows the specific items that were inserted, updated, or rejected, as well as a description of any errors that occurred.



Used Import settings

Input file: C:\Program Files\Smar\ProcessView\Examples\Ala

☑ Create new items

□ Update existing items

Record Statistics

Read from input file: 2

Inserted: 2

Updated: 0

Rejected: 0

Errors Occurred: 0

File Import Results Dialog Box

Importing Data From an XML File

The Configurator allows you to import data from your configuration database to an XML file. The XML export/import functionality was mainly developed for Windows platforms that do not support databases (e.g. Windows CE and Windows Embedded). XML has the following advantages over the CSV import/export function:

- XML has a standardized format, unlike the text/CSV format, which uses various delimiters (e.g. TAB instead of commas, strings could not accept all characters, etc.)
- XML is language-independent, whereas CSV converts date/time, floats, and currency fields according to local settings in Windows. For example, using CSV, you cannot export data on German Windows and import it on English windows without making changes
- Windows has an installed automation object that has the capability to work with XML. Thus, programmers can create/modify their configurations outside the Configurator using Visual Basic, if desired.
- XML supports schemas. A **schema** is a special XML file that specifies the data structure of an XML data file.

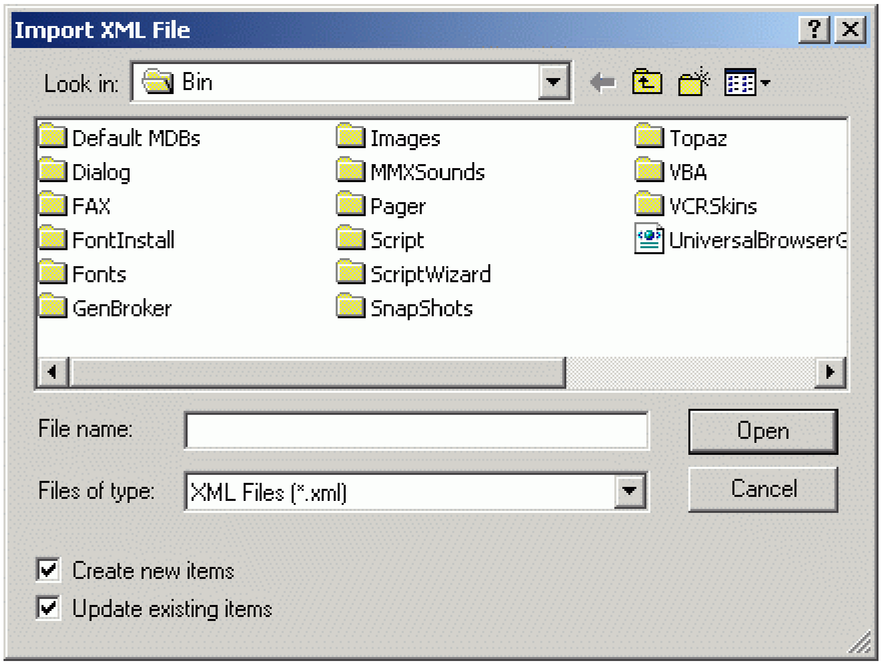
To import data, select **XML Import** from the **File** menu. This opens the **Import XML File** dialog box, as shown in the figure below. Give the file a name, and then choose the directory from which you want to import the data. You can then specify the delimiters and choose from the following import settings. Click **Open.**

- 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.

NOTES

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

Selecting XML Validate from the File menu does not import an XML data file, but it will try to validate its structure using stored XML schema. Once it passes this validation, the XML file is acceptable for import by the Configurator.



Look in: Bin

File name:

Files of type: XML Files (*.xml)

☑ Create new items

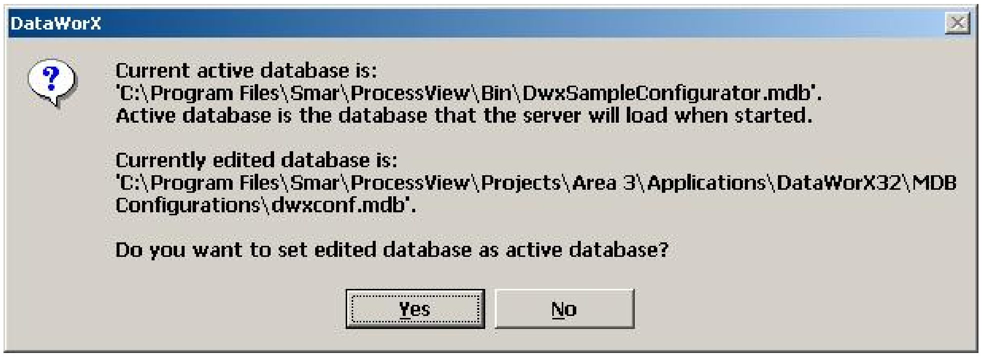
☑ Update existing items

Importing Configuration Data From an XML File

Activating the Database

Once your configuration is complete, you need to make sure that it is the active database. The database that is currently active is the one that the 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 current database is already the active database.

A dialog box appears showing both the current active database and database that is currently being edited, as shown in the figure below. To set the edited database as the active database, click the **Yes** button.



Current active database is:
'C:\Program Files\Smar\ProcessView\Bin\DwxSampleConfigurator.mdb'.
Active database is the database that the server will load when started.

Currently edited database is:
'C:\Program Files\Smar\ProcessView\Projects\Area 3\Applications\DataWorX32\MDB Configurations\dwxconf.mdb'.

Do you want to set edited database as active database?

Making the Database Active

Edit Menu

The **Edit** menu commands are listed in the table below.

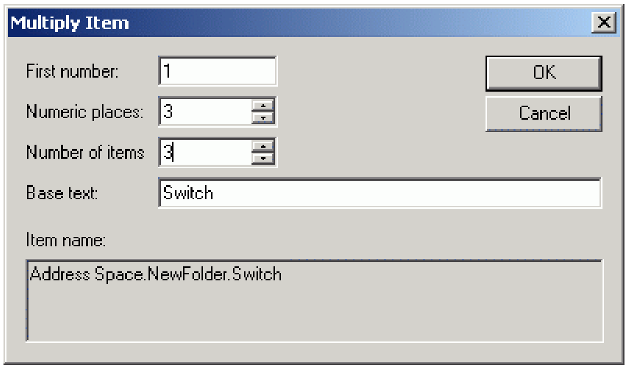
Edit Menu Commands

COMMAND	SHORTCUT KEYS	FUNCTION
New		Creates a new item depending on what is selected in the tree control.
Rename		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 in a list in the upper-right-hand section of the viewer.

Multiplying Items

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

1. Select the item in the tree control that you wish to multiply.
2. Either right-click the item and select **Multiply** from the pop-up menu, or select **Multiply** from the **Edit** menu. This opens the **Multiply Item** dialog box, shown below.



First number: 1

Numeric places: 3

Number of items 3

Base text: Switch

Item name:

Address Space.NewFolder.Switch

Multiply Item Dialog Box

3. 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. To modify the base text, change the Base Text field appropriately.
4. In the First Number field, specify the number to appear next to the first multiplied item.
5. In the Number of Items field, specify how many items you wish to create.
6. In the Numeric Places field, specify 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.
7. If you want to multiply all subfolders as well, check the Including Subtree check box.
8. Click the OK button to do the multiplication. The example configuration shown in the Multiply Item dialog box above creates three new items with the following names:

- Switch001
- Switch002
- Switch003

All subfolders will also be multiplied.

View Menu

The **View** menu commands are listed in the table below.

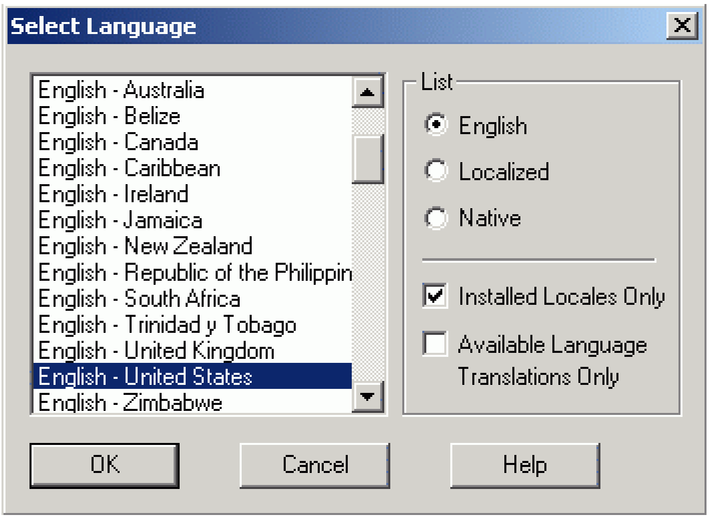
View Menu Commands

COMMAND	SHORTCUT KEYS	FUNCTION
Toolbars		Toggles the standard and data manipulation 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).
Monitor View	F12	Displays OPC server data in a separate 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 (see below). Choose the language you wish to use for your system (Unicode version only) 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 subtree.

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 the figure below.

NOTES
Language resource .dll is required for language switching.



English - Australia
English - Belize
English - Canada
English - Caribbean
English - Ireland
English - Jamaica
English - New Zealand
English - Republic of the Philippin
English - South Africa
English - Trinidad y Tobago
English - United Kingdom
English - United States
English - Zimbabwe

● English
○ Localized
○ Native

☑ Installed Locales Only
□ Available Language Translations Only

Select Language Dialog Box

Define the parameters listed in the table below. Then click **OK** to return to the work area.

Select Language Parameters

PARAMETER	DESCRIPTION
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). When **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 box.
Available Language Translations Only	Checking this box allows you to choose from available language translations only.

Go Menu

The **Go** menu commands are listed in the table below.

Go Menu Commands

COMMAND	SHORTCUT KEYS	FUNCTION
Up One Level		Moves the cursor up one level in the tree control.
Next Item	ALT+Down Arrow	Moves the cursor to the next item down in the tree control.
Previous Item	ALT+Up Arrow	Moves the cursor to the next item up in the tree view.
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 item in the tree.

COMMAND	SHORTCUT KEYS	FUNCTION
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.
Previous Pane	SHIFT+F6	Moves the cursor to the last pane used.

Action Menu

The **Action** menu commands are listed in the table below.

Action Menu Commands

COMMAND	FUNCTION
Start Runtime	Starts the DataWorX runtime operation.
Stop Runtime	Stops the DataWorX runtime operation.

Tools Menu

The **Tools** menu opens the **Options** dialog box, which is described in the section below.

Options

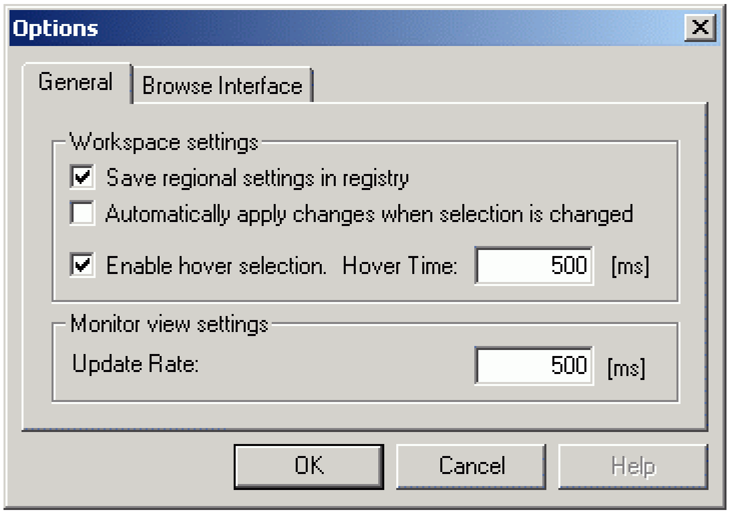
To choose additional settings, select **Options** from the **Tools** menu. This opens the **Options** dialog box, which contains the following tabs:

- General
- Browse Interface

General Tab

The **General** tab of the **Options** dialog box, shown below, 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 amount of time (in milliseconds).
- **OPC Monitoring Update Rate:** This specifies the update frequency (in milliseconds) of the items in the Monitor View. The monitor scans the server and displays the tag values at the bottom of the Configurator screen.



Workspace settings

☑ Save regional settings in registry

□ Automatically apply changes when selection is changed

☑ Enable hover selection. Hover Time: 500 [ms]

Monitor view settings

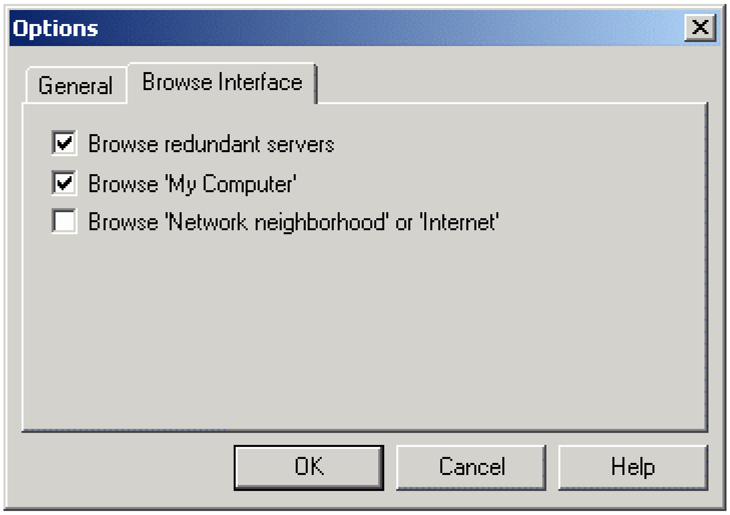
Update Rate: 500 [ms]

Options Dialog Box: General Tab

Browse Interface Tab

The **Browse Interface** tab of the **Options** dialog box, shown below, contains the following commands:

- Browse Redundant Servers: When checked, the items of the servers defined as redundant (in the Redundancy menu) will be shown.
- Browse My Computer: When checked, the local OPC server and its items available through DataWorX will be shown.
- Browse Network Neighborhood or Internet: When checked, the OPC servers located on remote nodes and their items will be shown.



☑ Browse redundant servers

☑ Browse 'My Computer'

□ Browse 'Network neighborhood' or 'Internet'

Options Dialog Box: Browse Interface Tab

Help Menu

The **Help** menu commands are listed in the table below.

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.

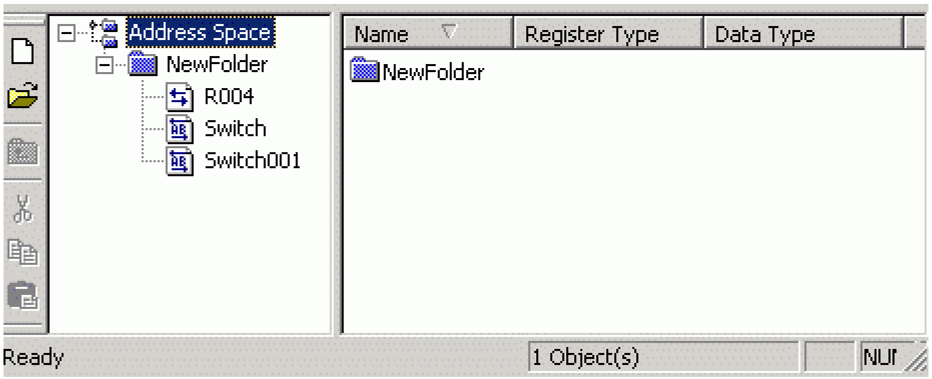
Chapter 2

CONFIGURING THE ADDRESS SPACE

Overview of Address Space Configuration

In the DataWorX Configurator, the parameters for data items are set up in the **Address Space** tree control, as shown in the figure below. When configuring the Address space, you can:

- Create folders to organize data items.
- Create and configure registers.
- Create and configure aliases.
- Create and configure switch aliases.
- Create and configure redundancy aliases.



Address Space Tree Control

The **Address Space** tree control in the Configurator sets the properties and connection parameters for all data items, which can be organized hierarchically. It is similar to organizing directories and files on your computer's hard disk. A **folder** can contain additional folders and also data items. The **data items** are always the branches in the tree control hierarchy. The hierarchical structure of the folders and data items helps to organize the registers, aliases, switches, and redundancy aliases.

NOTE
The ProcessView installation provides a sample DataWorX configuration database called **DwxSampleConfigurator.mdb.**

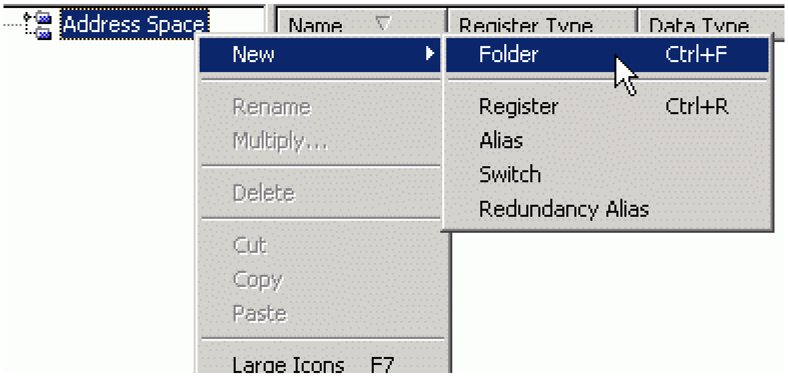
Folders

Folders can be used to group items logically. You can configure as many folders as required. Each folder can even have subfolders. The use of folders is not required.
If desirable, the configuration could just contain data items without any folders. But most likely this will only be useful if the application does not demand too many persistent tags.

Creating New Folders

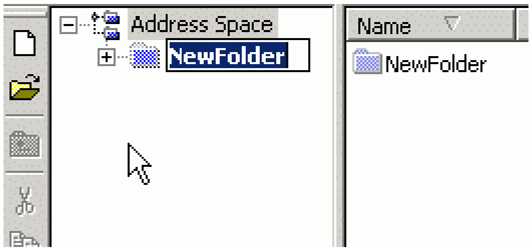
To create a new folder:

1. Right-click the **Address Space** tree control of the Configurator and select **New > Folder** from the pop-up menu, as shown in the figure below.



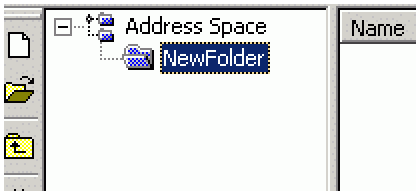
Creating a New Folder

2. Type a name for the new folder, as shown in the figure below.



Naming the New Folder

3. When you have naming the folder, press Enter. The new folder appears under the tree control, as shown in the figure below.



New Folder Added to Tree Control

Registers

Many clients require a common variable to share values. One of the key functions of DataWorX is to provide a mechanism for defining variables and making them available to *all* ProcessView clients and OPC clients. DataWorX uses the concept of **registers** to achieve this. DataWorX makes it possible to define many variables that are accessible to many clients simultaneously because DataWorX registers can be used as **global variables.** These variables can also act as aliases for clients. In the various client applications, you can configure global variables for use within that particular application, or possibly only within a particular document for that application.

Register Names

Each register has a unique name composed of only numbers, letters, and the underscore "_" character. DataWorX verifies the names are indeed unique, prompting you if this is not the case. The **Register name** field does not accept spaces. Spaces are disabled intentionally because the register names are used by OPC clients as tag names. The OPC specification allows for using spaces, but it is not recommended.

An **Alias Register** is a register that is used to keep the alias value and is of string data type. You can access it like an ordinary register. The [[and]] are used to expand the alias, i.e. to replace the name of the alias with its value. For example:

Register 'REG' = 10; Alias Register 'MODBUS' = "ICONICS.ModbusOPCServer".
'DataWorX32\REG' = 10
'DataWorX32\MODBUS' = "ICONICS.ModbusOPCServer"
'DataWorX32\[[MODBUS]]Dev1.Tag1' = ICONICS.ModbusOPCServer\Dev1.Tag1 (value)
DataWorX registers are accessible through the OPC Universal Tag Browser.
DataWorX registers are accessible from VB using the "GetRegister" function of the Automation interface.

The count limit is not restricted by DataWorX itself, but is limited by system resources.

Register Inputs
A register has one **input** (or source) to define its content.

- An input may be assigned to an expression that, when resolved, defines the register's content.
- An input may be assigned to None to create a global variable. (The initial value is selectable.)
- An input may be assigned to an OPC data point (including the value itself, quality, and time stamp), using the OLExpress naming convention.
- An input may be assigned to the output of another DataWorX register.
- Besides OPC inputs, registers, and expressions, conditions can also be used as register inputs. The condition itself is connected to multiple OPC items or registers. One of these inputs is chosen depending on the selected criteria. Using conditions as register inputs is particularly useful when used in conjunction with switch aliases.

Register Outputs

When the value of a register's input changes, it is written to all of the outputs assigned to that register (if any).

- An output may be assigned to an item of an OPC server. Thus, the register writes values to the server.
- An output may be assigned to the input of another DataWorX register.
- A register may be designated as "Read-Only." The register will still write to its outputs, but the value can only come from an input, such as another OPC server or an expression, not from an OPC client. If this is the case, clients may only view its contents.

Registers, aliases, and other objects in DataWorX can be hierarchically organized into groups (folders).

Using Registers

One of the key functions of DataWorX is to provide a mechanism for defining variables and making them available to *all* ProcessView clients and OPC clients. DataWorX uses the concept of **registers** to achieve this.

The "Global Variable" name is simply the register's name. It can be given values through OPC tags, expressions, constants, or even VBA. OPC server data-bridging is accomplished by assigning the input of a register to one OPC data point, and assigning the output to different (even multiple) OPC data points.

This section describes how to configure Registers functions in the DataWorX Configurator in order to connect more than two servers. For example, if you want a client PC to send a value from a Modbus OPC server to a Bristol OPC server, you can define the **Register Name** in the **Properties** dialog box, define the **Properties** for that register, set the **Input** to the Modbus OPC server's tag, and set the **Output** to the Bristol OPC server's tag for a Register Tag using the **Register Settings** dialog box.

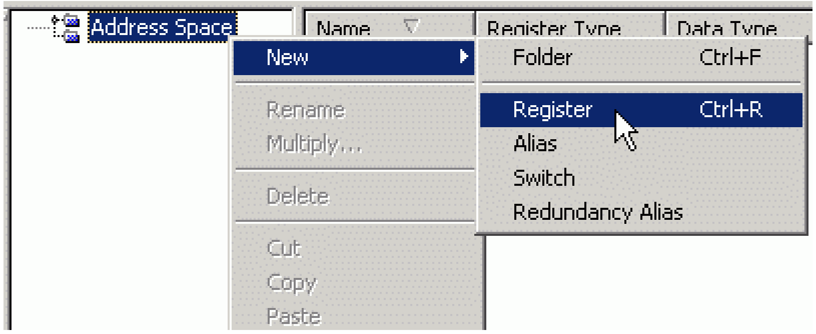
Registering Running Instances

DataWorX now registers its dispatch pointer at GenRegistrar on startup and unregisters on exit. Dispatch pointers may be used by Visual Basic or other applications to control a running application. Now, a dispatch pointer to an instance of DataWorX running in both configuration mode and runtime can be obtained. In past versions of DataWorX, this was possible only in runtime.

Creating New Registers

To create a new register:

1. Right-click the **Address Space** tree control of the Configurator and select **New > Register** from the pop-up menu, as shown in the figure below.

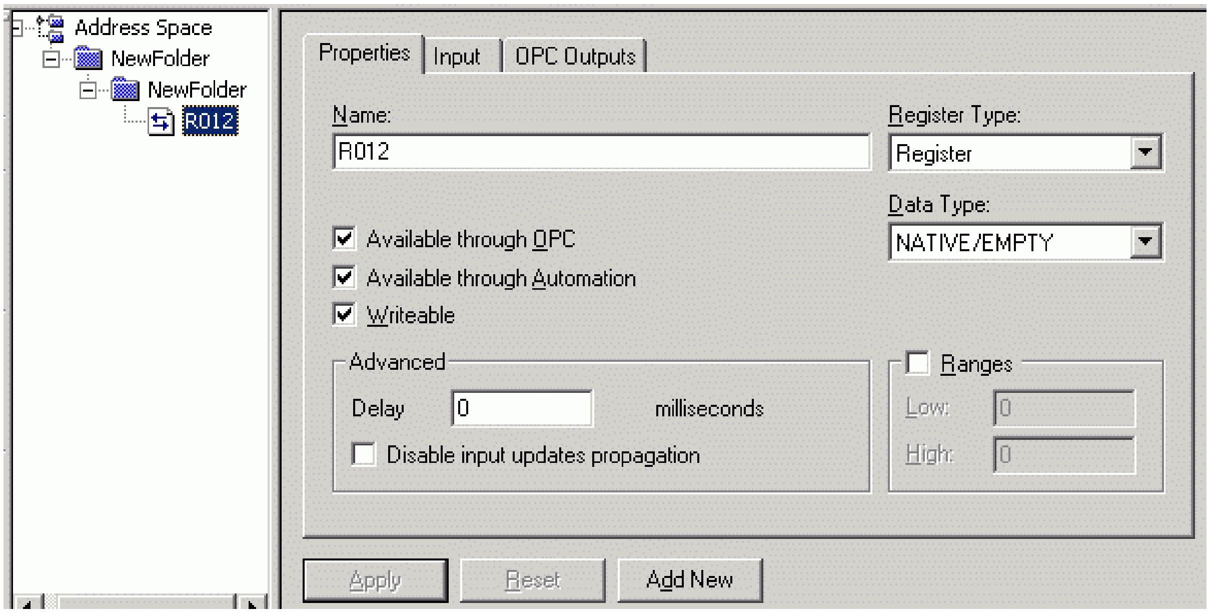


Creating a New Register

2. The properties dialog box for the new register appears in the right-hand pane of the Configurator, as shown in the figure below.

3. In the Name field, type a name for the new register.

4. When you have finished configuring the register properties, click the Apply button. The new register appears under the tree control, as shown in the figure below.



Name: R012

Register Type: Register

Data Type: NATIVE/EMPTY

☑ Available through OPC

☑ Available through Automation

☑ Writeable

Advanced

Delay 0 milliseconds

☐ Disable input updates propagation

☐ Ranges

Low: 0

High: 0

Configuring Register Properties

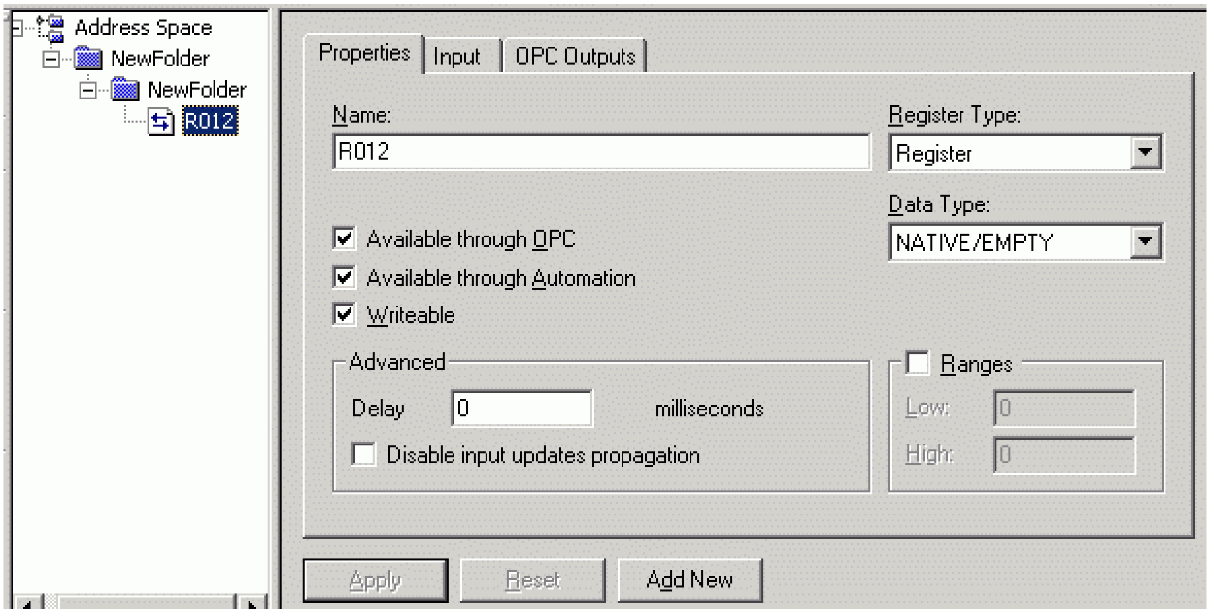
Configuring Register Properties

The register properties dialog box contains the following tabs, as shown in the figure below:

- Properties
- Input
- OPC Outputs

The **Properties**, **Input** and **Output** tabs are the same for different register types. The **Register Type** can be modified on the **Properties** tab by selecting a type from the drop-down list, as shown in the figure below. Depending on this register type, other pages appear or get hidden. For example, aliases can be browsed, so they have the **Browse Interface** tab (unlike registers). On the other hand redundancy aliases, for example, do not have inputs, so the **Input** tab disappears when you select a register to be a redundancy alias. It is important to understand that everything (aliases, switches, etc.) is a register. Its features then depend on the type of register (e.g. the data type for an alias is always STRING).

NOTE
Each register configuration has a limit of 4 kilobytes (4,096 characters). This limit applies to the entire register record (e.g. register name, expression strings, outputs, list of condition inputs, list of redundancy nodes, etc.).



Name: R012

Register Type: Register

Data Type: NATIVE/EMPTY

☑ Available through OPC

☑ Available through Automation

☑ Writeable

Delay 0 milliseconds

☐ Disable input updates propagation

☐ Ranges

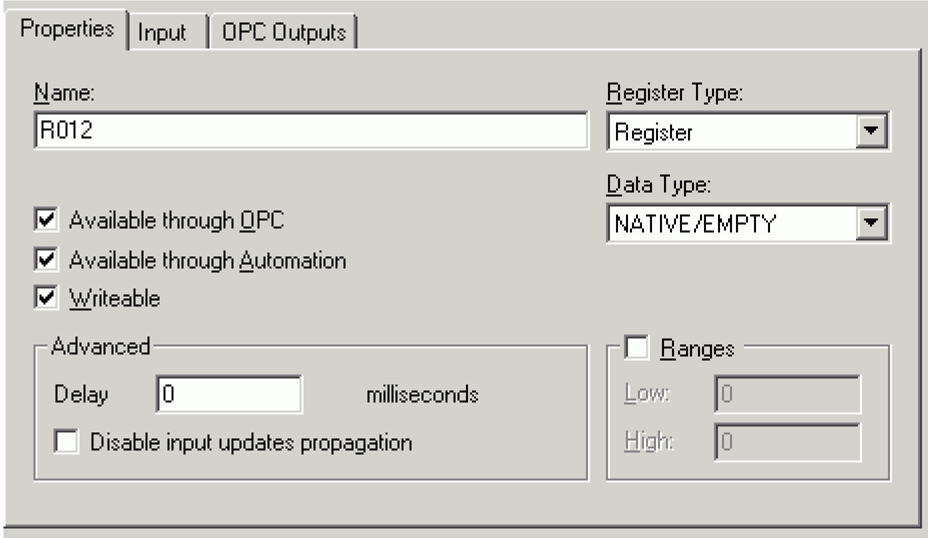
Low: 0

High: 0

Configuring Register Properties

Register Settings: Properties Tab

The **Properties** tab in the **Register Settings** dialog box, shown below, allows you to set the following register parameters, as described in the table below.



Name: R012

Register Type: Register

Data Type: NATIVE/EMPTY

☑ Available through OPC

☑ Available through Automation

☑ Writeable

Advanced

Delay 0 milliseconds

☐ Disable input updates propagation

☐ Ranges

Low: 0

High: 0

Register Settings: Properties Tab

Properties Tab Parameters

NAME	A common tag name.
REGISTER TYPE	Specifies Register, Alias, Switch Alias, or Redundancy Alias.
AVAILABLE THROUGH OPC	Checking this box makes the register available to OPC clients.
AVAILABLE THROUGH AUTOMATION	Checking this box makes the register available to VB applications so that it could be edited by a VB editor.
WRITEABLE	Checking this box makes the register writeable. Uncheck the box for a read-only OPC client.
DATA TYPE	Allows you to select from the following data types: Native/Empty, Float, Double, Boolean, Byte, Word, DWord, Character, Short, Long, String. All data types available in GraphWorX are supported in registers for DataWorX.
RANGES	Checking this box enables the High and Low ranges fields.
HIGH RANGE	You can specify a High Range in the box provided.
LOW RANGE	You can specify a Low Range in the box provided.
DELAY	You can specify a delay time for the register (in milliseconds) in the box provided.
DISABLE OPC PROPAGATION SUPPORT	When an OPC item is connected to a register as both input and output, a fast sequence of writes to that register may cause item value oscillation. (This may happen when two subsequent writes to the register are faster than the OPC item can perform the write operation. The acknowledge of the first write then overwrites the second written value already being stored in the register.) To avoid this behavior, Check the **Disable input updates propagation** check box in the register properties.

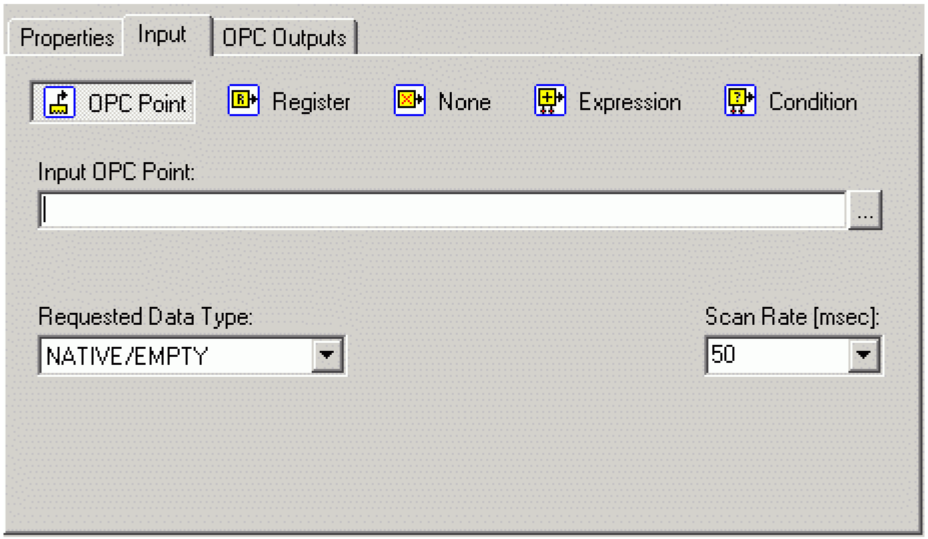
NOTE
By default, the data type and range information are obtained from the input of register.

Register Settings: Input Tab

The **Input** tab in the **Register Settings** dialog box, shown below, allows you to set the following register input parameters:

- OPC Point
- Register
- None
- Expression
- Condition Criteria

- Condition Result
- Condition Inputs



Input OPC Point:

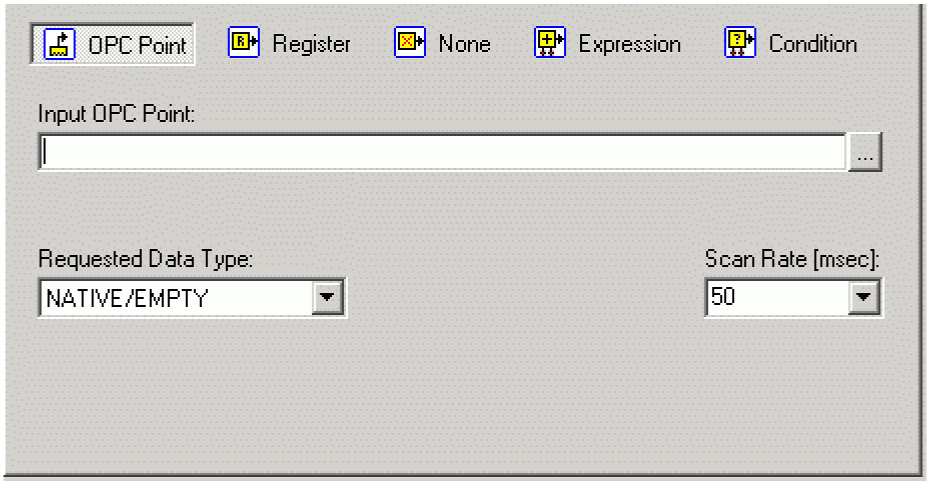
Requested Data Type: NATIVE/EMPTY

Scan Rate [msec]: 50

Register Settings: Input Tab

Input Tab: OPC Point

The **OPC Point** section of the **Input** tab, shown in the figure below, specifies that the input is an OPC item. In the **Input OPC Point** field, you can type in an item name (tag name) or browse for one by clicking the **...** button, which opens the Unified Data Browser. The **Registered Data Type** field allows you to select from the following data types: Native/Empty, Float, Double, Boolean, Byte, Word, DWord, Character, Short, Long, String. All data types available in GraphWorX are supported in registers for DataWorX. You can also specify the **Scan Rate** for OPC inputs (in milliseconds)



Input OPC Point:

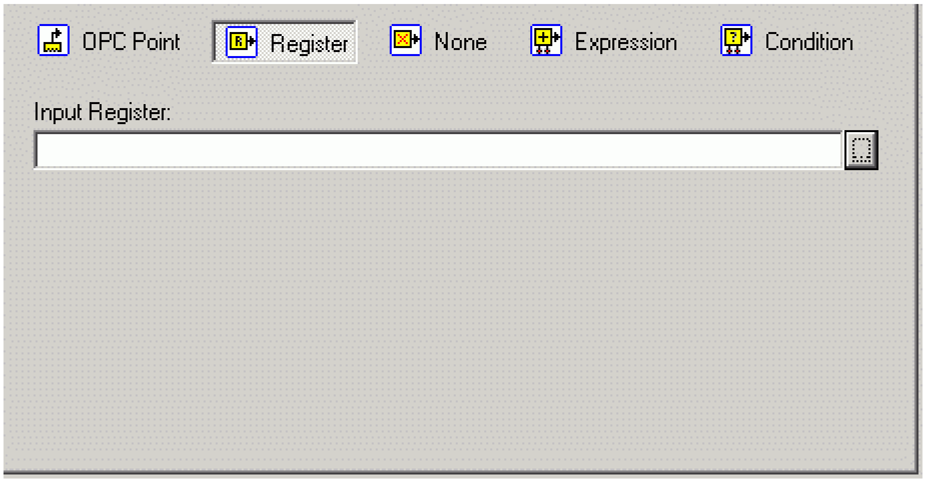
Requested Data Type: NATIVE/EMPTY

Scan Rate [msec]: 50

Input Tab: OPC Point

Input Tab: Register

In the **Register** section of the **Input** tab, shown in the figure below, you can type in an **Input Register** or browse for one by clicking the **...** button, which opens the Unified Data Browser. This lists the registers defined in DataWorX. You may select an input coming from another register.

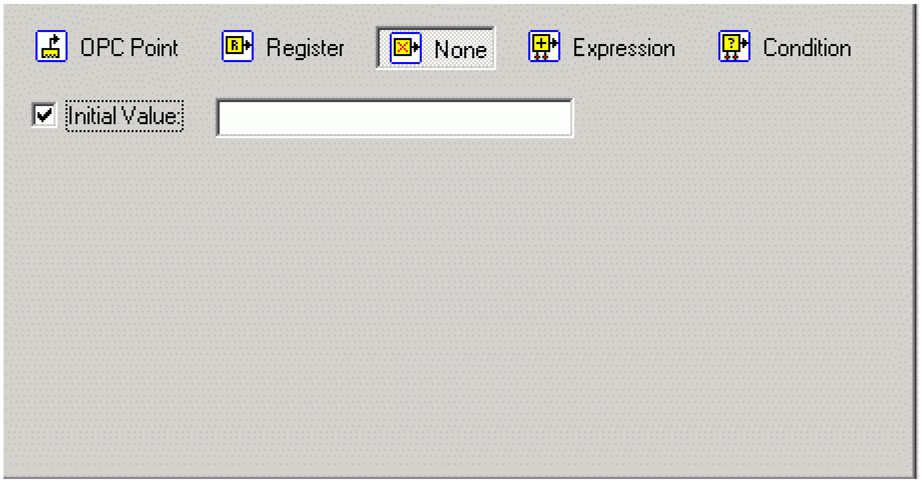


Input Register:

Input Tab: Register

Input Tab: None

Selecting the **None** section of the **Input** tab, shown in the figure below, means no input will be provided to this register. This could be used when you want to write a value from the client and send it to many OPC servers at the same time. This is also the mechanism for creating a global variable. Checking the **Initial Value** check box allows you to specify an initial value in the field to the right.

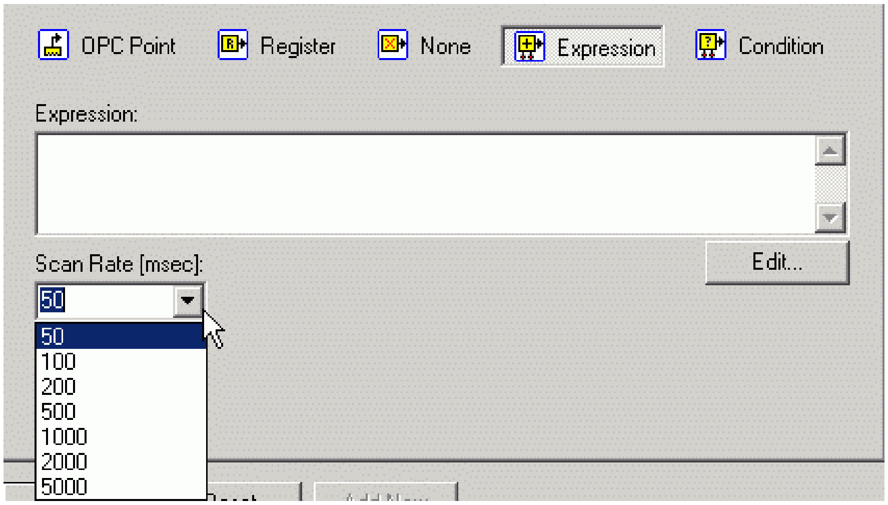


☑ Initial Value:

Input Tab: None

Input Tab: Expression

The **Expression** section of the **Input** tab, shown in the figure below, allows you to specify an expression in the box provided. Clicking the **Edit** button opens the **Edit Expression** dialog box, which allows you to edit expressions using the Arithmetic, Relational, Logical, Bitwise, and Functions methods, as well as OPC tags and registers. The result of expression includes a quality evaluation. You may specify how the quality should be evaluated. You can also specify the **Scan Rate** for OPC inputs (in milliseconds)



Scan Rate [msec]: 50

Input Tab: Expression

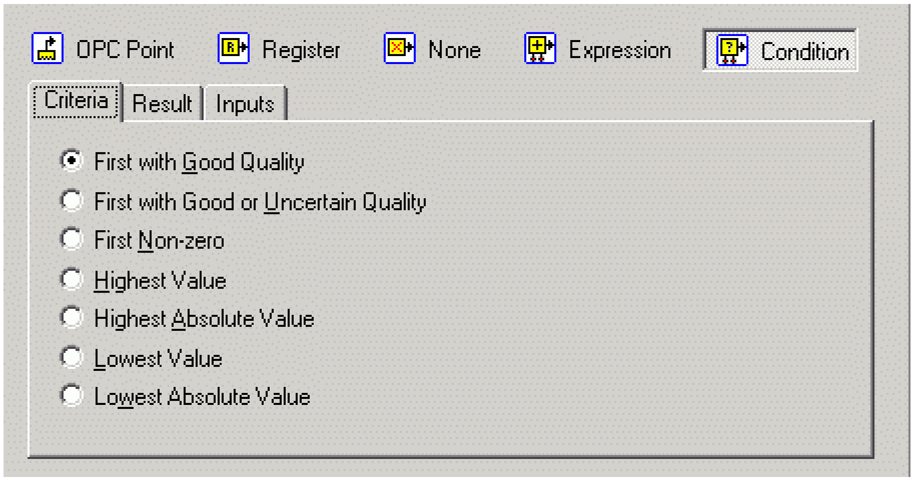
Input Tab: Condition Criteria

Besides OPC inputs, registers and expressions, **conditions** can be used as register inputs. The conditions themselves may be useful, but their biggest advantage is in use with Switch Aliases. The condition itself is connected to multiple OPC items or registers. One of these inputs is chosen depending on the selected criteria. The result of the condition (i.e. the value of the register having input set to this condition) may be:

- The value of the chosen input; the data type of the register will be the same as the data type of the input (by default).
- The zero-based index of the chosen input; the data type of the register will be a integer number in range 0..*N*-1, where *N* is the number of the condition inputs.
- The name of the chosen input; the data type of the register will be a string.

The **Condition Criteria** section of the **Input** tab, shown in the figure below, includes the following possible criteria:

- First with good quality
- First with good or uncertain quality
- First nonzero
- Highest value
- Highest absolute value
- Lowest value
- Lowest absolute value



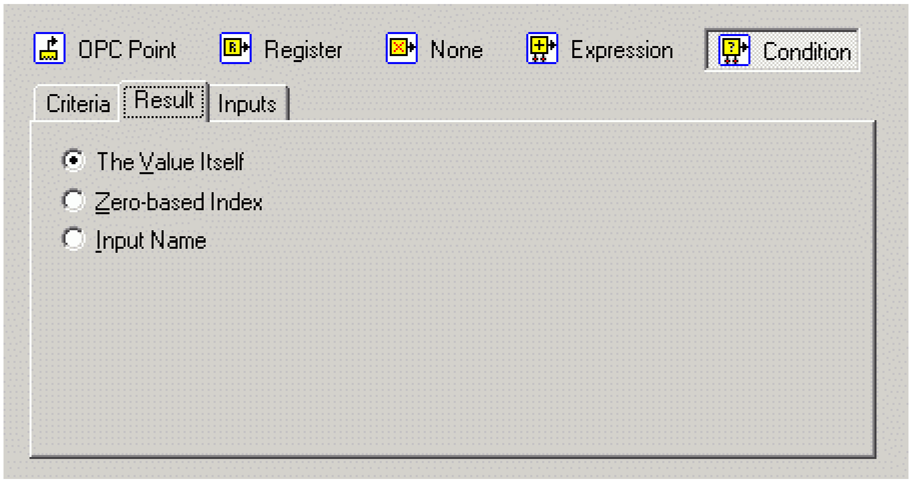
● First with Good Quality
○ First with Good or Uncertain Quality
○ First Non-zero
○ Highest Value
○ Highest Absolute Value
○ Lowest Value
○ Lowest Absolute Value

Input Tab: Condition Criteria

Input Tab: Condition Result

The **Condition Result** section of the **Input** tab, shown in the figure below, specifies the result of the condition (i.e. the value of the register having input set to this condition):

- **The value itself (the value of the chosen input):** The data type of the register will be the same as the data type of the input (by default).
- **Zero-based index of the chosen input:** The data type of the register will be an integer number in range 0..*N*-1, where *N* is the number of the condition inputs.
- **Input Name:** The data type of the register will be a string.

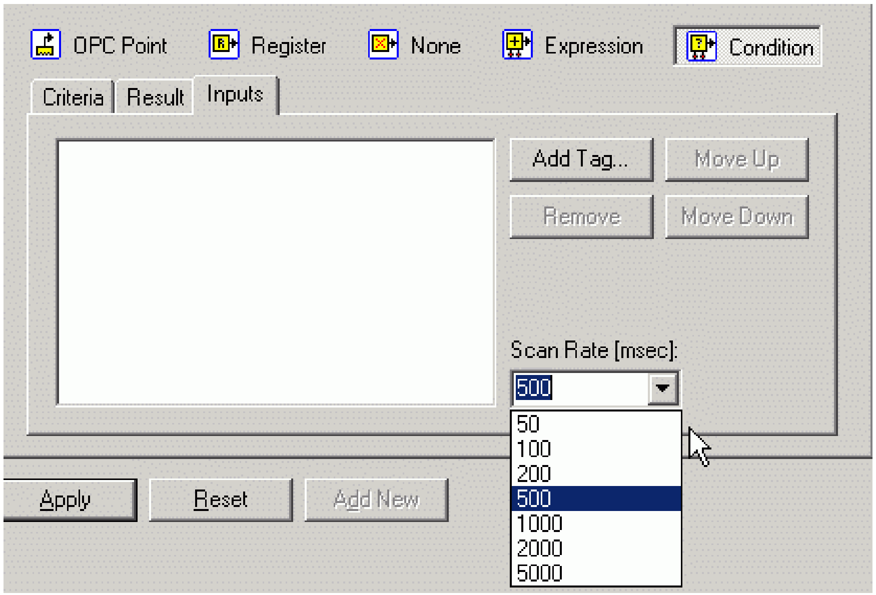


● The Value Itself
○ Zero-based Index
○ Input Name

Input Tab: Condition Result

Input Tab: Condition Inputs

The **Condition Inputs** section of the **Input** tab, shown in the figure below, enables you to specify the Input(s) of the condition. You can select an OPC tag from the Unified Data Browser by clicking **Add Tag.** You can also specify the **Scan Rate** for OPC inputs (in milliseconds).



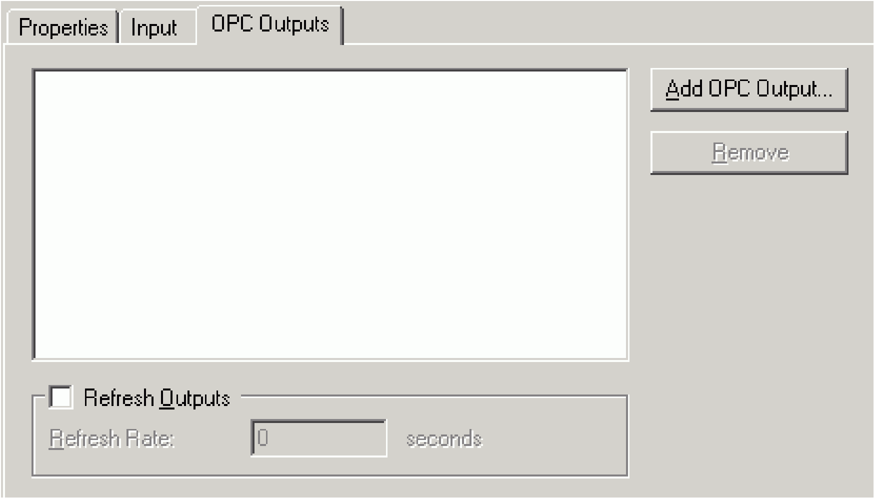
Input Tab: Condition Inputs

Register Settings: OPC Outputs Tab

In the **OPC Outputs** tab in the **Register Settings** dialog box, shown below, you can select OPC tags and /or registers from the Unified Data Browser by clicking **Add OPC Output.**

When bridging OPC data, values are written to the outputs only when the input value changes. This is the default behavior. To modify this behavior, you can force DataWorX to refresh outputs periodically. Then the value is written to the outputs even if the input value does not change. You can specify a **Refresh Rate** for outputs by checking the **Refresh Outputs** check box and typing the output refresh rate (in seconds) in the edit box.

NOTE
You may select more than one tag for the output.



Register Settings: OPC Outputs Tab

Aliases

DataWorX contains a mechanism for defining aliases. **Aliases** are symbols that are expanded to strings, known as "alias values," during runtime. Aliases are enclosed in double brackets: **[[** and **]].**

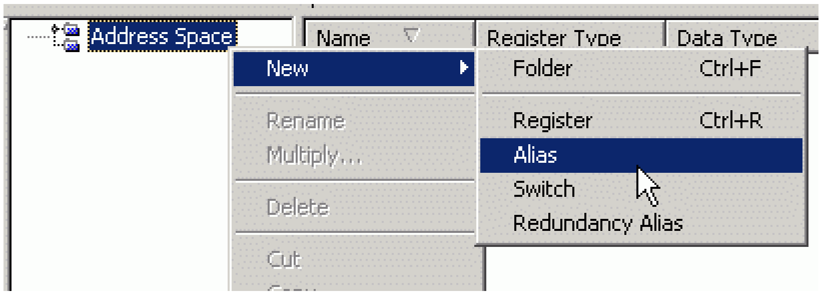
The main requirements for aliasing are as follows:

- Every alias must be defined before it is first used (that is, before the first item is requested with this alias). Otherwise the item name containing the alias is treated as invalid.
- If any name is syntactically valid and contains only aliases that have already been defined, it is treated as valid, even though after expanding aliases the name may not correspond to any existing item.
- The resolution of these aliases ("alias values") can change during runtime mode. When an alias changes, the items having the alias in their names stay valid. They simply change reference to another item after the change is made.

Creating New Aliases

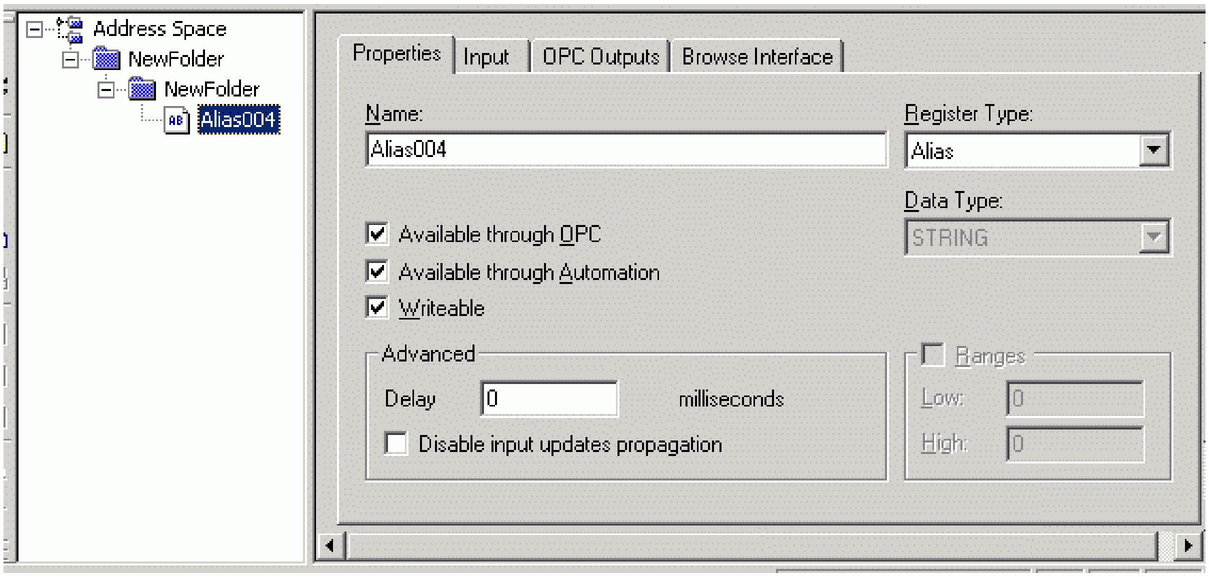
To create a new alias:

1. Right-click the **Address Space** tree control of the Configurator and select **New > Alias** from the pop-up menu, as shown in the figure below.



Creating a New Alias

2. The properties dialog box for the new alias appears in the right-hand pane of the Configurator, as shown in the figure below.
3. In the Name field, type a name for the new alias.
4. When you have finished configuring the alias properties, click the Apply button. The new alias appears under the tree control, as shown in the figure below.



Name: Alias004

Register Type: Alias

Data Type: STRING

☑ Available through OPC

☑ Available through Automation

☑ Writeable

Advanced

Delay 0 milliseconds

☐ Disable input updates propagation

☐ Ranges

Low: 0

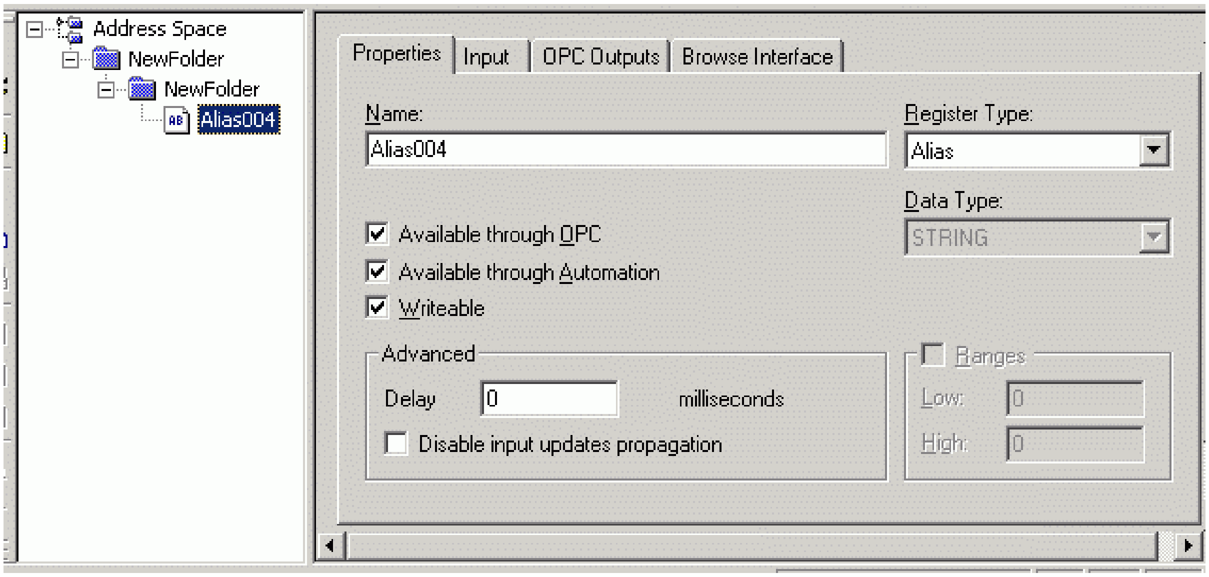
High: 0

Configuring Alias Properties

Configuring Alias Properties

The alias properties dialog box contains the following tabs, as shown in the figure below:

- Properties
- Input
- OPC Outputs
- Browse Interface



Name: Alias004

Register Type: Alias

Data Type: STRING

☑ Available through OPC

☑ Available through Automation

☑ Writeable

Advanced

Delay 0 milliseconds

□ Disable input updates propagation

□ Ranges

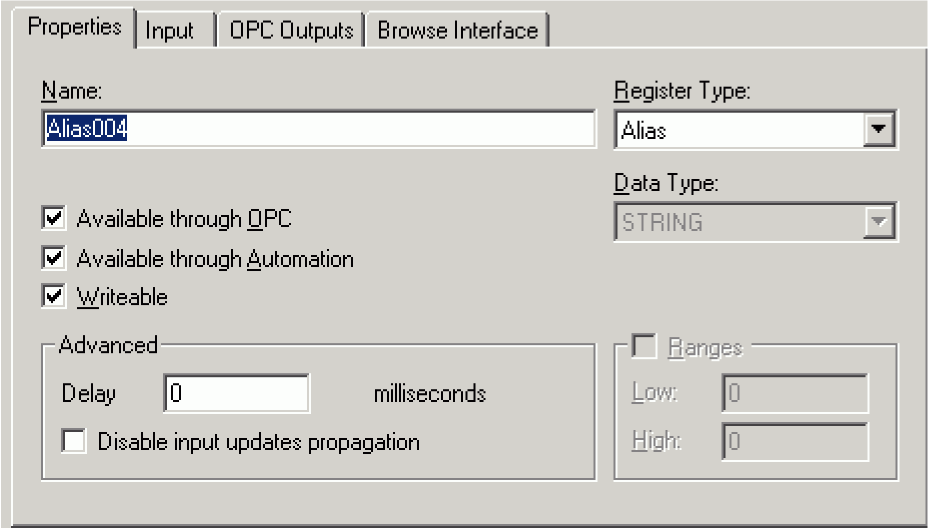
Low: 0

High: 0

Configuring Alias Properties

Alias Settings: Properties Tab

The **Properties** tab in the **Alias Settings** dialog box, shown below, allows you to set the following alias parameters, as described in the table below.



Name: Alias004

Register Type: Alias

Data Type: STRING

☑ Available through OPC

☑ Available through Automation

☑ Writeable

Advanced

Delay 0 milliseconds

□ Disable input updates propagation

□ Ranges

Low: 0

High: 0

Alias Settings: Properties Tab

Properties Tab Parameters

NAME	A common tag name.
REGISTER TYPE	Specifies Register, Alias, Switch Alias, or Redundancy Alias.
AVAILABLE THROUGH OPC	Checking this box makes the register available to OPC clients.
AVAILABLE THROUGH AUTOMATION	Checking this box makes the register available to VB applications so that it could be edited by a VB editor.
WRITEABLE	Checking this box makes the register writeable. Uncheck the box for a read-only OPC client.
DATA TYPE	This field is not available for aliases.
RANGES	This field is not available for aliases.
HIGH RANGE	This field is not available for aliases.
LOW RANGE	This field is not available for aliases.
DELAY	You can specify a delay time for the register (in milliseconds) in the box provided.
DISABLE OPC PROPAGATION SUPPORT	When an OPC item is connected to a register as both input and output, a fast sequence of writes to that register may cause item value oscillation. (This may happen when two subsequent writes to the register are faster than the OPC item can perform the write operation. The acknowledge of the first write then overwrites the second written value already being stored in the register.) To avoid this behavior, Check the **Disable input updates propagation** check box in the register properties.

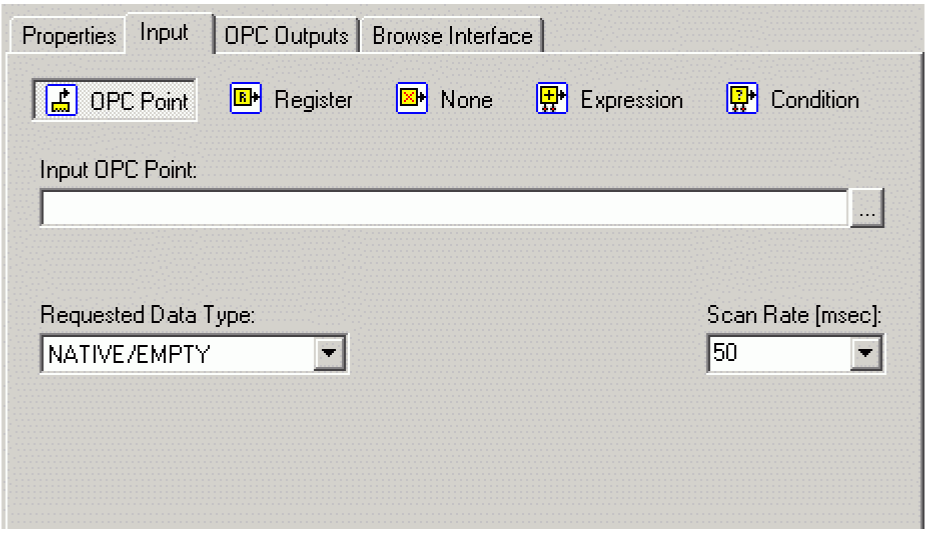
Note: By default, the data type and range information are obtained from the input of register.

Alias Settings: Input Tab

The **Input** tab in the **Alias Settings** dialog box, shown below, allows you to set the following alias input parameters:

- OPC Point
- Register
- None
- Expression
- Condition Criteria
- Condition Result
- Condition Inputs

For more information about input settings, please refer to the "Register Settings: Input Tab" section above.



Requested Data Type: NATIVE/EMPTY

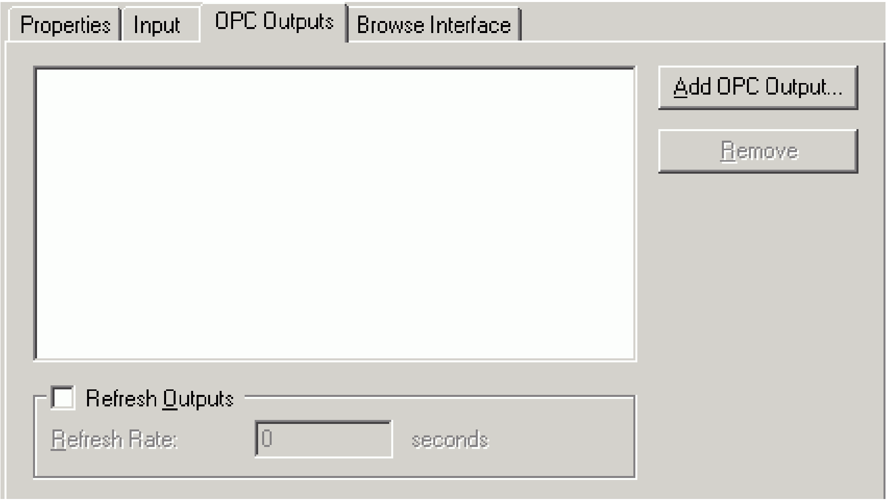
Scan Rate [msec]: 50

Alias Settings: Input Tab

Alias Settings: OPC Outputs Tab

In the **OPC Outputs** tab in the **Alias Settings** dialog box, shown below, you can select OPC tags and /or registers from the Unified Data Browser by clicking **Add OPC Output.**
When bridging OPC data, values are written to the outputs only when the input value changes. This is the default behavior. To modify this behavior, you can force DataWorX to refresh outputs periodically. Then the value is written to the outputs even if the input value does not change. You can specify a **Refresh Rate** for outputs by checking the **Refresh Outputs** check box and typing the output refresh rate (in seconds) in the edit box.

NOTE
You may select more than one tag for the output.



□ Refresh Outputs
Refresh Rate: 0 seconds

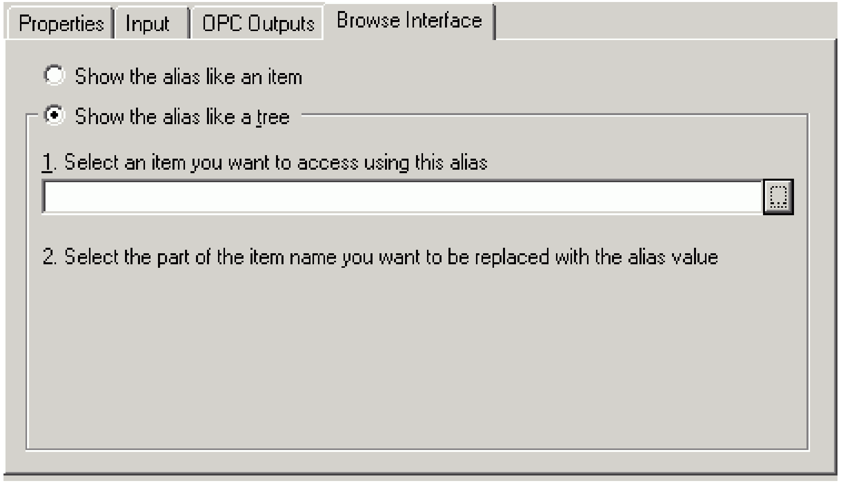
Alias Settings: OPC Outputs Tab

Alias Settings: Browse Interface Tab

In the **Browse Interface** tab in the **Alias Settings** dialog box, shown below, you can define how the alias should appear in the browse interface:

- **Show the alias like an item:** Selecting this option causes the alias to be displayed as a leaf of the tree.
- **Show the alias like a tree:** The subtree of items will appear as a subtree of the alias. In other words, the hierarchy displayed in the browser will mirror the exact tree structure of the alias set up in the group sub-window of DataWorX.

Then simply follow the two steps indicated on the **Browse Interface** tab. If you choose to show the alias like a tree, first select an item you want to access using the alias. Click the **...** button to open the Unified Data Browser. Then select a part of the item name you selected in Step 1. This selected part is the one you intend to replace with the alias.



○ Show the alias like an item

● Show the alias like a tree

1. Select an item you want to access using this alias

2. Select the part of the item name you want to be replaced with the alias value

Alias Settings: Browse Interface Tab

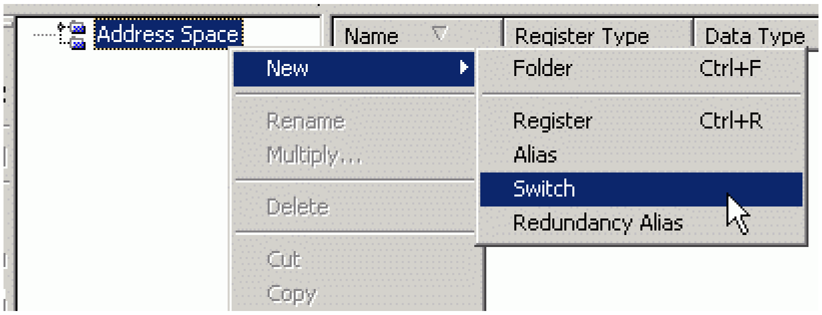
Switch Aliases

A **switch alias** is a special kind of alias. Unlike a regular alias, it has a numeric input. It contains a predefined set of values. The value of the alias is the one of the predefined set that corresponds to the input value.

Creating New Switch Aliases

To create a new switch alias:

1. Right-click the **Address Space** tree control of the Configurator and select **New > Switch** from the pop-up menu, as shown in the figure below.



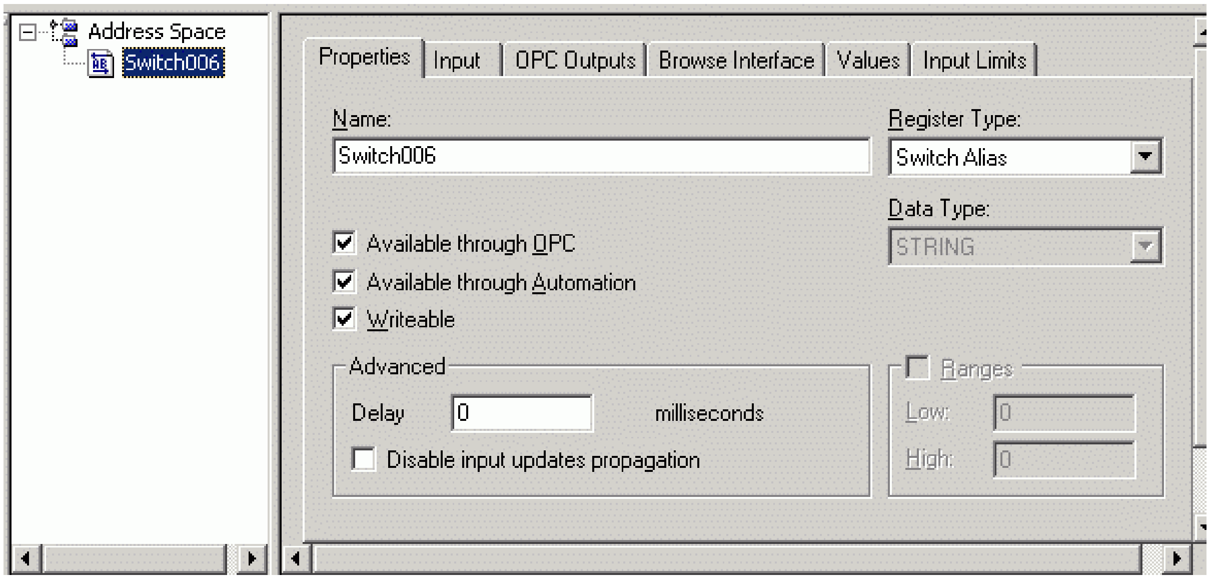
Creating a New Switch Alias

2. The properties dialog box for the new switch alias appears in the right-hand pane of the Configurator, as shown in the figure below.

3. In the Name field, type a name for the new switch alias. The name of the switch alias must meet the conditions for register name (unique, consisting of letters, numbers, and underscores).

4. Use the Values tab to define the values for the switch alias.

5. When you have finished configuring the switch alias properties, click the Apply button. The new switch alias appears under the tree control, as shown in the figure below.



Name: Switch006

Register Type: Switch Alias

Data Type: STRING

☑ Available through OPC

☑ Available through Automation

☑ Writeable

Advanced

Delay 0 milliseconds

□ Disable input updates propagation

□ Ranges

Low: 0

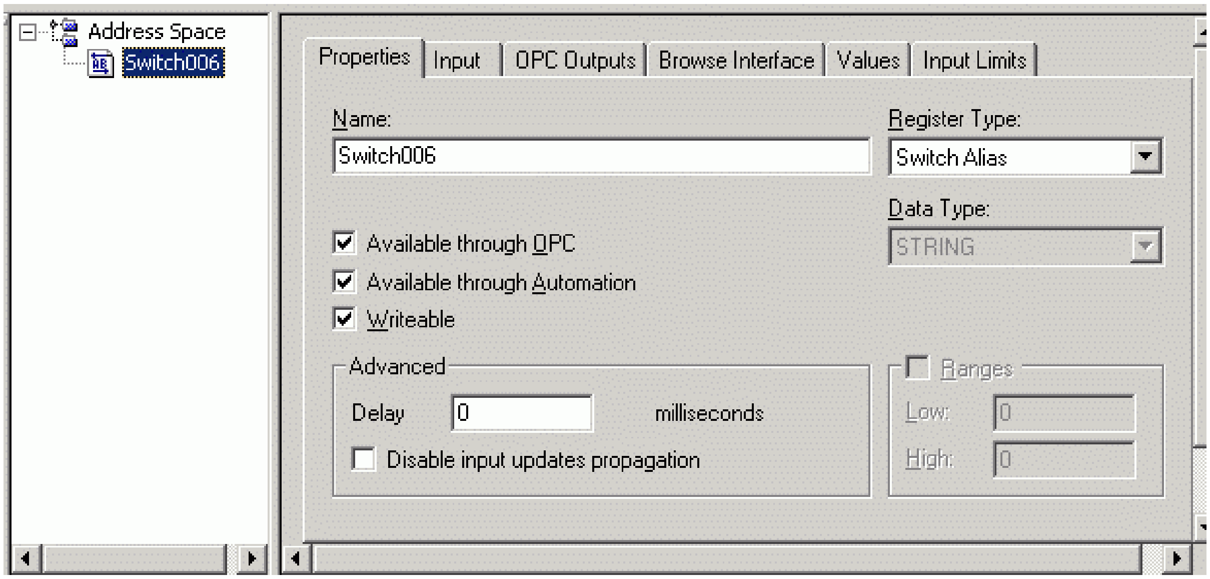
High: 0

Configuring Switch Alias Properties

Configuring Switch Alias Properties

The switch alias properties dialog box contains the following tabs, as shown in the figure below:

- Properties
- Input
- OPC Outputs
- Browse Interface
- Values
- Input Limits



Name: Switch006

Register Type: Switch Alias

Data Type: STRING

☑ Available through OPC

☑ Available through Automation

☑ Writeable

Advanced

Delay 0 milliseconds

□ Disable input updates propagation

□ Ranges

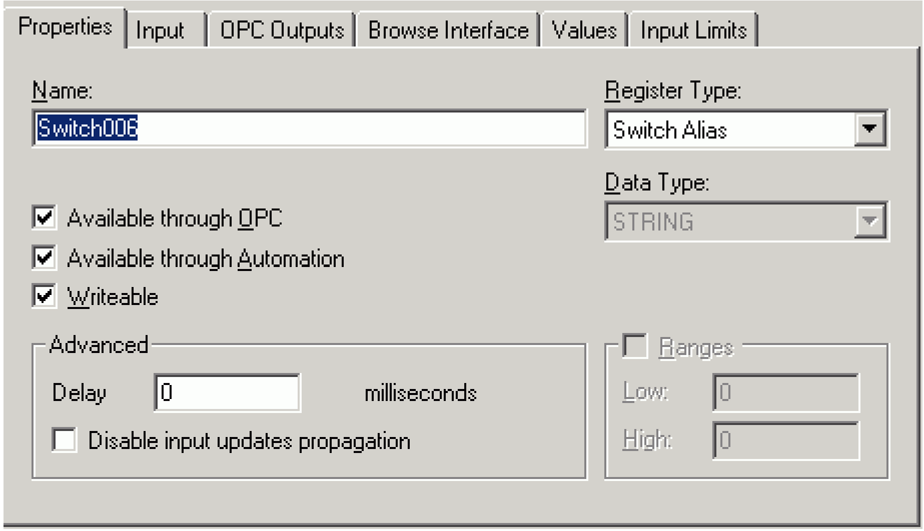
Low: 0

High: 0

Configuring Switch Alias Properties

Switch Alias Settings: Properties Tab

The **Properties** tab in the **Switch Alias Settings** dialog box, shown below, allows you to set the following switch alias parameters, as described in the table below.



Name: Switch006

Register Type: Switch Alias

Data Type: STRING

☑ Available through OPC

☑ Available through Automation

☑ Writeable

Delay 0 milliseconds

☐ Disable input updates propagation

☐ Ranges

Low: 0

High: 0

Switch Alias Settings: Properties Tab

Properties Tab Parameters

NAME	The name of the switch alias must meet the conditions for register name (unique, consisting of letters, numbers, and underscores).
REGISTER TYPE	Specifies Register, Alias, Switch Alias, or Redundancy Alias.
AVAILABLE THROUGH OPC	Checking this box makes the register available to OPC clients.
AVAILABLE THROUGH AUTOMATION	Checking this box makes the register available to VB applications so that it could be edited by a VB editor.
WRITEABLE	Checking this box makes the register writeable. Uncheck the box for a read-only OPC client.
DATA TYPE	This field is not available for switch aliases.
RANGES	This field is not available for switch aliases.
HIGH RANGE	This field is not available for switch aliases.
LOW RANGE	This field is not available for switch aliases.
DELAY	You can specify a delay time for the register (in milliseconds) in the box provided.
DISABLE OPC PROPAGATION SUPPORT	When an OPC item is connected to a register as both input and output, a fast sequence of writes to that register may cause item value oscillation. (This may happen when two subsequent writes to the register are faster than the OPC item can perform the write operation. The acknowledge of the first write then overwrites the second written value already being stored in the register.) To avoid this behavior, Check the **Disable input updates propagation** check box in the register properties.

NOTE
By default, the data type and range information are obtained from the input of register.

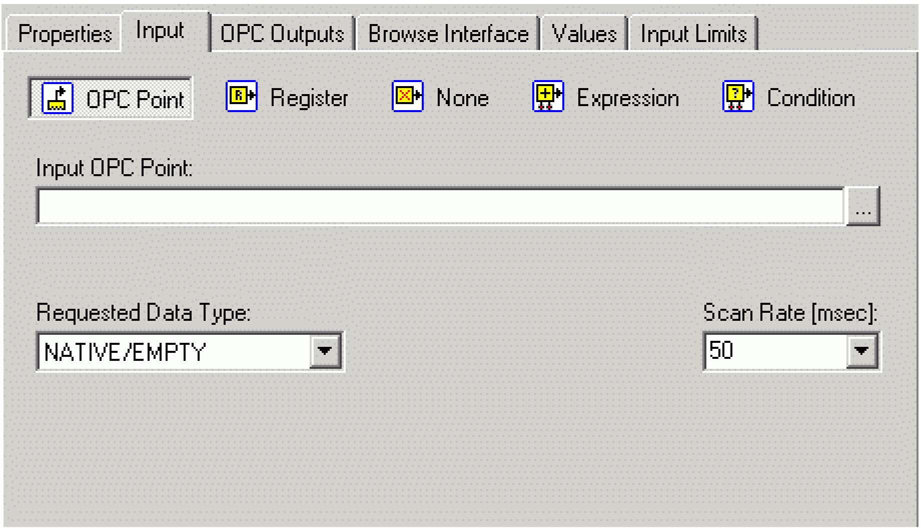
Switch Alias Settings: Input Tab

The **Input** tab in the **Switch Alias Settings** dialog box, shown below, allows you to set the following switch alias input parameters:

- OPC Point
- Register

- None
- Expression
- Condition Criteria
- Condition Result
- Condition Inputs

For more information about input settings, please refer to the "Register Settings: Input Tab" section above.



Input OPC Point:

Requested Data Type: NATIVE/EMPTY

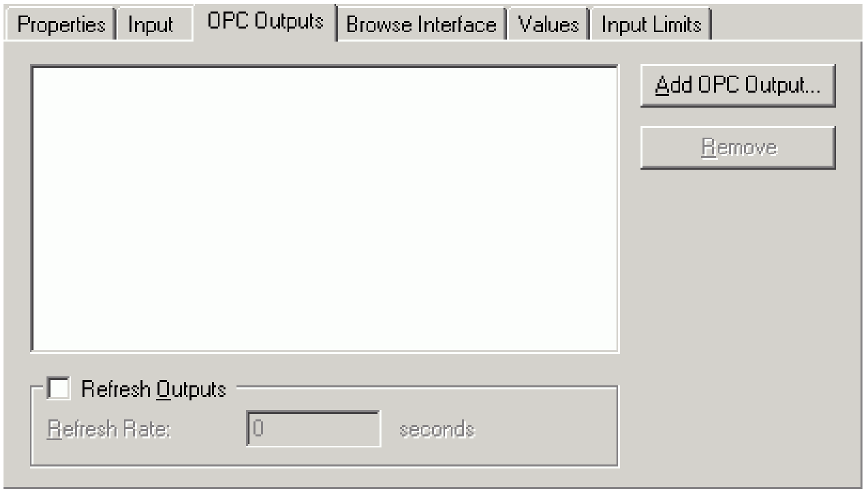
Scan Rate [msec]: 50

Switch Alias Settings: Input Tab

Switch Alias Settings: OPC Outputs Tab

In the **OPC Outputs** tab in the **Switch Alias Settings** dialog box, shown below, you can select OPC tags and /or registers from the Unified Data Browser by clicking **Add OPC Output.**
When bridging OPC data, values are written to the outputs only when the input value changes. This is the default behavior. To modify this behavior, you can force DataWorX to refresh outputs periodically. Then the value is written to the outputs even if the input value does not change. You can specify a **Refresh Rate** for outputs by checking the **Refresh Outputs** check box and typing the output refresh rate (in seconds) in the edit box.

NOTE
You may select more than one tag for the output.



□ Refresh Outputs

Refresh Rate: 0 seconds

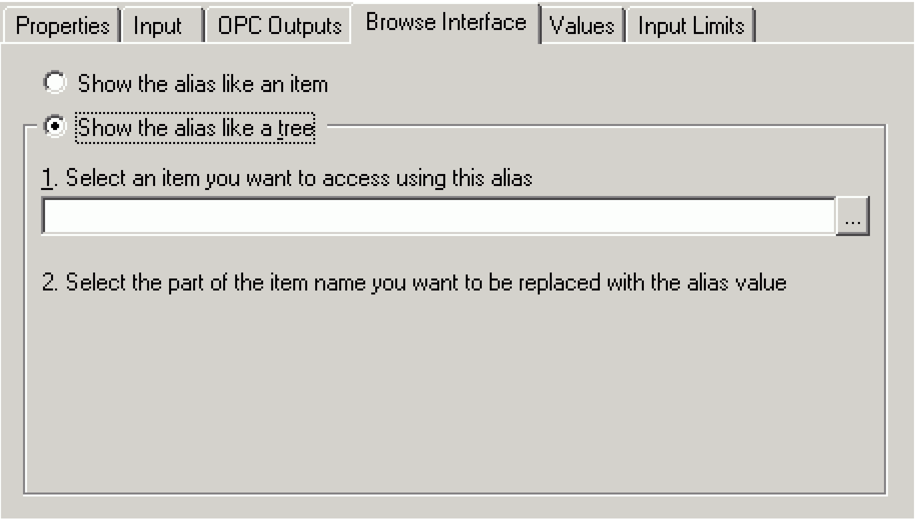
Switch Alias Settings: OPC Outputs Tab

Switch Alias Settings: Browse Interface Tab

In the **Browse Interface** tab in the **Switch Alias Settings** dialog box, shown below, you can define how the switch alias should appear in the browse interface:

- **Show the alias like an item:** Selecting this option causes the alias to be displayed as a leaf of the tree.
- **Show the alias like a tree:** The subtree of items will appear as a subtree of the alias. In other words, the hierarchy displayed in the browser will mirror the exact tree structure of the alias set up in the group sub-window of DataWorX.

Then simply follow the two steps indicated on the **Browse Interface** tab. If you choose to show the alias like a tree, first select an item you want to access using the alias. Click the **...** button to open the Unified Data Browser. Then select a part of the item name you selected in Step 1. This selected part is the one you intend to replace with the alias.



○ Show the alias like an item

● Show the alias like a tree

1. Select an item you want to access using this alias

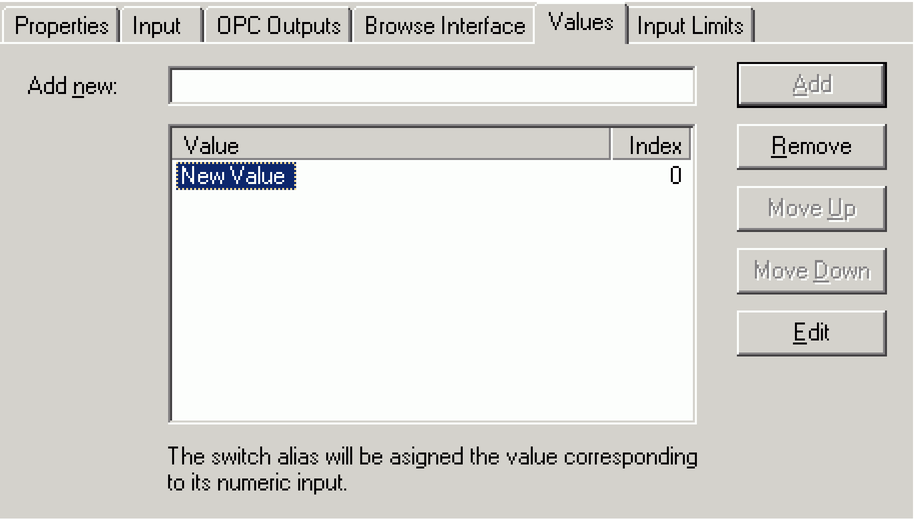
2. Select the part of the item name you want to be replaced with the alias value

Switch Alias Settings: Browse Interface Tab

Switch Alias Settings: Values Tab

In the **Values** tab in the **Switch Alias Settings** dialog box, shown below, use the **Add New** field and the **Add** button to add new values for the switch alias. Use the **Move Up, Move Down,** and **Remove** buttons to change the order of the values. To edit a value, simply click it in the **Value** column. The corresponding numbers for particular values are listed in the **Index** column. The switch alias will be assigned the value corresponding to its numeric input.

NOTE
The indexes cannot be changed.



Add new:

Value	Index
New Value	0

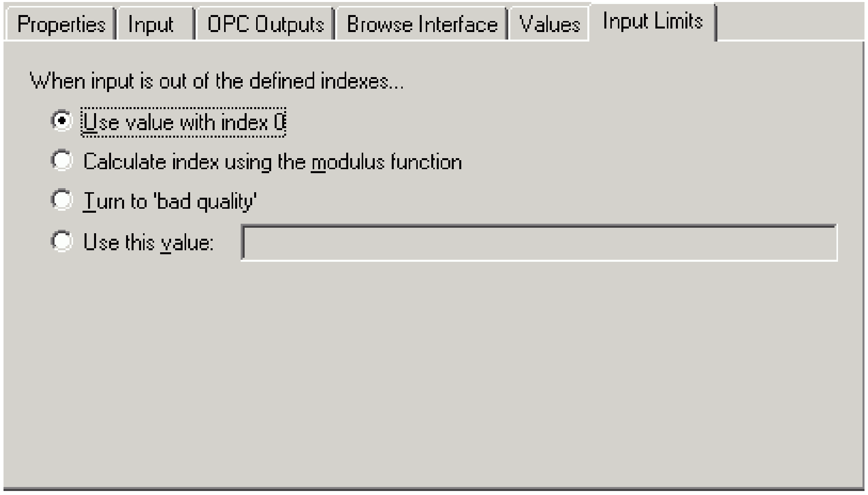
The switch alias will be asigned the value corresponding to its numeric input.

Switch Alias Settings: Values Tab

Switch Alias Settings: Input Limits Tab

When the input is outside the range of the defined indexes, you can select an input type on the Input Limits tab in the Switch Alias Settings dialog box, shown below. For example, suppose you have defined four values for the switch alias; thus, their indexes are "0," "1," "2," and "3." The Input Limits tab allows you to define what should happen when the switch alias's input is less than "0" or greater than "3":

- The value with index "0" can be used
- The MODULUS function can be used.
- It can indicate "bad quality."
- You can also specify a value in the edit box.



When input is out of the defined indexes...

● Use value with index 0
○ Calculate index using the modulus function
○ Turn to 'bad quality'
○ Use this value:

Switch Alias Settings: Input Limits Tab

Example of Using a Switch Alias

Assume that a Modbus OPC Server with two devices is connected to one PC. Both devices are getting the same process data. The task is to establish redundancy on these devices.

Assume further that the connection from DataWorX to the OPC server works well. What can go wrong is the connection from the OPC server to the devices. Redundancy aliases cannot solve this problem as it works on the server level. This is a task for switch aliases and conditions.

1. Assume that a tag connected to the first device is: Smar.ModbusOPCServer\device1.Tag1

The same data can be accessed via the second device as: Smar.ModbusOPCServer\device2.Tag1

2. Now define a switch alias that will switch between the two devices:

Alias name: DEVICE

Set of predefined values: device1, device2

Tag1 mentioned above will be then accessed using the switch alias as:

Smar.ModbusOPCServer\[[DEVICE]].Tag1

Depending on the input of the DEVICE alias, either device1 or device2 will be involved.

3. To set up the correct value on the DEVICE alias input, a register with condition will be used. Define such a register:

- Add a new register and choose a name, such as RCOND.
- Go to the **Input** tab, select **Condition > Criteria.**
- Select **First with Good Quality** as the criterion,
- On the **Input** tab, select **Condition > Result.**
- Select **Zero-Based Index** as the result.
- Switch to the **Condition > Inputs** tab, and then add the two tags mentioned above:

Smar.ModbusOPCServer\device1.Tag1

Smar.ModbusOPCServer\device2.Tag1

The output of the RCOND register is a number that tells which is the first tag with the good quality.

4. Finally, connect the output of the RCOND register to the DEVICE alias.

Redundancy Aliases

The **Redundancy** feature of DataWorX allows you to utilize other PCs as backup servers if a primary server goes offline. This means that you can designate alternative PC machines as backup servers if a designated primary server goes offline. Once a primary server does go offline, DataWorX will default to the backup server or servers in the sequence in which the backup servers were designated.

If the appropriate option is selected in the dialog box provided for this purpose, DataWorX will default to the primary server once it returns online.

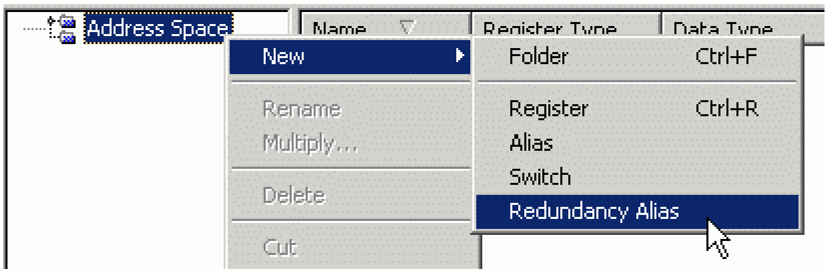
The main qualifying factors for using the redundancy feature in DataWorX are as follows:

1. You must designate one OPC server as the "Primary" server in each set.
2. You may designate one or more OPC servers as the "Backup" server(s) in each set. (The number of servers is not restricted by DataWorX itself; rather it is limited only by system resources). If more than one backup server is specified, they should be ordered (2nd, 3rd, 4th, etc.) You will see a message outlining the details of the discrepancies and will be allowed to either accept it as is or permit reconfiguration.
3. The various OPC client applications request data from DataWorX, rather than from the OPC server directly. This way if a primary OPC server failure occurs (due to any number of conditions), an automatic switchover to the backup OPC server occurs.
4. DataWorX monitors the OPC servers and aggregates the data to the requesting clients.

Creating New Redundancy Aliases

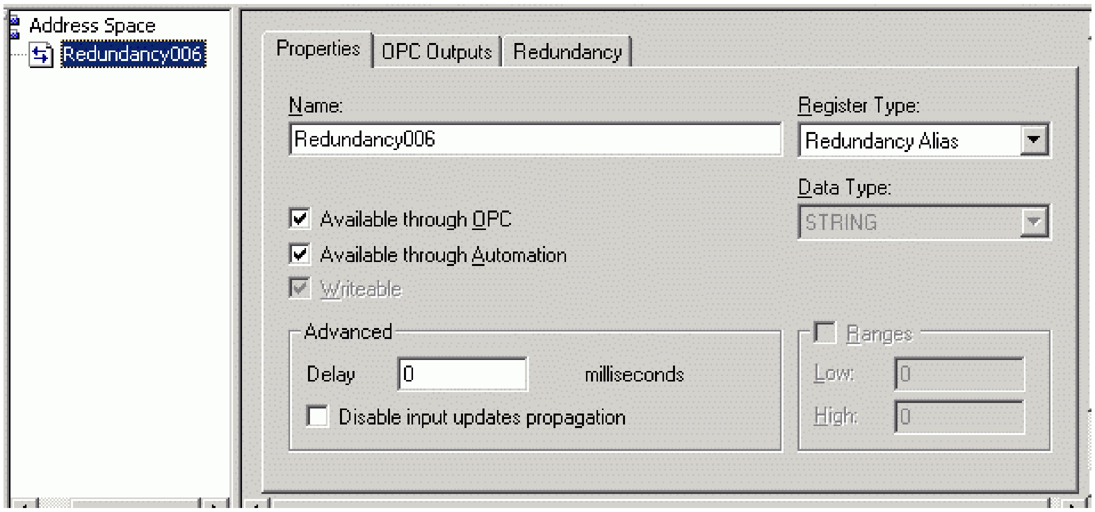
To create a new redundancy alias:

1. Right-click the **Address Space** tree control of the Configurator and select **New > Redundancy Alias** from the pop-up menu, as shown in the figure below.



Creating a New Redundancy Alias

2. The properties dialog box for the new redundancy alias appears in the right-hand pane of the Configurator, as shown in the figure below.
3. In the Name field, type a name for the new redundancy alias.
4. When you have finished configuring the redundancy alias properties, click the Apply button. The new redundancy alias appears under the tree control, as shown in the figure below.



Name: Redundancy006

Register Type: Redundancy Alias

Data Type: STRING

☑ Available through OPC

☑ Available through Automation

☑ Writeable

Advanced

Delay 0 milliseconds

□ Disable input updates propagation

□ Ranges

Low: 0

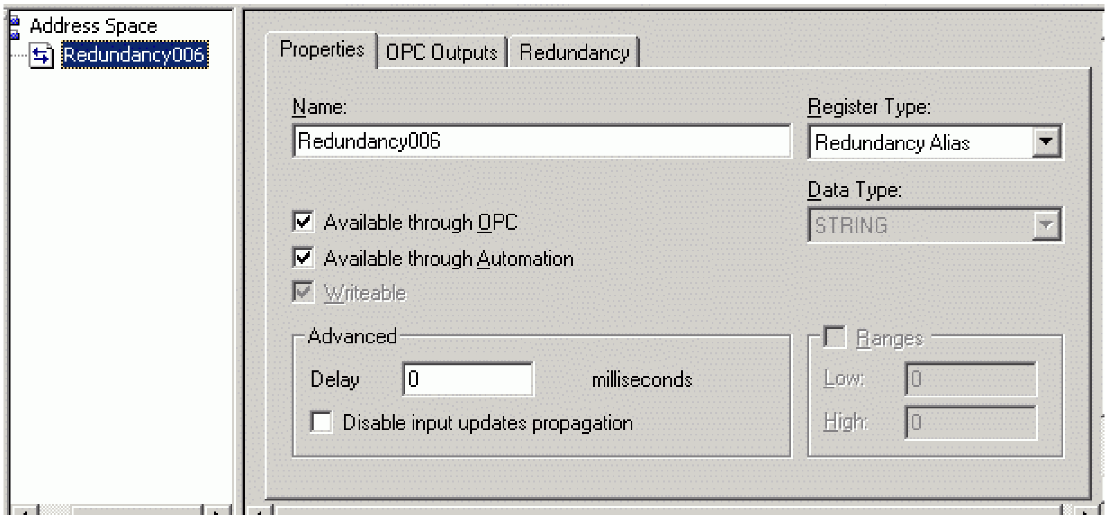
High: 0

Configuring Redundancy Alias Properties

Configuring Redundancy Alias Properties

The redundancy alias properties dialog box contains the following tabs, as shown in the figure below:

- Properties
- OPC Outputs
- Redundancy



Name: Redundancy006

Register Type: Redundancy Alias

Data Type: STRING

☑ Available through OPC

☑ Available through Automation

☑ Writeable

Advanced

Delay 0 milliseconds

☐ Disable input updates propagation

☐ Ranges

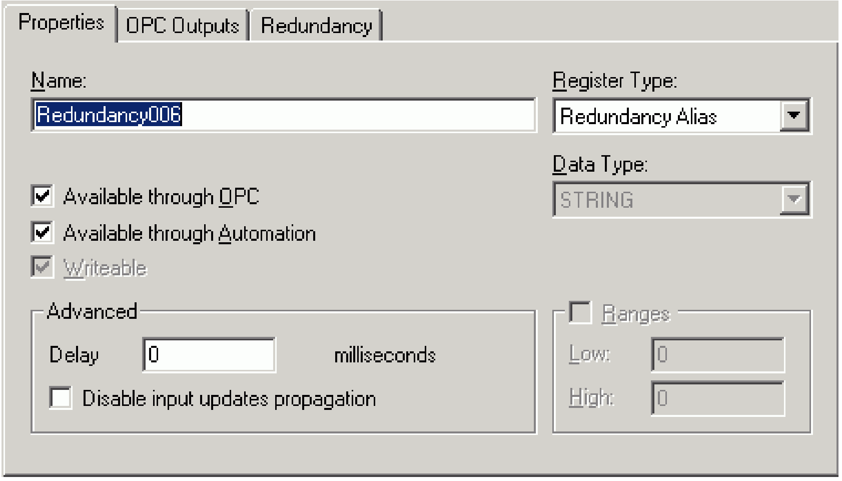
Low: 0

High: 0

Configuring Redundancy Alias Properties

Redundancy Alias Settings: Properties Tab

The **Properties** tab in the **Redundancy Alias Settings** dialog box, shown below, allows you to set the following redundancy alias parameters, as described in the table below.



Name: Redundancy006

Register Type: Redundancy Alias

Data Type: STRING

☑ Available through OPC

☑ Available through Automation

☑ Writeable

Advanced

Delay 0 milliseconds

☐ Disable input updates propagation

☐ Ranges

Low: 0

High: 0

Redundancy Alias Settings: Properties Tab

Properties Tab Parameters

NAME	A common tag name.
REGISTER TYPE	Specifies Register, Alias, Switch Alias, or Redundancy Alias.
AVAILABLE THROUGH OPC	Checking this box makes the register available to OPC clients.
AVAILABLE THROUGH AUTOMATION	Checking this box makes the register available to VB applications so that it could be edited by a VB editor.
WRITEABLE	This field is not available for redundancy aliases.
DATA TYPE	This field is not available for redundancy aliases.
RANGES	This field is not available for redundancy aliases.
HIGH RANGE	This field is not available for redundancy aliases.
LOW RANGE	This field is not available for redundancy aliases.
DELAY	You can specify a delay time for the register (in milliseconds) in the box provided.
DISABLE OPC PROPAGATION SUPPORT	When an OPC item is connected to a register as both input and output, a fast sequence of writes to that register may cause item value oscillation. (This may happen when two subsequent writes to the register are faster than the OPC item can perform the write

	operation. The acknowledge of the first write then overwrites the second written value already being stored in the register.) To avoid this behavior, Check the **Disable input updates propagation** check box in the register properties.

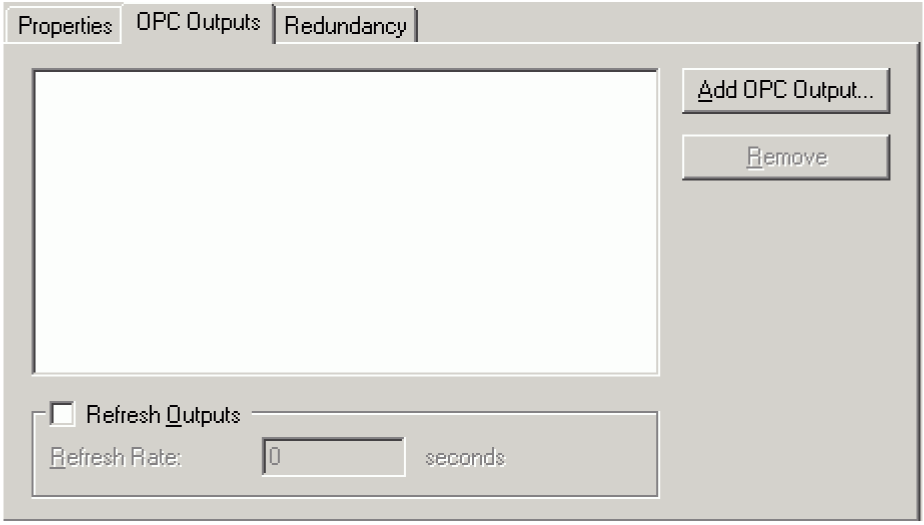
NOTE
By default, the data type and range information are obtained from the input of register.

Redundancy Alias Settings: OPC Outputs Tab

In the **OPC Outputs** tab in the **Redundancy Alias Settings** dialog box, shown below, you can select OPC tags and /or registers from the Unified Data Browser by clicking **Add OPC Output.**

When bridging OPC data, values are written to the outputs only when the input value changes. This is the default behavior. To modify this behavior, you can force DataWorX to refresh outputs periodically. Then the value is written to the outputs even if the input value does not change. You can specify a **Refresh Rate** for outputs by checking the **Refresh Outputs** check box and typing the output refresh rate (in seconds) in the edit box.

NOTE
You may select more than one tag for the output.



□ Refresh Outputs

Refresh Rate: 0 seconds

Redundancy Alias Settings: OPC Outputs Tab

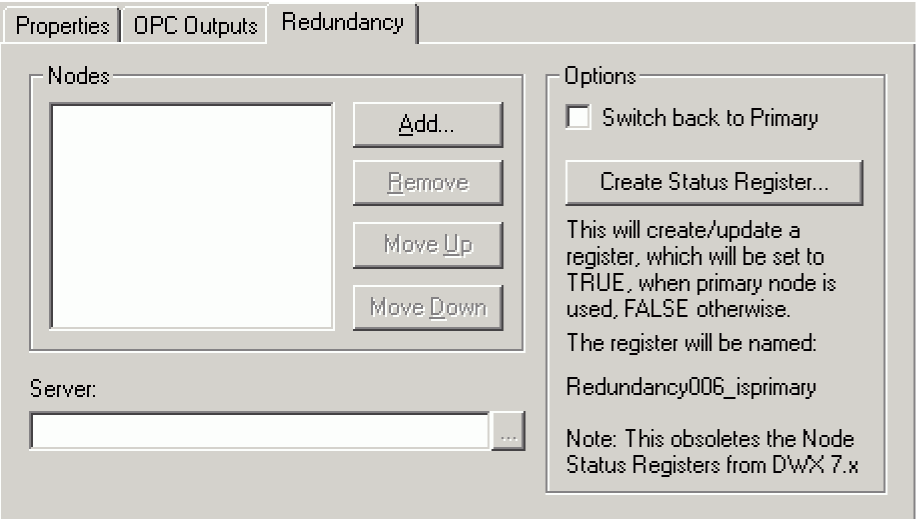
Redundancy Alias Settings: Redundancy Tab

In the **Redundancy** tab in the **Redundancy Alias Settings** dialog box, shown below, you can define select redundant nodes/servers. Click the **Add** button to browse for computers on the network through the Unified Data Browser to be designated as a primary or secondary node. Click the **Move Up** and **Move Down** buttons to change the order of the nodes. Clicking the **Remove** button deletes a network node from the list of primary or secondary nodes.

The **Server** field displays the name of the server from which the designated PC is receiving its input. Click the ... button to browse a list of OPC servers in order to choose a server from which the PC that will be designated as a primary or secondary node will receive its input.

When DataWorX detects that a primary server is running again (after having crashed), it switches back to the primary server from the backup server. If the **Switch Back to Primary** check box is checked, you will be asked before DataWorX switches back to the primary server. This is in case you may not want to the primary server for some reason (e.g. the server is in testing mode).

Clicking the **Create Status Register** button allows you to specify whether the primary node is online or offline using the integers "0" or "1." It creates/updates a register that will be set to TRUE when the primary node is used, and set to FALSE otherwise. This register could be very helpful in triggering alarms and starting/stopping data-logging.



□ Switch back to Primary

This will create/update a register, which will be set to TRUE, when primary node is used, FALSE otherwise.

The register will be named:

Redundancy006_isprimary

Note: This obsoletes the Node Status Registers from DWX 7.x

Redundancy Alias Settings: Redundancy Tab

Chapter 3

RUNTIME OPERATIONS

DataWorX Runtime Environment

The runtime environment of DataWorX lets you view real-time data as they are transmitted between the servers on the network. This is the state in which you can view the live data being received according to the parameters you set in configuration mode. The aggregation feature of DataWorX is especially useful during runtime mode. A register with its input connected to an OPC point can be used to "prerequest" items from the OPC servers. Because registers remain in existence during the entire runtime operation, the items connected to their inputs are also requested for the entire duration of runtime. Because of the feature of OPC aggregation, clients can then request these items without a delay.

During runtime, you can perform the following tasks:

- Open a DataWorX file.
- Edit the value of a register.
- Change the value of an alias.
- Edit an alias and change its default value.

Starting and Stopping Runtime Mode

You can switch to runtime mode by selecting **Start Runtime** from the **Action** menu in configuration mode. You can stop runtime mode by selecting **Stop Runtime** from the **Action** menu. Clicking the traffic light button on the toolbar, shown at left, also commences or stops runtime mode. The traffic light icon switches from red to green once you switch from the configuration mode to runtime mode.

NOTE
The traffic light button on the toolbar starts/stop the runtime mode, not the DataWorX Runtime itself. The DataWorX Runtime (it is an OPC server) is started when needed and runs forever (until stopped by ProcessView Tray, or when no clients access it, by the Configurator).

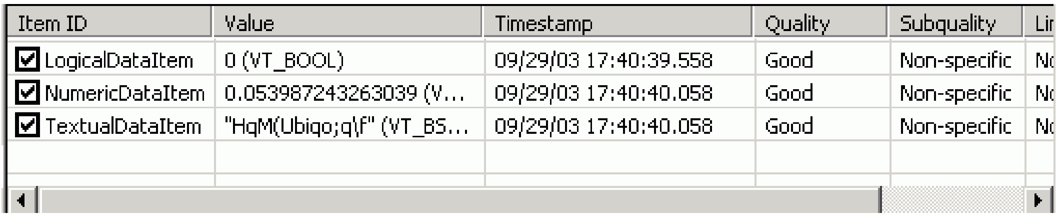
The runtime module loads its configuration from the active configuration database. The Configurator sets this setting by the **Make Active** command on the **File** menu of the Configurator. During runtime mode, the runtime monitor shows live data for the items displayed. It logs the start and stop of runtime as many times as runtime is started and stopped. It also displays messages giving the current status of the tags. Selecting **Update Runtime Configuration** from the **File** menu forces the DataWorX runtime engine to reload any changes made in to the configuration database since runtime mode was started.

When the **DwxRuntime** is in memory (running), it is accessible to OPC clients, which may connect to it. If DwxRuntime is in runtime mode, it connects to the underlying OPC servers and gets data, does data bridging, etc. If DwxRuntime is in memory but not in runtime mode, OPC clients can connect to it but they do not get any data.

Monitor View

The Configurator includes a runtime monitor for viewing live server data. To change to the monitor view, select **Monitor View** from the **View** menu. The runtime monitor appears in the bottom pane of the Configurator screen, as shown in the figure below. During runtime, the monitor scans the displays the tag values and other statistics such as date, time, and quality.

Monitoring is enabled for each item with a check mark next to it. To enable/disable monitoring for an item, you can click on the box to the left of the item. A check mark inside the box means the item is enabled for monitoring. If there is no check mark, then the item is disabled.

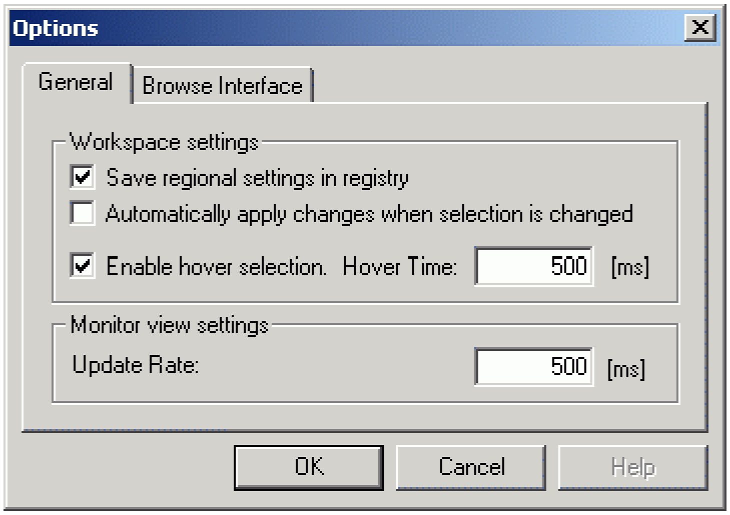


Item ID	Value	Timestamp	Quality	Subquality	Lir
☑ LogicalDataItem	0 (VT_BOOL)	09/29/03 17:40:39.558	Good	Non-specific	N(
☑ NumericDataItem	0.053987243263039 (V...	09/29/03 17:40:40.058	Good	Non-specific	N(
☑ TextualDataItem	"HqM(Ubiqo;q\f" (VT_BS...	09/29/03 17:40:40.058	Good	Non-specific	N(

Runtime Monitor View

Monitor View Refresh Rate

To set the **OPC Monitoring Update Rate** (in milliseconds), select **Options** from the **Tools** menu and click on the **General** tab of the **Options** dialog box, as shown in the figure below.



Workspace settings

☑ Save regional settings in registry

□ Automatically apply changes when selection is changed

☑ Enable hover selection. Hover Time: 500 [ms]

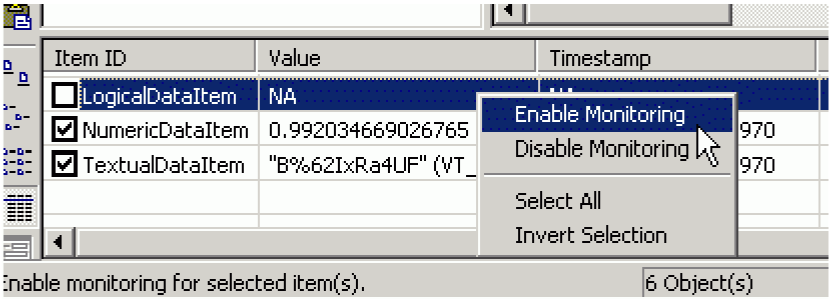
Monitor view settings

Update Rate: 500 [ms]

Options Dialog Box: General Tab

Enable Monitoring

Monitoring is enabled for each item with a check mark next to it. To enable/disable monitoring for an item, you can click on the box to the left of the item. A check mark inside the box means the item is enabled for monitoring. If there is no check mark, then the item is disabled. To enable monitoring for an unchecked item in the monitor view, you can also right-click on the item and select **Enable Monitoring** from the pop-up menu, as shown in the figure below.



Item ID	Value	Timestamp
□ LogicalDataItem	NA	NA
☑ NumericDataItem	0.992034669026765	970
☑ TextualDataItem	"B%62IxRa4UF" (VT_	970

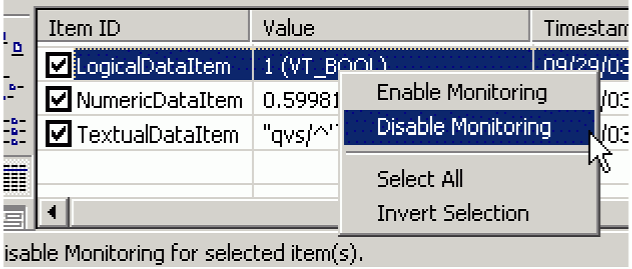
:nable monitoring for selected item(s). 6 Object(s)

Enabling Monitoring for an Item

Disable Monitoring

Monitoring is enabled for each item with a check mark next to it. To enable/disable monitoring for an item, you can click on the box to the left of the item. A check mark inside the box means the item is enabled for monitoring. If there is no check mark, then the item is disabled. To disable monitoring for a checked item in the monitor view, you can also right-click on the item and select **Disable**

Monitoring from the pop-up menu, as shown in the figure below.



Item ID	Value	Timestam
☑ LogicalDataItem	1 (VT_BOOL)	09/29/03
☑ NumericDataItem	0.59981	/03
☑ TextualDataItem	"qvs/^'	/03

isable Monitoring for selected item(s).

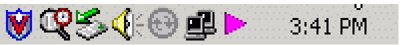
Disabling Monitoring for an Item

Running DataWorX As a Service

In general, DataWorX can be registered and run as a service (e.g. under Windows NT and Windows 2000) as well as a stand-alone COM server. However, the following differences apply:

To configure DataWorX to run as a service, do the following:

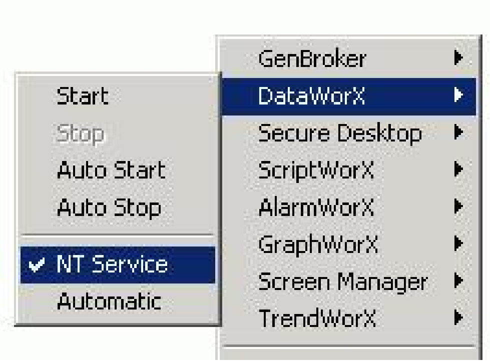
1. Install ProcessView or DataWorX.
2. Use the DataWorX Configurator to configure your application.
3. Once the application setup is completed, use the **ProcessView Tray** to register to DataWorX as an NT Service. To do this, start ProcessView Tray from the Windows Start menu by selecting **Programs > Smar ProcessView > Tools > ProcessView Tray.**
4. A purple triangle appears in the task bar, as shown in the figure below.



Task Bar With ProcessView Tray Icon

5. Right-click on the triangle to open the ProcessView Tray menu, as shown in the figure below. Select DataWorX > NT Service from the pop-up menu, as shown in the figure below.

NOTE
You can also use ProcessView Tray to set DataWorX to start automatically as an NT service the next time the PC is rebooted; select **DataWorX > Automatic** from the pop-up menu.



Registering DataWorX As a Service

OLE Automation in DataWorX

DataWorX 8.0 consists of two parts – the Configurator and the Runtime part. Both expose an OLE Automation interface; however the Configurator's interface is designed for use with ProjectWorX.

The interface of the Runtime part is described below.

The name of the ProcessView DwxRuntime Automation Library is **AutoDwxRuntimeLib.** It defines the following classes and interfaces:

- DwxRuntime
- IPoint
- IRegister
- IRedundancyAlias

DwxRuntime Object

This object represents the whole DataWorX Runtime module. It contains other DataWorX objects like points and registers. It can be used to create or access them.

Methods
GetPoint(strName As String, nScanRate As Long) As IPoint
Creates a point object with the specified name and scan rate and returns and interface of it. The point object can be subsequently used to read and/or write values from/to OPC servers.
The **strName** parameter should meet ProcessView point name convention:
i.e. [\\node\]OPCServer\TagName.
The **nScanRate** is the requested scan rate in milliseconds.

GetRegister(strName As String) As IRegister
Returns an interface of an existing DataWorX register. This interface can be used to access the registers value and some of its properties.

GetRedundancyAlias(strName As String) As IRedundancyAlias
Returns an interface of an existing DataWorX Redundancy Alias object.

ConfigurationUpdate()
Forces DataWorX to reload the active configuration and include changes made since the configuration was loaded last time.

Shutdown()
Forces DataWorX to quit immediately. Any reference to DwxRuntime object becomes invalid after calling this function. Users should not call this function – it has been primarily designed for ProcessView ProcessView Tray.

Property
Runtime As Boolean
This is a read-write property that tells whether DataWorX is in runtime mode. Writing to it starts or stops the runtime operation. When starting the runtime operation, DataWorX requests points on OPC servers; the data updates from the OPC servers are propagated during runtime (data bridging).

IPoint Interface

An interface to a point object can be obtained by calling the **DwxRuntime.GetPoint()** function. The point objects represent a non-persistent connection to OPC servers.

Properties
Name As String
Read-only property; name of the relevant OPC point, in the ProcessView point name convention.

Value As Variant
Read-write property; represents value of the relevant OPC point. Writing to this property causes an asynchronous write to the OPC server.

Method
GetValueEtc(Value, Quality As Long, Timestamp As Date, Milliseconds As Long)
Gets the current value, quality and timestamp of the relevant OPC point object.

IRegister Interface

An interface to a register existing in DataWorX. It may represent registers of any type (i.e. aliases, switch aliases, etc.) defined in DataWorX. This interface can be obtained by calling

DwxRuntime.GetRegister().

Properties
Name As String
Read-only property; name of the relevant DataWorX register.

Value As Variant
Read-write property; represents the value of the relevant DataWorX register. Writing to this property changes the value of the register. If the register has defined any output, the new value may be also written into the output.

Ranges As Boolean
Read-write property telling the user whether the ranges of the DataWorX register are valid and should be used.

HiRange As Double
LoRange As Double
Read/write properties containing ranges of the register. Writing to these properties modifies the ranges used in runtime to clip the register value. The range changes are not persistent (do not get stored into the active configuration database.)

REGISTER_TYPE RegType
Read-only property; type of the register, one of the REGISTER_TYPE values:

RT_REGISTER = 0
RT_ALIAS = 1
RT_REDUNDANCY_ALIAS = 2
RT_REDUNDANCY_FLAG = 3
RT_SWITCH_ALIAS = 4

Method
GetValueEtc(Value, Quality As Long, Timestamp As Date, Milliseconds As Long)
Gets the current value, quality and timestamp of the DataWorX register.

IRedundancyAlias Interface

An interface to a redundancy alias existing in DataWorX. It can be obtained by calling Application.GetRedundancyAlias(). It can be used to force a redundancy switchover.

Methods
SwitchToPrimary
Forces redundancy switchover to the node defined as primary.

SwitchToNext
Forces redundancy switchover to the backup node following the node that is currently used. If the currently used node is the last backup node, it will switch again to the primary node.

Properties
IsPrimary As Boolean
Returns TRUE if redundancy currently uses the node defined as primary; otherwise returns FALSE.

PrimaryNodeName As String
Returns the name of the node defined as primary.

CurrentNodeName As String
Returns the name of the currently used node.