L O O K O U T ™

Lookout Evaluation Guide™

Worldwide Technical Support and Product Information

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Contents

Chapter 4
Where to Go from Here

Appendix A
Technical Support Resources

1

What Is Lookout?

Lookout is a highly productive automation software package with an easy-to-use interface. Lookout is used to control, monitor, modify, analyze, or report on your industrial automation applications.

You do not need to use programming or script writing to create Lookout processes. This makes Lookout the quickest solution to get your automation processes up and running.

Why Choose Lookout?

National Instruments Lookout is the easiest to use HMI SCADA software on the market. This, combined with the easy-to-use networking and drag-and-drop development environment, makes Lookout a highly productive tool to create your industrial automation applications.

Lookout is used to control many types of industrial applications, from manufacturing a variety of products to providing essential services. Lookout is being used to brew beer, process food, run chemical and petrochemical plants, operate oil and gas pipelines, automate buildings, control energy management systems, bottle soft drinks, operate power plants, and operate municipal water supplies.

The total cost of ownership of software includes development, maintenance, and training costs. With Lookout, you cut down on these costs and get faster return on your investment—guaranteed. If, after using a purchased copy of Lookout for 90 days, you do not find it to be the easiest-to-use software on the market, we will refund your money.

How Does Lookout Work?

With Lookout, you can create a control process in three basic steps. First, you *select* the type of object you want to create from Lookout's large library of control, driver, and display objects. Second, you *configure* the object using Lookout's enhanced productivity tools, which include the Lookout Object Explorer; Connection Browser; and special expression,

connection, and data point configuration dialog boxes. Finally, you *make connections* between your objects using a simple connection dialog box.

Since the Lookout interface includes the controls you need to connect objects and drivers, Lookout lets you avoid time-consuming programming and scripting.

Object-Oriented

When you develop a control process in Lookout, you create specific objects such as controls, trend charts, and hardware drivers. Lookout's library of object classes includes a vast selection of objects.

Lookout comes with advanced objects, such as the Loader, the Monitor, and the Symbolic Link, that you can easily use to create emergency backup systems to take over in case of system failures. You can also use objects to create and run a multitude of processes from a single process template—all done the easy Lookout way.

Each programmable logic controller (PLC), remote terminal unit (RTU), or protocol driver object you create comes already equipped to read from and write to the field hardware connected to your computer.

Connections

In Lookout, you create connections between objects to meet a variety of control process needs. You can create one-way connections, reciprocal connections (as shown in the *Create a Client Process* example in Chapter 3, *Try Out Lookout*), and complex connections that test logical conditions or perform calculations on a value.

Expressions

Edit Lookout expressions (the objects on your control panel) so that they process and analyze data while it is being reported. Expressions can also test current conditions to make fast and efficient adjustments to processes.

Event Driven

Events drive Lookout. This means that Lookout is notified *immediately* when a change occurs in a setpoint, I/O value, or expression (instead of waiting for continuous software operation loops to make their way around to checking a value).

Online Configuration

With Lookout online configuration, you change system configurations without quitting your control processes. You can even develop and modify a Lookout process while your application is running. Lookout remains completely online while objects are being added to the application. This means that there are no gaps in your data, alarm, and event records when you do maintenance or upgrade your processes.

Multi-Server and Multi-Client Networking

Connect any number of computers running Lookout server and client processes. The TCP/IP networking protocol integrated into Lookout makes networking as easy as dragging a data point to a control panel display, or typing in a Uniform Resource Locator (URL).

Web Capabilities

With the web client feature of Lookout, you can monitor and control a Lookout process from any computer connected to the Internet. In seconds, you can create a basic HTML page, following the simple export procedure in Lookout. You can then access your client process through Microsoft's Internet Explorer. The advantage of accessing Lookout client processes on the web is that you do not need Lookout software on the computer being used as a web client. (To experience how easy it is to create a web client, see the *Create a Web Client* exercise in Chapter 3, *Try Out Lookout*.)

Graphics

Lookout includes an extensive library of graphics you can use to customize your process control panels. Graphics can be either static (like text labels) or animated (graphically representing changes as they occur in your processes). The water tank in the *Create a Server Process* example in Chapter 3, *Try Out Lookout*, includes both static and a simple animated graphic displays.

Lookout supports metafiles (.wmf) and bitmap graphic files (.bmp). You can also import AutoCad files and photographs as bitmaps or metafiles.

Distributed Alarms and Events

Use any computer running Lookout to monitor alarms and events generated by any Lookout process. Lookout lets you set up to ten alarm priorities. You use these priorities to group and filter alarms and events, which lets you focus on what is most important in a given circumstance. You

acknowledge alarms from any computer in a network using a single keystroke. In addition, Lookout includes the following alarm reporting features:

- Voice annunciation using `.wav` files
- Alarm/event reporting that you can define for each object
- Filtered alarm/event report printing
- Distributed alarm/event logging

Security

Lookout security works both on individual controls and across networks. Lookout lets you set up to ten security levels. You can use the security features to limit panel retrieval and viewing, individual object control, and determine if Lookout can be closed or minimized.

With Lookout, you can automatically start up a process when you power up your computer.

Distributed Data Logging

Lookout logs alarms, events, and data to its internal Citadel database. The Citadel historical database is the highest-performing real-time historical solution currently available in the market. Citadel includes an open database connectivity (ODBC) driver that enables other databases (such as Access and MES) to retrieve historical data using structured query language (SQL). You can log data from any computer running Lookout on your network to any other Lookout computer, and then access that data using SQL queries. You can also log data to spreadsheet files, or to other applications using dynamic data exchange (DDE). You can log data at regular intervals, on demand, on occurrence of an event, or in any combination of these logging schedules. You can log data to any computer on your network, and retrieve data from any computer, just as easily as you accomplish the networking tasks in the *Networking* exercise in Chapter 3, *Try Out Lookout*.

Trending

You can display data from a number of different sources at one time using the Lookout HyperTrend object. You can also create groups, each one having its own data set to display and its own scaling and time constraints. You can define as many HyperTrend objects as you want. Each object can plot as many numeric (analog) and /or logical values as you want.

Report Generation

Lookout lets you create custom reports using your favorite spreadsheet package. You can also configure Lookout to create automatic scheduling and on-demand reports.

Telemetry

Lookout allows multiple protocols to share the same serial port and, therefore, the same radio frequency. For instance, you can have different manufacturers' PLCs and RTUs using different communications protocols on the same line using one modem.

Hardware Connectivity

Lookout is a fully-compliant OLE for Process Control (OPC) client and server, allowing full connectivity through the industry standard for open multivendor connectivity.

Lookout offers seamless integration with National Instruments hardware, such as FieldPoint and Data Acquisition (DAQ) products. Lookout also has dozens of custom drivers to help you control PLCs and RTUs from a wide variety of manufacturers.

Combined with National Instruments LabVIEW or BridgeVIEW software, you also bring motion control and machine vision to your control processes, and access a full spectrum of analysis and measurement options.

2

Getting Started

This chapter describes the system requirements for the Lookout software and contains installation instructions.

System Requirements

Make sure you have the following minimum components in place before you attempt to install and use Lookout:

- Pentium class PC running at 90 MHz or faster

- 32 MB RAM

- Windows NT version 4 or later, or Windows 98/95

- 45 MB free disk space

- Another 20 MB or more free disk space (depending on how much data you intend to log to the internal Citadel database)

- If you want to experiment with Lookout's networking capabilities, your computer must have TCP/IP installed and functioning. See the *Testing TCP/IP* topic of the Lookout online help for more information on this requirement.

- If you want to explore Lookout's networking capabilities (as shown in the *Networking* exercise in Chapter 3, *Try Out Lookout*), you need access to a second computer on your network that meets all of the above requirements.

- If you want to create a web client, your computer must have Microsoft Internet Explorer, version 3.2 or later.

Lookout is Y2K compliant and requires no special considerations for the year 2000.

Install Lookout

Follow these instructions to install the Lookout software:

1. Before you install Lookout, make sure you have shut down all applications.

2. Insert the Lookout CD into your CD drive.

3. Follow the prompts on the screen to complete the Lookout installation.

The Lookout CD has autorun capability. If for some reason the autorun fails to start the CD installation routine, follow these instructions:

1. Click on the **Start** icon in the taskbar and select **Run**.

2. Enter *N*:\SETUP, where *N* represents your CD drive. Then, select **OK**.

    *   Use **Browse** to enter the name of an alternate directory, or select **Next** to accept the recommended directory name.

    *   Lookout lets you choose whether to install its online help. However, if you choose not to install the online help, the Lookout help buttons will not work.

    *   Make sure you select the option to install Lookout's ODBC driver if you want to be able to access Lookout's internal Citadel database.

    *   On a Windows NT system, if you want to be able to block authorized users from using <Alt-Tab> to gain access to applications other than Lookout, make sure you install the optional NT keyboard driver from the list of optional components.

3

Try Out Lookout

This evaluation guide contains the following exercises that lead you through the following Lookout activities:

- *Create a Server Process*—Build a process that runs on your computer. This exercise shows how easy it is to connect Lookout to hardware, control the hardware, and display values from the hardware registers. You will use this process as the server process in the rest of the Lookout evaluation exercises.

- *Create a Client Process*—Create a client process to access and control your server process.

- *Create a Web Client* (optional)—Experiment with the web client capabilities of Lookout.

- *Networking* (optional)—Learn how to run a client process on any other computer on your network.

Your evaluation copy of Lookout allows you to have up to ten I/O points and two client connections. You can run evaluation copies of Lookout on as many computers on your network as you like. Your evaluation copy will run for one hour at a time. Before Lookout shuts down, you will be given the opportunity to save your process. The Lookout evaluation software has no expiration date.

💡 **Tip** The Lookout online help contains information on all the Lookout objects, features, and services, as well as a developer tour that includes a brief tutorial.

Create a Server Process

A Lookout server process is an application that directly controls and monitors field hardware. You run Lookout server processes on computers that have direct, physical connections to industrial automation hardware. In this exercise, you simulate connections to hardware.

📝 **Note** While *server* is a networking term, a Lookout server process does not necessarily need to be connected to a network. You would create a Lookout server process for any non-networked task you want to use Lookout to perform.

In this exercise, you create and configure Lookout objects, make and edit connections between those objects, and configure data for logging.

1. Start Lookout by selecting **Start»Programs»National Instruments Lookout»Lookout 4.0**.

2. Close the Demonstration process (if necessary) by selecting **File»Close All**.

3. Select **File»New** to create a new Lookout process.

4. In the **Create Process** dialog box, name your process Eval_Server, as shown below. Leave the rest of the fields with their default settings.

Tip Click on the **Help** button for more information about any of the areas on a dialog box.

5. Click on **OK**.

6. In the **New Control Panel** dialog box that appears, change the **Title** to Lookout Evaluation Server Control Panel.

7. Click on **OK**.

Tip   Notice that the status bar at the bottom of the Lookout workspace turned yellow when you created your new process. This signals that Lookout is in Edit mode. If you find you cannot create an object or you have trouble with completing some of the steps in the evaluation exercise, check to see whether Lookout is in Edit or Run mode. You can change modes by pressing <Ctrl-Space>.

8. Select **Object»Object Explorer**.

    You use the Lookout Object Explorer to examine Lookout processes running on any Lookout computer on your network, create new objects, arrange objects in hierarchical folders, make connections, edit data members, and register computers running Lookout on your network.

    For more information on the Lookout Object Explorer, select **Help»Contents** from the Lookout menu, then view the *Object Explorer* topic.

9. Arrange your Lookout workspace so that you can see both your control panel and the Object Explorer. The following illustration shows how your Lookout screen might look when you complete the following exercises. Various Lookout features you will be learning about are labeled to help you orient yourself in the Lookout workspace.
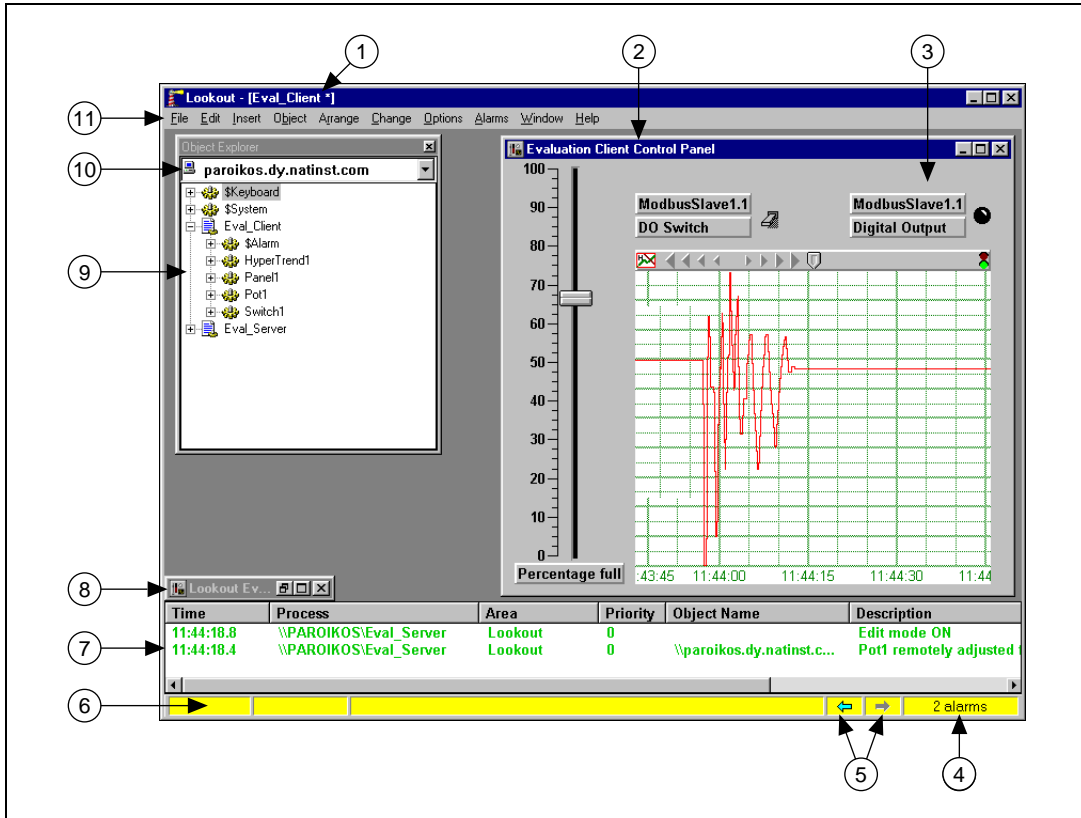
1	Active process name	4	Active alarm/event count	6	Status bar	9	Object Explorer
2	Title bar	5	Control panel navigation	7	Alarm window	10	Root window
3	Control panel		arrows	8	Minimized control panel	11	Lookout menu

♦ *Lookout handles discrete, batch, and continuous processes.*

♦ *Lookout can handle an unlimited number of objects, I/O points, and graphic panels.*

Create a Server ModbusSlave Object

1. Right-click on the `Eval_Server` process in the Object Explorer, and select **New Object** from the menu. The **Select Object Class** dialog box appears.

2. Define your object. Open the **Drivers** folder and select the **ModbusSlave** object. Notice that a description of this object appears in the field to the right of the list of objects.

3. Click on **OK**. The **New Modbus Slave** dialog box appears, as shown in the following illustration. For this example, accept the default values for the object `ModbusSlave1` by clicking on **OK**.
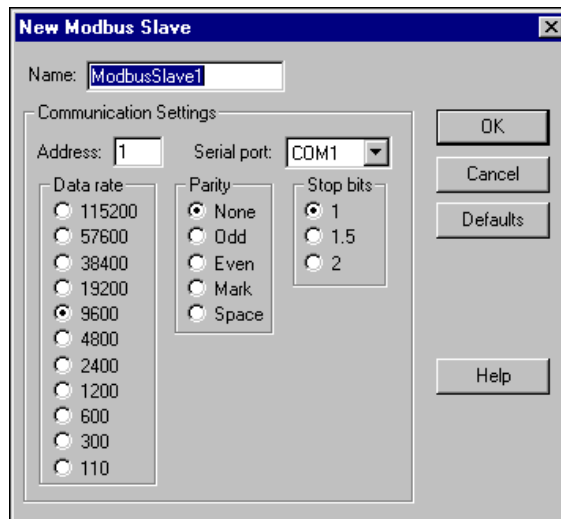
4. The Modbus Slave object, `ModbusSlave1`, appears under your `Eval_Server` process in the Object Explorer.

Note These exercises use the ModbusSlave driver object because it does not return errors if it cannot locate hardware connected to your serial port. You use the ModbusSlave driver object as you would any PLC or RTU driver object.

♦ *Connecting to hardware is done similar to creating the Modbus Slave object.*

Create and Connect a Server Pot Object to Your Modbus Slave

1. Expand the tree view of your newly created ModbusSlave1 object by clicking on the + sign to the left of it in the Object Explorer, as shown in the following illustration. This lets you view the data members available for you to use.

2. Right-click and drag the 40001-49999 data member range to your control panel. Release the mouse button and select **Create Control»Pot**.
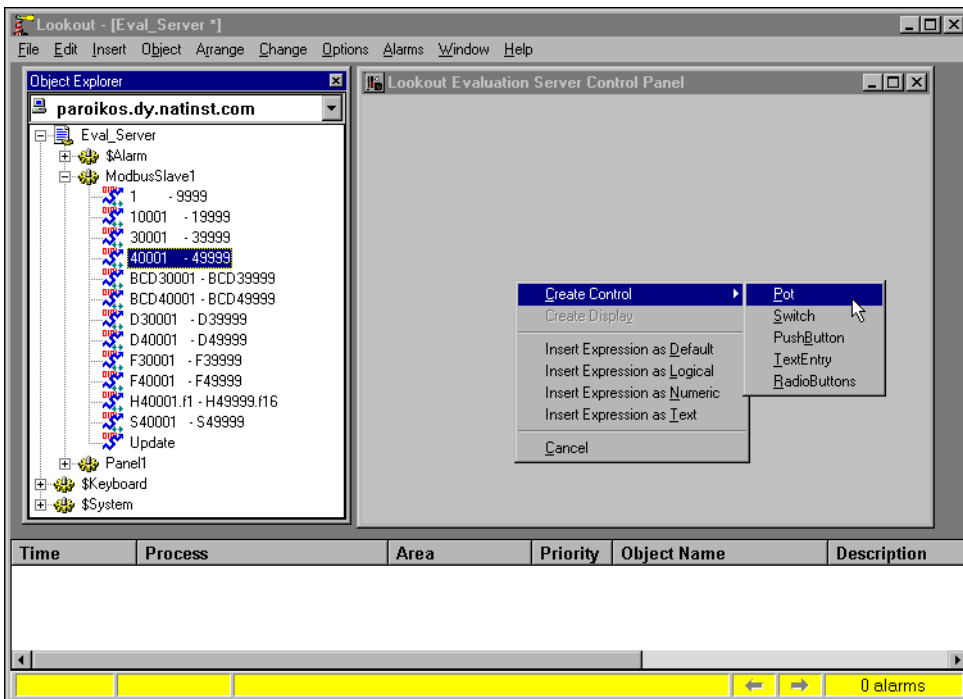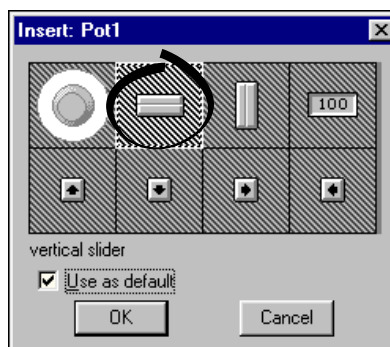

Tip Pot is an abbreviation for potentiometer. In Lookout, you use Pot objects to set or control analog outputs.

3. The **New Potentiometer** dialog box appears, as shown in the following illustration.
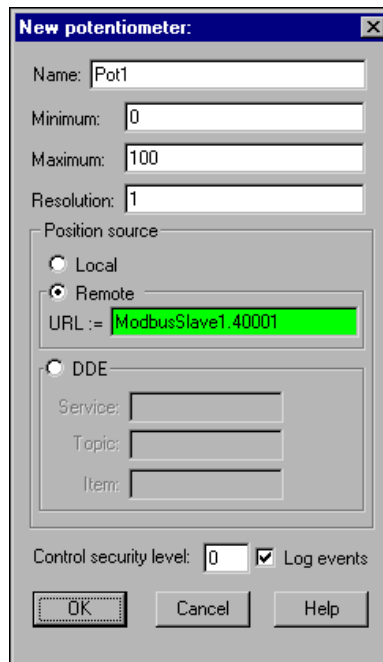
4. Accept the default values for the object Pot1. Click on **OK**. The following dialog box appears.

5. Select the vertical slider (top row, second graphic).

6. Select the **Use as Default** checkbox, then click on **OK**. You can position your object wherever you like on the control panel.

7. Use the sizing handles to change the size of your Pot (slider) object.
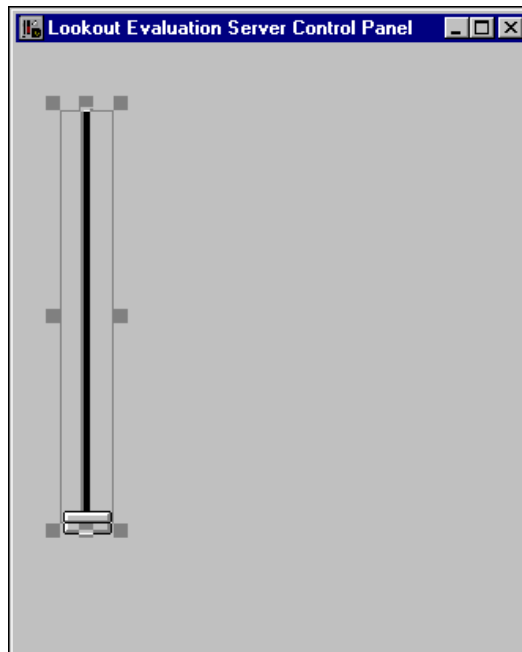
♦ *Lookout features easy-to-use drag-and-drop project development.*

8. To check that your connection works, place a display for the `ModbusSlave1.40001` data member on your control panel by clicking on `40001–49999` in the Object Explorer and dragging it to your control panel. This inserts a digital representation of the 40001 register on the control panel.

9. Use the sizing handles around the number to make the display large enough to show three digits.

10. View your process in action. Press <Ctrl-Space> to leave Edit mode, then use your pointer to move the Pot slider up and down. Notice the number displayed in the expression changes as you move your Pot control. Your Pot (slider) object output is connected to the ModbusSlave1 data member 40001, and the value the Pot sets for that data member is displayed as a number on your control panel.

♦ *In ten simple steps, you have created and configured a driver object to talk to field hardware, connected a control to that driver object, displayed the register you are connected to, and tested the process.*

The connection between your Pot control and your ModbusSlave driver is a remote source connection. This connection responds to changes in the control from sources other than itself, making your control an indicator as well as a control. If you want your control to hold the value you set even if something changes the value in your PLC or other device, you can use a local source direct connection. With this type connection, Lookout will restore the control to the device when possible. For more information on creating and using local source direct connections, see the Lookout documentation.

♦ *With Lookout online configuration, you can change system configurations without shutting down your control processes. You can even develop and modify a Lookout process while your application is running. Lookout remains completely online while objects are being added to the application. This means that there are no gaps in your data or alarm and event records due to maintenance or upgrading of your processes.*

The display you created to show the value of the ModbusSlave1.40001 register is a Lookout expression (a flexible way to display, process, and use data in Lookout). Take a few moments to explore this expression.

1. Select **File»Save** to save your server process.

2. Press <Ctrl-Space> to return to Edit mode (the status bar at the bottom of the Lookout workspace should turn yellow).

3. Re-examine your expression. Right-click on the digital display and select **Object Properties**. The **Revise expression** dialog box appears.
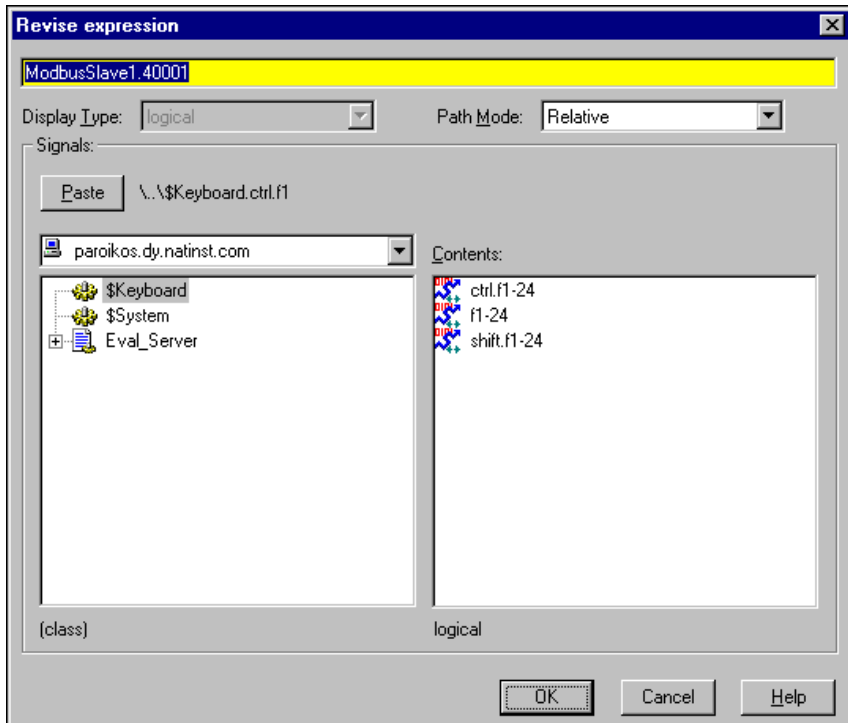
4. With this dialog box, you can do such things as perform calculations or logical tests on data, and change the path relativity. When you are finished looking at this expression, click on **OK**.

Tip   For more information about Lookout expressions and how to put them to use, click on the **Help** button in the **Revise Expression** dialog box.

Customize Your Display

1. Modify your Modbus Slave display properties. Right-click on the digital display expression. This time, select **Display Properties**. The following dialog box appears.
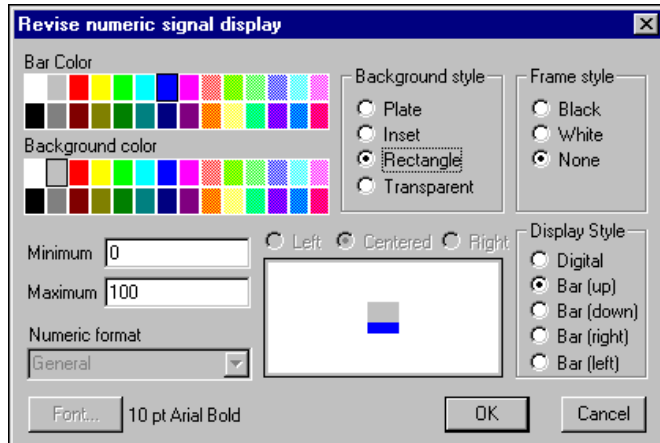
2. Select the **Bar (up)** option in the **Display Style** section of the dialog box, and set the **Bar Color** to blue. Set the **Background Style** to **Plate**. Click on **OK**.

3. In the control panel, adjust the size of the bar using the sizing handles.
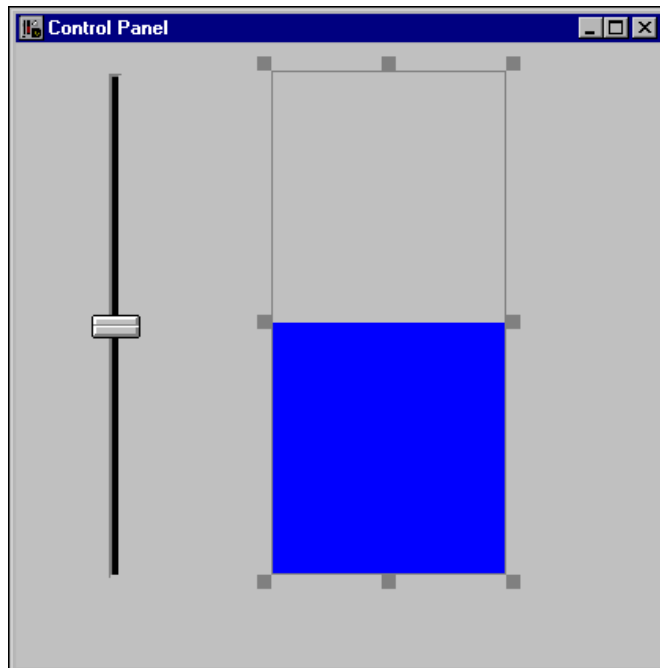
4. Press <Ctrl-Space> to leave Edit mode, then move your Pot slider up and down. The Modbus Slave value is now displayed as a blue bar instead of as a number.

5. Press <Ctrl-Space> to return to Edit mode.

6. Add a graphic to your display. Select **Insert»Graphic**. The following dialog box appears.
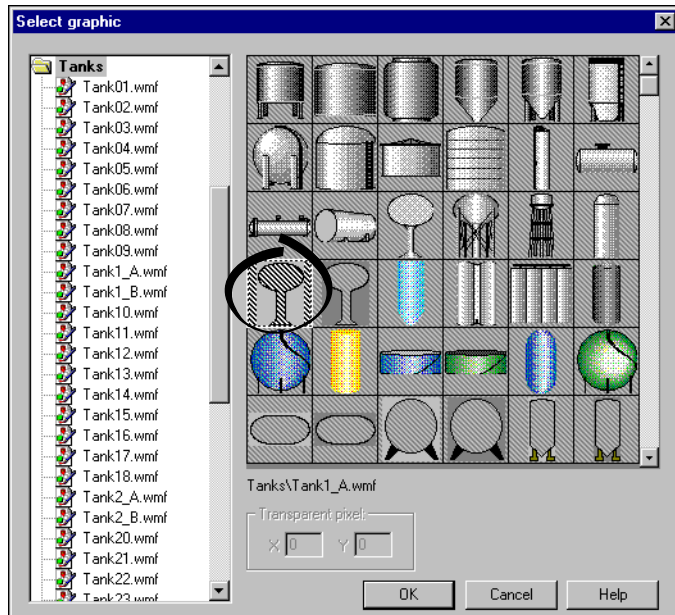

7. Open the **Tanks** folder, and select the first water tower graphic in the fourth row, `Tank1_A.WMF`. Click on **OK**.

    This particular graphic has a transparent center (indicated by diagonal hatch marks). You can position it over your bar display to give a graphic representation of a tank's fullness.

8. Position the water tower over the bar indicator, and re-size it as shown in the following illustration. This creates a simple, animated display that shows you how full the water tower is at any given time.
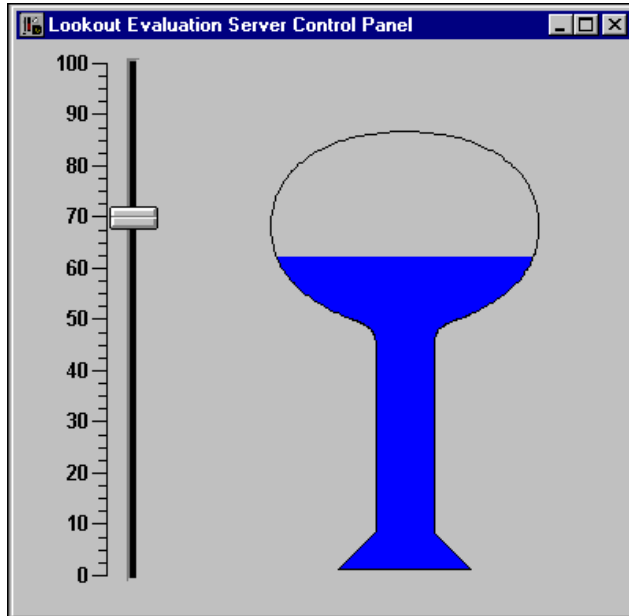
Tip You can create more complicated animations using the Lookout Animator object; see the *Graphics* and the *Animator* topics in the Lookout online help for more information.

9. Add a scale to the Pot slider. Right-click in the control panel and select **Insert Scale**. The following dialog box appears.
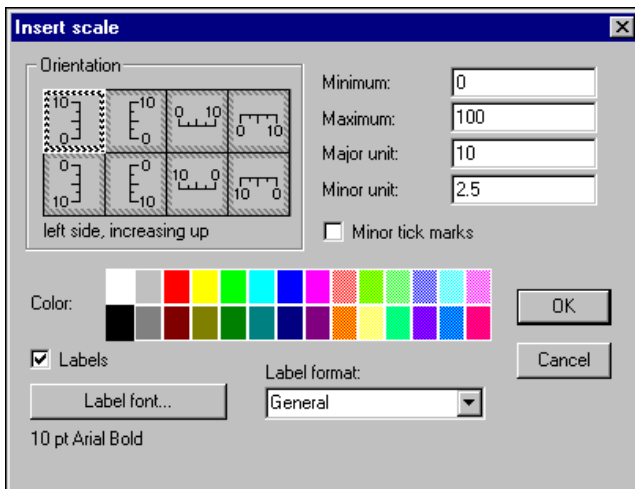
10. Accept the default settings and click on **OK**. Position this scale next to the slider.

11. Select **Insert»Text/Plate/Inset** from the Lookout menu, and place a label that says `Percentage Full` below the scale on your control panel.
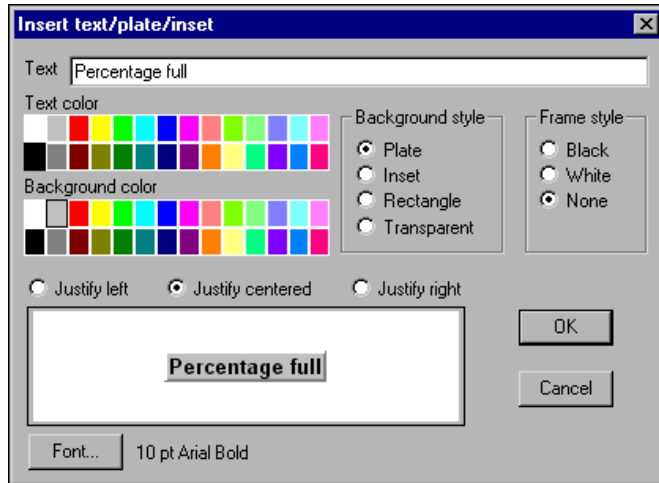
♦ *Lookout includes an extensive library of graphics you can use to customize your process control panels. Lookout supports Windows metafiles (.wmf) and bitmap graphic files (.bmp), In addition, you can import AutoCAD files or photographs.*

Configure Data for Logging

You now have a control you can use to set the water level in your simulated tank and a scale that shows what percentage of the tank should be full. You might also want to know how many gallons of liquid the tank is holding, display information about the tank and its contents graphically, and trigger alarms when the tank is too full or almost empty.

To keep track of this data and to make it easier to handle, Lookout uses the internal Citadel database. Each time you create a Lookout object, every one of its data members is a potential entry in this database. You can log data to your local computer or to other computers running Lookout anywhere on your network.

Let us assume your tank holds 250,000 gallons. You can configure a database entry for your tank to track how full the tank is (in gallons), automatically convert the percentage measurement to a volume measurement, and handle your logging and alarming.

1. Right-click on the `ModbusSlave1` object in the Object Explorer. Select **Edit Database**.

2. Enter the values shown in the following dialog box.

a. Select the `40001` data member you connected your Pot object to by selecting `40001-4999` in the **Native Members** list. Assign it an **Alias** of `TankLevel`.

b. In the **Scaling** section of the dialog box, set the **Raw units** at `0` for the **Minimum** and `100` for the **Maximum**. These are the raw numeric values connected to the `40001` data member, indicating what percentage of the tank is currently full. Set the **Eng. units** to `0` for the **Minimum** and `250000` for the **Maximum**.

    Lookout now automatically scales the 0–100 input to a value between 0–250,000 that you can display using the alias value `TankLevel`.

c. Check **Log to historical database**, and set the **Lifespan** to 5 days.

      d.   Set the **Deviation** to 1.5. (This part of the database editing will be used in the next exercise.)

      e.   Set your **Alarm conditions** as shown. Notice that Lookout lets you divide alarms into groups, called alarm areas. (In this case, you create an alarm area called Tanks by typing *Tanks* into the **Area** field.)

Tip   For more detailed information on editing the Citadel database, click on the **Help** button in any Edit Database dialog box. Refer to the *Alarms and Events* topic in the Lookout help for more information on alarms and alarming.

      f.   Click on the **Save** button (or the **Update** button if you saved earlier in the process), then click on the **Quit** button to exit the database editing dialog box.

3.   Expand the ModbusSlave1 object in the Object Explorer by clicking on the +, and drag the scaled data member TankLevel to your control panel. This digital display reports the contents of your tank in gallons.

Your control panel should now look something like the following illustration.
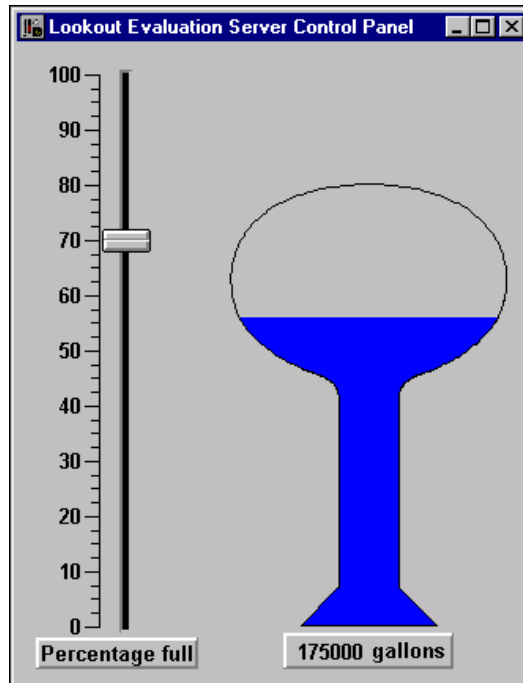
Tip   To create the label with the number of gallons, select **Insert»Text/plate/Inset** to insert a label with the word "gallons," then select **Justify right**. Select your digital display on the control panel, and in the **Display properties**, set the background style to **Transparent**. Then, drag your digital display over your text label, and select **Move to Front** from the **Arrange** menu.

4. Press <Ctrl-Space> to exit Edit mode, then move the Pot slider up and down. Moving the Pot to the upper and lower limits of its range triggers the alarms you set for the database member `TankLevel`.

5. Right-click on an alarm in the **Alarms** window and select **Acknowledge All** to acknowledge the alarms. You do not need to enter a comment.

Tip   If you want to change the size and location of the **Alarms** window, select **Alarms»Display Options**. To control what is displayed in the Alarm window, select **Alarms»Filter Options**. For a more detailed description of alarms and alarming, refer to the *Alarms and Events* topic in the online help.

6. Save your server process. You will be accessing it with the client process you create in the next example.

Tip   You can add network and local security to this server process. To learn more about using the Lookout security features, view the *Security* topic in the Lookout online help.

♦   *Log data to any computer on your network, and retrieve data from any computer.*

♦   *Set alarm points, login values, and convert scaling in one easy dialog box.*

♦   *View and acknowledge alarms from any computer on the network.*

Review—Creating a Server Process

A Lookout server process is an application that is connected to hardware and provides data for clients. Run Lookout server processes on your computers that have direct, physical connections to your industrial automation hardware. You use Lookout driver and protocol objects to build Lookout servers. You may not need or want to use Lookout in a networked environment. Any Lookout process you build to run on a computer connected to field hardware can be built the way this server example is, even if you are not planning to use Lookout's networking features. If you are not networking Lookout, you may find that it is useful to develop more than one process to run on a single Lookout computer—the basic server,

and one or more client processes with different security properties for different operators using the standalone system.

Create a Client Process

In this exercise, you build a simple Lookout client process to interact with the server you built in the *Create a Server Process* exercise.

A Lookout client process can run on the same computer as a server, or on a different computer. You can create a set of clients to run on the same computer as your server process, each addressing different parts of the main process, or perhaps with different security setups. The central idea behind a Lookout client is to create a process that works through a server process, not directly with field hardware. In this way, the client process becomes completely portable and flexible.

The instructions for this exercise assume you are developing your client process on the same computer that is running your server process. You could just as easily develop a client on a different computer running on your network, and in the *Networking* exercise, you will have a chance to move the client to a second computer, add a feature, and fix a data quality problem that is intentionally inserted when you build the client to demonstrate how easy trouble-shooting is in Lookout.

1. Launch Lookout if it is not already running.

2. Load your `Eval_Server` process using the **File»Open** command.

   If you did not save your server process from the previous example, you can use the `Eval_Server` sample process, found in the `Examples` folder installed with your evaluation copy of Lookout.

3. Minimize your server process control panel by clicking on the minimization box (_) in the upper-right corner of the control panel.

4. Select **File»New** to start a new Lookout process.

5. In the **Create Process** dialog box that appears, name your new process `Eval_Client`. Click on **OK**.

6. In the **New Control Panel** dialog box appears, change the **Title** to `Evaluation Client Control Panel`, and click on **OK**.

Create a Client Pot Object

1. From the evaluation server process, right-click and drag the 40001-49999 data member range to your control panel. Release the mouse button and select **Create Control»Pot**.

   The remote connection is defined by a URL, which directs Lookout to the target value. Properly configured, a remote position source connection works on any computer running Lookout on your network.

2. Right-click in the green **URL** field in the **New Potentiometer** dialog box. The following dialog box appears.
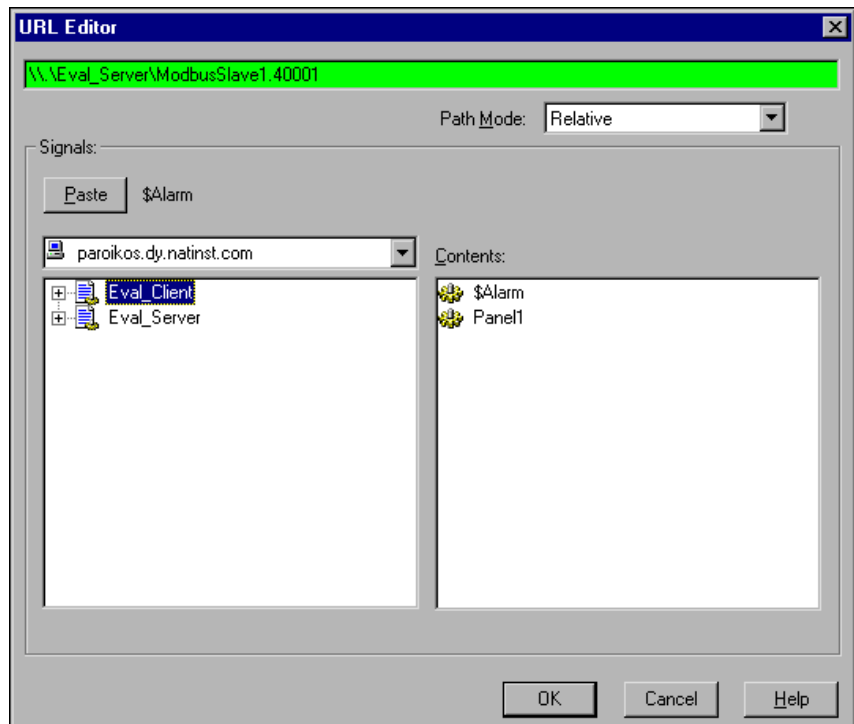
The path \\.\Eval_Server\ModbusSlave1.40001 should work as long as you client is running on the same computer you used to create your client process—but your goal is to create a process that runs from any computer on your network that has Lookout installed. For this to be true, you must change the path.

3. In a simple case like this one, you could just alter the URL by typing your computer name in the appropriate spot in the string. However, in order to show how the Lookout URL editor works, delete the old URL string. You can then assemble a new URL by making the following selections in the dialog box:

    a. Set **Path Mode** to Absolute. *This ensures that your client can find its way to the data member you are connecting to, no matter what computer the client is run on.*

    b. Open the Eval_Server process in the left tree view, and select ModbusSlave1.

    c. Select the 40001 data member in the **Contents** list.

    d. The assembled URL string is displayed next to the **Paste** button. Click on **Paste** to insert the URL string into the green URL field.

    e. Click on **OK**.

Note   Notice that the illustration features the name for the computer used to take the illustration screen shot. Your own computer name should appear instead of *paroikos.dy.natinst.com*.

Tip   Remember that you always create a connection from the controller to the object or server you want to modify.

Tip   For more detailed information on creating and editing URLs, click on the **Help** button in any **URL Editor** dialog box. For more information on Lookout paths and path relativity, refer to the *Path Names in Lookout* help topic.

4. Click on **OK** in the **New potentiometer** dialog box to create the new Pot vertical slider object.

5. Use the sizing handles to modify the size of your Pot object.

6. Press <Ctrl-Space> to leave Edit mode. Activate your server process control panel by selecting **Window»Lookout Evaluation Server Control Panel**.

7. Arrange your two control panels so you can see both. Operate the Pot control in the client process control panel. Notice that both the Pot control and the ModbusSlave data member (on the server process) operate in unison with the Pot control in your client process.

8. Operate the Pot control in your server process. Notice that the Pot control in your client process changes to reflect movement of the server values.

Your client process affects the server process in this way no matter what computer on the network it is run on.

Connect a Client Switch Object to Your Modbus Slave

1. Press <Ctrl-Space> to return to edit mode (the status bar at the bottom of the Lookout workspace should turn yellow).

2. Right-click on your `Eval_Client` process in the Object Explorer, and select **New Object**.

3. From the **Control** folder, select **Switch** and click on **OK**. The following dialog box appears.
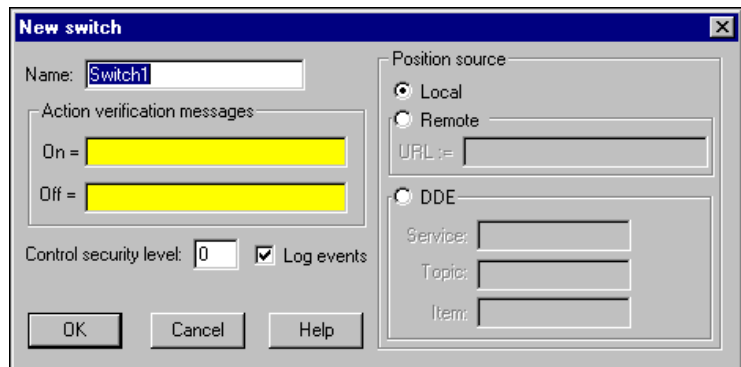
4. Select the **Remote** option, and right-click in the green **URL** field. The **URL Editor** dialog box appears.
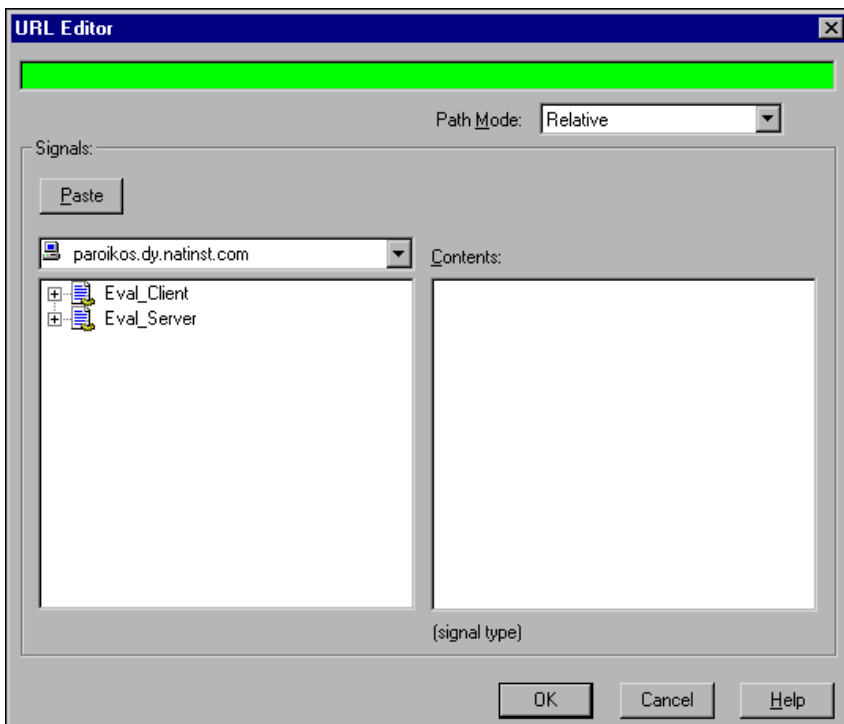

When you created your Pot object for your client, you used the **Path Mode** to make sure the URL path would work from any computer on your network. Another way you can ensure portability for this control is to change the root of the **Signals** list box.

5. Click on the down arrow in the root box below the **Paste** button, as shown in the following illustration.
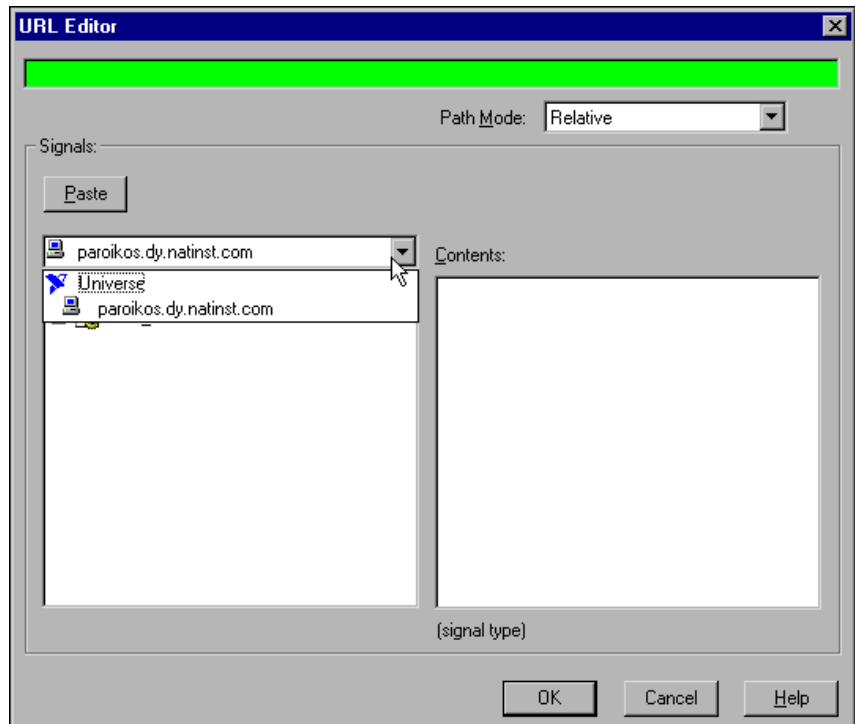
6. Select **Universe**. Expand the Network node in the tree that appears, pick your computer under the Network node, then expand the Eval_Server process. Select the ModbusSlave1 object as shown in the following illustration.
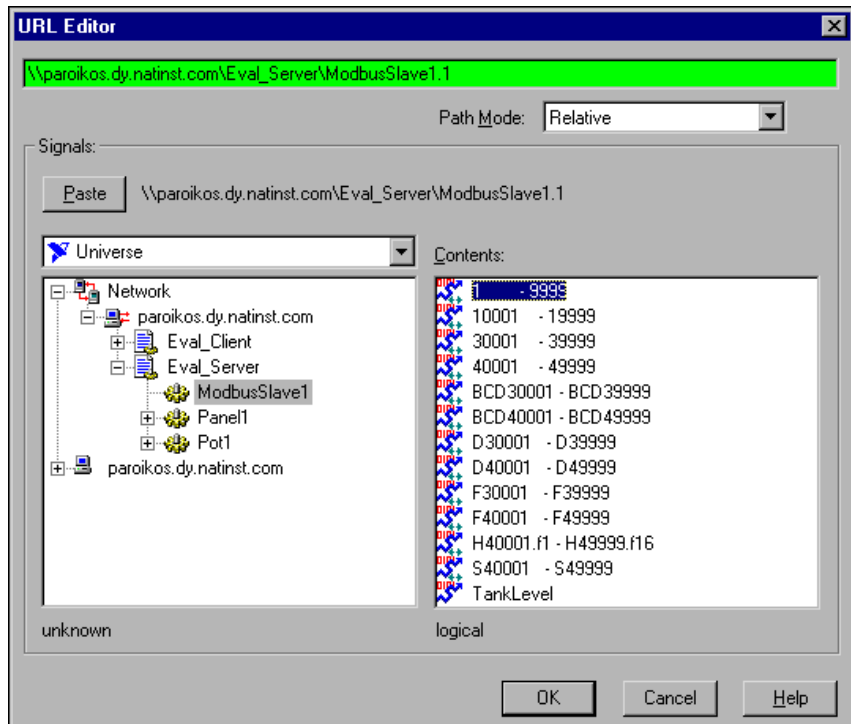
7. Select the 1-9999 data member in the **Contents** list and click on **Paste** to insert the URL string into the green URL field.

8. Click on **OK**.

9. Click on **OK** in the **New Switch** dialog box to finish creating your Switch object.

10. Drag the Switch object from the Object Explorer to your client control panel. This panel should now contain a Pot object and a Switch object.

11. In the Object Explorer, expand the ModbusSlave1 object in your server process as shown in the following illustration, and drag and drop the `ModbusSlave1.1` data member from your `Eval_Server` process to both your client and server control panels.
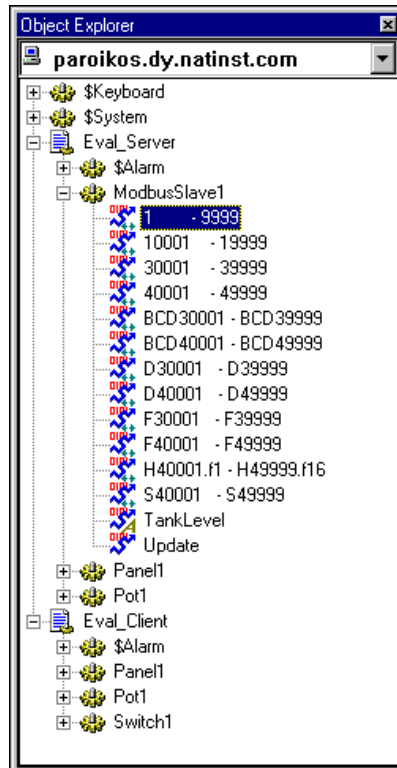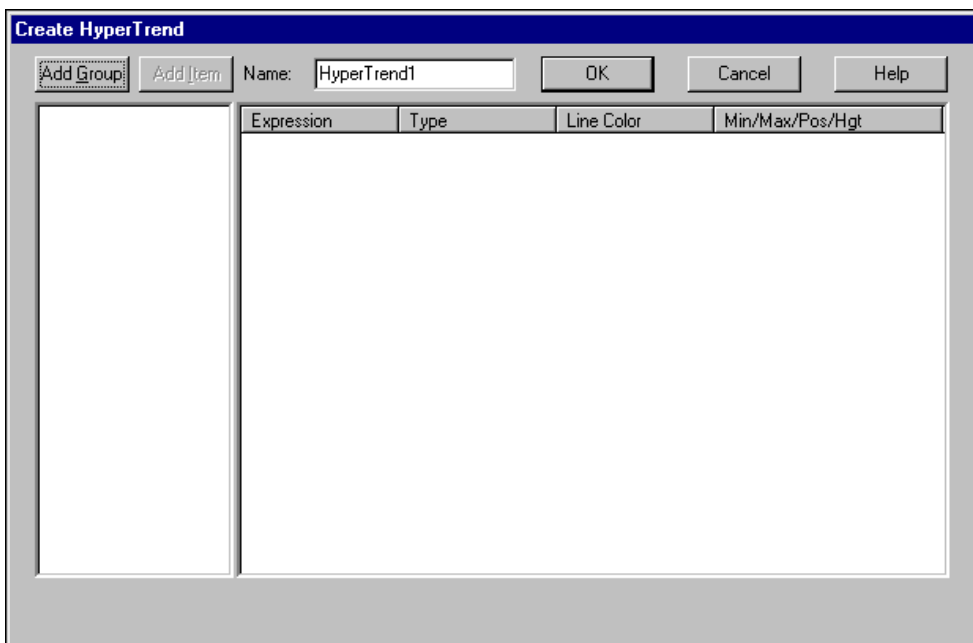

12. Press <Ctrl-Space> to leave Edit mode, and operate the switch you placed on your client control panel. Notice that the client panel display of the Modbus Slave data point operates just the same as the display in the process actually containing the object.

♦ *Connecting to an I/O point across a network is as easy as connecting it from the same computer.*
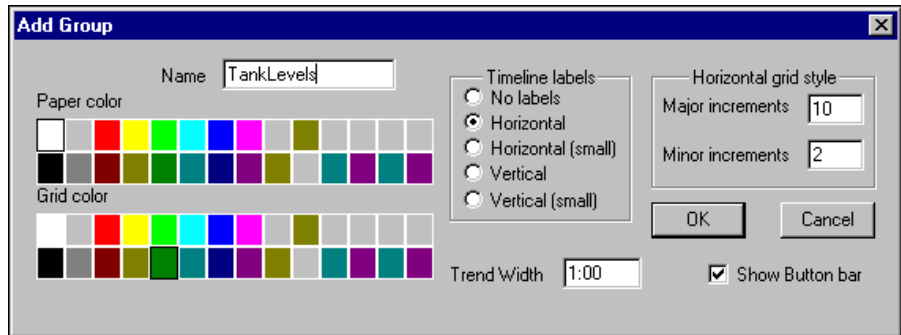
Create a HyperTrend Object

When you configured the `TankLevel` data member in your server process for scaling (see the section *Configure Data for Logging*), you also set it to be logged to Lookout's Citadel database. As long as your server process is running, Lookout is keeping track of this value in the Citadel database.

1. Make note of the current time on your computer, then change the position of the Pot slider on your client or server process a number of times in large increments/decrements. Later, you will view the changes you made on the HyperTrend chart.

2. Press <Ctrl-Space> to return to edit mode.

3. Right-click on your `Eval_Client` process in the Object Explorer and choose **New Object**. Select **HyperTrend** from the **Logging** folder. The following dialog box appears.

Create HyperTrend					
Add Group	Add Item	Name: HyperTrend1	OK	Cancel	Help

Expression	Type	Line Color	Min/Max/Pos/Hgt

4. Click on the **Add Group** button. The following dialog box appears.

5. Name the group TankLevels. The default trend width is one minute; you can leave it in place and accept the other defaults.

6. Click on **OK**. Lookout returns you to the primary **Create HyperTrend** dialog box. Make sure your new TankLevels group is highlighted, and then click on the **Add Item** button. The following dialog box appears.
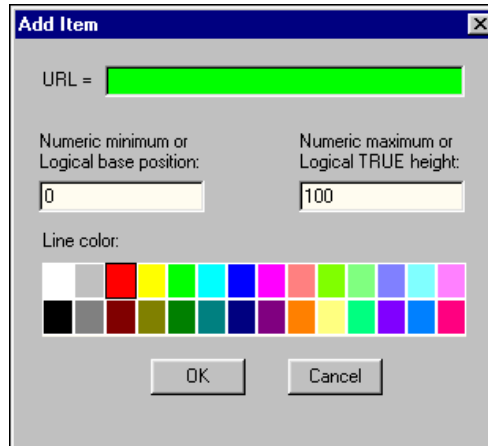
7. Set **Maximum** to 250000 to match the scaled value of the data point you are about to display.

8. Right-click in the green **URL** field to activate the **URL Editor**. The following dialog box appears.
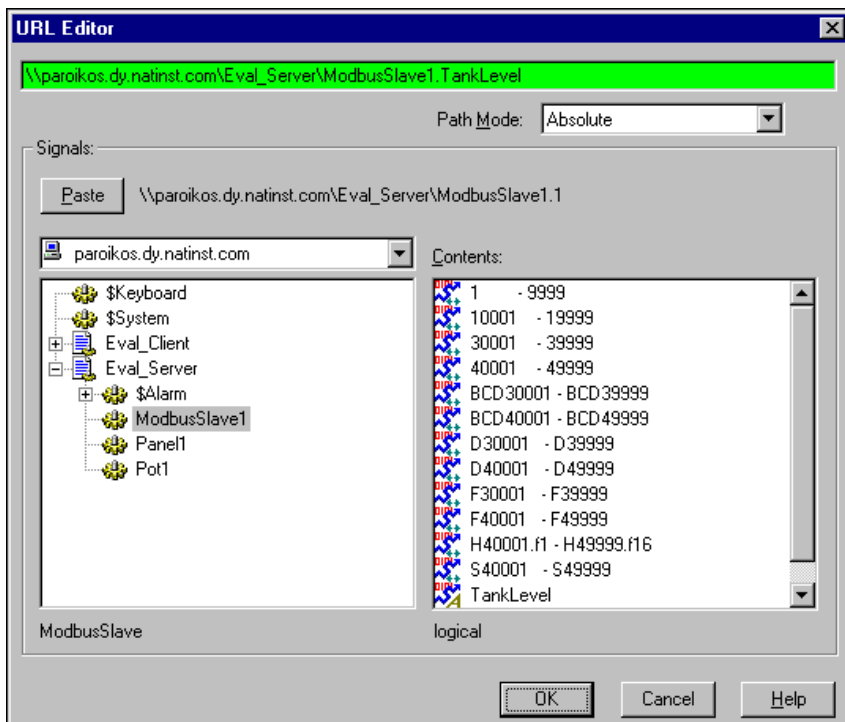
9. Set **Path Mode** to Absolute, then select the ModbusSlave1 object in your Eval_Server process in the left tree view. Select the TankLevel data member in the **Contents** list. Click on the **Paste** button, then click on **OK**.

10. Click on **OK** in the **Add Item** dialog box and again in the **Create HyperTrend** dialog box.

11. Drag your new HyperTrend object from the Object Explorer to your client process control panel. Use the sizing handles to adjust the size of the chart. Your client process control panel should now resemble the following illustration.


| 1 | Modbus Slave 1.1 Digital Output Switch | 2 | Modbus Slave 1.1 Digital Output Indicator | 3 | Hypercursor icon |
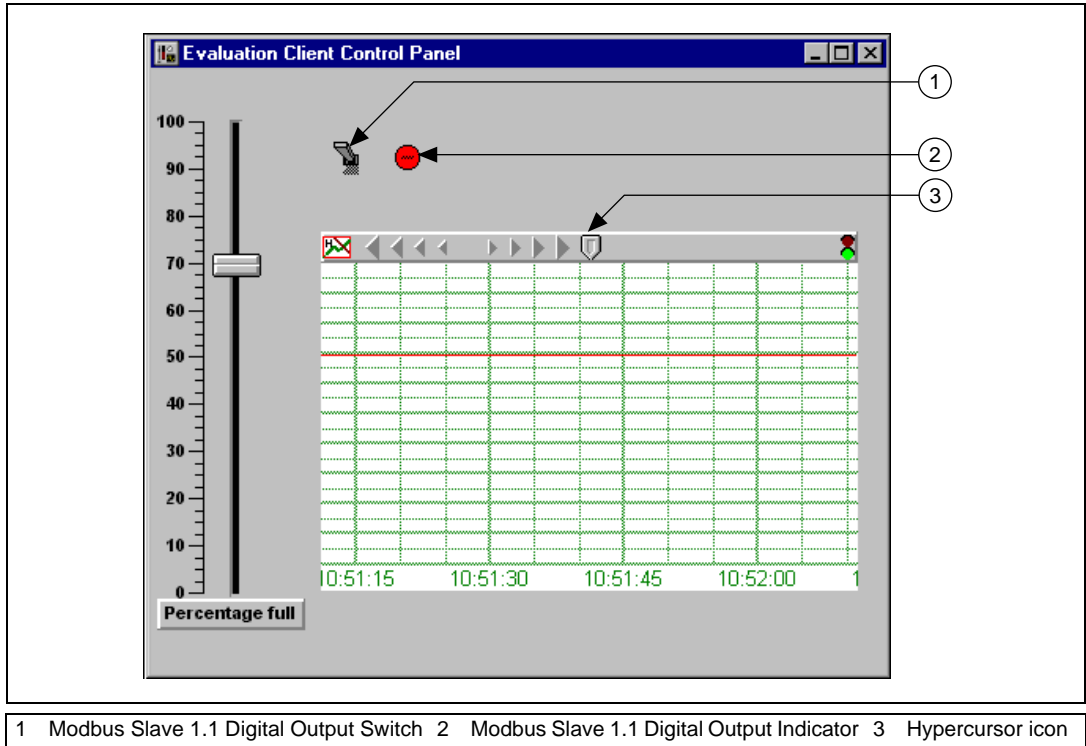
View Your HyperTrend Data

1. Press <Ctrl-Shift> to toggle out of Edit mode. Move the Pot slider up and down and notice the trace change on the graph.

2. Click on the HyperCursor icon in the center of the top of the HyperTrend object. The HyperCursor icon is replaced by a solid line down the center of the chart, and the **HyperTrend1 Cursor** dialog box appears, as shown in the following illustration.
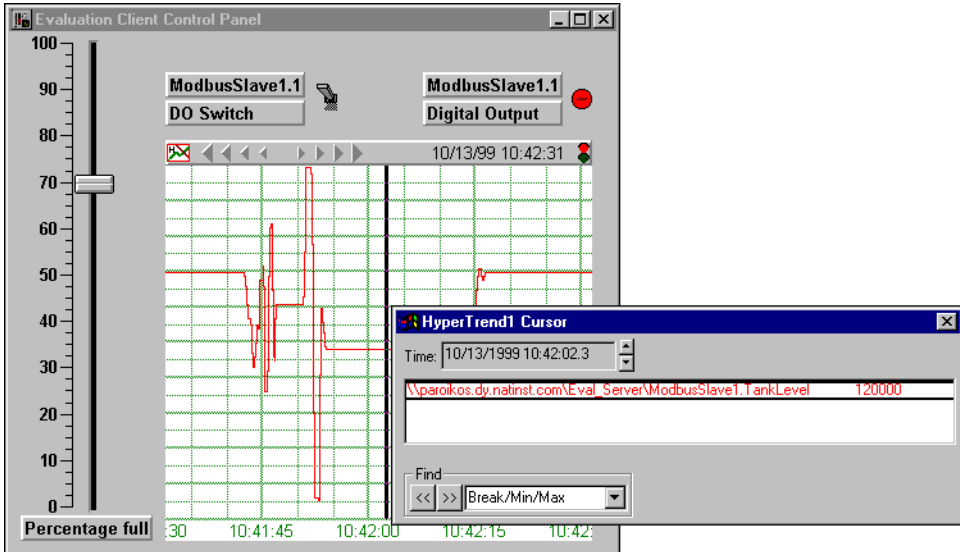
3. You can use either the **Time** controls on the dialog box or left-pointing arrowheads at the top of the HyperTrend chart to scroll back to the time you noted when you changed `TankLevel` values (the larger the arrowhead, the faster the scroll speed).

4. Select **File»Save All** from the Lookout menu to save both your processes.

♦ *You can define as many HyperTrend objects as you want. Each object can plot as many numeric (analog) and /or logical values as you want.*

Review—Creating a Client Process

Lookout client processes are intended to interact with Lookout servers. A properly-made Lookout client process should be capable of running on any computer running Lookout on your network without modification.

To ensure this portability, there are a few simple development rules to follow when creating a Lookout client process, which are explained in detail in the Lookout online help. The essence of these rules is that a Lookout client application should not connect directly to field hardware, or refer directly to or depend on the computer on which the client process is running.

To meet these conditions, you should not use a driver object in a Lookout client, and you should always use remote connections from a client process to a server process (rather than making a direct connection).

Still, because mistakes are not uncommon in the real world, a small error has purposefully been made in the client you just built to allow you to debug the process in the *Networking* exercise.

Create a Web Client

You can create a version of any Lookout process to access using Microsoft Internet Explorer, 3.2 or later. With a Lookout client, you not only can access, but also control your process from anywhere in the world. In this exercise, you will find out how easy it is to do this.

1. Open Lookout and run your `Eval_Client` and `Eval_Server` processes.

2. Press <Ctrl-Space> to put Lookout in Edit mode.

3. Select **File»Web Server Export Options**. The following dialog box appears.
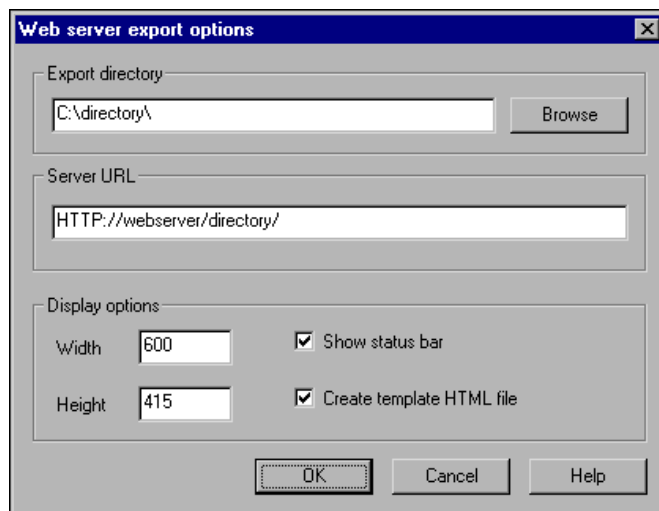
4. In the **Export directory** field, enter the complete path to the directory in which you want to create your Lookout web client HTML page. All the necessary support files are also placed in this directory. (If no directory exists on the path you enter, Lookout will create one.)

5. **Server URL** is the URL for your HTML page.

- If your computer is running web server software, enter the complete web server path to the page, but do not include the page itself. For example, if the complete URL to your page is
  ```
  http://webserver/directory/client.html
  ```
  enter
  ```
  http://webserver/directory/
  ```

- If your computer is *not* set up as a web server, you can still create a web client to use with your web browser, but you can only open it in your own computer. It will not be visible to a browser running elsewhere on your network. Enter the same path you entered in the **Export Directory** field, such as
  ```
  c:\directory
  ```

6. Click on **OK**.

7. Select **File»Export Web Server Files**. The following dialog box appears.
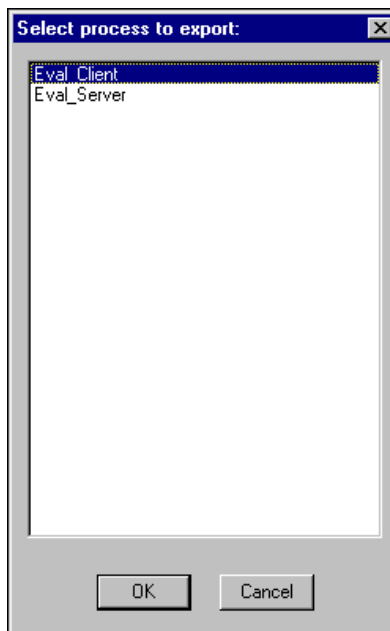
8. Select your `Eval_Client` process for export. Click on **OK**.

You now have an HTML page your can access with a browser. To access the page, complete these steps:

1. Make sure Lookout is running your server process so the web client has a server to access.

2. Open Internet Explorer.

3. Set the security level option in Internet Explorer to Low.

4. Use Internet Explorer to open the web client file.

5. Operate the client process through the web. Notice that your web client controls the server process just as the Lookout client did.

♦ *If you are using the web client, you do not need Lookout software on the computer. Lookout downloads the necessary files.*

Networking

If you have access to a second computer on your network, you can run your new client on that computer and try out Lookout's easy-to-use networking. This exercise shows how a client process developed in a server computer can be distributed across any machine in a network. The client process works with absolutely no development.

1. Install your Lookout evaluation software on the second computer.

2. Copy your client process files from your first computer to the Lookout directory on your second computer. If you did not change the name of your process when saving, you should have the following four files that comprise your client process:

   • `Eval_Client.l4p`

   • `Eval_Client.l4t`

   • `Eval_Client.lks`

   • `Eval_Client.lka`

Note   For more information about Lookout file types, refer to the online help.

3. On your second computer, launch Lookout, select **File»Open**, and open Eval_Client.l4p. The Lookout default is to open a process with the control panels minimized, as shown in the following illustration.
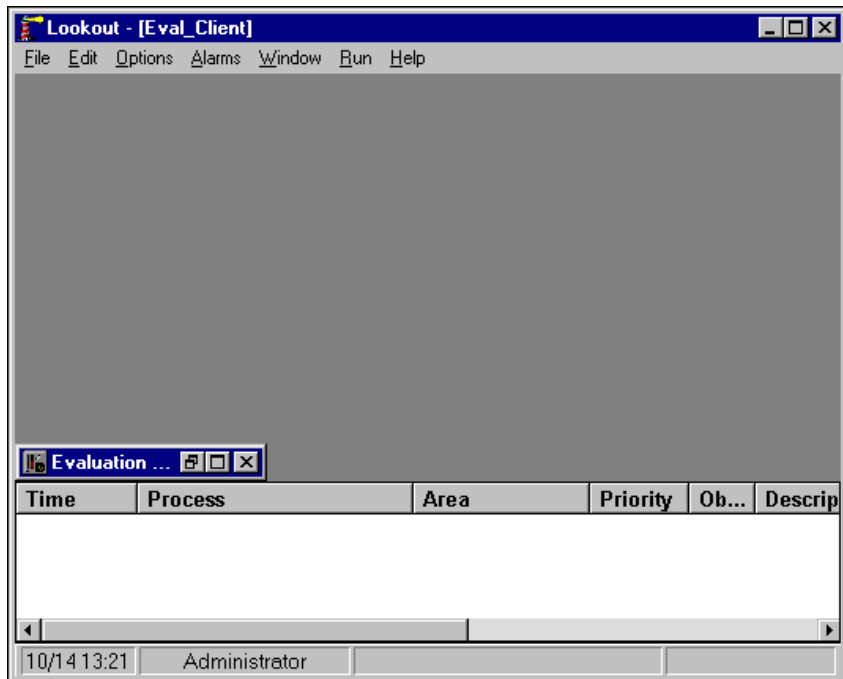
4. Activate the control panel by clicking on the activate ( ) button on the minimized menu bar at the bottom of the Lookout workspace.

You can operate the Pot object slider on your second computer. The Pot controls in your server and original client processes (running on your original computer) should respond.

Register Your Network Computers

While Lookout processes can communicate with each other across the network without any special preparations, you must register all other computers running Lookout if you want to browse across the network for development purposes.

1. Press <Ctrl-Space> to put Lookout in Edit mode. Select **Object» Object Explorer** if the Object Explorer is not already running.

2. Click on the name of your second computer in the window at the top of the Object Explorer, and select **Universe** from the pull down list, as shown in the following illustration.
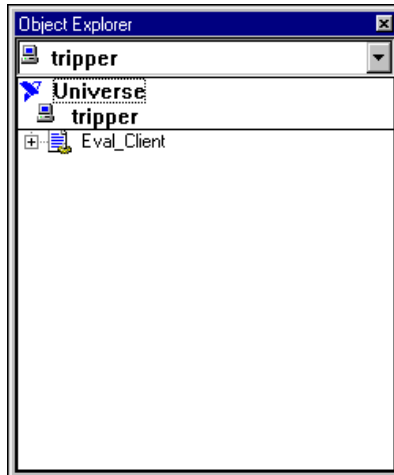
You can now browse every computer registered as running Lookout on your network.

3. Register your original computer (the one running your server process) by right-clicking on **Network** and selecting **Register computer**.

4. In the **Register Network Computer** dialog box that appears, type the name of your original computer into the **Computer name** field, as shown. If you prefer, you can browse for your computer name in the network tree view available in the **Entire Network** field.
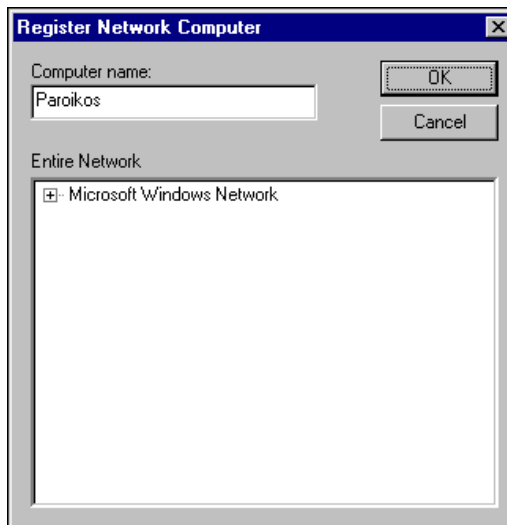
5. Click on **OK**.
6. Expand the Network node of the tree view in the Object Explorer. You should see both your second computer (the computer you are currently working on) and your original computer (the computer running your server process).
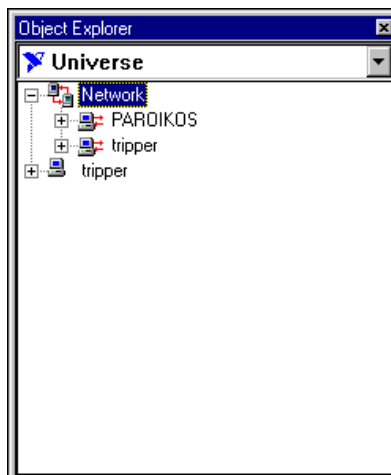
Correct Problems with Data Quality

You may notice that the digital display indicator on your second computer has a red X superimposed on it. This is an example of the Lookout data quality feature, alerting you that your process is receiving data that has some problem. Complete these steps to fix any data quality problems.

1. Delete the display with the data quality alert (red X) over it from your client control panel. Select the display, and press <Delete> on your keyboard.
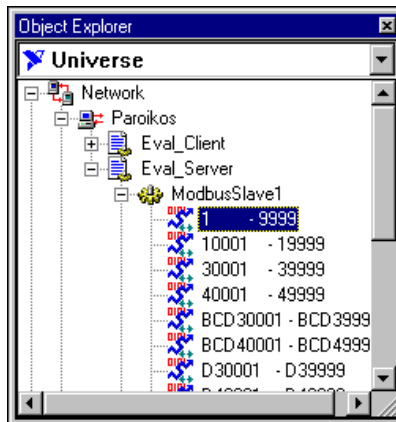
2. Expand the Object Explorer tree view so that you can see the processes running on your original computer as well as the ModbusSlave1 object in the Eval_Server process, as shown in the following illustration.

3. Replace the display you deleted in the previous step. Drag the 1-9999 data member to your client control panel. Notice that the new display object no longer shows the data quality alert (red X).

4. Press <Ctrl-Shift> to exit Edit mode and operate your switch. If you can see your original computer, you should notice that the display works in unison with the displays on the client and server processes running on your server computer.

5. Select **File»Save** to save your changes.

♦ *With Lookout, networking is as easy as using Windows Explorer.*

Synchronize Computer Clocks

You might notice some time lag in operating your Pot control and seeing the change in your HyperTrend chart on your original computer. This can happen when your networked computers do not have their clocks synchronized to show the same time. To provide for accurate data logging, follow these steps to have Lookout synchronize your computers.

1. Select **Options»Time Synchronization** from the Lookout menu bar. The following dialog box appears.
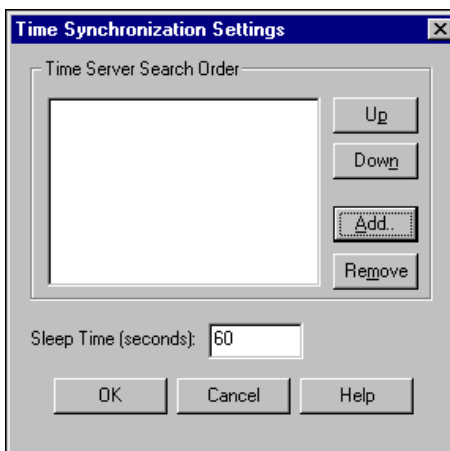
2. Click on **Add**. The following dialog box appears.
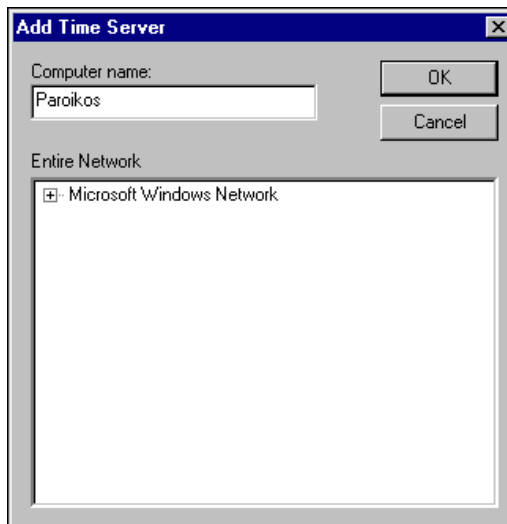
3. Enter the name of your original computer in the **Computer name** field of the **Add Time Server** dialog box. You can also browse for your computer in the **Entire Network** list.

4. Click on **OK**. The **Time Synchronization Settings** dialog box reappears.

5. Set **Sleep time** to 300. With this setting, your computers resynchronize every five minutes.

6. Click on **OK**. Your computers are now synchronized.

7. Select **File»Save** to save your changes.

Show Networked Alarms and Events

If you operate your Pot slider to the top and bottom, you may notice that the alarms you trigger on your original computer do not appear in the **Alarms** window on your second computer. To monitor and acknowledge alarms from a network computer, you must select the processes you want to monitor.

1. Set your second computer to monitor alarms on your original computer. On your second computer, select **Alarms»Select Processes** from the Lookout menu. The following dialog box appears.
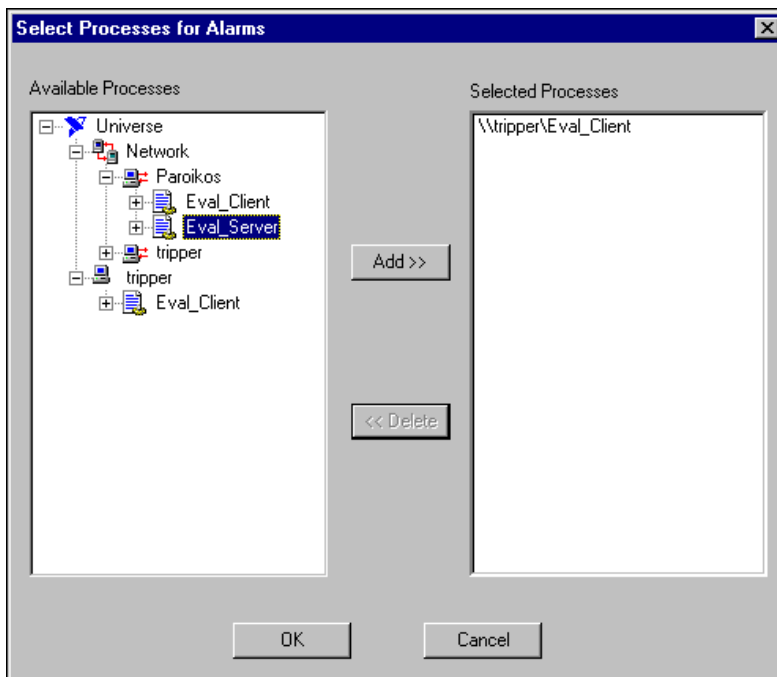
2. Expand the tree view to show the processes running on your original computer. Select the `Eval_Server` process, and click on the **Add** button. Click on **OK**.

    You second computer can now monitor alarms from your original computer.

3. Select **File»Save** to save your changes.

♦   *Connecting to alarms across a network is done in one easy step.*

View and Acknowledge Alarms

1. Operate your Pot slider, leaving it in one extreme or another so that you have one active alarm (in red) along with no longer active alarms (in blue) in the **Alarms** window.

2. To acknowledge alarms, right-click on an alarm in the **Alarms** window. Select **Acknowledge All**, as shown in the following illustration.

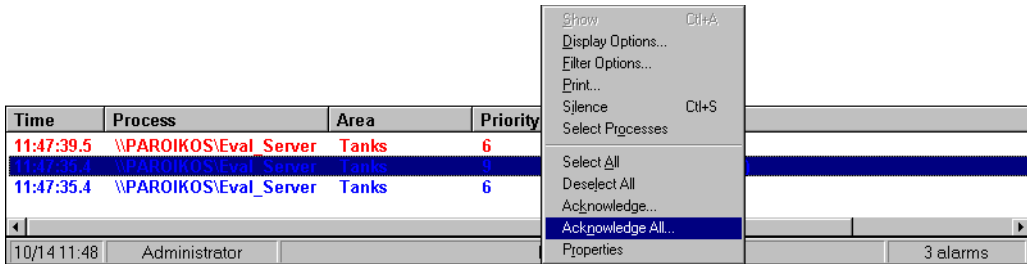| Time	Process	Area	Priority	Show	Ctl+A
				Display Options...	
				Filter Options...	
				Print...	
11:47:39.5	**\\PAROIKOS\Eval_Server**	**Tanks**	**6**	Silence	Ctl+S
11:47:35.4	\\PAROIKOS\Eval_Server	Tanks	9	Select Processes	
11:47:35.4	**\\PAROIKOS\Eval_Server**	**Tanks**	**6**	Select All	
				Deselect All	
				Acknowledge...	
				Acknowledge All...	
10/14 11:48	Administrator			Properties	3 alarms

3. The **Acknowledge** dialog box appears. You can enter comments in this dialog box concerning the alarm acknowledgement.

Acknowledge

Comment

Alarm acknowledgement demonstration

[OK]   [Cancel]
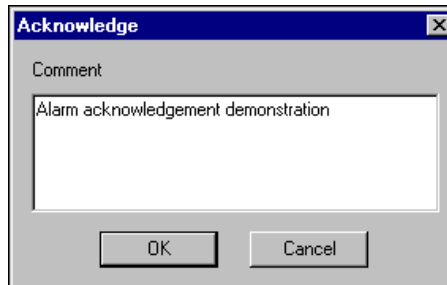
4. Enter `Alarm acknowledgement demonstration` as the comment. Click on **OK**.

The alarms in blue are cleared from the alarm window, but the active alarm, formerly in red, turns black, except for the alarm area.

5. Double-click on the active but acknowledged alarm. The **Alarm Properties** dialog box appears, as shown in the following illustration.

Alarm Properties	✕
Event Or Alarm:	Alarm
User at activation:	Administrator
Activated:	1999-10-14 11:52:36
De-Activated:	still active
Acknowledged:	1999-10-14 11:52:50
Ack User:	Administrator
Priority:	6
Process:	\\PAROIKOS\Eval_Server
Object Name:	\\paroikos.dy.natinst.com\Eval_Server\ModbusSlave1
Area:	Tanks
Ack Comment:	Alarm acknowledgement demonstration
Description:	Lo (TankLevel)

[←- Previous]   [Next -->]   [Done]
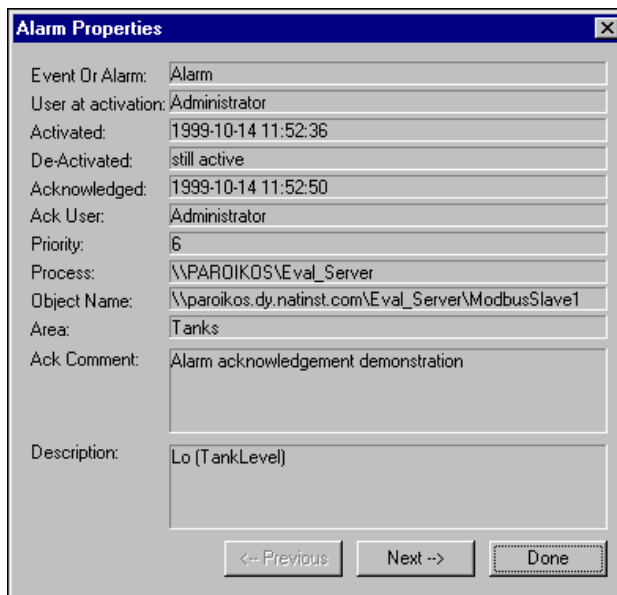
You can check for details on any unacknowledged or active alarms.

6. Click on **Done**.

4

Where to Go from Here

This chapter introduces you to the demonstration processes and additional features included with your Lookout software, and describes how to uninstall your Lookout evaluation software. It also includes information to help you contact National Instruments to learn more about Lookout and other National Instruments products.

Explore Lookout Demonstration Processes

Your Lookout evaluation software includes a directory of demonstration processes, located in the `Examples` folder. These processes demonstrate many useful Lookout features and functionality that are not covered in the evaluation exercises.

When you first open your evaluation copy of Lookout, a home process you can use to run the other demonstration processes runs automatically. If you disabled the autoload selection for this process, you can run it yourself by opening the `Examples` folder in your Lookout directory and opening the `home.l4p` process.

To keep Lookout from opening this process every time you launch the program, select **Options»Startup** from the menu and remove the `home.l4p` process.

After you have operated a process for a while, enter Edit mode by pressing <Ctrl-Space>. Select **Objects»Connection Browser** and use the Connection Browser along with the Object Explorer to examine demonstration processes and see how they work.

More on Lookout

There are many more features in Lookout than are addressed in this guide. Some of the other major capabilities of Lookout are the SPC, SQL, batch management, sequential process management, and redundancy. Other features such as complex expressions, data tables, animated graphics, advanced security across networks, and connectivity with other National Instruments software makes Lookout very powerful. These, along with a

host of other capabilities that are beyond the scope of this guide, make Lookout one of the most powerful software packages available on the market.

Uninstalling Your Lookout Evaluation Software

To uninstall your evaluation copy of Lookout, select **Start»Programs» National Instruments Lookout»Uninstall Lookout Evaluation**, and follow the onscreen directions. When the uninstallation process is complete, you might receive a message that some components could not be uninstalled. These files will be located in your Lookout directory, and include database files for data you logged during the demonstrations, and any process files you created. You can delete these files manually if you choose.

Where To Learn More About Lookout and National Instruments Industrial Automation Solutions

For more information about Lookout and other National Instruments industrial automation products, visit the National Instruments web site at `http://www.ni.com/automation`. You can also e-mail your questions to `info@ni.com`.

Your local National Instruments representative can supply information tailored to your needs. If you are not already in contact with a representative for your area, call National Instruments at 512 794 0100 to have your questions answered.

Thank you for your interest in Lookout.

A

Technical Support Resources

This appendix describes the comprehensive resources available to you in the Technical Support section of the National Instruments Web site and provides technical support telephone numbers for you to use if you have trouble connecting to our Web site or if you do not have internet access.

NI Web Support

To provide you with immediate answers and solutions 24 hours a day, 365 days a year, National Instruments maintains extensive online technical support resources. They are available to you at no cost, are updated daily, and can be found in the Technical Support section of our Web site at `www.ni.com/support`

Online Problem-Solving and Diagnostic Resources

- **KnowledgeBase**—A searchable database containing thousands of frequently asked questions (FAQs) and their corresponding answers or solutions, including special sections devoted to our newest products. The database is updated daily in response to new customer experiences and feedback.

- **Troubleshooting Wizards**—Step-by-step guides lead you through common problems and answer questions about our entire product line. Wizards include screen shots that illustrate the steps being described and provide detailed information ranging from simple getting started instructions to advanced topics.

- **Product Manuals**—A comprehensive, searchable library of the latest editions of National Instruments hardware and software product manuals.

- **Hardware Reference Database**—A searchable database containing brief hardware descriptions, mechanical drawings, and helpful images of jumper settings and connector pinouts.

- **Application Notes**—A library with more than 100 short papers addressing specific topics such as creating and calling DLLs, developing your own instrument driver software, and porting applications between platforms and operating systems.

Software-Related Resources

- **Instrument Driver Network**—A library with hundreds of instrument drivers for control of standalone instruments via GPIB, VXI, or serial interfaces. You also can submit a request for a particular instrument driver if it does not already appear in the library.

- **Example Programs Database**—A database with numerous, non-shipping example programs for National Instruments programming environments. You can use them to complement the example programs that are already included with National Instruments products.

- **Software Library**—A library with updates and patches to application software, links to the latest versions of driver software for National Instruments hardware products, and utility routines.

Worldwide Support

National Instruments has offices located around the globe. Many branch offices maintain a Web site to provide information on local services. You can access these Web sites from `www.ni.com/worldwide`

If you have trouble connecting to our Web site, please contact your local National Instruments office or the source from which you purchased your National Instruments product(s) to obtain support.

For telephone support in the United States, dial 512 795 8248. For telephone support outside the United States, contact your local branch office:

Australia 03 9879 5166, Austria 0662 45 79 90 0, Belgium 02 757 00 20, Brazil 011 284 5011, Canada (Calgary) 403 274 9391, Canada (Ontario) 905 785 0085, Canada (Québec) 514 694 8521, China 0755 3904939, Denmark 45 76 26 00, Finland 09 725 725 11, France 01 48 14 24 24, Germany 089 741 31 30, Greece 30 1 42 96 427, Hong Kong 2645 3186, India 91805275406, Israel 03 6120092, Italy 02 413091, Japan 03 5472 2970, Korea 02 596 7456, Mexico (D.F.) 5 280 7625, Mexico (Monterrey) 8 357 7695, Netherlands 0348 433466, New Zealand 09 914 0488, Norway 32 27 73 00, Poland 0 22 528 94 06, Portugal 351 1 726 9011, Singapore 2265886, Spain 91 640 0085, Sweden 08 587 895 00, Switzerland 056 200 51 51, Taiwan 02 2528 7227, United Kingdom 01635 523545