DAServer Manager User's Guide

Invensys Systems, Inc.

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Contents

Welcome

A Wonderware® DAServer is one component of a software system that connects your software application with sources of information on the factory floor. Use the DAServer Manager, located in the ArchestrA™ System Management Console (SMC), to configure, activate and troubleshoot a DAServer. This guide describes the user interface, features, and functions of the DAServer Manager.

Documentation Conventions

This documentation uses the following conventions:

Convention	Used for
Initial Capitals	Paths and file names.
Bold	Menus, commands, dialog box names, and dialog box options.
Monospace	Code samples and display text.

Technical Support

Wonderware Technical Support offers a variety of support options to answer any questions on Wonderware products and their implementation.

Before you contact Technical Support, refer to the relevant section(s) in this documentation for a possible solution to the problem. If you need to contact technical support for help, have the following information ready:

- The type and version of the operating system you are using.

- Details of how to recreate the problem.

- The exact wording of the error messages you saw.

- Any relevant output listing from the Log Viewer or any other diagnostic applications.

- Details of what you did to try to solve the problem(s) and your results.

- If known, the Wonderware Technical Support case number assigned to your problem, if this is an ongoing problem.

Chapter 1

Getting Started

The DAServer Manager is a part of the ArchestrA™ System Management Console (SMC) suite of utilities. It enables the configuration, diagnosis, activation, or deactivation of a local DAServer or a remote DAServer located on a different node from the DAServer Manager.

Use the DAServer Manager to view and configure the DAServers. Servers developed with the Data Access Server Toolkit can be stand-alone products or designed for use with ArchestrA based products.

You can open multiple instances of the DAServer Manager at the same time; however, you can use only the first instance to create device hierarchies and configure a DAServer. In all other instances of the DAServer Manager, hierarchy and configuration settings are set to read-only.

Note The DAServer Manager user interface may look different on different versions of Microsoft Windows. In addition, the version of Microsoft Management Console (MMC) installed on your computer may affect the content and behavior of the user interface.

Navigating in the DAServer Manager

You can access the DAServer Manager from the SMC. The DAServer Manager has a hierarchical tree of items, called the console tree, and a configuration pane, called the details pane:

console tree   details pane
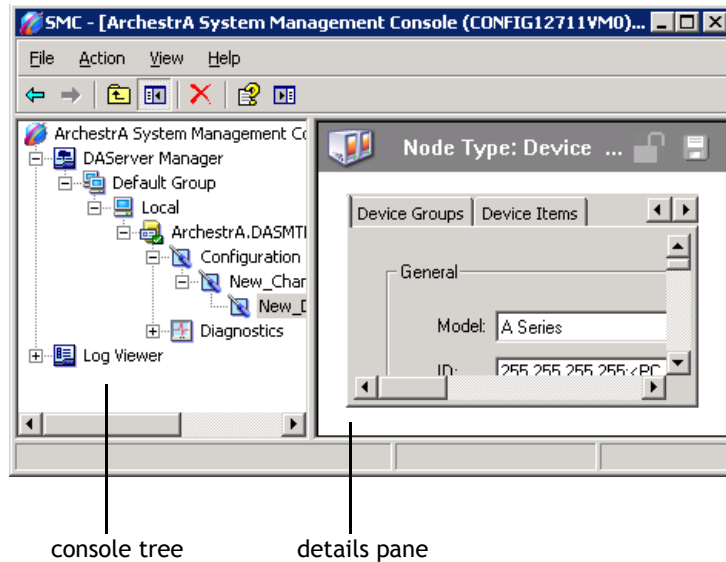
In the console tree, the **Default Group** item appears under the **DAServer Manager** item.

The **Default Group** lists all the computer nodes on the local domain, beginning with, by default, the local computer (**Local**), which is the computer on which the DAServer Manager is running.

Each computer node is itself a container if one or more DAServers are running on that node. When you click different nodes in the console tree, the information in the details pane changes accordingly.

To add a node group

1   Right-click on the DAServer Manager node, select **New** and then select **Node Group**. The **New Node Group** dialog box appears.

2   Type a name for the node group and click **OK**.

To delete a node group

1   In the **DAServer Manager**, navigate to the node group.

2   Right-click on the **Node Group**, click **Delete**. The **Delete** dialog box appears.

3   Click **Yes**.

To add a remote computer node

1   In the **DAServer Manager**, navigate to a **Node Group** node.

2   Right-click on the node, point to **New** and then click **Node**. The **New Node** dialog appears.

3   Click **Browse**. The **Browse Nodes** dialog box appears.

4   Select the **Domain Name** from the **Domain** list and select the **Remote Computer** name from the node list.

To delete a remote computer node

1   In the **DAServer Manager**, navigate to the node.

2   Right-click on the node, and then click **Delete**. The **Delete** dialog box appears.

3   Click **Yes**.

Examples

In the following example, the SMC shows the DAServer Manager with ArchestrA.DASOME5C.1 installed on a local computer node. The red icon next to the DAServer name indicates that the DAServer is inactive. Inactive DAServers contain only the **Configuration** node.
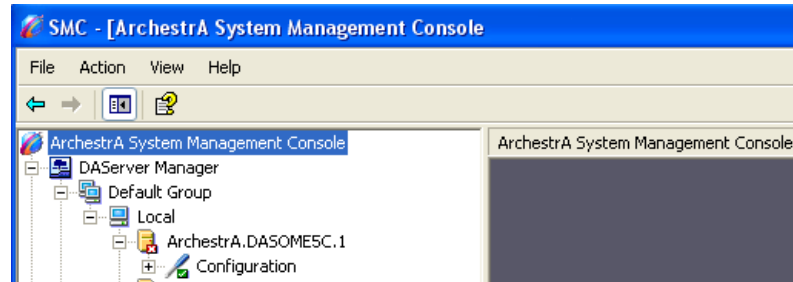
In this example, the SMC shows the DAServer Manager with ArchestrA.ServerName.1 installed on a local computer node. The green icon next to the DAServer name indicates its active state. When expanded as shown, an active DAServer contains both **Configuration** and **Diagnostics** nodes.
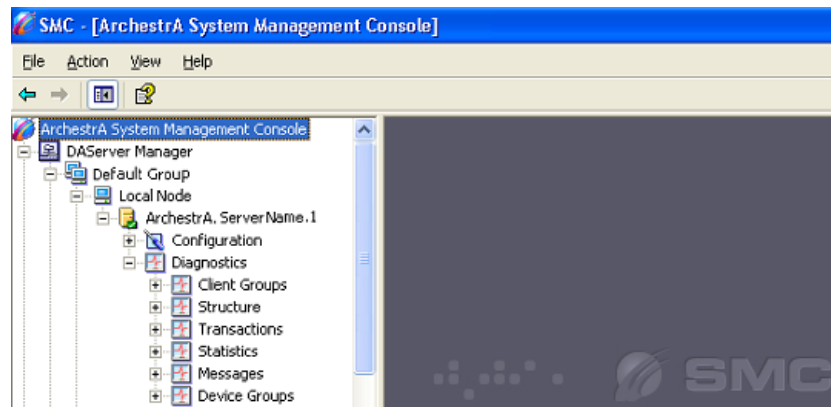
License Status

You can view the icon of the active DAServer to determine its license status as follows:

Icons	Description
	The DAServer in active state, running not as a service with a valid license.
	The DAServer in active state, running not as a service in the demo mode.
	The DAServer in active state, running not as a service, and without a valid license.
	The DAServer in active state, running as a service, and with a valid license.
	The DAServer in active state, running as a service, and in demo mode.
	The DAServer in active state, running as a service, and without a valid license, and not in a demo mode.

For more information about demo mode, see Demo Mode on page 45.

Chapter 2

Managing the DAServer Hierarchy

The DAServer configuration has a hierarchical structure. Each hierarchy node represents a physical device, such as a PLC, port, or device. You can view the DAServer's configuration hierarchy under the **Configuration** node.

Enabling or Disabling a Hierarchy Node

The following rules govern enabling and disabling nodes:

- Hierarchy nodes can be enabled and disabled when the DAServer is active or inactive. The default state of a node is enabled.

- You cannot disable the DAServer and Configuration nodes, or the nodes between them. However, nodes that model busses, ports, or bridges can be disabled.

- System items remain valid for disabled nodes. All other items have "Out-of Service" quality updated to the client. No messages are sent to the device corresponding to the disabled nodes. Write transactions for a disabled node fail immediately with a bad HRESULT.

- Disabling a node disables all its child nodes. The tree pane does not show child nodes as disabled. When you enable a node, all child nodes are enabled, except those nodes you explicitly disabled. Explicitly disabled child nodes remain disabled until you enable them.

To enable a node

◆ Right-click the node name and then click **Enable**. The node icon shows a check mark for the node's state.

To disable a node

◆ Right-click the node name and then click **Disable**. The node icon shows an "X" for the node's state.

A change in the state of a hierarchy node is reflected for a remote DAServer Manager viewing the same DAServer only after you refresh the data by collapsing and expanding the DAServer hierarchy tree on the remote DAServer.

Resetting a Hierarchy Node

You can reset a hierarchy node to make modified configuration parameters take effect without deactivating and reactivating the DAServer. Resetting a node also resets all of its child nodes.

The DAServer and Configuration nodes, and the nodes between them, cannot be reset.

To reset a node

1   In the DAServer Manager, navigate to the configuration node.

 • Expand the **DAServer Manager** hierarchy, expand the node group, and then expand **Local** or the remote computer name.

 • Expand the **DAServer**.

2   Right-click on the node and then click **Reset**.

Deleting a Hierarchy Node

If you delete a node, the deletion takes effect immediately.

You cannot delete a node if the DAServer is active and items are subscribed to a node. You can delete the node after removing all subscribed items.

To delete a node

1   In the DAServer Manager, navigate to the configuration node.

   • Expand the **DAServer Manager** hierarchy, expand the node group, and then expand **Local** (or the remote computer name).

   • Expand the **DAServer**.

2   Right-click on the node and then click **Delete**.

Renaming a Hierarchy Node

If you rename a node, the change takes effect immediately.

You cannot rename a node if the DAServer is active and items are subscribed to a node. You can rename the node after removing all subscribed items.

To rename a node

1   In the DAServer Manager, navigate to the configuration node.

   • Expand the **DAServer Manager** hierarchy, expand the node group, and then expand **Local** (or the remote computer name).

   • Expand the **DAServer**.

2   Right-click on the node and then click **Rename**.

Chapter 3

Configuring Global Parameters

Each DAServer has a unique set of parameters that you can configure for your particular environment. For descriptions of those configuration parameters, see your DAServer-specific documentation.

Using the DAServer Manager, you can also configure a set of common, or global, parameters for each DAServer.

Accessing the Global Parameters

To access the global parameters

1 In the DAServer Manager, click **Configuration** under the DAServer name in the tree hierarchy.

- Expand the **DAServer Manager**, expand the node group, and then expand **Local** (or the remote computer name).

- Expand the **DAServer**, and then click **Configuration**.

The **Global Parameters** tab appears in the details pane.

2 For instructions on configuring the parameters, see the following sections:

- Configuring Intervals for Device Group Updates and Slow Polling on page 21
- Configuring Transaction and Subscription Settings on page 22
- Configuring Protocol Timers on page 24
- Configuring the Poke Mode on page 25

Note The **Device Group Cache** option is for future use only and should not be selected. Some DAServers, in fact, may disable this option.

3   Click the **Save** icon to write the current data to the DAServer's configuration set. If the DAServer is enabled and you have changed a global parameter, the new value takes effect when you save the configuration. For more information, see Hot Configuration on page 44.

When you click the **Save** icon, leading zeros are truncated from your entries in numerical fields. The behavior of the rest of the DAServer's configuration hierarchy depends on the refresh mechanism of the server-specific programming logic.

Configuring Intervals for Device Group Updates and Slow Polling

The device group update interval parameter specifies the update interval of the <Default> device group. If it is not specified, all unnamed device groups have an update interval of 1,000 milliseconds.

The slow poll interval parameter controls the interval that the DAServer polls the field device after it goes into slow poll mode. This occurs when certain connectivity problems occur, such as an unplugged PLC. When the DAServer again achieves connectivity with the field device, it returns to normal operation and is governed by the setting of the device group update interval.

To configure the update and poll intervals

1   In the DAServer Manager, click **Configuration** under the DAServer name in the tree hierarchy.

●   Expand the **DAServer Manager**, expand the node group, and then expand **Local** (or the remote computer name).

●   Expand the **DAServer**, and then click **Configuration**. The **Global Parameters** tab appears in the details pane.

2   In the **Device Group Update Interval** box, type the value in milliseconds. The default value is 1,000.

3   In the **Slow Poll Interval** box, type an integer representing the interval, in milliseconds, between polls per transaction item. The default value is 10,000.

4   Click **Save**.

Configuring Transaction and Subscription Settings

You can set the following transaction and subscription settings:

- **Transaction to Subscription Ratio** - This parameter controls the ratio of transaction to subscription messages in a DAServer at the time when several transaction messages are pending. This value is the maximum number of transaction messages sent before sending a subscription message. The second half of the ratio is always 1. The default ratio is 2 transaction messages to 1 subscription message (2:1).

  Transactions have a higher priority than subscriptions. If only one transaction message is pending, that message is sent first no matter how many subscription messages are due to be sent. If one or more transactions generate several transaction messages, this ratio applies to the number of generated transaction messages. This ratio ensures that a certain amount of subscription activity is guaranteed even in a transaction overloaded state. The value sets the number of allowed transaction messages to be arbitrated on the protocol before evaluation of due subscription messages is enforced. If subscription messages are due, one of them is sent before sending transaction messages again.

- **Transaction Message Timeout** - This parameter sets the timeout for transactions (read/write/refresh/property) per message. The value is an integer representing the timeout in milliseconds per transaction message. Default is 60000 (corresponds to the default ValidDataTimeout in legacy I/O servers). A properly operating DAServer should never encounter this timeout because a transaction will always be completed by the protocol engine (successful or not). This timeout only prevents a client from hanging in a transaction forever if for some reason (bug in the DAServer specific code) the transaction messages are never scheduled until completion. The timeout is specified on an individual message level. It is not the maximum amount of time a transaction can take. It is the maximum amount of time between message updates within a transaction. The timeout has to be set in such a way that under no circumstances can data acquisition on an individual message take longer than this timeout. The time it might take for a transaction containing several messages theoretically can be multiples of this timeout.

- **Diagnostic Backlog Size** - Controls the maximum number of transactions allowed in the **Transactions** diagnostic node. When the maximum value is reached, the transactions shown in the node are deleted, beginning with the oldest transaction. The diagnostic backlog size parameter does not affect the number of transactions allowed by the DAServer. It strictly affects the number of transactions shown in the **Transactions** node.

- **Maximum Queued Transactions and Updates** - Controls the maximum number of outstanding transactions in each of the three transaction queues (read, write, refresh).

- **Maximum Queued Updates** - Controls the maximum number of outstanding subscription updates for an individual item.

To configure transaction and subscription settings

1 In the DAServer Manager, click Configuration under the DAServer name in the tree hierarchy.

   - Expand the **DAServer Manager**, expand the node group, and then expand **Local** (or the remote computer name).

   - Expand the **DAServer**, and then click **Configuration**. The **Global Parameters** tab appears in the details pane.

2 In the **Transaction to Subscription Ratio** box, type the value. This value is an integer that specifies the maximum number of transaction messages sent before sending a subscription message. The default value is 2.

3 In the **Transaction Message Timeout** box, type the value in milliseconds. The default value of is 60,000 milliseconds.

4 In the **Diagnostic Backlog Size** box, type the backlog value. The default value is server-specific.

5 In the **Maximum Queued Transactions** box, type the required value. When a transaction queue is full, new transactions are rejected and a message is posted to the logger. The minimum value of this parameter is 1, and the maximum value is 300. The default value is 75.

6   In the **Maximum Queued Updates** box, type the required value. This affects how many client data values on each item are to be queued between two client updates. When the queued updates exceed this limit, the new subscription replaces the oldest subscription. The minimum value of this parameter is 1, and the maximum value is 1,000. The default value is 1.

7   Click **Save**.

Configuring Protocol Timers

You can use the server protocol timer to control the interval between protocol activities for timer-driven DAServers. Your specific DAServer documentation will describe whether the DAServer uses this value.

This server protocol parameter corresponds to the default ProtocolTimerTick in legacy I/O Servers. This value is ignored by DAServers that use an entirely event-driven protocol engine.

The DDE/SuiteLink timer controls the time between processing client requests though the DDE or SuiteLink protocols. If you set this value to a smaller number, it increases the responsiveness, but may reduce the throughput. The default value works well for most installations.

To configure timers

1   In the DAServer Manager, click **Configuration** under the DAServer name in the tree hierarchy.

- Expand the **DAServer Manager**, expand the node group, and then expand **Local** (or the remote computer name).

- Expand the **DAServer**, and then click **Configuration**. The **Global Parameters** tab appears in the details pane.

2   In the **Server Protocol Timer** box, type the value, in milliseconds, between protocol activities if the DAServer is timer-driven. The default value is 50.

3   In the **DDE/SL Timer Tick** box, type the value in milliseconds. The minimum value of this parameter is 20, and the maximum value is 6,000. The default value is 50.

4   Click **Save**.

Configuring the Poke Mode

You can use the poke mode to control how the DAServer optimizes and folds pokes within a transaction. You can select from the following three modes:

- **Control Mode** - Preserves the poke order without folding. This mode is typically used by batch and control applications that depend on the order of the pokes and also on processing of every item poked.

- **Transition Mode** - Preserves the poke order with minimum folding by keeping the first, second, and last poke values of an item. This mode is used by batch and control applications that depend on the order of pokes but do not process every item poked.

- **Optimization Mode** - Does not preserve the poke order and has maximum folding by only poking the last value of an item. This mode is typically used by HMI applications.

To configure the poke mode

1 In the DAServer Manager, click **Configuration** under the DAServer name in the tree hierarchy.
   - Expand the **DAServer Manager**, expand the node group, and then expand **Local** (or the remote computer name).
   - Expand the **DAServer**, and then click **Configuration**. The **Global Parameters** tab appears in the details pane.
2 In the **Poke Mode** list, select the mode. The default mode is DAServer dependent.
3 Click **Save**.

Configuring Case Sensitivity for Item IDs and Device Group Names

You can control how the DAServer scans items and device group names with respect to upper and lower case. The default is set to case insensitive, which is recommended if you are working with legacy applications.

Case sensitivity applies to item names (fully qualified item ID, including hierarchy names) and device group names.

To configure case sensitivity

1   In the DAServer Manager, click **Configuration** under the DAServer name in the tree hierarchy.

   • Expand the **DAServer Manager**, expand the node group, and then expand **Local** (or the remote computer name).

   • Expand the **DAServer**, and then click **Configuration**. The **Global Parameters** tab appears in the details pane.

2   In the **Enable/Disable** area, select the **Case Sensitive** check box. By default, this check box is clear.

3   Click **Save**.

Enforcing Uniqueness for Device Group Names

You can control whether the device group names are checked for uniqueness across all device nodes of a DAServer.

If you enable uniqueness checking, all device groups on a server node are considered one list across the namespace. And because device group names are not case sensitive, a specific name is allowed only one time, regardless of case.

If you disable uniqueness checking, you can have the same device group name in different device nodes, but not in the same node (inside device groups, names are not case sensitive). This means that device group names are unique on one hierarchy level only.

Uniqueness checking is enabled by default.

Checking for uniqueness is required when working with DDE/SuiteLink installations.

To enforce uniqueness for device group names

1   In the DAServer Manager, click **Configuration** under the DAServer name in the tree hierarchy.

- Expand the **DAServer Manager**, expand the node group, and then expand **Local** (or the remote computer name).

- Expand the **DAServer**, and then click **Configuration**. The **Global Parameters** tab appears in the details pane.

2   In the **Enable/Disable** area, the **Unique Device Group** check box is selected by default as it is required for working with DDE/SuiteLink legacy installations. If you clear this check box, device group names must be unique on one hierarchy level only.

3   Click **Save**.

Enabling the DAServer to Run in Simulation Mode

Some DAServers can simulate communication with a field device. Availability of a simulation mode is DAServer-specific. If the DAServer does not support this mode, the element is not available.

To enable simulation mode

1   In the DAServer Manager, click **Configuration** under the DAServer name in the tree hierarchy.

- Expand the **DAServer Manager**, expand the node group, and then expand **Local** (or the remote computer name).

- Expand the **DAServer**, and then click **Configuration**. The **Global Parameters** tab appears in the details pane.

2   In the **Enable/Disable** area, select the **Simulation Mode** check box.

You can clear this check box to set the DAServer in normal operation mode.

3   Click **Save**.

Showing or Hiding System Items

You can specify whether system items appear in the browser interface. This option also confirms recognition of system items as valid ItemIDs by the DAServer's data acquisition interfaces.

To show or hide system items

1   In the DAServer Manager, click **Configuration** under the DAServer name in the tree hierarchy.

   • Expand the **DAServer Manager**, expand the node group, and then expand **Local** (or the remote computer name).

   • Expand the **DAServer**, expand **Configuration**.

2   In the **Enable/Disable** area, select the **System Items** check box. By default, this option is selected for system items. If you clear this option, no system items appear in the DAServer's namespace.

3   Click **Save**.

Chapter 4

Managing Device Groups

Device groups are labels used by client applications when accessing the DAServer. The device group update interval determines how often the DAServer polls the device and sends data to the client application. If you configure multiple device groups with different update intervals, the client application can receive data at various intervals.

Small update intervals mean fast turnaround for data changes and a high overhead because a large amount of data is moving. Large update intervals mean a slow turn around for data changes and a low overhead because not as much data is being passed to the client application.

For DDE/SuiteLink clients, the device group is the same as the DDE/SuiteLink topic. DDE/SuiteLink clients require that at least one device group be created for each device.

For OPC clients, the device group equals the OPC access path. The DAServer has a default device group for each device, and this device group cannot be deleted. If you are using OPC client applications, creating a device group is optional.

Viewing Common Device Groups

Under the **Configuration** node in the console tree, most DAServer specific items have the **Device Groups** tab as a common component in the details pane.
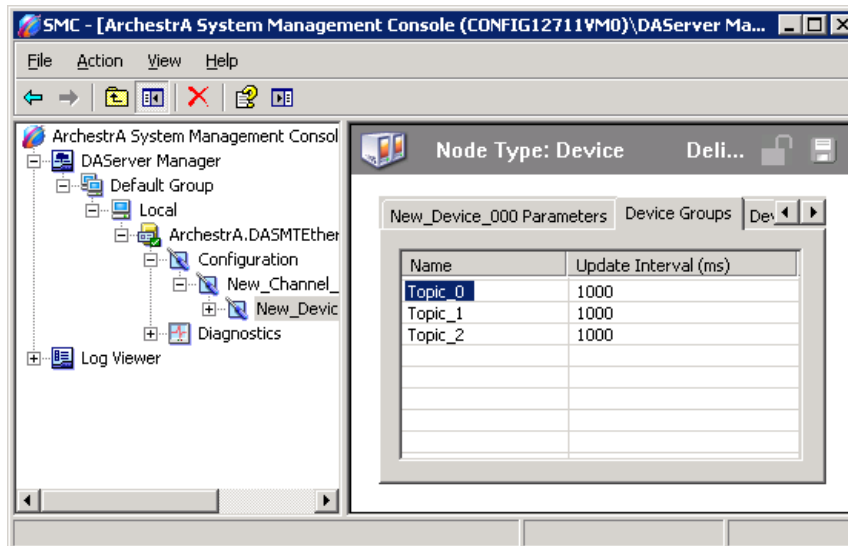
Caution Device group names are not case sensitive. Therefore, ensure you do not use two device groups with the same name with different case. Each device group name must be unique, including case.

Adding a Device Group

Device groups allow you to specify an update interval for a set of device items. The device group does not contain any device items. The linkage is made when the client makes a request.

To add a device group

1   In the DAServer Manager, navigate to the device.

   a   Expand **DAServer Manager**, expand the node group, and then expand **Local** or the remote computer name.

   b   Expand the DAServer, expand **Configuration**, and then expand the hierarchy.

2   Select the device.

3   In the right pane, click the **Device Groups** tab.

4   Right-click the column field, and click **Add**. A **Name** field appears with a default name.

New_Device_000 Parameters	Device Groups	Device Items
Name	Update Interval (ms)
Topic_0	1000

5   Type a name and press Enter. The **Update Interval** field defaults to 1000. The unit is in milliseconds (ms). A device group is added.

For information on setting the default update interval, see Configuring Intervals for Device Group Updates and Slow Polling on page 21.

6   Click the **Save** icon.

Renaming a Device Group

Changing the name of an existing device group requires that any client queries using the device group must be changed. Requests for data accepted by the DAServer before the change are not affected.

To change a device group name

1   In the DAServer Manager, navigate to the device.

 a   Expand **DAServer Manager**, expand the node group, and then expand **Local** or the remote computer name.

 b   Expand the DAServer, expand **Configuration**, and then expand the hierarchy.

2   Select the device.

3   Click the **Device Groups** tab.

4   Move the pointer over the name or the box containing the name to be changed.

5   Right-click the name and then click **Rename**. The name is selected.

New_Device_000 Parameters	Device Groups	Device Items
Name	Update Interval (ms)
Topic_0	1000

6   Type a name and press Enter.

7   Click the **Save** icon.

Setting Device Group Data

The device group data consists of one item, the update interval. The update interval specifies the time period in milliseconds between DAServer reads of the device memory. You can specify a number between 0 and 2147483646 (596.52 hours).

To set the update interval

1 In the DAServer Manager, navigate to the device.

   a Expand **DAServer Manager**, expand the node group, and then expand **Local** or the remote computer name.

   b Expand the DAServer, expand **Configuration**, and then expand the hierarchy.

2 Select the device.

3 In the right pane, click the **Device Groups** tab.

4 Right-click the interval and click **Modify Update Interval**. The current update interval is selected.

Update Interval (ms)	
1000	

5 Type an interval and press Enter.

6 Click the **Save** icon.

Deleting a Device Group

When you delete a device group, the quality of items being accessed using the device group changes to BAD. The DAServer rejects new requests for data using the device group.

To delete a device group

1 In the DAServer Manager, navigate to the device.

   a Expand **DAServer Manager**, expand the node group, and then expand **Local** or the remote computer name.

   b Expand the DAServer, expand **Configuration**, and then expand the hierarchy.

2 Select the device.

3 In the right pane, click the **Device Groups** tab.

4 Right-click the group to be deleted and click **Delete**.

5 Read the warning and then click **Yes**.

6 Click the **Save** icon.

Chapter 5

Managing Device Items

Defining device items provides a more user-friendly way to name data in the device. Defining device items is optional. Use device items to access data in the DAServer and devices connected to the DAServer. Device items consist of two pieces: a name and an item reference. After it is defined in the DAServer, you can access it in the client program either through item name or the item reference.

The device item name is an alternative name for the item reference. It is an "alias" or a label for the data in the device. You can use this label instead of the item reference when you create the client application.

The item reference identifies data in the device. The item reference is a PLC memory reference. Each device's memory reference can have a different format. For more information, see your DAServer specific documentation.

The actual item reference can be entered as the device item name. In this case, the item reference value can be left empty.

To provide diagnostic and operational information, the DAServer has several system items that do not access data in a device. They are grouped by function:

- Global system items

- Device-group-specific system items

- Device-specific system items

For more information about system items, see your DAServer specific documentation.

Device item names defined in the DAServer show up as OPC browsable items.

You can add device items while the DAServer is active, and these new items are immediately available to client applications.

You can make changes to items while the DAServer is active. Changes take effect immediately. OPC clients that are already connected to the item are not affected until they release and re-acquire the item.

For detailed formats for specifying item references and how to subscribe to data items, see your DAServer specific documentation.

Creating Aliases for Item References

The device item name is an alias for the item reference. Device item names can be 256 characters long. Long names may be more explanatory, but your client application may have limited screen space.

To set a device item name

1 In the DAServer Manager, navigate to the device.

   a Expand **DAServer Manager**, expand the node group, and then expand **Local** or the remote computer name.

   b Expand the DAServer, expand **Configuration**, and then expand the channel, port, or bridge.

2 Select the device.

3 In the right pane, click the **Device Items** tab.

4 Right-click the column and click **Add**. A **Name** field is selected with a default name.

New_Device_000 Parameters	Device Groups	Device Items
Name		**Item Reference**
Item_0		
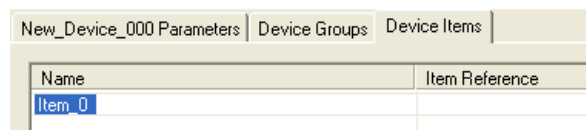
5 Type the name and press Enter.

6 Click the **Save** icon.

Renaming a Device Item

Changing a device item name affects new client requests for data. Requests for data already accepted by the DAServer are not affected.

To change a device item name

1   In the DAServer Manager, navigate to the device.

   a   Expand **DAServer Manager**, expand the node group, and then expand **Local** or the remote computer name.

   b   Expand the DAServer, expand **Configuration**, and then expand the channel, port, or bridge.

2   Select the device.

3   In the right pane, click the **Device Items** tab.

4   Right-click the device item name, and click **Rename**.

5   Type the new name and press Enter.

6   Click the **Save** icon.

Deleting a Device Item

Deleting a device item name affects new client requests for data. Requests for data already accepted by the DAServer are not affected.

To delete a device item name

1   In the DAServer Manager, navigate to the device.

   a   Expand **DAServer Manager**, expand the node group, and then expand **Local** or the remote computer name.

   b   Expand the DAServer, expand **Configuration**, and then expand the channel, port, or bridge.

2   Select the device.

3   In the right pane, click the **Device Items** tab.

4   Right-click the item to be deleted and click **Delete**.

5   Read the warning and click **Yes**.
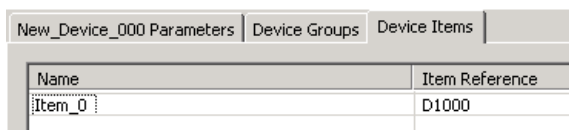
6   Click the **Save** icon.

Setting the Item Reference

You must know which memory locations you need and the memory location attributes before entering item references in the DAServer.

For more information, see your DAServer specific documentation.

To set an item reference

1 In the DAServer Manager, navigate to the device.

   a Expand **DAServer Manager**, expand the node group, and then expand **Local** or the remote computer name.

   b Expand the DAServer, expand **Configuration**, and then expand the channel, port, or bridge.

2 Select the device.

3 Click the **Device Items** tab.

4 Right-click the **Item Reference** field to be set and click **Rename**.

New_Device_000 Parameters	Device Groups	Device Items

Name	Item Reference
Item_0	D1000

5 Type the item reference and press Enter.

6 Click the **Save** icon.

Exporting and Importing CSV Files

To help you manage item references (tags) and device item names outside of the DAServer Manager, the DAServer supports importing and exporting device item data in a comma separated value (CSV) file. The CSV functions are only available when a device items tab is selected.

Each row in the .csv file represents an item, and each row contains two elements. The first element must be the item name; the second element must be the item reference string. The item name can be the same as the reference string or it can be an alias. If either the item name or reference string element contains a comma, use quotation marks around the element to avoid a collision with the comma delimiters.

Item names are not case-sensitive.

To export a device item list

1   In the DAServer Manager, navigate to the device.

   a   Expand **DAServer Manager**, expand the node group, and then expand **Local** or the remote computer name.

   b   Expand the DAServer, expand **Configuration**, and then expand the channel, port, or bridge.

2   Select the device.

3   In the right pane, click the **Device Items** tab.

4   Right-click the columns field and click **Export**.

5   In the **Save As** dialog box, type a file name, select a directory, and click **Save**.

To import a device item list

1   In the DAServer Manager, navigate to the device.

   a   Expand **DAServer Manager**, expand the node group, and then expand **Local** or the remote computer name.

   b   Expand the DAServer, expand **Configuration**, and then expand the channel, port, or bridge.

2   Select the device.

3   In the right pane, click the **Device Items** tab.

4   Right-click the columns field and click **Import**.

5   In the **Open** dialog box, find the file containing the items to be imported, and press **Open**. Items contained in the file are now listed on the **Device Items** tab.

Clearing All Device Item Names

You can delete all device items for a device.

To clear all device item names

1   In the DAServer Manager, navigate to the device.

   a   Expand **DAServer Manager**, expand the node group, and then expand **Local** or the remote computer name.

   b   Expand the DAServer, expand **Configuration**, and then expand the channel, port, or bridge.

2   Select the device.

3   In the right pane, click the **Device Items** tab.

4   Right-click the columns field and click **Clear All**.

5   Read the warning and click **Yes**.

6   Click the **Save** icon.

Chapter 6

Managing Your DAServer

After you configure the DAServer, there are two steps to take before you can access data with your client application.

The first step is to determine what kind of client applications are to be used with this DAServer. If any of your client applications use DDE/SuiteLink, you must configure the DAServer as a service. If only OPC client applications will be used, you can configure the DAServer as a service or as not a service.

The last step is to activate the DAServer. Some client applications can programatically activate the DAServer. If you configure the DAServer as an automatic service, the DAServer is started and activated when the computer on which the DAServer is installed starts up. If you configure the DAServer as a manual service, the DAServer is not started when the computer starts up. Instead, it is started upon the first connection from an OPC client or when activated from the DAServer Manager.

After a DAServer is running as an auto or manual service, it stays running until explicitly stopped in the DAServer Manager or the computer shuts down.

Configuring the DAServer as Service

A service is a program, routine, or process that performs a specific function to support other programs, typically at a low (close to the hardware) level. A service runs whether or not you are logged on to the computer.

If you select the auto service state, the DAServer automatically runs when you start the computer. If you select the manual service state, then you must start the DAServer after you start the computer.

To support DDE clients, the DAServer must be configured as a service.

The DAServer can only be set to run as a service when the DAServer is in the deactivated state.

To configure the DAServer as a service

1   In the DAServer Manager, navigate to the DAServer.
    •   Expand **DAServer Manager**, expand the node group, and then expand **Local** or the remote computer name.

2   Right-click the DAServer name and then click **Configure As Service**.

3   Click either **Auto Service** or **Manual Service**.

4   Read the message and click **Yes**.

Configuring the DAServer as Not a Service

The DAServer can only be set to run as not a service when the DAServer is in the deactivated state.

If the DAServer is configured as not a service, clients cannot connect to the DAServer using DDE.

To configure the DAServer as not a service

1   In the DAServer Manager, navigate to the DAServer.
    •   Expand **DAServer Manager**, expand the node group, and then expand **Local** or the remote computer name.

2   Right-click the DAServer name and then click **Configure As Service**.

3   Click **Not a Service**.

4   Read the message and click **Yes**.

Archiving Configuration Sets

A configuration set includes the DAServer's global parameters; each channel and its parameters; and each device and its parameters, device groups, and device items. It lets you manage the settings of different DAServer configurations.

The DAServer contains a default configuration set. You cannot delete the default configuration set.

You can create multiple configuration sets and switch between them. Archiving, clearing, and switching configuration sets can only be done when the DAServer is deactivated.

You cannot use COM1 through COM9 as the name of a configuration set, as these names are reserved for system functions.

Before you create a configuration set, verify that you have saved any changes you made to the global parameters. If you change a parameter and then immediately create a configuration set, the original parameter value is saved as part of the configuration set, not the changed value.

To save a global parameter, click the **Save** icon.

To archive a configuration set

1   In the DAServer Manager, navigate to the configuration node.

    a   Expand **DAServer Manager**, expand the node group, and then expand **Local** or the remote computer name.

    b   Expand the DAServer.

2   Click **Configuration**.

3   Right-click and click **Archive Configuration Set**.

4   In the dialog box, type the configuration set name, and click **Archive**. All the current configuration values are saved to the set.

After you archive at least one configuration set, you can select it for use.

To select a configuration set

1 In the DAServer Manager, navigate to the configuration node.

   a Expand **DAServer Manager**, expand the node group, and then expand **Local** or the remote computer name.

   b Expand the DAServer.

2 Click **Configuration**.

3 Right-click, point to **Use Another Configuration Set**, then click the desired name.

To change the parameter values saved in a configuration set, make sure the desired configuration set is shown, then follow this procedure.

To change the parameter values in a configuration set

1 In the DAServer Manager, navigate to the configuration node.

   a Expand **DAServer Manager**, expand the node group, and then expand **Local** or the remote computer name.

   b Expand the DAServer.

2 Click **Configuration**.

3 Change the parameters that you want to change.

4 Click the **Save** icon.

Clearing a configuration set returns the parameters to their default values.

To clear a configuration set

1 In the DAServer Manager, navigate to the configuration node.

   a Expand **DAServer Manager**, expand the node group, and then expand **Local** or the remote computer name.

   b Expand the DAServer.

2 Click **Configuration**.

3 Right-click, move the mouse over **Clear Configuration Set**, then left click.

4 Read the warning message, then click **Yes**. The parameters are set to the default values.

To delete a configuration set

1   In the DAServer Manager, navigate to the configuration node.

    a   Expand **DAServer Manager**, expand the node group, and then expand **Local** or the remote computer name.

    b   Expand the DAServer.

2   Click **Configuration**.

3   Right-click **Configuration,** point to **Delete Configuration Set** and select the configuration set to delete.

4   Read the warning message, then click **Yes**.

Activating/Deactivating the DAServer

When you activate the DAServer, it starts communicating and accepting requests from client applications. If a DAServer is configured as an automatic service, the DAServer is started and activated when the computer starts up. Also, a DAServer can be activated by an OPC client connection request.

You cannot deactivate a DAServer from the SMC if the DAServer is started in-proc by an OPC client.

To activate the DAServer.

1   In the DAServer Manager, navigate to the DAServer.

    •   Expand **DAServer Manager**, expand the node group, and then expand **Local** or the remote computer name.

2   Right-click the DAServer and then click **Activate Server**.

Deactivating your DAServer stops it from communicating with client applications.

A DAServer with active OPC clients does not stop until the last OPC client shuts down.

To deactivate the DAServer

1   In the DAServer Manager, navigate to the DAServer.

    •   Expand **DAServer Manager**, expand the node group, and then expand **Local** or the remote computer name.

2   Right-click the DAServer and then click **Deactivate Server**.

3   Read the warning message and click **Yes**.

In-Proc/Out-of-Proc

The DAServer can run as a stand-alone process (out-of-proc) or as part of the client process (in-proc).

When the DAServer is running out-of-proc, it supports requests from both DDE/SuiteLink and OPC client applications. When the DAServer is running in-proc, it only supports OPC client applications.

If the DAServer is running as a service, the icon for the DAServer node in the SMC is yellow. If the DAServer is running as not a service, the icon is white.

Hot Configuration

Hot configuration depends on the DAServer-specific code implementation and the type of configuration parameter. In most cases only a selected number of parameters can be configured while the DAServer is running, depending on the state of the object the parameter belongs to. For example, changing the baud rate of an open COM port requires closing the port and reopening it with the new baud rate. If this functionality is not implemented in your DAServer, it is not supported. You can reset the hierarchy in order to have newly configured parameters in effect. For more information about, resetting a hierarchy node, see Resetting a Hierarchy Node on page 16. Some parameter values simply need a new assignment to go into effect immediately. For example, if the response timeout for a port is changed, it is compared in the next timeout checking cycle.

Demo Mode

You can install the DAServer without a license. The DAServer runs without a license in Demo mode for 120 minutes. While in demo mode the DAServer checks for a license every 30 seconds. When the 120 minutes expires:

• The DAServer stops updating items.

• All non-system items have a Bad quality status.

• New items are rejected.

After the 120 minutes the DAServer checks for a license every thirty seconds. If a license is not found, the DAServer logs a warning.

You can use the SYSLicensed system item to check the status of your license. This item returns true if the proper license is found or the DAServer is in demo mode (the 120 minutes), otherwise, it returns false.

After the DAServer finds a valid license, it logs a message, stops looking for a license, and begins running normally. For more information, see the *License Utility User Guide* and License Status on page 13

Chapter 7

Diagnostics

The DAServer Manager has information that may be useful in troubleshooting problems. When the DAServer is active, a **Diagnostics** node is present below the **Configuration** node in the console tree of the System Management Console.

All DAServers include at least the following six diagnostic nodes:

- Client Groups

- Structure

- Transactions

- Statistics

- Messages

- Device Groups

Viewing Status Information

When you select individual diagnostic nodes or items contained in a diagnostic node, the **Details** pane shows data for that node or item.

The following example of a diagnostic hierarchy shows a
DDE/SuiteLink plug-in for the **Client Groups** node.
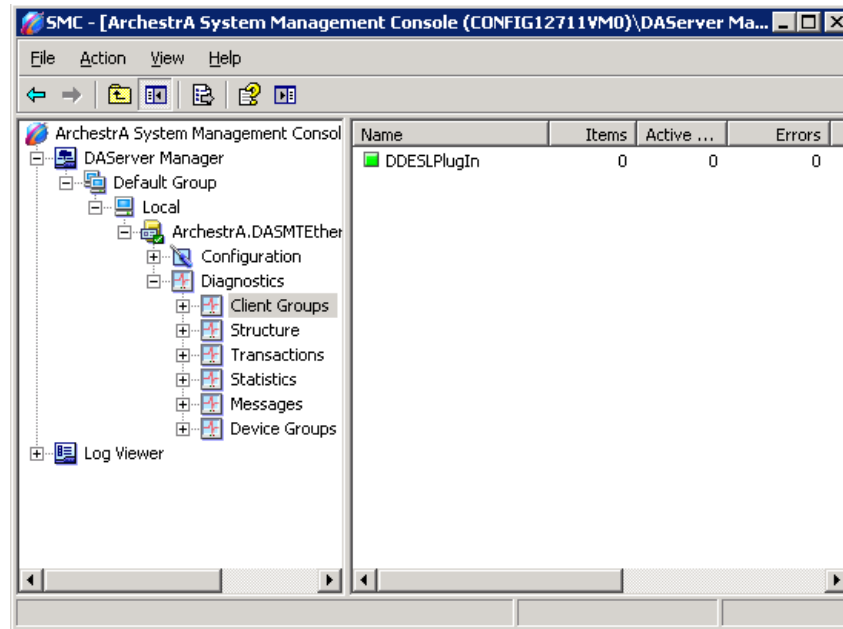
What is shown on your computer may vary depending on the
plug-in(s) you have installed.

A particular DAServer may have additional diagnostic nodes
and additional data shown under the common diagnostic
nodes. For more information and description about
additional features, see your DAServer documentation.

If the string value obtained by the DAServer contains a tab
character or newline character, they are filtered out and
replaced with the sequence "\t" and "\n" respectively.

Descriptive icons are present with each data element that
indicates the quality of the presented information. These
icons are described in the following table:

Icon	Description
	The clock indicates that the data shown on the line was not updated during the last update interval and the data item has just been scrolled into view. The clock is shown until the next update interval, when it changes to other icons described in this table.
	White - Initializing (no VTQ available yet, no time-out yet)

Icon	Description
	Red - Error Active
	Yellow - Warning Active
	Green - Normal Active
	Red Marked - Bad Inactive
	Yellow Marked - Warning Inactive
	Green - Normal Inactive

Client Group Diagnostics

If you click the **Client Groups** node, all individual client groups are shown in the **Details** pane. You can see the following data for each individual client group shown:

• Data quality icon

• Name of the client

• Number of items

• Number of active items

• Number of items with errors

• Update interval

The data quality icons are marked as active/inactive, depending on their corresponding OPC group state. The following table describes the icon states.

Icon State	Icon Colors	Client Group
Normal		The OPC quality is good for all items in this group.

Icon State	Icon Colors	Client Group
Warning		The OPC quality is uncertain or bad for at least one item in this group and the OPC quality is good for at least one item.
Error		The OPC quality is uncertain or bad for all items.

If you select an individual client group in the console tree, the following data is shown in the **Details** pane:

- Data quality icon

- Name of the client

- Client value and time

- Client quality

- Subscription message

- State

- Location

- Device group

If you select an individual client group in the console tree, the same normal/warning/error icon colors apply.

When you double-click any item name in the Details pane, the **Diagnostic Info** dialog box appears.
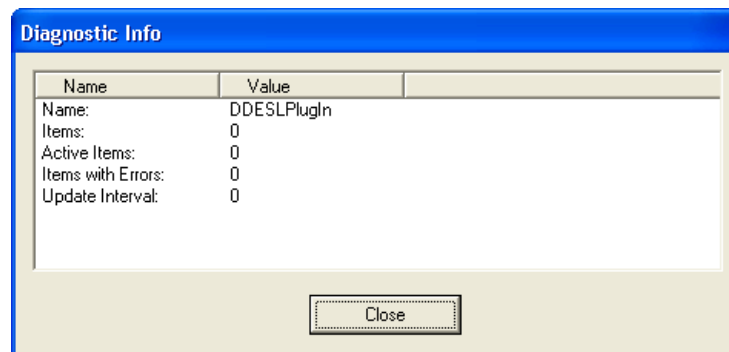
The **Diagnostic Info** dialog box provides detailed information about the client group's diagnostics. This information varies between client groups and the type of data described. For example, the **Diagnostic Info** dialog box shows quality for transactions except for write transactions. It shows write status for write transactions.

Structure Diagnostics

The DAServer namespace may include many levels of hierarchy, some which have not been added and are not visible in the console tree. In the Structure diagnostic node, you can view data for as many levels of hierarchy as possible based on the structure of the DAServer. Data for each structural hierarchy includes:

- Data quality icon
- Name of the item
- Number of items
- Number of items with errors
- Read/Write status
- Value
- Time
- Quality
- Number of messages
- Device groups.

The **R/W Status** column always shows **R/W**, which indicates that the structure supports both read/refresh/property transactions and write transactions. For more information, see R/W Items in Diagnostics on page 59.

The structure icons are marked as active or inactive. The hierarchical elements (structural branches) are always marked as active, and the normal/warning/error color of the icons is set as follows:

Icon State	Icon Colors	Hierarchical Element
Normal		The status error code is greater than or equal to zero (not negative), and the OPC quality is good for all items on this level.
Warning		The status error code is greater than or equal to zero (not negative), and the OPC quality is uncertain or bad for at least one item on this level.
Error		The status error code is less than zero (negative).

Hierarchical items (leaves) are marked as active if they are referencing at least one active group item. Hierarchical items (leaves) are marked as inactive if they are referencing all inactive group items. The normal/warning/error color of the icons is set as follows:

Icon State	Icon Colors	Item
Normal		The OPC quality is good.
Warning		The OPC quality is uncertain.
Error		The OPC quality is bad.

If the Structure node shows an error indicator, it does not necessarily mean that an error condition exists at the hierarchical level in focus. It means that an error condition exists at some point down the hierarchical tree.

Transaction Diagnostics

The **Transaction** diagnostic node contains all individual transactions. Data for the **Transaction** node includes:

- Data quality icon

- Type of transaction

- Item ID

- Number of items

- Status

- Start time

- End time

Note Items shown below the **Transaction** node in the hierarchy depend on how a DAServer developer has customized the code and configuration of an individual DAServer. Items below the root level in this hierarchy are subject to customization and configuration of individual DAServer.

The **Status** column indicates whether the transaction status is COMPLETE, ERROR, or INCOMPLETE. The following table shows icon colors for the normal/warning/error conditions for the **Transaction** node:

Icon State	Icon Colors	Transaction
Initializing		Transaction is in process.
Normal		Transaction has completed successfully, and the OPC quality is good for all items or write completed with success.
Warning		Transaction has completed successfully, and the OPC quality is uncertain or bad for at least one item or write completed with error in at least one item.
Error		Transaction has completed with error, the OPC quality is uncertain or bad for all items or write completed with error.

Pending individual transactions are marked with a white icon (the state is undefined/pending). A transaction item element is always marked as active. Viewing completed transactions refers to viewing a snapshot. Data for an individual transaction item includes

- Data quality icon

- Name of the item

- Read/write status

- Value

- Time

- Quality/result

- Message ID (MsgID)

- Location

The **Quality/Results** column shows the write complete code for demand write transactions and data quality for all other transactions. The **R/W Status** column displays **R** for read/refresh/property transactions or **W** for write transactions. The location is the path of the hierarchical item name.

For a demand write transaction, the data shown in the **Quality/Results** column indicates the success or failure of the item in the transaction.

- All zeros (00000000) specify that the item is successful.

- A positive number specifies that the item is successful but indicates a condition that you must record. You can double-click the item to open the **Diagnostic Info** dialog box, and view the write status data for additional information about the item.

- A negative number in the **Quality/Results** column indicates that the item in the transaction is not successful.

The following table describes the status icons for the normal, warning, and error conditions of the transaction items:

Icon State	Icon Colors	Transaction Item
Normal		The OPC quality is good; write completed with success.
Warning		The OPC quality is uncertain.
Error		The OPC quality is bad; write completed with error.

Statistic Diagnostics

The **Statistics** diagnostic node has no sub-nodes because it shows general DAServer data. The types of statistics available include:

* Server state

* DAS Engine version

* Start time

* Current time

* Client groups

* Client group items

* Client group errors

* Device items and device errors

* Messages

For each type of statistic, the data shown includes the following:

* Data quality icon

* Type of statistic

* Value

* Unit/info

The following table describes the status icons for the normal, warning, and error conditions of the client group and device items:

Icon State	Icon Colors	Statistic
Normal		The number of items with errors is 0.
Warning		The number of items with errors is not zero and not equal to the corresponding total number of items.
Error		The number of items with errors is equal to the corresponding total number of items.

Message Diagnostics

The **Messages Diagnostic** node shows data for the node and for the individual messages. Data shown for the node includes:

• Data quality icon

• Message ID

• Number of items

• Number of items with errors

• Status

The following table describes the status icons for the normal, warning, and error conditions of messages.

Icon State	Icon Colors	Message
Normal		The OPC quality is good for all items in this message.
Warning		The OPC quality is uncertain or bad for at least one item in this message, and the OPC quality is good for at least one item.
Error		The OPC quality is uncertain or bad for all items in this message.

Both messages and message items are always marked as active. The data for an individual message item includes:

• Data quality icon

• Name of item

• Read/write status

• Value

• Time

• Quality

• Message ID (MsgID)

• Location

The **R/W Status** column displays:

- **R** for read/refresh/property messages

- **W** for write messages

- **R/W** for both read/refresh/property and write messages

For more information, see R/W Items in Diagnostics on page 59.

The **Location** column shows the path of the hierarchical item name.

The following table describes the status icons for the normal, warning, and error conditions of message items:.

Icon State	Icon Colors	Message Item
Normal		The OPC quality is good.
Warning		The OPC quality is uncertain.
Error		The OPC quality is bad.

Note Items below the root level in this hierarchy are subject to customization and configuration of individual DAServer.

Device Group Diagnostics

The **Device Groups** diagnostic node shows data for the node and for the individual device groups. The data that is shown for the node includes:

- Data quality icon

- Device group

- Update interval

- Number of items

- Number of active items

- Number of items with errors

- Location

Only the **Client Groups** and **Device Groups** nodes show system items.

Note Items shown below the **Device Groups** node in the hierarchy depend on how a DAServer developer has customized the code and configuration of an individual DAServer. Items below the root level in this hierarchy are subject to customization and configuration of individual DAServer.

The following table describes the status icons for the normal, warning, and error conditions for the device groups:

Icon State	Icon Colors	Device Group
Normal		The OPC quality is good for all items in this device group.
Warning		The OPC quality is uncertain or bad for at least one item in this device group, and the OPC quality is good for at least one item.
Error		The OPC quality is uncertain or bad for all items in this device group.

Device group items are marked as active if at least one active group item from any active group is referencing the device group items. They are marked as inactive if no active item in any active group is referencing the device group items. Referencing indicates the same fully qualified ItemID/hierarchical name and the same OPC access path/device group.

Data for an individual device group item includes:

- Data quality icon

- Name of the item

- Read/write status

- Value

- Time

- Quality

- Message ID (MsgID)

- Location

The **R/W Status** column displays:

- **R** for read/refresh/property device group items

- **W** for write device group items

- **R/W** for both read/refresh/property and write device group items

For more information, see R/W Items in Diagnostics on page 59.

The **Location** column shows the path of the hierarchical item name.

The following table describes the status icons for the normal, warning, and error conditions for the device group items:

Icon State	Icon Colors	Device Group Item
Normal		The OPC quality is good.
Warning		The OPC quality is uncertain.
Error		The OPC quality is bad.

R/W Items in Diagnostics

The **R/W Status** column that appears in the details pane for the **Structure**, **Transactions**, **Messages**, and **Device Groups** nodes shows the read/write status as follows:

- Any item that has been updated with VTQ (good or bad) is marked **R**. Before being updated with VTQ, it is marked with a hyphen (-) for read-uninitialized.

- Any item that has no pending write operations, because it either contains all completed write activities or has never been poked, is marked **W**. If write operations are pending on an item, it is marked with a **-W**.

The normal state of an item is **R/W**. All others reflect temporary or special states, such as an item being in an initialization state, an item is processing a write, or an error accessing item data occurred.

1   In the **Structure** dialog box, an **R** indicates:

- The item is updated from any subscription or transaction with a corresponding fully qualified itemID at least once.
- A VTQ for any client group item pointing to this item is available if the item is reading from cache and the item is active.

The **R** is missing only for a short period of time during initialization of an active item. Reasons for a missing an **R** state include:

- Item is not active long enough to acquire data.
- Item cannot access data.
- System item SYSPollNow is poked and the device item is not updated yet.

In the **Structure** dialog box, a **W** indicates:

- No pokes are pending on this item.
- All pokes are complete.
- No write transaction items are connected to this item.

2   In the **Transaction** dialog box, demand reading or demand writing creates a new transaction item. Each transaction item represents a unique demand operation on this item. Transaction items display **R** in the **R/W Status** column during read transactions and **W** during write transactions. The **R** indicates that the item's VTQ was acquired in this transaction for this item, and **W** indicates that the item poke is complete. **R** also can represent a refresh or property read. A refresh is typically a device group-wide read (either from the field device or from cache) that is triggered by the client. A property read is a read of any property of an item (usually a property other than VTQ) by the client.

3   In the **Message** dialog box, an **R** indicates that item VTQ was acquired for this item and a **W** indicates that the item poke is complete.

4   In the **Device Groups** dialog box, an **R** indicates that the item VTQ was acquired for this item. **W** is always set because there are no transaction items and a poke is always complete.

Time Zone Format for Diagnostic Data

All diagnostic data has a date/time component. The DAServer engine sends diagnostic time information embedded in diagnostic strings or info. This allows the client to show the time in the selected format. You can view the current time zone component of the date/time stamp or set it by selecting one of the three available formats from the **Time Zone** menu, located on the menu bar. The **Time Zone** menu is available when you select the **DAServer Manager** or any branch under it in the hierarchy.

The time zone formats are as follows:

*   UTC (Coordinated Universal Time) - The date/time is shown as per the UTC time of the DAServer.

*   Client Time Zone - The date/time shown reflects the client's time zone (that is, DAServer UTC + client time zone).

*   Server Time Zone - The date/time shown reflects the DAServer's time zone (that is, DAServer UTC + DAServer time zone).

Another characteristic of time data associated with diagnostic data is related to duration of existence of the data. This characteristic is determined by the DAServer engine and is shown in three formats as follows:

*   Short-lived data - Used for time stamping data points of end devices (for example, PLCs, RTUs, and control processors). This format shows hours, minutes, and seconds.

*   Medium-lived data - Used for transaction start and end times. This format shows month, day, year, hours, minutes, and seconds.

*   Long-lived data - Used for the **Statistics** diagnostic node for the DAServer start time and current time. This format shows the day of the week, month, day, year, hours, minutes, and seconds.

OPC Quality Flags

OPC clients show a variety of possible quality flags for an item's data value. These clients typically show quality flags in one of the two forms, textual description or hexadecimal value.

If your OPC client shows quality flags in textual form, see the DescriptionTable on page 66 for descriptions of these flags. If your OPC client shows quality flags in hexadecimal form, see the Hexadecimal Quality Code Cross-Reference Table on page 63.

For descriptions of hexadecimal quality flags, first check the hex value in the Hexadecimal Quality Code Cross-Reference Table. Then, use the three numbers in associated Description Cross-Reference column to find the Textual Quality Words and Description in the Description Table.

The three descriptions provide a complete explanation for the quality code shown in your OPC client. For example, hex quality code 0x001B (**1, 10, 20** cross-reference numbers) is described as follows:

- **1** Bad quality - The Value is not useful
- **10** Comm failure - Communication has failed. There is no last known value available.
- **20** Constant - The value is a constant and cannot move.

Hexadecimal Quality Code Cross-Reference Table

Hexadecimal Quality Flag	Description Cross-Reference
0x0000	1, 4, 17
0x0001	1, 4, 18
0x0002	1, 4, 19
0x0003	1, 4, 20
0x0004	1, 5, 17
0x0005	1, 5, 18
0x0006	1, 5, 19
0x0007	1, 5, 20
0x0008	1, 6, 17
0x0009	1, 6, 18
0x000A	1, 6, 19
0x000B	1, 6, 20
0x000C	1, 7, 17
0x000D	1, 7, 18
0x000E	1, 7, 19
0x000F	1, 7, 20
0x0010	1, 8, 17
0x0011	1, 8, 18
0x0012	1, 8, 19
0x0013	1, 8, 20
0x0014	1, 9, 17
0x0015	1, 9, 18
0x0016	1, 9, 19
0x0017	1, 9, 20
0x0018	1, 10, 17
0x0019	1, 10, 18
0x001A	1, 10, 19
0x001B	1, 10, 20

Hexadecimal Quality Flag	Description Cross-Reference
0x001C	1, 11, 17
0x001D	1, 11, 18
0x001E	1, 11, 19
0x001F	1, 11, 20
0x0040	2, 4, 17
0x0041	2, 4, 18
0x0042	2, 4, 19
0x0043	2, 4, 20
0x0044	2, 12, 17
0x0045	2, 12, 18
0x0046	2, 12, 19
0x0047	2, 12, 20
0x0050	2, 13, 17
0x0051	2, 13, 18
0x0052	2, 13, 19
0x0053	2, 13, 20
0x0054	2, 14, 17
0x0055	2, 14, 18
0x0056	2, 14, 19
0x0057	2, 14, 20
0x0058	2, 15, 17
0x0059	2, 15, 18
0x005A	2, 15, 19
0x005B	2, 15, 20
0x00C0	3, 4, 17
0x00C1	3, 4, 18
0x00C2	3, 4, 19
0x00C3	3, 4, 20
0x00D8	3, 16, 17
0x00D9	3, 16, 18

Hexadecimal Quality Flag	Description Cross-Reference
0x00DA	3, 16, 19
0x00DB	3, 16, 20

DescriptionTable

Description Cross-Reference Number	Textual Quality Words	Description
1	Bad	The Value is not useful.
2	Uncertain	The quality of the value is uncertain.
3	Good	The quality of the value is good.
4	Non-specific	There is no specific reason for the quality state.
5	Configuration error	There is some server specific problem with the configuration. For example, the item in question has been deleted from the configuration.
6	Not connected	The input must be logically connected to some entity but it is not. This quality may reflect that no value is available at this time. For example, the value may not have been provided by the data source.
7	Device failure	A device failure has been detected.
8	Sensor failure	A sensor failure has been detected. (Numbers 17 through 20 in this table may provide additional diagnostic information in some situations.)
9	Last known value	The communication has failed. However, the last known value is available. The "age" of the value may be determined from the time stamp in the OPCITEMSTATE.
10	Comm failure	The communication has failed. There is no last known value available.
11	Out of service	The block is offscan or otherwise locked. This quality is also used when the active state of the item or the group containing the item is inactive.

Description Cross-Reference Number	Textual Quality Words	Description
12	Last usable value	Whatever device was writing this value has stopped doing so. The returned value should be regarded as "stale." This differs from Bad quality (No. 1) with Last Known Value (No. 9). The later status is associated specifically with a detectable communications error on a "fetched" value. The former status is associated with the failure of some external source to "put" something into the value within an acceptable period of time. The "age" of the value can be determined from the TIME STAMP in OPCITEMSTATE.
13	Sensor not accurate	Either the value has "clamped" at one of the sensor limits (related to No. 18 or 19) or the sensor is out of calibration through some form of internal diagnostics (related to No. 17).
14	Engineering units exceeded	The returned value is outside the limits defined for this parameter. In this case (per the Fieldbus Specification) the Limits descriptions (No. 17 - 20) indicate which limit has exceeded but they do not necessarily imply that the value cannot move farther out of range.
15	Sub-normal	The value is derived from multiple sources and has less than the required number of good sources.
16	Local override	The value has been overridden. Typically, this means that the input has been disconnected and a manually entered value has been "forced."
17	Not limited	The value is free to move up or down.
18	Low limited	The value has "clamped" at some lower limit.

Description Cross-Reference Number	Textual Quality Words	Description
19	High limited	The value has "clamped" at some high limit.
20	Constant	The value is a constant and cannot move.

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