

HP LoadRunner

for the Windows operating systems

Software Version: 9.10

Online Monitor Reference

Manufacturing Part Number: T7182-90010

Document Release Date: January 2008

Software Release Date: January 2008



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Table of Contents

Welcome to This Guide

Welcome to the *HP LoadRunner Monitor Reference*. This guide describes how to set up the server monitor environment and configure LoadRunner monitors for monitoring data generated during a scenario.

LoadRunner is HP's tool for application performance testing. LoadRunner stresses your entire application to isolate and identify potential client, network, and server bottlenecks.

LoadRunner enables you to test your system under controlled and peak load conditions. To generate load, LoadRunner runs thousands of Virtual Users, or **Vusers**, that are distributed over a network. The Vusers can run on UNIX and Windows-based platforms. Using a minimum of hardware resources, these Vusers provide consistent, repeatable, and measurable load to exercise your application just as real users would. LoadRunner's in-depth reports and graphs provide the information that you need to evaluate the performance of your application.

This chapter includes:

- ▶ How This Guide Is Organized on page 16
- ▶ Who Should Read This Guide on page 18
- ▶ LoadRunner Online Documentation on page 18
- ▶ Additional Online Resources on page 19
- ▶ Typographical Conventions on page 21

How This Guide Is Organized

This guide contains the following parts:

Part I Introduction to Online Monitoring

Introduces you to monitoring scenario execution using the LoadRunner online monitors.

Part II Web Resource Monitoring

Describes the Web resource monitoring.

Part III Transaction Monitoring

Describes run-time and transaction monitoring.

Part IV System Resource Monitoring

Describes system resource monitoring, including the following resource monitors: Windows, UNIX, Server, SNMP, Antara FlameThrower, and SiteScope.

Part V Network Delay Monitoring

Describes how to use network monitoring to determine whether your network is causing a delay in the scenario.

Part VI Firewall Monitoring

Describes how to use the Firewall server online monitor to measure the performance of a Firewall server during scenario execution.

Part VII Web Server Resource Monitoring

Describes Web server resource monitoring, including the following monitors: Apache, iPlanet/Netscape, iPlanet (SNMP), Microsoft IIS.

Part VIII Web Application Server Monitoring

Describes Web application server monitoring, including the following monitors: Ariba, ATG Dynamo, BroadVision, ColdFusion, Fujitsu INTERSTAGE, iPlanet (NAS), Microsoft ASP, Oracle9iAS HTTP, SilverStream, WebLogic (SNMP), WebLogic (JMX), and WebSphere Application Server.

Part IX Database Server Resource Monitoring

Describes database server resource monitoring: DB2, Oracle, SQL server, and Sybase.

Part X Streaming Media Monitoring

Describes streaming media monitoring, including the following monitors: Windows Media Server, RealPlayer audio and video servers, and RealPlayer and Media Clients.

Part XI ERP/CRM Server Resource Monitoring

Describes ERP/CRM server resource monitoring, including the following monitors: SAP Portal, SAP CCMS, SAPGUI, Siebel Server Manager, Siebel Web Server, and PeopleSoft (Tuxedo) server.

Part XII Application Component Monitoring

Describes application component monitoring, using the Microsoft COM+ monitor.

Part XIII Application Deployment Monitoring

Describes application deployment monitoring, using the Citrix MetaFrame server monitor.

Part XIV Middleware Performance Monitoring

Describes middleware performance monitoring, including the following monitors: Tuxedo, and IBM WebSphere MQ server.

Part XV Infrastructure Resource Monitoring

Describes infrastructure resource monitoring, using the Network Client monitor.

Part XVI Appendixes

Contains additional information about using LoadRunner online monitors.

Note: For information about J2EE and .NET Diagnostics monitors, see the *HP Diagnostics Software User's Guide*.

Who Should Read This Guide

This guide is for the following users of LoadRunner:

- Performance Engineers
- Project Manager

This document assumes that you are moderately knowledgeable about enterprise application development and highly skilled in enterprise system and database administration.

LoadRunner Online Documentation

LoadRunner includes the following online documentation:

- **Readme.** Provides last-minute news and information about LoadRunner. You access the Readme from the **Start** menu.
- **Books Online/Printer-Friendly Documentation.** Includes PDF versions of the guides. Select **Help > Books Online**.
- **Online Help.** Available from specific LoadRunner windows by clicking in the window and pressing **F1** or clicking the **Help** button.

- ▶ **LoadRunner Online Help** includes:
 - ▶ **Error Codes Troubleshooting.** Provides clear explanations and troubleshooting tips for Controller connectivity and Web protocol errors. It also provides general troubleshooting tips for Winsock, SAPGUI, and Citrix protocols.
 - ▶ **LoadRunner Agent Configuration Tool Online Help.** Provides help on the Agent Configuration Tool, accessed by clicking the **Help** button in the Agent Configuration dialog box (**Start > LoadRunner > Advanced Settings > Agent Configuration**).
 - ▶ **LoadRunner Controller Automation COM and Monitor Automation Reference.** An interface with which you can write programs to run the LoadRunner Controller and perform most of the actions available in the Controller user interface. You access the reference from the LoadRunner online documentation.
- ▶ **LoadRunner Function Reference.** Gives you online access to all of LoadRunner's functions that you can use when creating Vuser scripts, including examples of how to use the functions. Check HP's Customer Support Web site for updates to the *HP LoadRunner Online Function Reference*.

Additional Online Resources

HP Software Self-solve knowledge base. This link enables you to browse the HP Software Self-solve knowledge base and add your own articles. The URL for this Web site is <http://h20230.www2.hp.com/selfsolve/documents>.

HP Software Support Web site. This site enables you to access the HP Software Self-solve knowledge base, post to and search user discussion forums, submit support requests, download patches and updated documentation, and more. The URL for this Web site is <http://www.hp.com/go/hpssoftwaresupport>. You can also access this Web site from the **Help** menu.

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Typographical Conventions

This guide uses the following typographical conventions:

UI Elements and Function Names	This style indicates the names of interface elements on which you perform actions, file names or paths, and other items that require emphasis. For example, “Click the Save button.” It also indicates method or function names. For example, “The wait_window statement has the following parameters:”
<i>Arguments</i>	This style indicates method, property, or function arguments and book titles. For example, “Refer to the <i>HP User’s Guide</i> .”
<Replace Value>	Angle brackets enclose a part of a file path or URL address that should be replaced with an actual value. For example, <MyProduct installation folder>\bin.
Example	This style is used for examples and text that is to be typed literally. For example, “Type Hello in the edit box.”
CTRL+C	This style indicates keyboard keys. For example, “Press ENTER.”
[]	Square brackets enclose optional arguments.
{ }	Curly brackets indicate that one of the enclosed values must be assigned to the current argument.
...	In a line of syntax, an ellipsis indicates that more items of the same format may be included. In a programming example, an ellipsis is used to indicate lines of a program that were intentionally omitted.
	A vertical bar indicates that one of the options separated by the bar should be selected.

Welcome to This Guide

Part I

Introduction to Online Monitoring

1

Introduction

You can monitor a scenario execution using the LoadRunner online monitors.

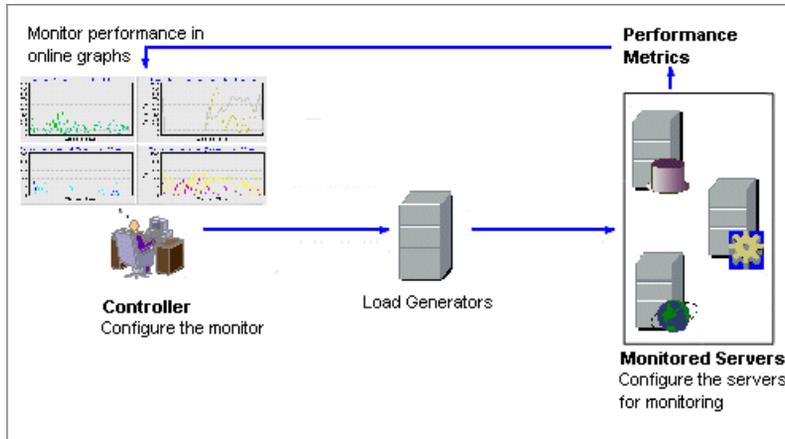
This chapter includes:

- ▶ Setting Up the Monitoring Environment on page 26
- ▶ Choosing Monitors and Measurements on the Controller on page 36
- ▶ Monitor Types on page 37

Note: For information on setting monitor options, configuring graph settings and measurements, and exporting graph data, refer to the *HP LoadRunner Controller User's Guide*.

Setting Up the Monitoring Environment

Before monitoring a scenario, you need to set up and configure the LoadRunner monitoring components. Each monitor has different configuration requirements that are explained in the specific monitoring chapters. The diagram below illustrates the LoadRunner monitoring process.



Before monitoring a server, perform the following steps:

- ▶ Configure the monitoring environment on the server machine (if necessary)
- ▶ Configure the monitor on the Controller machine

Configuring the Monitoring Environment on the Server Machine

To use the following monitors, you must first install or configure monitoring components on the server machine:

- COM+
- Citrix
- DB2
- IBM WebSphere MQ
- iPlanet (NAS)
- J2EE & .NET Diagnostics
- Network Delay
- Oracle
- PeopleSoft (Tuxedo)
- SAPGUI
- SAP Portal
- SAP CCMS
- Siebel Server Manager
- Siebel Web Server
- SiteScope
- Sybase
- Tuxedo
- UNIX
- WebLogic (JMX)
- WebSphere (EPM)
- WebSphere
- WebSphere Application Server

Configuring LoadRunner Monitors on the Controller

To obtain performance data for a monitor, you need to configure the monitor from the Controller, and indicate which statistics and measurements you want to monitor. You select these counters using the monitor's Add Measurements dialog box.

To set up a monitor, you need to perform the following:

- Add a monitored server to the Controller by selecting the server whose monitors you want to configure.
- For SiteScope monitors, configure the remote server.
- Configure the monitor by selecting the measurements that you want to monitor.

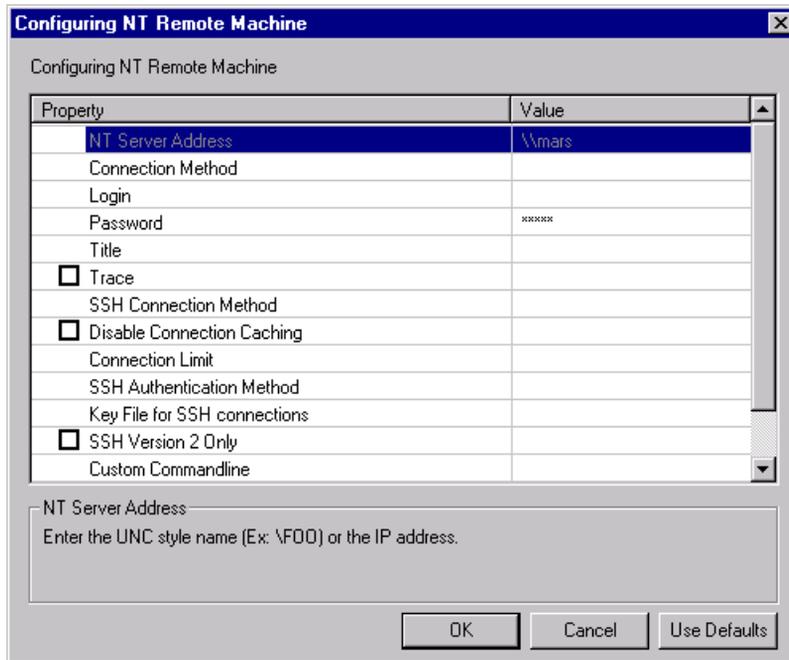
For more information on setting up the monitoring environment and configuring a monitor, see the specific monitoring chapter.

Configuring the Remote Machine for SiteScope Monitors

You configure the remote machine according to your machine's platform: Windows NT or Unix.

Configuring the NT Remote Machine

For machine on a NT platform, when you add measurements to monitor for the first time, the Configuring NT Remote Machine dialog box opens.



Select settings for the remote machine as described in “Understanding the Configuring NT Remote Machine Dialog Box” on page 29.

Configuring the UNIX Remote Machine

For machine on a UNIX platform, when you add measurements to monitor for the first time, the Configuring Unix Remote Machine dialog box opens.

Property	Value
Server Address	missouri
OS	
Connection Method	
Login	
Password	*****
Title	
Prompt	#
Login Prompt	
Password Prompt	
Secondary Prompt	
Secondary Response	
Initialize Shell Environment	
<input checked="" type="checkbox"/> Trace	

OS
Enter the OS on the remote server

OK Cancel Use Defaults

Select settings for the remote machine as described in “Understanding the Configuring Unix Remote Machine Dialog Box” on page 32.

Understanding the Configuring NT Remote Machine Dialog Box

You configure the remote NT machine from the Configuring NT Remote Machine dialog box.

- **NT Server Address.** The IP address or UNC style name of the NT server you wish to monitor. An IP hostname will also work provided that the SiteScope server has a way to resolve this common name into an IP address (for example, by the use of a hosts file, DNS, or WINS/DNS integration).

- **Connection Method.** SiteScope can use one of two connection types for monitoring remote NT server resources. These are:
 - **NetBIOS.** The default server-to-server communication protocol for Windows NT and 2000 networks.
 - **SSH.** Secure Shell, a more secure communication protocol that can be installed on Windows NT/2000 based networks. This connection method normally requires installing SSH libraries on each server to which you want to connect.
- **Login.** The login for the remote server. If the server is within the same domain as the SiteScope machine, include the domain name in front of the user login name. For example: domainnameuser. If you are using a local machine login account for machines within or outside the domain, include the machine name in front of the user login name. For example: machinenameuser.
- **Password.** The password for the remote server or the passphrase for the SSH key file.

Note: When using SSH authentication with public/private key based authentication enter the passphrase for the identity file here.

- **Title.** (Optional) A name by which the remote machine should be known. This name will appear in the drop-down list.
- **Trace.** Check this box to have trace messages to and from the subject server recorded to the SiteScope RunMonitor.log file.
- **SSH Connection Method.** The method to use for this connection. The currently supported methods are:
 - **Internal Java Libraries.** Connect using the Java SSH client integrated with SiteScope.
 - **Plink.** Connect using an external SSH client. On NT, SiteScope ships with Plink. On UNIX or Linux SiteScope will use an installed client such as OpenSSH.

- **Disable Connection Caching.** Check this option to turn off connection caching for this remote. By default SiteScope caches open connections.
- **Connection Limit.** Controls the number of open connections that SiteScope will allow for this remote. If you have a large number of monitors configured to use this connection then set this number high enough to relieve the potential bottleneck.

Note: This setting does not effect the running of tests for a remote, tests will always create a new connection.

- **SSH Authentication Method.** The authentication method to use for SSH connections. The currently supported methods are:
 - **Password.** Authenticate using a password.
 - **Key File.** Authenticate using public/private key authentication. When this option is selected SiteScope uses the private key in the file **SiteScope/groups/identity** to authenticate. The corresponding public key must be listed in the **authorized_keys** file on the remote host.
- **Key File for SSH connections.** Select the file that contains the private key for this connection. The default key file is **SiteScope\groups\identity**. This setting only applies when the authentication method is **Key File** .
- **SSH Version 2 Only.** Check this option to force SiteScope to use SSH protocol version 2 only. This option only applies when using the integrated Java Client in SiteScope.
- **Custom Commandline.** Enter a custom commandline for a remote using the External Client. This option can be used when needing to pass specific options to the external client being executed. Valid substitution variable are:
 - **\$root\$.** This will be translated to the SiteScope directory.
 - **\$user\$.** This will be translated to the username entered into the remote.
 - **\$password\$.** This will be translated to the password entered into the remote.
 - **\$host\$.** This will be translated to the hostname entered into the remote.

- **SSH Port Number.** Enter the port that the remote SSH server is listening on. By default, the port number is 22.

Understanding the Configuring Unix Remote Machine Dialog Box

You configure the Unix remote machine from the Configuring Unix Remote Machine dialog box.

- **Server Address.** Displays the IP address or host name of the server that you entered in the Add Machine dialog box.
- **OS.** Select the operating system running on the remote server. The following versions of UNIX are supported:

AIX	OPENSERVR
FreeBSD	SCO
HP/UX	SGI Irix
HP/UX 64-bit	Sun Solaris
Linux	Tru64 5.x
MacOSX	Tru64 Pre 4.x (Digital)

- **Connection Method.** Select the method for connecting to the server. The supported methods are:
 - **Telnet.** Log in to the remote server using Telnet.
 - **SSH.** Log in to the remote server using the SSH protocol. This may require additional software and setup depending on the version of UNIX you are working with.
 - **Rlogin.** Log in to the remote server using the Rlogin protocol.
 - **HTTP.** Connect to an HTTP server on the remote server and run the command via a CGI. For this method, the Login and Password are optional and are used for authorizing the log on to the remote machine if required.
- **Login.** The login for the remote server.
- **Password.** Enter the password for the remote server.

- **Title.** Enter a name by which the remote machine should be known. This name will appear in the drop-down list in monitors that can connect to this server.
- **Prompt.** Enter the prompt to be displayed when the system is ready to handle a command - the default is #.
- **Login Prompt.** Enter the prompt to be displayed when the system is waiting for the login to be entered - the default is "login:"
- **Password Prompt.** Enter the prompt to be displayed when the system is waiting for the password to be entered - the default is "password:"
- **Secondary Prompt.** Enter the prompt to be displayed if the telnet connection to the remote server causes the remote server to prompt for more information about the connection. Separate multiple prompt strings by commas (.). For example, for Telnet connections to some remote servers, the remote server may ask what terminal type should be emulated for the connection. In this case you might need to enter Terminal type? as the secondary prompt. The response to the secondary prompt is entered in the Secondary Response field below.
- **Secondary Response.** Enter the responses to secondary prompts required to establish connections with this remote server. Separate multiple responses with commas (.).
- **Initialize Shell Environment.** Enter any shell commands to be executed at the beginning of the session. Separate multiple commands with a semicolon (;). This option allows you to specify shell commands to be executed on the remote machine directly after a Telnet or SSH session has been initiated. These commands can be used to customize the shell for each SiteScope remote.

Examples:

- ▶ The remote shell may not have the correct path set for SiteScope scripts to run. The following command will add the directory **/usr/local/bin** into the PATH of the current shell on the remote machine:

```
export PATH=$PATH:/usr/local/sbin
```

- ▶ The remote shell may not be initializing the pseudo terminal correctly. Enter the following command to increase the terminal width to 1024 characters:

```
stty cols 1024;${SHELL}
```

Note: Commands after a shell invocation will not be executed.

- ▶ There have been cases where the remote Telnet Server does not echo back the command line properly. This may cause strange behavior for monitors that rely on this behavior.

Enter the following command to force the remote terminal to echo:

```
stty echo
```

- ▶ Certain UNIX shells have been known to behave erratically with SiteScope. This includes **bash**, **ksh**, and **csh**. Enter the following command to change the shell to **sh** for the SiteScope connection:

```
/bin/sh
```

- ▶ **Trace.** Select this option to trace messages to and from the remote server in the **RunMonitor.log** file.
- ▶ **SSH Connection Method.** Select the method to use to connect to the remote server.
 - ▶ **Internal Java Libraries.** Connect using the Java SSH client integrated with SiteScope
 - ▶ **Plink.** Connect using an external SSH client. On Windows NT, SiteScope ships with Plink.
- ▶ **Disable Connection Caching.** Select this to disable SSH connection caching.

- **Connection Limit.** Enter the maximum number of connections for this remote machine.
- **SSH Authentication Method.** Select the method to use to authenticate to the remote server (for SSH connections only).
 - **Password.** Authenticate using a password.
 - **Keyfile.** Authenticate using public/private key authentication. When this option is selected, SiteScope uses the private key in the file **SiteScope/groups/identity** to authenticate. The corresponding public key must be listed in the **authorized_keys** file on the remote host.
- **Connection Limit.** Enter the maximum number of connections for this remote machine.
- **SSH Version 2 Only.** Select this option to force SSH to only use SSH protocol version 2. This option is only supported when using the internal Java libraries connection method.
- **Custom Commandline.** Enter the command for execution of the external SSH client. For substitutions with options listed above, use \$host\$, \$user\$, and \$password\$ respectively. This setting is supported only for connections using an external process.
- **SSH Port Number.** Enter the port on which the SSH service is running.

After defining the server for SiteScope, you can test the settings by clicking on the test link. SiteScope attempts to display the working directory of the remote machine (the "pwd" command on UNIX, or "cd" on Windows NT), as a test to ensure that the remote machine can be accessed and can run commands properly.

Choosing Monitors and Measurements on the Controller

You specify the machines and measurements that the Controller will monitor during a scenario execution via the Controller's Run tab. During scenario execution, the collected measurement data will appear in the online graphs.

To select measurements to monitor:

- 1** Click the graph in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The monitored server machine dialog box opens.
- 3** Some monitors are native LoadRunner monitors (by default), but you can also monitor through the SiteScope monitor engine.

If you want to monitor a server through the SiteScope monitor engine, click **Advanced**.

In the Choose Monitor Engine dialog box, choose **SiteScope**, and click **OK**.

For more information, see the relevant monitoring section.

- 4** In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.
 - Enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs, and click **OK**.
 - For SiteScope monitors enter the name and port number of the SiteScope server, and specify whether you are using a Secure HTTP connection. To use an account, fill in the relevant account information. For more information, see "Understanding the Add Machine Dialog Box" on page 37.
- 5** In the **Resource Measurements** section of the monitor dialog box, click **Add**. The Monitor Configuration dialog box opens. Choose the measurements for the specific server, and click **OK** to save your configuration.

Understanding the Add Machine Dialog Box

Adds the machine that you want to monitor to the Monitored Server Machines list.

- **Monitored Machine Information**
 - **Name.** Enter the name or IP address of the machine that you want to monitor.
 - **Platform.** Enter the platform of the machine you want to monitor.
- **SiteScope Server Information.** For monitors that use SiteScope, enter the following SiteScope server information:
 - **Name.** Enter the name of the SiteScope server.
 - **Port.:** Enter the SiteScope port (default:8888).
 - **Use Secure HTTP.** Select this to use a Secure HTTP connection.
 - **Use Account.** Select this option to use a specific SiteScope user account. Enter the following account details:
 - **Account.** The SiteScope account name or number
 - **Username.** The username defined to log in to the SiteScope account
 - **Password.** The password defined to log in to the SiteScope account

Monitor Types

The online monitors are divided into the following categories:

- **Web Resource Monitors.** Provide information about the number of Web connections, throughput volume, HTTP responses, server retries, and downloaded pages at the Web servers during the scenario. For more information, see Part II, “Web Resource Monitoring.”
- **Transaction and Run-Time Monitors.** Display the transaction rate and response times, and the number and status of Vusers participating in the scenario, as well as the number and types of errors that the Vusers generate. For more information, see Part III, “Transaction Monitoring.”

- ▶ **System Resource Monitors.** Measure the Windows, UNIX, Server, SNMP, Antara FlameThrower, and SiteScope resources used during a scenario. For more information, see Part IV, “System Resource Monitoring.”
- ▶ **Network Delay Monitor.** Displays information about the network delays on your system. For more information, see Part V, “Network Delay Monitoring.”
- ▶ **Firewall Monitor.** Measures statistics related to the firewall servers during the scenario. For more information, see Part VI, “Firewall Monitoring.”
- ▶ **Web Server Resource Monitors.** Measure statistics related to the Apache, Microsoft IIS, iPlanet (SNMP) and iPlanet/Netscape Web servers during the scenario. For more information, see Part VII, “Web Server Resource Monitoring.”
- ▶ **Web Application Server Resource Monitors.** Measure statistics related to the Ariba, ATG Dynamo, BroadVision, ColdFusion, Fujitsu INTERSTAGE, iPlanet (NAS), Microsoft ASP, Oracle9iAS HTTP, SilverStream, WebLogic (SNMP), WebLogic (JMX), and WebSphere application servers during the scenario. For more information, see Part VIII, “Web Application Server Monitoring.”
- ▶ **Database Server Resource Monitors.** Measure statistics related to the SQL server, Oracle, Sybase, and DB2 databases during the scenario. For more information, see Part IX, “Database Server Resource Monitoring.”
- ▶ **Streaming Media Monitors.** Measure statistics related to the Windows Media Server and RealPlayer audio/video servers, as well as the RealPlayer client during the scenario. For more information, see Part X, “Streaming Media Monitoring.”
- ▶ **ERP/CRM Server Resource Monitors.** Measure statistics related to the SAP Portal, SAP CCMS, SAPGUI, Siebel Server Manager, Siebel Web Server, and PeopleSoft (Tuxedo) servers during the scenario. For more information, see Part XI, “ERP/CRM Server Resource Monitoring.”
- ▶ **J2EE & .NET Diagnostics Monitors.** Provide information to trace, time, and troubleshoot individual transactions through J2EE Web, application, and database servers. For more information, see the *HP Diagnostics Software User's Guide*.
- ▶ **Application Component Monitor.** Measures statistics related to the Microsoft COM+ server during a scenario run. For more information, see Part XII, “Application Component Monitoring.”

- ▶ **Application Deployment Solutions Monitor.** Measures statistics related to the Citrix MetaFrame XP and 1.8 servers during a scenario run. For more information, see Part XIII, “Application Deployment Monitoring.”
- ▶ **Middleware Performance Monitors.** Measure statistics related to the Tuxedo and IBM WebSphere MQ servers during a scenario run. For more information, see Part XIV, “Middleware Performance Monitoring.”
- ▶ **Infrastructure Resources Monitor.** Displays information about network client data points during a scenario using the Network Client graph. For more information, see Part XV, “Infrastructure Resource Monitoring.”
- ▶ **Security Monitor.** Displays information about simulated attacks on the server during a scenario using the Distributed Denial of Service graph. For more information, see Part XVI, “Appendixes.”

All of the monitors allow you to view a summary of the collected data at the conclusion of the scenario. Using LoadRunner Analysis, you can generate a graph for any of the monitors. For more information, see the *HP LoadRunner Analysis User's Guide*.

Part II

Web Resource Monitoring

2

Web Resource Monitors

You obtain information about the performance of your Web server using LoadRunner's Web Resource monitor.

This chapter includes:

- ▶ About Web Resource Monitoring on page 44
- ▶ Hits per Second Graph on page 44
- ▶ Throughput Graph on page 44
- ▶ HTTP Responses per Second Graph on page 45
- ▶ Pages Downloaded per Second Graph on page 47
- ▶ Retries per Second Graph on page 49
- ▶ Connections Graph on page 49
- ▶ Connections per Second Graph on page 49
- ▶ SSLs per Second Graph on page 50

About Web Resource Monitoring

The Web Resource monitor enables you to analyze the throughput on the Web server, the number of hits per second that occurred during the scenario, the number of HTTP responses per second, the HTTP status codes (which indicate the status of HTTP requests, for example, **the request was successful, the page was not found**) returned from the Web server, the number of downloaded pages per second, the number of server retries per second, the number of open TCP/IP connections, the number of new TCP/IP connections per second, and the number of SSL Connections per second.

Hits per Second Graph

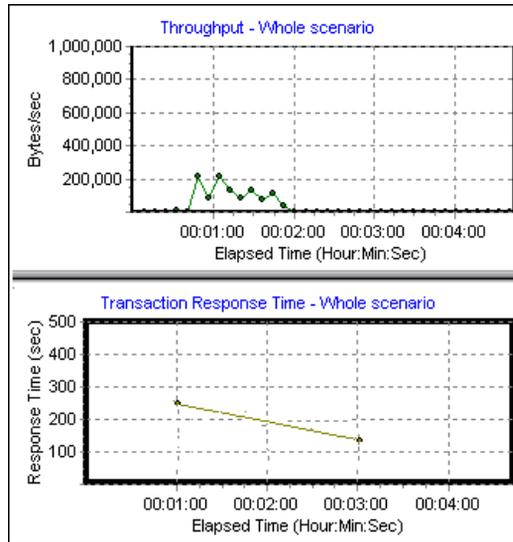
The **Hits Per Second** graph shows the number of hits (HTTP requests) to the Web server (y-axis) as a function of the elapsed time in the scenario (x-axis). This graph can display the whole step, or the last 60, 180, 600, or 3600 seconds. You can compare this graph to the Transaction Response Time graph to see how the number of hits affects transaction performance.

Throughput Graph

The **Throughput** graph shows the amount of throughput on the Web server (y-axis) during each second of the scenario run (x-axis). Throughput is measured in bytes and represents the amount of data that the Users received from the server at any given second. You can compare this graph to the Transaction Response Time graph to see how the throughput affects transaction performance.

In the following example, the Transaction Response time graph is compared with the Throughput graph. It is apparent from the graph that as the throughput decreases, the transaction response time also decreases. The peak throughput occurred at approximately 1 minute into the step. The highest response time also occurred at this time.

Example:



HTTP Responses per Second Graph

The **HTTP Responses per Second** graph shows the number of HTTP status codes (y-axis)—which indicate the status of HTTP requests, for example, “the request was successful” or “the page was not found”—returned from the Web server during each second of the scenario run (x-axis), grouped by status code. You can group the results shown in this graph by script (using the "Group By" function) to locate scripts which generated error codes.

The following table displays a list of HTTP status codes:

Code	Description
200	OK
201	Created
202	Accepted
203	Non-Authoritative Information
204	No Content

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Code	Description
205	Reset Content
206	Partial Content
300	Multiple Choices
301	Moved Permanently
302	Found
303	See Other
304	Not Modified
305	Use Proxy
307	Temporary Redirect
400	Bad Request
401	Unauthorized
402	Payment Required
403	Forbidden
404	Not Found
405	Method Not Allowed
406	Not Acceptable
407	Proxy Authentication Required
408	Request Timeout
409	Conflict
410	Gone
411	Length Required
412	Precondition Failed
413	Request Entity Too Large
414	Request - URI Too Large
415	Unsupported Media Type

Code	Description
416	Requested range not satisfiable
417	Expectation Failed
500	Internal Server Error
501	Not Implemented
502	Bad Gateway
503	Service Unavailable
504	Gateway Timeout
505	HTTP Version not supported

For more information on the above status codes and their descriptions, see <http://www.w3.org/Protocols/rfc2616/rfc2616-sec10.html#sec10>.

Pages Downloaded per Second Graph

The **Pages Downloaded per Second** graph shows the number of Web pages (y-axis) downloaded from the server during each second of the scenario run (x-axis). This graph helps you evaluate the amount of load Vusers generate, in terms of the number of pages downloaded.

Note: To view the Pages Downloaded per Second graph, you must select **Pages per second (HTML Mode only)** from the script's run-time settings Preferences tab before running your scenario.

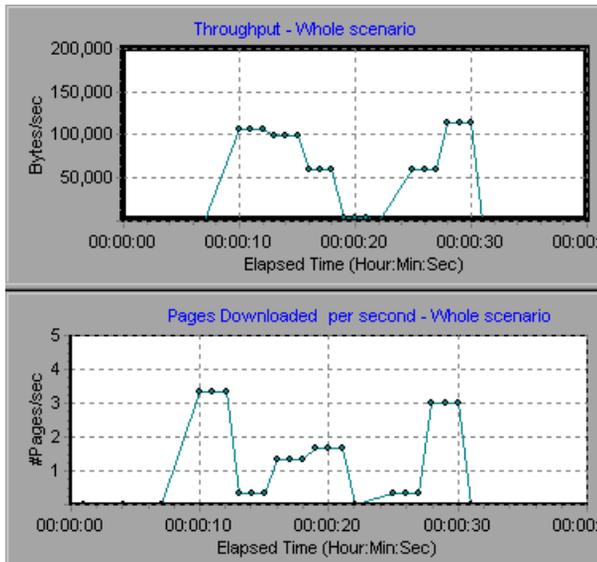
Like throughput, downloaded pages per second is a representation of the amount of data that the Vusers received from the server at any given second.

- The Throughput graph takes into account each resource and its size (for example, the size of each **.gif** file, the size of each Web page).

- ▶ The Pages Downloaded per Second graph takes into account simply the number of pages.

In the following example, the Throughput graph is compared with the Pages Downloaded per Second graph. It is apparent from the graph that throughput is not proportional to the number of pages downloaded per second. For example, between 15 and 16 seconds into the scenario, the throughput decreased while the number of pages downloaded per second increased.

Example:



Retries per Second Graph

The **Retries Per Second** graph shows the number of attempted Web server connections (y-axis) as a function of the elapsed time in the scenario (x-axis). A server connection is retried when the initial connection was unauthorized, when proxy authentication is required, when the initial connection was closed by the server, when the initial connection to the server could not be made, or when the server was initially unable to resolve the load generator's IP address.

Connections Graph

The **Connections** graph shows the number of open TCP/IP connections (y-axis) at each point in time of the scenario (x-axis). One HTML page may cause the browser to open several connections, when links on the page go to different Web addresses. Two connections are opened for each Web server.

This graph is useful in indicating when additional connections are needed. For example, if the number of connections reaches a plateau, and the transaction response time increases sharply, adding connections would probably cause a dramatic improvement in performance (reduction in the transaction response time).

Connections per Second Graph

The **Connections Per Second** graph shows the number of new TCP/IP connections (y-axis) opened and the number of connections that are shut down each second of the scenario (x-axis).

This number should be a small fraction of the number of hits per second, because new TCP/IP connections are very expensive in terms of server, router and network resource consumption. Ideally, many HTTP requests should use the same connection, instead of opening a new connection for each request.

SSLs per Second Graph

The SSLs per Second graph shows the number of new and reused SSL Connections (y-axis) opened in each second of the scenario (x-axis). An SSL connection is opened by the browser after a TCP/IP connection has been opened to a secure server.

Because creating a new SSL connection entails heavy resource consumption, you should try to open as few new SSL connections as possible; once you've established an SSL connection, you should reuse it. There should be no more than one new SSL connection per Vuser.

If you set your run-time settings to simulate a new Vuser at each iteration (via the Browser Emulation tab in the Run-Time Settings menu), you should have no more than one new SSL connection per Vuser per iteration. Ideally, you should have very few new TCP/IP and SSL connections each second.

Part III

Transaction Monitoring

3

Run-Time and Transaction Monitoring

While running a scenario, you use LoadRunner's Run-Time and Transaction monitors to view graphs of run-time status and transaction performance.

This chapter includes:

- ▶ About Run-Time and Transaction Graphs on page 53
- ▶ Run-Time Graphs on page 54
- ▶ Transaction Monitor Graphs on page 56
- ▶ Enabling Web Page Diagnostics on page 59

About Run-Time and Transaction Graphs

The **Run-Time** monitor provides information about the status of the Vusers participating in the scenario, and the number and types of errors that the Vusers generate. In addition, the Run-Time monitor provides the User-Defined Data Points graph, which displays the real time values for user-defined points in a Vuser script.

The **Transaction** monitor displays the transaction rate and response time during scenario execution. For more information about transactions, see "Adding Transactions to a Script" on page 58.

Run-Time Graphs

The **Runtime** monitor provides information for the following graphs:

- Running Vusers Graph
- User-Defined Data Points Graph
- Error Statistics Graph
- Vusers with Errors Graph

Running Vusers Graph

The monitor's **Running Vusers** graph provides information about the status of the Vusers running in the current scenario on all load generator machines. The graph shows the number of running Vusers, while the information in the legend indicates the number of Vusers in each state.

Color	Scale	Status	Max	Min	Avg	Std	Last
	1	Running	14	2	7.632653...	3.783389...	14
	1	Error	0	0	0	0	0
	1	Finished	0	0	0	0	0

The Status field of each Vuser displays the current status of the Vuser. The following table describes each Vuser status.

Status	Description
Running	The total number of Vusers currently running on all load generators.
Ready	The number of Vusers that completed the initialization section of the script and are ready to run.
Finished	The number of Vusers that have finished running. This includes both Vusers that passed and failed.
Error	The number of Vusers whose execution generated an error. Check the Status field in the Vuser view or the Output window for a complete explanation of the error.

User-Defined Data Points Graph

The **User-Defined Data Points** graph displays the real-time values of user-defined data points. You define a data point in your Vuser script by inserting an `lr_user_data_point` function at the appropriate place (`user_data_point` for GUI Vusers and `lr.user_data_point` for Java Vusers).

```
Action1()
{
  lr_think_time(1);
  lr_user_data_point ("data_point_1",1);
  lr_user_data_point ("data_point_2",2);
  return 0;
}
```

For Vuser protocols that support the graphical script representations such as Web and Oracle NCA, you insert a data point as a user-defined step. Data point information is gathered each time the script executes the function or step. For more information about data points, see the *HP LoadRunner Online Function Reference*.

By default, LoadRunner displays all of the data points in a single graph. The legend provides information about each data point. If desired, you can hide specific data points using the legend below the graphs.

You can also view data points offline, after the completion of the scenario. For more information, see the *HP LoadRunner Analysis User's Guide*.

Error Statistics Graph

The monitor's **Error Statistics** graph provides details about the number of errors that accrue during each second of the scenario run. The errors are grouped by error source—for example, the location in the script or the load generator name.

Vusers with Errors Graph

The **Vusers with Errors** graph provides details about the number of Vusers that generate errors during scenario execution. The errors are grouped by error source.

Transaction Monitor Graphs

The **Transaction** monitor provides the following graphs:

- Transaction Response Time
- Transactions per Second (Passed)
- Transactions per Second (Failed, Stopped)
- Total Transactions per Second (Passed)

The **Transaction Response Time** graph shows the average response time of transactions in seconds (y-axis) as a function of the elapsed time in the scenario (x-axis).

The **Transactions per Second (Passed)** graph shows the number of successful transactions performed per second (y-axis) as a function of the elapsed time in the scenario (x-axis).

The **Transactions per Second (Failed, Stopped)** graph shows the number of failed and stopped transactions per second (y-axis) as a function of the elapsed time in the scenario (x-axis).

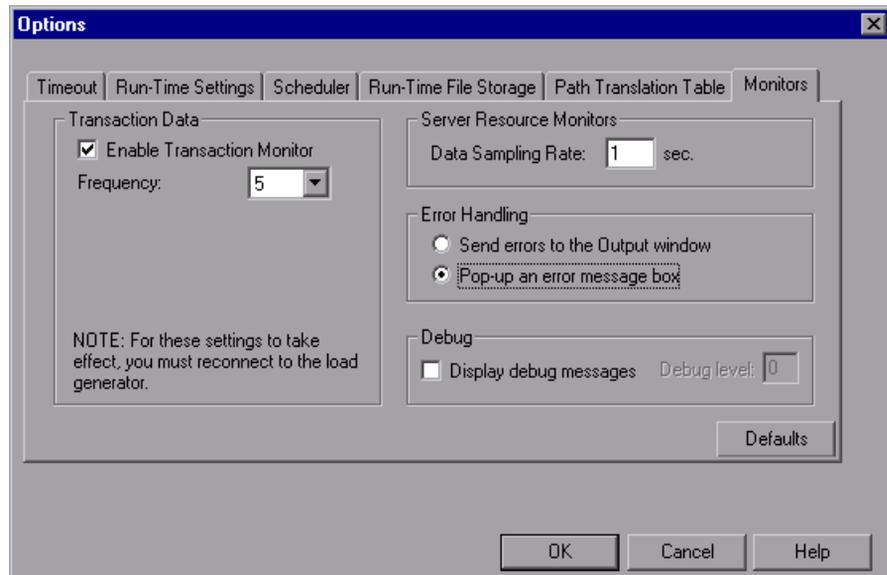
The **Total Transactions per Second (Passed)** graph shows the total number of completed, successful transactions per second (y-axis) as a function of the elapsed time in the scenario (x-axis).

Enabling the Transaction Monitor

The Transaction monitor is enabled by default—it automatically begins monitoring Vuser transactions at the start of a scenario. To conserve resources, you can disable the Transaction monitor.

To disable the Transaction monitor:

- 1 Choose **Tools > Options** and select the **Monitors** tab.



- 2 Disable transaction monitoring by clearing the **Enable Transaction Monitor** check box. To enable transaction monitoring, select the **Enable Transaction Monitor** check box.

Adding Transactions to a Script

If there are no transactions defined in your Vuser script, no data will be displayed in the online graphs. To add transactions to an existing script, edit it using the appropriate tool. The following table shows the script generation tools for each script type:

Script type	Editing tool
QTP scripts	WinRunner
VuGen scripts	VuGen (Virtual User Generator)

To add a transaction to a script in the Controller:

- 1 Click the **Design** tab to view the list of Vuser groups and scripts.
- 2 To edit a script for a Vuser group, select the group and click the **View Script** button to the right of the Scenario Groups window. The script generation tool opens.

To edit a script for an individual Vuser, click **Vusers**. Right-click the Vuser whose script you want to edit, and select **View Script** to open the script generation tool.

- 3 Insert Start and End Transaction functions or markers throughout your script.

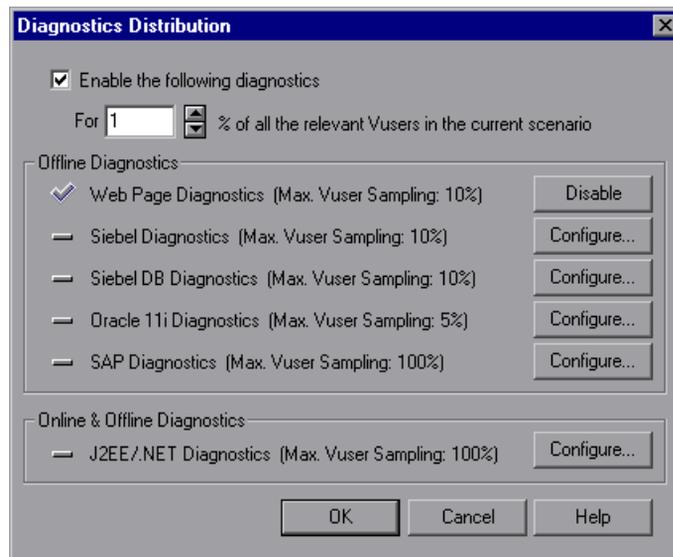
For more information, see the appropriate user's guide as described in the *Welcome* chapter.

Enabling Web Page Diagnostics

In order for the Analysis to generate Web Page Diagnostics graphs, which provide you with performance information for each transaction and sub-transaction defined in your script, you must enable the Web page Diagnostics feature in the Controller before running your scenario.

To enable Web Page Diagnostics in the Controller:

- 1 From the Controller's Run tab, choose **Diagnostics > Configuration**. The Diagnostics Distribution dialog box opens.



- 2 Select **Enable the following diagnostics** and specify the percentage of Vusers for which you want transaction breakdown to be performed.
- 3 Click the **Enable** button next to **Web Page Diagnostics (Max. Vuser Sampling: 10%)**.
- 4 Click **OK**.

For more information, refer to the “Working with Diagnostics” section of the *HP LoadRunner Controller User's Guide*.

For more information about Web Page Breakdown graphs, refer to the *HP LoadRunner Analysis User's Guide*.

Part IV

System Resource Monitoring

4

Understanding System Resource Monitors

You use LoadRunner's System Resource monitors to monitor a machine's system resource usage during a scenario run and isolate server performance bottlenecks.

A primary factor in a transaction's response time is its system resource usage. Using the LoadRunner resource monitors, you can monitor the Windows, UNIX, Server, SNMP, Antara FlameThrower, and SiteScope resources on a machine during a scenario run, and determine why a bottleneck occurred on a particular machine.

The Windows measurements correspond to the built-in counters available from the Windows Performance Monitor.

The UNIX measurements include those available by the **rstatd** daemon: average load, collision rate, context switch rate, CPU utilization, incoming packets error rate, incoming packets rate, interrupt rate, outgoing packets error rate, outgoing packets rate, page-in rate, page-out rate, paging rate, swap-in rate, swap-out rate, system mode CPU utilization, and user mode CPU utilization.

Note: You must configure an **rstatd** daemon on all UNIX machines being monitored. For information on how to configure an **rstatd** daemon, refer to the UNIX *man* pages, or see "Setting up the Monitoring Environment" on page 81.

The Server Resources monitor can measure CPU, disk space, memory, and application resources used on remote Windows and UNIX servers.

The SNMP monitor is available for monitoring machines using the Simple Network Management Protocol (SNMP). SNMP monitoring is platform independent.

The Antara FlameThrower monitor can measure the following performance counters: Layer, TCP, HTTP, SSL/HTTPS, Sticky SLB, FTP, SMTP, POP3, DNS, and Attacks.

The SiteScope monitor can measure server, network, and processor performance counters. For detailed information on the performance counters that SiteScope can monitor, see the relevant SiteScope documentation.

The resource monitors are automatically enabled when you execute a scenario. However, you must specify the machine you want to monitor and which resources to monitor for each machine. You can also add or remove machines and resources during the scenario run.

For more information about a particular System Resource monitor see:

- Chapter 5, “Windows Resource Monitoring”
- Chapter 6, “UNIX Resource Monitoring”
- Chapter 7, “Server Resource Monitoring”
- Chapter 8, “SNMP Resource Monitoring”
- Chapter 9, “Antara FlameThrower Monitoring”
- Chapter 10, “SiteScope Resource Monitoring”

5

Windows Resource Monitoring

The Windows Resources monitor shows the Windows resources measured during the scenario. Windows NT and Windows 2000 measurements correspond to the built-in counters available from the Windows Performance Monitor.

Note: To monitor a Windows NT or 2000 machine through a firewall, use TCP, port 139.

This chapter includes:

- ▶ Setting up the Monitoring Environment on page 66
- ▶ Adding a Machine to Monitor on page 66
- ▶ Configuring the Windows Resources Monitor on page 67
- ▶ Windows Resource Performance Counters on page 71

Setting up the Monitoring Environment

- If you are using the SiteScope monitor engine, ensure that SiteScope has been installed on a server. You can install SiteScope on the same server as the Controller, or on a dedicated server.
- If you want to monitor a remote Windows server that does not use Windows domain security, you must authenticate the Controller on the remote Windows server. To authenticate the Controller, create an account, or change the password of the account used to log on to the Controller so that it matches the password and user name used to log on to the remote monitored Windows machine. When the remote Windows machine requests another machine's resources, it sends the logged-in user name and password of the machine requesting the resources.

Adding a Machine to Monitor

In order to monitor the Windows resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

To add a machine to the Controller:

- 1** Click the **Windows Resources** graph in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The Windows Resources dialog box opens.
- 3** By default, LoadRunner monitors Windows resources using the native LoadRunner monitor engine.

If you want to monitor Windows resources using the SiteScope monitor engine, click **Advanced**.

In the Choose Monitor Engine dialog box, choose **SiteScope**, and click **OK** to close the Monitor Engine dialog box.

- 4 In the **Monitored Server Machines** section, click **Add**.

The Add Machine dialog box opens.

- ▶ In the **Monitored Machine Information** section, enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs.
- ▶ In the **SiteScope Server Information** section, enter the SiteScope machine name, and port (default: 8888), and specify whether you are using a Secure HTTP connection. If you are using a SiteScope account, fill in the relevant account information.

Note: If you are adding a native LoadRunner monitor, the **SiteScope Server Information** section does not appear.

Click **OK** to close the Add Machine dialog box.

- 5 Click **Add** in the **Resource Measurements on: <machine>** section of the Windows Resources dialog box.
- 6 Continue with “Configuring the Windows Resources Monitor” on page 67.

Configuring the Windows Resources Monitor

The configuration for this monitor differs slightly depending on whether you are adding a native LoadRunner or SiteScope monitor.

This section describes:

- ▶ Configuring the Native LoadRunner Windows Resources Monitor
- ▶ Configuring the SiteScope Windows Resources Monitor

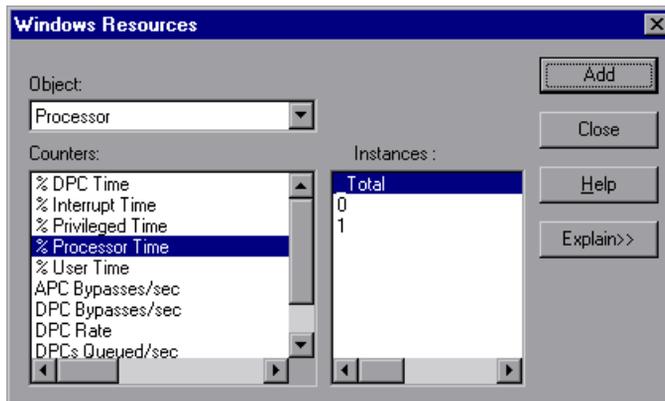
Configuring the Native LoadRunner Windows Resources Monitor

- 1 When you add a machine in the Windows Resources dialog box, the default measurements are displayed in the **Resource Measurements on: <machine>** section.

Note: To change the default counters for the Windows machine monitor, see “Changing a Monitor’s Default Counters” on page 543.

If you are monitoring a Win 2000 machine, some of the NT machine default counters may not be available (such as % Total CPU usage and Interrupts/sec).

- ▶ To delete a measurement from the default list, select the measurement and click **Delete**.
 - ▶ To select additional measurements, click **Add**.
- 2** A Windows Resources dialog box opens displaying the available Windows resources.



For each measurement select an object, counter, and instance, as described in “Understanding the Add Windows Resources Measurements Dialog Box” on page 70, and then click **Add**.

For a description of the available measurements, see “Windows Resource Performance Counters” on page 71.

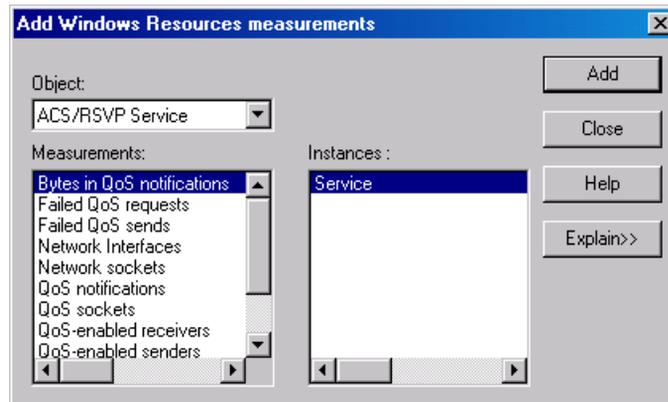
- 3** When you have finished selecting the measurements to monitor, click **Close**. The counters that you selected appear in the **Resource Measurements on: <machine>** section of the Windows Resources dialog box.
- 4** Click **OK** in the Windows Resources dialog box to activate the monitor.

Configuring the SiteScope Windows Resources Monitor

The first time you add measurements you need to configure the remote machine properties. When you click **Add** in the **Resource Measurements on: <machine>** section of the Windows Resources dialog box, the Configuring NT Remote Machine dialog box opens.

To configure a SiteScope Windows Resources monitor:

- 1** Enter the remote machine's configuration information, as described in "Understanding the Configuring NT Remote Machine Dialog Box" on page 29, and click **OK**.
- 2** The Configuring PDH Monitor dialog box opens. Verify the **Server** and **Update every** properties, and click **OK**.
- 3** The Add Windows Resources Measurements dialog box opens displaying the available measurements and server properties.



For each measurement select an object, measurement, and instance, as described in "Understanding the Add Windows Resources Measurements Dialog Box" on page 70, and then click **Add**.

For a description of the available measurements, see "Windows Resource Performance Counters" on page 71.

Note: To change the default counters for the Windows machine monitor, see “Changing a Monitor’s Default Counters” on page 543.

If you are monitoring a Win2000 machine, some of the NT machine default counters may not be available (such as % Total CPU usage and Interrupts/sec).

- 4 When you have finished selecting the measurements to monitor, click **Close**. The measurements that you selected appear in the **Resource Measurements on:** <machine> section of the Windows Resources dialog box.
- 5 Click **OK** in the Windows Resources dialog box to activate the monitor.

Understanding the Add Windows Resources Measurements Dialog Box

The Add Windows Resources Measurements dialog box lets you select the Windows NT and Windows 2000 resources to monitor. The Windows resources correspond to the built-in counters available from the Windows Performance Monitor.

- **Object.** Select the object to monitor on the specified Windows machine.
- **Counters/Measurements.** Select the resource counter/measurement to monitor. Select multiple counters using the CTRL key. For an explanation of each counter, click **Explain**.
- **Instances.** If multiple instances of the selected counter are running, select one or more instances to monitor for the selected counter.
- **Explain.** Displays a description of the selected counter.

Windows Resource Performance Counters

The following default measurements are available for Windows machines:

Object	Measurement	Description
System	% Total Processor Time	The average percentage of time that all the processors on the system are busy executing non-idle threads. On a multi-processor system, if all processors are always busy, this is 100%, if all processors are 50% busy this is 50% and if 1/4 of the processors are 100% busy this is 25%. It can be viewed as the fraction of the time spent doing useful work. Each processor is assigned an Idle thread in the Idle process which consumes those unproductive processor cycles not used by any other threads.
System	File Data Operations/sec	The rate at which the computer issues read and write operations to file system devices. This does not include File Control Operations.
Processor	% Processor Time (Windows 2000)	The percentage of time that the processor is executing a non-idle thread. This counter was designed as a primary indicator of processor activity. It is calculated by measuring the time that the processor spends executing the thread of the idle process in each sample interval, and subtracting that value from 100%. (Each processor has an idle thread which consumes cycles when no other threads are ready to run). It can be viewed as the percentage of the sample interval spent doing useful work. This counter displays the average percentage of busy time observed during the sample interval. It is calculated by monitoring the time the service was inactive, and then subtracting that value from 100%.

Object	Measurement	Description
System	Processor Queue Length	The instantaneous length of the processor queue in units of threads. This counter is always 0 unless you are also monitoring a thread counter. All processors use a single queue in which threads wait for processor cycles. This length does not include the threads that are currently executing. A sustained processor queue length greater than two generally indicates processor congestion. This is an instantaneous count, not an average over the time interval.
Memory	Page Faults/sec	This is a count of the page faults in the processor. A page fault occurs when a process refers to a virtual memory page that is not in its Working Set in the main memory. A page fault will not cause the page to be fetched from disk if that page is on the standby list (and hence already in main memory), or if it is in use by another process with which the page is shared.
PhysicalDisk	% Disk Time	The percentage of elapsed time that the selected disk drive is busy servicing read or write requests.
Memory	Pool Nonpaged Bytes	The number of bytes in the nonpaged pool, a system memory area where space is acquired by operating system components as they accomplish their appointed tasks. Nonpaged pool pages cannot be paged out to the paging file. They remain in main memory as long as they are allocated.

Object	Measurement	Description
Memory	Pages/sec	The number of pages read from the disk or written to the disk to resolve memory references to pages that were not in memory at the time of the reference. This is the sum of Pages Input/sec and Pages Output/sec. This counter includes paging traffic on behalf of the system cache to access file data for applications. This value also includes the pages to/from non-cached mapped memory files. This is the primary counter to observe if you are concerned about excessive memory pressure (that is, thrashing), and the excessive paging that may result.
System	Total Interrupts/sec	The rate at which the computer is receiving and servicing hardware interrupts. The devices that can generate interrupts are the system timer, the mouse, data communication lines, network interface cards, and other peripheral devices. This counter provides an indication of how busy these devices are on a computer-wide basis. See also Processor:Interrupts/sec.
Objects	Threads	The number of threads in the computer at the time of data collection. Notice that this is an instantaneous count, not an average over the time interval. A thread is the basic executable entity that can execute instructions in a processor.
Process	Private Bytes	The current number of bytes that the process has allocated that cannot be shared with other processes.

6

UNIX Resource Monitoring

The UNIX Resources monitor shows the UNIX resources measured during the scenario. This graph helps you determine the impact of Vuser load on the various system resources.

The UNIX kernel statistics measurements include those available by the rstatd daemon: average load, collision rate, context switch rate, CPU utilization, incoming packets error rate, incoming packets rate, interrupt rate, outgoing packets error rate, outgoing packets rate, page-in rate, page-out rate, paging rate, swap-in rate, swap-out rate, system mode CPU utilization, and user mode CPU utilization.

To obtain data for this graph, you need to select the desired measurements for the online monitor (from the Controller) before running the scenario.

This chapter includes:

- ▶ Setting up the Monitoring Environment on page 76
- ▶ Adding a Machine to Monitor on page 77
- ▶ Configuring the UNIX Resources Monitor on page 78
- ▶ UNIX Resources Performance Counters on page 80

Setting up the Monitoring Environment

To monitor UNIX resources, you must configure the rstatd daemon.

Note: The rstatd daemon might already be configured, because when a machine receives an rstatd request, the inetd on that machine activates the rstatd automatically.

To verify whether the rstatd daemon is already configured:

The **rup** command reports various machine statistics, including rstatd configuration. Run the following command to view the machine statistics:

```
>rup host
```

You can also use **lr_host_monitor** and see if it returns any relevant statistics.

If the command returns meaningful statistics, the rstatd daemon is already configured and activated. If not, or if you receive an error message, the rstatd daemon is not configured.

To configure the rstatd daemon:

- 1 Run the command: `su root`
- 2 Go to `/etc/inetd.conf` and look for the rstatd row (it begins with the word rstatd). If it is commented out (with a #), remove the comment directive, and save the file.

- 3 From the command line, run:

```
kill -1 inet_pid
```

where **inet_pid** is the pid of the inetd process. This instructs the inetd to rescan the `/etc/inetd.conf` file and register all daemons which are uncommented, including the rstatd daemon.

- 4 Run `rup` again.

If the command still does not indicate that the rstatd daemon is configured, contact your system administrator.

Note: To monitor a UNIX machine through a firewall, you must run a UNIX utility called **rpcinfo** and identify the rstatd's port number. By running **rpcinfo -p <hostname>**, you will receive a list of all RPC servers registered in the host's portmapper, along with the port number. This list will not change until rstatd is stopped and rerun.

Some firewalls allow you to open an RPC program number instead of a port. In such cases, open program 100001. If are prompted to include a version number, specify versions 3 and 4.

Adding a Machine to Monitor

In order to monitor the UNIX Resources of a particular machine from the Controller, you need to add the machine and the measurements you want to monitor.

To add a machine to the Controller:

- 1 Click the UNIX Resources graph in the graph tree, and drag it into the right pane of the Run view.
- 2 Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The UNIX Resources dialog box opens.

In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.

- 3 Enter the server name or IP address of the machine you want to monitor, and click **OK**.
- 4 In the **Resource Measurements** section of the UNIX Resources dialog box, select the measurements you want to monitor.

For a description of the available measurements, see “UNIX Resources Performance Counters” on page 80.

Note: To change the default counters for the UNIX monitor, see “Changing a Monitor’s Default Counters” on page 543.

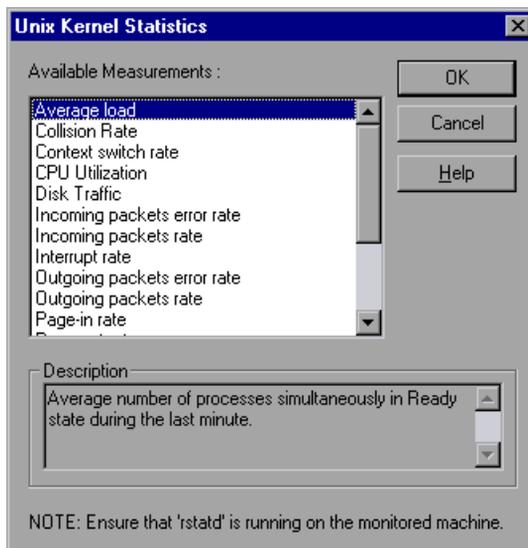
- 5 To select additional measurements, click **Add**.
- 6 Continue with Configuring the UNIX Resources Monitor below.

Configuring the UNIX Resources Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which measurements to monitor on the machine.

To configure the UNIX Resources monitor:

- 1 When you click **Add** in the **Resource Measurements on: <machine>** section of the UNIX Resources dialog box, the UNIX Kernel Statistics dialog box opens, displaying the available measurements and server properties.



Select measurements and server properties as described in “Understanding the Unix Kernel Statistics Dialog Box” on page 79.

For a description of the available measurements, see “UNIX Resources Performance Counters” on page 80.

- 2 Click **OK**. The measurements that you selected appear in the **Resource Measurements on: <machine>** section of the UNIX Resources dialog box.
- 3 Click **OK** in the UNIX Resources dialog box to activate the monitor.

Note: Ensure that the rstatd daemon is correctly configured and running on the monitored UNIX machine. For more information, see “Setting up the Monitoring Environment” on page 76.

To change the default counters for the UNIX monitor, see “Changing a Monitor’s Default Counters” on page 543.

Understanding the Unix Kernel Statistics Dialog Box

The UNIX Kernel Statistics dialog box lets you select the UNIX kernel statistics to monitor.

The UNIX kernel statistics measurements include those available by the rstatd daemon: average load, collision rate, context switch rate, CPU utilization, incoming packets error rate, incoming packets rate, interrupt rate, outgoing packets error rate, outgoing packets rate, page-in rate, page-out rate, paging rate, swap-in rate, swap-out rate, system mode CPU utilization, and user mode CPU utilization.

- **Available Measurements.** Select the measurements you want to add. To select more than one measurement, use the CTRL key.
- **Description.** Displays a description of the selected measurement.

Note: Ensure that rstatd is running on the monitored UNIX machine. For more information, see “Setting up the Monitoring Environment” on page 76.

UNIX Resources Performance Counters

The following default measurements are available for the UNIX machine:

Measurement	Description
Average load	Average number of processes simultaneously in Ready state during the last minute
Collision rate	Collisions per second detected on the Ethernet
Context switches rate	Number of switches between processes or threads, per second
CPU utilization	Percent of time that the CPU is utilized
Disk rate	Rate of disk transfers
Incoming packets error rate	Errors per second while receiving Ethernet packets
Incoming packets rate	Incoming Ethernet packets per second
Interrupt rate	Number of device interrupts per second
Outgoing packets errors rate	Errors per second while sending Ethernet packets
Outgoing packets rate	Outgoing Ethernet packets per second
Page-in rate	Number of pages read to physical memory, per second
Page-out rate	Number of pages written to pagefile(s) and removed from physical memory, per second
Paging rate	Number of pages read to physical memory or written to pagefile(s), per second
Swap-in rate	Number of processes being swapped
Swap-out rate	Number of processes being swapped
System mode CPU utilization	Percent of time that the CPU is utilized in system mode
User mode CPU utilization	Percent of time CPU is utilized in user mode

7

Server Resource Monitoring

The Server Resources monitor shows the resources of monitors (CPU, disk space, memory, or applications) used on remote Windows and UNIX servers measured during the scenario. This helps you determine the impact of Vuser load on the various system resources.

The Server Resources monitor includes the following monitors:

- ▶ **CPU Monitor.** Monitors CPU usage.
- ▶ **Disk Space Monitor.** Monitors disk space.
- ▶ **Memory Monitor.** Monitors Pages per Second and Percentage of Virtual Memory Used.
- ▶ **Service Monitor.** Verifies that specific processes are listed as running and checks CPU usage.

To obtain data for this graph, you need to select the desired measurements for the online monitor (from the Controller) before running the scenario.

This chapter includes:

- ▶ Setting up the Monitoring Environment on page 81
- ▶ Adding a Machine to Monitor on page 82
- ▶ Configuring the Server Resources Monitor on page 83
- ▶ Server Resources Performance Counters on page 86

Setting up the Monitoring Environment

- ▶ Ensure that SiteScope has been installed on a server. You can install SiteScope on the same machine as the Controller, or on a dedicated server.

- Verify that SiteScope is collecting the required data from the servers it is monitoring. From the SiteScope Panel, select the monitor group polling the Server Resource machines, and check that the monitor displays a list of server measurements in the Status column.

Adding a Machine to Monitor

In order to monitor the server resources of a particular machine from the Controller, you need to add the machine and the measurements you want to monitor.

To add a machine to the Controller:

- 1** Click the Server Resource graph in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The Server Resources dialog box opens.
- 3** In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.
- 4** In the **Monitored Machine Information** section, enter the server name or IP address of the machine you want to monitor, and select the platform on which the machine runs.

Note: If you are using the HTTP method of monitoring, enter the full URL of the CGI script (for example: <http://demo.thiscompany.com/cgi-bin/run.sh>).

In the **SiteScope Server Information** section, enter the SiteScope machine name, and port (default: 8888), and specify whether you are using a Secure HTTP connection. If you are using a SiteScope account, fill in the relevant account information.

- 5** Click **OK**. The Server Resources dialog box is redisplayed.

- 6 In the **Resource Measurements** section of the Server Resources dialog box, click **Add** to configure the remote machine and select the measurements that you want to monitor.
- 7 Continue with Configuring the Server Resources Monitor below.

Configuring the Server Resources Monitor

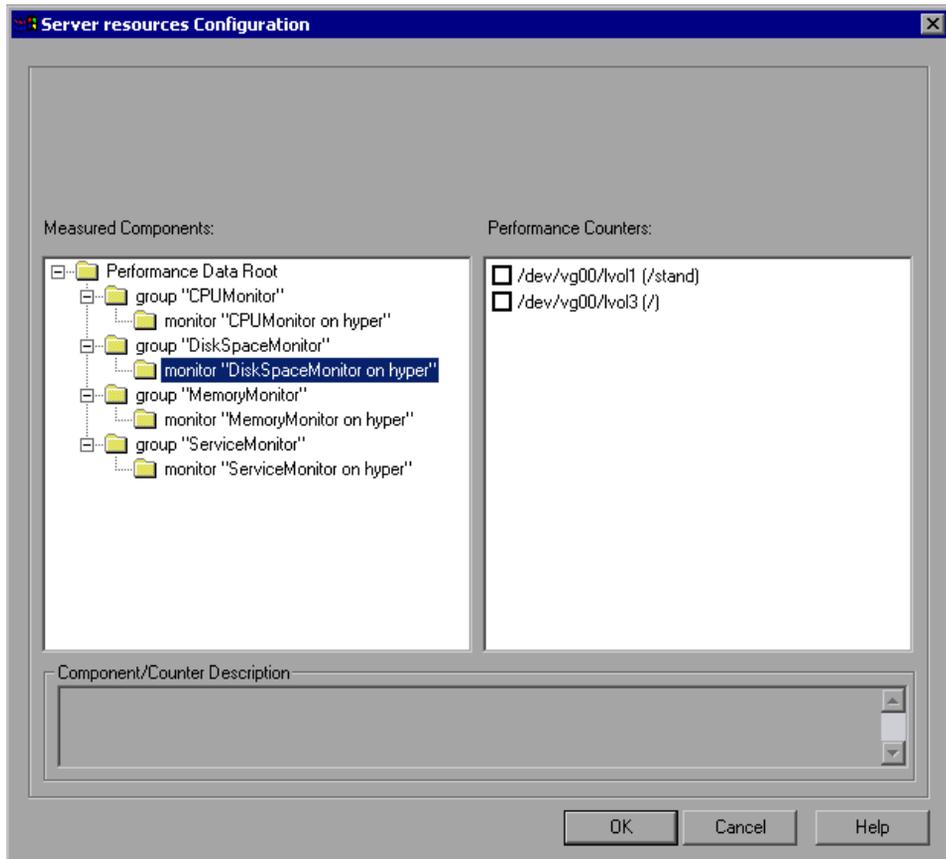
After you have added the machine that you are monitoring, you configure the monitor by choosing which measurements to monitor on the machine.

To configure the Server Resources monitor:

- 1 The first time you add measurements you need to configure the remote machine properties. When you click **Add** in the **Resource Measurements on: <machine>** of the Server Resources dialog box, a dialog box opens to configure the remote machine as follows:
 - If you are monitoring a machine on an NT platform, the Configuring NT Remote Machine dialog box opens.
 - If you are monitoring a machine on a UNIX platform, the Configuring UNIX Remote Machine dialog box opens.

Enter the remote machine's configuration information, as described in "Configuring the Remote Machine for SiteScope Monitors" on page 28, and click **OK**.

- 2 The Server Resources Configuration dialog box opens, displaying the available measurements.



Browse the **Measured Components** tree, select the required performance counters in the right pane, as described in “Understanding the Server Resources Configuration Dialog Box” on page 85.

For a list of the available performance counters, see “Server Resources Performance Counters” on page 86.

- 3 Click **OK**. The components that you selected appear in the **Resource Measurements on: <machine>** section of the Server Resources dialog box.

- 4 In the Controller, click **OK** in the Server Resources dialog box to activate the monitor.

Note: The minimum recommended online graph refresh rate (in the Graph Configuration dialog box) is 30 seconds. If you choose a lower refresh rate, the Controller may not get all the data in time.

Understanding the Server Resources Configuration Dialog Box

The Server Resources Configuration dialog box enables you to select the server resources to monitor.

- **Host.** Displays the name of the monitored machine.
- **Measured Components.** Displays the available components. Browse the tree and select the component you want to monitor. A description of the highlighted component appears in the Component/Counter Description box.
- **Performance Counters.** Check the required performance counters. A description of the selected counter appears in the Component/Counter Description box.
- **Component/Counter Description.** Displays a description of the selected component or counter.

Server Resources Performance Counters

Monitor	Measurements	Description
CPU Monitor	Utilization	Measures CPU utilization.
Disk Space Monitor	Disk space	Measures the percentage of disk space used.
Memory Monitor	MB free	Measures the amount of disk space free, in MB.
	Pages/sec	Measures the number of virtual memory pages that are moved between main memory and disk storage.
	Percent used	Measures the percentage of memory and paging file space used.
Services Monitor		Monitors processes locally or on remote systems. Can be used to verify that specific processes are running.

8

SNMP Resource Monitoring

The SNMP Resources monitor shows statistics for machines using the Simple Network Management Protocol (SNMP). The SNMP Resources monitor is available for monitoring any machine that runs an SNMP agent, using the Simple Network Management Protocol (SNMP).

Note: The LoadRunner SNMP monitor is the same as the SiteScope SNMP by MIB monitor.

This chapter includes:

- ▶ Setting up the Monitoring Environment on page 87
- ▶ Adding a Machine to Monitor on page 88
- ▶ Configuring the SNMP Resources Monitor on page 89

Setting up the Monitoring Environment

- ▶ To obtain data for this graph, you need to configure the SNMP Resources monitor (from the Controller) and select the measurements you want to display, before running the scenario.
- ▶ If you are using the SiteScope monitor engine, ensure that SiteScope has been installed on a server. You can install SiteScope on the same machine as the Controller, or on a dedicated server.

Adding a Machine to Monitor

In order to monitor the SNMP Resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

To add a machine to the Controller:

- 1** Click the **SNMP Resources** graph in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The SNMP dialog box opens.
- 3** By default, LoadRunner monitors SNMP resources using the native LoadRunner monitor engine.

If you want to monitor SNMP resources using the SiteScope monitor engine, click **Advanced**.

In the Choose Monitor Engine dialog box, choose **SiteScope**, and click **OK**.

- 4** In the **Monitored Server Machines** section, click **Add**.

The Add Machine dialog box opens.

- ▶ In the **Monitored Machine Information** section, enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs.
- ▶ In the **SiteScope Server Information** section, enter the SiteScope machine name, and port (default: 8888), and specify whether you are using a Secure HTTP connection. If you are using a SiteScope account, fill in the relevant account information.

Note: If you are adding a native LoadRunner monitor, the **SiteScope Server Information** section does not appear.

Click **OK** to close the Add Machine dialog box.

- 5** In the **Resource Measurements on: <machine>** section of the SNMP dialog box, click **Add**.
- 6** Continue with Configuring the SNMP Resources Monitor below.

Configuring the SNMP Resources Monitor

The configuration for this monitor differs slightly depending on whether you are adding a SiteScope or native LoadRunner monitor.

This section describes:

- ▶ Configuring the Native LoadRunner SNMP Monitor
- ▶ Configuring the SiteScope SNMP by MIB Monitor

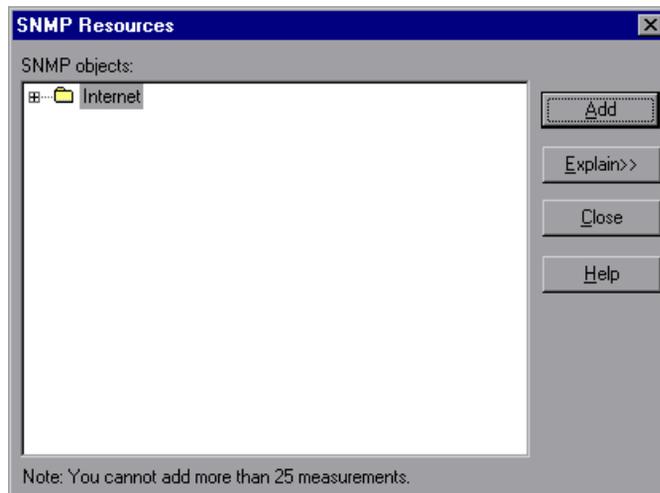
Configuring the Native LoadRunner SNMP Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which objects to monitor on the machine.

To configure the SNMP Resources monitor:

- 1 When you click **Add** to add a measurement, the SNMP Resources dialog box opens.

Browse the **SNMP Objects** tree, and select and add SNMP resources, as described in “Understanding the SNMP Resources Dialog Box” on page 90.



- 2 Click **Close**. The resources that you selected appear in the **Resource Measurements on: <machine>** section of the SNMP dialog box.

Note: The native LoadRunner SNMP monitor can only monitor up to 25 measurements.

- 3 Click **OK** in the SNMP dialog box to activate the monitor.

Understanding the SNMP Resources Dialog Box

The SNMP Resources dialog box enables you to select the Windows or UNIX resources to monitor using the Simple Network Management Protocol (SNMP).

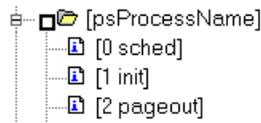
- **SNMP Objects.** Select each required object and click **Add**. Click **Explain** for the ID number and a description of the selected object.
- **Explain.** Displays a description of the selected object.

Note: The native LoadRunner SNMP monitor can only monitor up to 25 measurements.

Improving the Level of Measurement Information

You can improve the level of measurement information for the SNMP monitor by enabling measurements with string values to be listed (in addition to measurements with numeric values), and by enabling the name modifier (which displays the string value as an identifying part of the measurement name).

In the following example of a measurement using the name modifier, the string value of ProcessName (sched) is displayed in addition to its instance ID (0):



To enable this feature, add the following line to the **<LoadRunner root folder>\dat\monitors\snmp.cfg** file:

```
SNMP_show_string_nodes=1
```

Usage Notes: You can select more than one name modifier, but the first in the hierarchy will be used. Each time the SNMP Add Measurements dialog box opens, the information is reread from the **snmp.cfg** file. You cannot add the same measurement twice (once with a name modifier and once without it). If you do so, an error message is issued.

Note: You can modify the list of resources that you want to monitor at any point during the scenario. A scenario does not have to be active in order for you to monitor the resources on a remote machine.

Configuring the SiteScope SNMP by MIB Monitor

After you have added the machine that you are monitoring, you choose the measurements to monitor on the machine.

To configure the SNMP by MIB monitor:

- 1 The first time you add a measurement to the monitor, you need to configure the monitor properties. When you click **Add** to add a measurement, the Configuring SNMP by MIB Monitor dialog box opens.

Enter values for the monitor properties as described in “Understanding the Configuring SNMP by MIB Monitor Dialog Box” on page 94, and click **OK**.

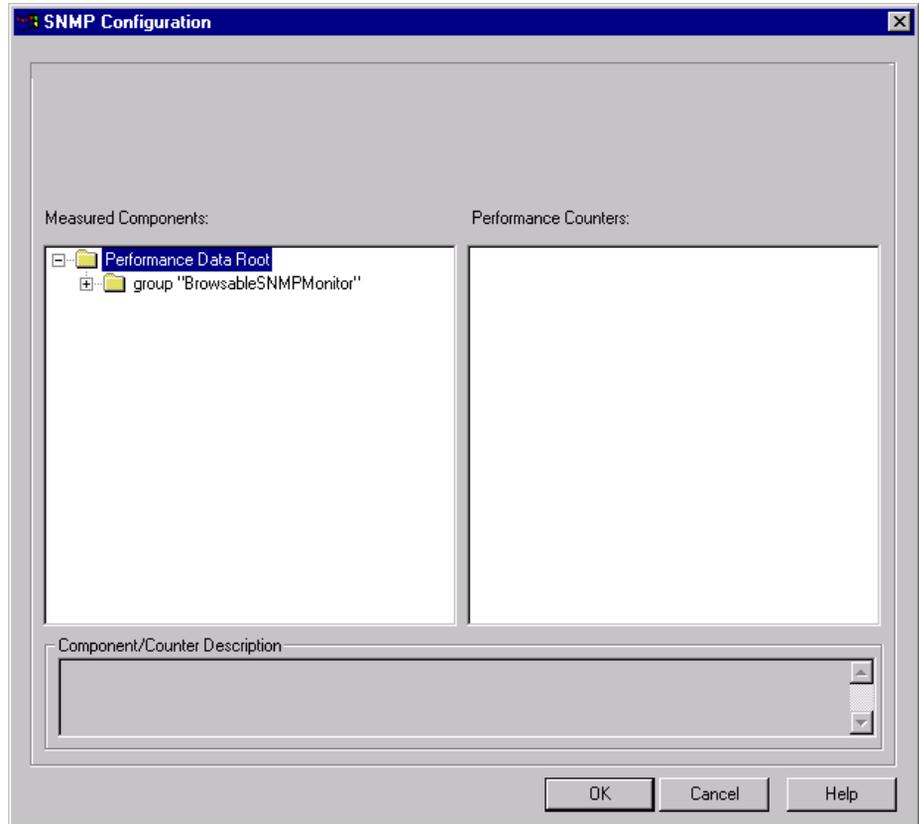
Property	Value
Server	message
MIB File	
SNMP Version	
V1/V2 Community	public
SNMP V3 Authentication Type	
SNMP V3 Username	
SNMP V3 Authentication Password	*****
SNMP V3 Privacy Password	*****
SNMP V3 Context Engine ID	
SNMP V3 Context Name	
Timeout	5
Retries	1
Port	161

Server
the IP address or host name of the agent

OK Cancel Use Defaults

- 2 The SNMP Configuration dialog box opens.

Browse the **Measured Components** tree and select the performance counters on the right, as described in “Understanding the SNMP Configuration Dialog Box” on page 95. Click a component or counter to see its description in the **Component/Counter Description** section.



- 3 Click **OK** to close the SNMP Configuration dialog box. The components that you selected appear in the **Resource Measurements on: <machine>** section of the SNMP dialog box.

- 4 Click **OK** in the SNMP dialog box to activate the monitor.

Note: You can modify the list of resources that you want to monitor at any point during the scenario. A scenario does not have to be active in order for you to monitor the resources on a remote machine.

Understanding the Configuring SNMP by MIB Monitor Dialog Box

You configure the SNMP by MIB monitor in the Configuring SNMP by MIB Monitor dialog box.

- **Server.** Enter the name of the server you want to monitor.
- **MIB File.** Select the MIB file which contains the objects you are interested in monitoring. If you select a specific MIB file, then only the objects described in that MIB file are displayed. If you select **All MIBs**, then all objects retrieved from the agent during the MIB traversal will be displayed. If no MIB information is available for an object, it is still displayed, but with no textual name or description. To make this monitor aware of new or additional MIBs, simply place new MIB files in the **SiteScope/templates.mib** directory.
- **SNMP Version.** Select the version of SNMP to use when connecting.
- **V1/V2 Community.** Enter the community string (valid only for version 1 or 2 connections).
- **SNMP V3 Authentication Type.** Select the type of authentication to use for version 3 connections.
- **SNMP V3 Username.** Enter the username for version 3 connections.
- **SNMP V3 Authentication Password.** Enter the authentication password to use for version 3 connections.
- **SNMP V3 Privacy Password.** Enter the privacy password if DES privacy encryption is desired for version 3 connections. Leave blank if you do not want privacy.

- **SNMP V3 Context Engine ID.** Enter a hexadecimal string representing the Context Engine ID to use for this connection. This is applicable for SNMP V3 only.
- **SNMP V3 Context Name.** Enter the Context Name to use for this connection. This is applicable for SNMP V3 only.
- **Timeout.** Enter the total time, in seconds, that SiteScope should wait for all SNMP requests (including retries) to complete. The default is 5 seconds.
- **Retries.** Enter the number of times each SNMP GET request should be retried before SiteScope considers the request to have failed. The default is 1 retry.
- **Port.** Enter the port to use when requesting data from the SNMP agent. The default of 161 is the port on which an SNMP agent will typically be listening.
- **Update every.** Enter how frequently the monitor should read the server statistics. The drop-down list to the right of the text box lets you specify time increments of seconds, minutes, hours, or days. You must specify a time increment of at least 3 seconds. The default is 3 seconds.

Understanding the SNMP Configuration Dialog Box

The SNMP Configuration dialog box enables you to select the performance counters to monitor using the Simple Network Management Protocol (SNMP).

- **Host.** The name of the host machine.
- **Measured Components.** Displays a tree containing all the available measured components.
- **Performance Counters.** Displays the performance counters for a selected measured component.
- **Component/Counter Description.** Displays a description of the selected measured component or performance counter.

9

Antara FlameThrower Monitoring

The Antara FlameThrower monitor displays statistics about the resource usage on the Antara FlameThrower server during the scenario run.

This chapter includes:

- ▶ Setting up the Monitoring Environment on page 97
- ▶ Adding a Machine to Monitor on page 98
- ▶ Configuring the Antara FlameThrower Monitor on page 99
- ▶ Antara FlameThrower Performance Counters on page 101

Setting up the Monitoring Environment

To obtain data for this graph, you need to configure the Antara FlameThrower online monitor (from the Controller) and select the measurements you want to display, before running the scenario.

Adding a Machine to Monitor

In order to monitor the Antara FlameThrower resources of a particular machine from the Controller, you need to add the machine and the measurements you want to monitor.

To add a machine to the Controller:

- 1** Click the Antara FlameThrower graph in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The Antara FlameThrower dialog box opens.

In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.

- 3** Enter the server name or IP address of the machine you want to monitor according to the following format: <server name>:<port number>.

For example: merc1:12135

Select the platform on which the machine runs, and click **OK**.

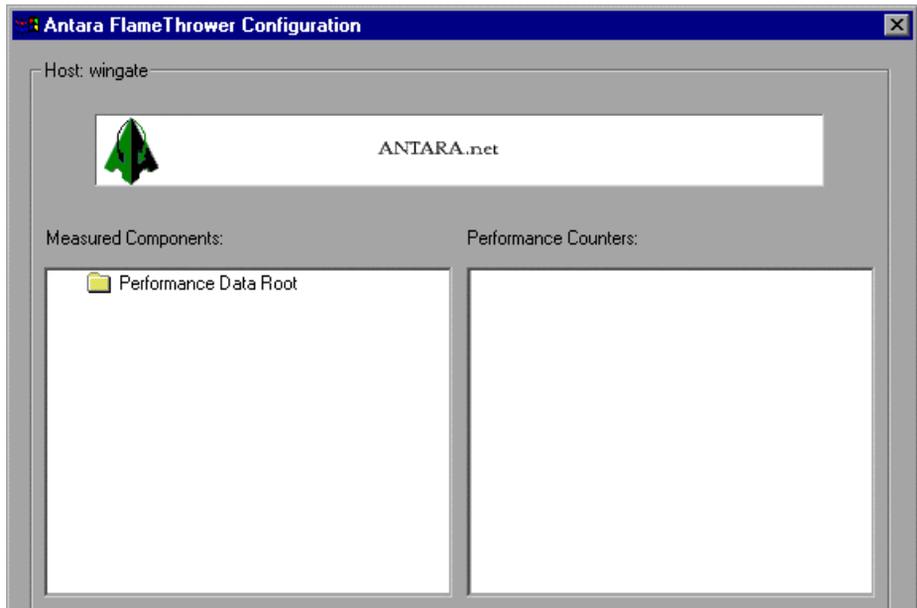
- 4** In the **Resource Measurements** section of the Antara FlameThrower dialog box, click **Add**.
- 5** Continue with Configuring the Antara FlameThrower Monitor below.

Configuring the Antara FlameThrower Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which measurements to monitor on the machine.

To configure the Antara FlameThrower monitor:

- 1 When you click **Add** in the **Resource Measurements** section of the Antara FlameThrower dialog box, the Antara FlameThrower Configuration dialog box opens.



- 2 Browse the Measured Components tree, and select performance counters, as described in “Understanding the Antara FlameThrower Configuration Dialog Box” on page 100, and then click **OK**.

For a description of the available measurements, see “Antara FlameThrower Performance Counters” on page 101.

The resources that you selected appear in the **Resource Measurements on:** *<machine>* section of the Antara FlameThrower dialog box.

- 3 In the controller click **OK** in the Antara FlameThrower dialog box, to activate the monitor.

Understanding the Antara FlameThrower Configuration Dialog Box

The Antara FlameThrower Configuration dialog box lets you select the items to monitor on the Antara FlameThrower application server.

- **Host.** Displays the name of the monitored machine.
- **Measured Components.** Displays the available components. Browse the tree and select the component you want to monitor. A description of the highlighted component appears in the Component/Counter Description box.
- **Performance Counters.** Check the required performance counters. A description of the selected counter appears in the Component/Counter Description box.
- **Component/Counter Description.** Displays a description of the selected component or counter.

Antara FlameThrower Performance Counters

The following tables describe the counters that can be monitored:

Layer Performance Counters

The following counters measure Layer performance:

Measurement	Description
TxBytes	The total number of Layer 2 data bytes transmitted.
TxByteRate(/sec)	The number of Layer 2 data bytes transmitted per second.
TxFrames	The total number of packets transmitted.
TxFrameRate(/sec)	The number of packets transmitted per second.
RxBytes	The total number of Layer 2 data bytes received.
RxByteRate(/sec)	The number of Layer 2 data bytes received per second.
RxFrames	The total number of packets received.
RxFrameRate(/sec)	The number of packets received per second.

TCP Performance Counters

The following counters measure TCP performance:

Measurement	Description
ActiveTCPConns	Total number of currently active TCP connections.
SuccTCPConns	Total number of SYN ACK packets received.
SuccTCPConn Rate(/sec)	Number of SYN ACK packets received per second.
TCPConnLatency (milisec)	Interval between transmitting a SYN packet and receiving a SYN ACK reply packet in msec.
MinTCPConn Latency(milisec)	Minimum TCPConnectionLatency in msec.
MaxTCPConn Latency(milisec)	Maximum TCPConnectionLatency in msec.

Measurement	Description
TCPSndConnClose	Total number of FIN or FIN ACK packets transmitted (Client).
TCPRcvConnClose	Total number of FIN or FIN ACK packets received (Client).
TCPSndResets	Total number of RST packets transmitted.
TCPRcvResets	Total number of RST packets received.
SYNSent	Total number of SYN packets transmitted.
SYNSentRate(/sec)	Number of SYN packets transmitted per second.
SYNAckSent	Total number of SYN ACK packets transmitted.
SYNAckRate(/sec)	Number of SYN ACK packets transmitted per second.

HTTP Performance Counters

The following counters measure HTTP performance:

Measurement	Description
HTTPRequests	Total number of HTTP Request command packets transmitted.
HTTPRequestRate (/sec)	Number of HTTP Request packets transmitted per second.
AvgHTTPData Latency(miliseconds)	The average HTTP Data Latency over the past second in msec.
HTTPData Latency(miliseconds)	Interval between transmitting a Request packet and receiving a response in msec.
DataThroughput (bytes/sec)	The number of data bytes received from the HTTP server per second.
MinHTTPData Latency(miliseconds)	Minimum HTTPDataLatency in msec.
MaxHTTPData Latency(miliseconds)	Maximum HTTPDataLatency in msec.

Measurement	Description
MinData Throughput (bytes/sec)	Minimum HTTPDataThroughput in seconds.
MaxData Throughput (bytes/sec)	Maximum HTTPDataThroughput in seconds.
SucHTTPRequest	Total number of successful HTTP Request Replies (200 OK) received.
SucHTTPRequest Rate(/sec)	Number of successful HTTP Request Replies (200 OK) received per second.
UnSucHTTP Requests	Number of unsuccessful HTTP Requests.

SSL/HTTPS Performance Counters

The following counters measure SSL/HTTPS performance:

Measurement	Description
SSLConnections	Number of ClientHello messages sent by the Client.
SSLConnection Rate(/sec)	Number of ClientHello messages sent per second.
SuccSSL Connections	Number of successful SSL Connections. A successful connection is one in which the Client receives the Server's finished handshake message without any errors.
SuccSSLConnection Rate(/sec)	Number of successful SSL connections established per second.
SSLAlertErrors	Number of SSL alert messages received by the client (e.g. bad_record_mac, decryption_failed, handshake_failure, etc.)
SuccSSLResumed Sessions	Number of SSL Sessions that were successfully resumed.
FailedSSLResumed Sessions	Number of SSL Sessions that were unable to be resumed.

Sticky SLB Performance Counters

The following counters measure Sticky SLB performance:

Measurement	Description
Cookie AuthenticationFail	The number of Cookie's that were not authenticated by the Server.
SuccCookie Authentication	The number of Cookie's authenticated by the server.
SSLClientHellos	The number of Client Hello packets sent to the server.
SSLServerHellos	The number of Server Hello packets sent to back to the client.
SSLSessionsFailed	The number of Session ID's that were not authenticated by the server.
SSLSessions Resumed	The number of Session ID's authenticated by the server.
succSSLClientHellos	The number of Client Hello replies received by the client or packets received by the server.
succSSLServerHellos	The number of Server Hello's received by the client.

FTP Performance Counters

The following counters measure FTP performance:

Measurement	Description
TPUsers	Total number of FTP User command packets transmitted.
FTPUserRate(/sec)	Number of FTP User command packets transmitted per second.
FTPUserLatency (milisecs)	Interval between transmitting a FTP User command packet and receiving a response in msec.
MinFTPUserLatency(milisecs)	Minimum FTPUsersLatency in msec.
MaxFTPUserLatency(milisecs)	Maximum FTPUsersLatency in msec.

Measurement	Description
SuccFTPUsers	Total number of successful FTP User command replies received.
SuccFTPUserRate (/sec)	Number of successful FTP User command replies received per second.
FTPPasses	Total number of FTP PASS packets transmitted.
FTPPassRate(/sec)	Number of FTP PASS packets transmitted per second.
FTPPassLatency (milisecs)	Interval between transmitting a FTP PASS packet and receiving a response in msec.
MinFTPPassLatency (milisecs)	Minimum FTPPassLatency in msec.
MaxFTPPassLatency (milisecs)	Maximum FTPPassLatency in msec.
SuccFTPPasses	Total number of successful FTP PASS replies received.
SuccFTPPassRate (/sec)	Number of successful FTP PASS replies received per second.
FTPControl Connections	Total number of SYN packets transmitted by the FTP client.
FTPControl ConnectionRate (/sec)	Number of SYN packets transmitted by the FTP client per second.
SuccFTPControl Connections	Total number of SYN ACK packets received by the FTP client.
SuccFTPControl ConnectionRate (/sec)	Number of SYN ACK packets received by the FTP Client per second.
FTPData Connections	Number of SYN ACK packets received by the FTP client per second.
FTPDataConnection Rate(/sec)	Number of SYN ACK packets transmitted by the FTP Client or received by the FTP Server per second.
SuccFTPData Connections	Total number of SYN ACK packets transmitted by the FTP Client or received by the FTP Server.

Measurement	Description
SuccFTPData ConnectionRate (/sec)	Number of SYN ACK packets received by the FTP server per second.
FtpAuthFailed	Total number of error replies received by the FTP client.
FTPGets	Total number of client Get requests.
FTPPuts	Total number of client Put requests.
SuccFTPGets	Total number of successful Get requests (data has been successfully transferred from server to client).
SuccFTPPuts	Total number of successful Put requests (data has been successfully transferred from client to server).

SMTP Performance Counters

The following counters measure SMTP performance:

Measurement	Description
SMTPHelos	Total number of HELO packets transmitted.
SMTPHeloRate(/sec)	Number of HELO packets transmitted per second.
SMTPHeloLatency (milisecs)	Interval between transmitting a HELO packet and receiving a response in msec.
MinSMTPHelo Latency(milisecs)	Minimum SMTPHeloLatency in msec.
MaxSMTPHelo Latency(milisecs)	Maximum SMTPHeloLatency in msec.
SuccSMTPHelos	Total number of successful HELO replies received.
SuccSMTPHelo Rate(/sec)	Number of successful HELO replies received per second.
SMTPMailFroms	Total number of Mail From packets transmitted.
SMTPMailFromRate (/sec)	Number of Mail From packets transmitted per second.

Measurement	Description
SMTPMailFrom Latency(milisecs)	Interval between transmitting a Mail From packet and receiving a response in msec.
MinSMTPMailFrom Latency(milisecs)	Minimum SMTPMailFromLatency in msec.
MaxSMTPMailFrom Latency(milisecs)	Maximum SMTPMailFromLatency in msec.
SuccSMTPMail Froms	Total number of successful Mail From replies received.
SuccSMTPMailFrom Rate(/sec)	Number of successful Mail From replies received per second.
SMTPRcptTos	Total number of RcptTo packets transmitted.
SMTPRcptToRate (/sec)	Number of RcptTo packets transmitted per second.
SMTPRcptTo Latency(milisecs)	Interval between transmitting a RcptTo packet and receiving a response in msec.
MinSMTPRcptTo Latency(milisecs)	Minimum SMTPRcptToLatency in msec.
MaxSMTPRcptTo Latency(milisecs)	Maximum SMTPRcptToLatency in msec.
SuccSMTPRcptTos	Total number of successful RcptTo replies received.
SuccSMTPRcptTo Rate(/sec)	Number of successful RcptTo replies received per second.
SMTPDataas	Total number of Data packets transmitted.
SMTPDataRate(/sec)	Number of Data packets transmitted per second.
SMTPDataLatency (milisecs)	Interval between transmitting a Data packet and receiving a response in msec.
MinSMTPData Latency(milisecs)	Minimum SMTPDataLatency in msec.
MaxSMTPData Latency(milisecs)	Maximum SMTPDataLatency in msec.

Measurement	Description
SuccSMTPDdatas	Total number of successful Data replies received.
SuccSMTPDataRate (/sec)	Number of successful Data replies received per second.

POP3 Performance Counters

The following counters measure POP3 performance:

Measurement	Description
POP3Users	Total number of Pop3 User command packets transmitted.
POP3UserRate(/sec)	Number of Pop3 User command packets transmitted per second.
POP3UserLatency (milisecs)	Interval between transmitting a Pop3 User command packet and receiving a response in msec.
MinPOP3User Latency(milisecs)	Minimum POP3UserLatency in msec.
MaxPOP3User Latency(milisecs)	Maximum POP3UserLatency in msec.
SuccPOP3Users	Total number of successful Pop3 User replies received.
SuccPOP3UserRate (/sec)	Number of successful Pop3 User replies received per second.
POP3Passes	Total number of Pop3 Pass command packets transmitted.
POP3PassRate(/sec)	Number of Pop3 Pass command packets transmitted per second.
POP3PassLatency (milisecs)	Interval between transmitting a Pop3 Pass packet and receiving a response in msec.
MinPOP3Pass Latency(milisecs)	Minimum POP3PassLatency in msec.
MaxPOP3Pass Latency(milisecs)	Maximum POP3PassLatency in msec.

Measurement	Description
SuccPOP3Passes	Total number of successful Pop3 Pass replies received.
SuccPOP3PassRate (/sec)	Number of successful Pop3 Pass replies received per second.
POP3Stats	Total number of Pop3 Stat command packets sent.
POP3StatRate(/sec)	Number of Pop3 Stat command packets transmitted per second.
POP3StatLatency (milisechs)	Interval between transmitting a Pop3 Stat packet and receiving a response in msec.
MinPOP3Stat Latency(milisechs)	Minimum POP3StatLatency in msec.
MaxPOP3Stat Latency(milisechs)	Maximum POP3StatLatency in msec.
SuccPOP3Stats	Total number of successful Pop3 Stat replies received.
SuccPOP3StatRate (/sec)	Number of successful Pop3 Stat replies received per second.
POP3Lists	Total number of Pop3 List command packets transmitted.
POP3ListRate(/sec)	Number of Pop3 List command packets transmitted per second.
POP3ListLatency (milisechs)	Interval between transmitting a Pop3 List packet and receiving a response in msec.
MinPOP3List Latency(milisechs)	Minimum POP3ListLatency in msec.
MaxPOP3List Latency(milisechs)	Maximum POP3ListLatency in msec.
SuccPOP3Lists	Total number of successful Pop3Lists received.
SuccPOP3ListRate (/sec)	Number of successful Pop3Lists received per second.
POP3Retrs	Total number of Pop3 Retr packets transmitted.
POP3RetrRate(/sec)	Number of Pop3 Retr packets transmitted per second.

Measurement	Description
POP3RetrLatency (milisecs)	Interval between transmitting a Pop3 Retr packet and receiving a response in msec.
MinPOP3Retr Latency(milisecs)	Minimum POP3RetrLatency in msec.
MaxPOP3Retr Latency(milisecs)	Maximum POP3RetrLatency in msec.
SuccPOP3Retrs	Total number of successful Pop3Retrs received.
SuccPOP3RetrRate (/sec)	Number of successful Pop3Retrs received per second.

DNS Performance Counters

The following counters measure DNS performance:

Measurement	Description
SuccPrimaryDNS Request	Total number of Successful DNS requests made to the Primary DNS server.
SuccSecondaryDNS Request	Total number of Successful DNS requests made to the Secondary DNS server.
SuccDNSData RequestRate(/sec)	Number of Successful DNS Request packets transmitted per second.
PrimaryDNSFailure	Total number of DNS requests failures received from the Primary DNS server.
PrimaryDNSRequest	Total number of DNS requests made to the Primary DNS server.
SecondaryDNS Failure	Total number of DNS requests failures received from the Secondary DNS server.
SecondaryDNS Request	Total number of DNS requests made to the Secondary DNS server.
MinDNSData Latency	Minimum DNS Data Latency in msec.

Measurement	Description
MaxDNSData Latency	Maximum DNS Data Latency in msec.
CurDNSData Latency	Interval between sending a DNS request packet and receiving a response in msec.
DNSDataRequest Rate(/sec)	Number of DNS Request packets transmitted per second.
NoOf ReTransmission	Total number of DNS Request packets retransmitted.
NoOfAnswers	Total number of Answers to the DNS Request packets.

Attack Performance Counters

The following counters measure Attack performance:

Measurement	Description
Attacks	Total number of attack packets transmitted (All Attacks)
AttackRate(/sec)	Number of attack packets transmitted per second (ARP, Land, Ping, SYN, and Smurf)
Havoc Flood	Number of Havoc packets generated (Stacheldraht only)
Icmp Flood	Number of ICMP attack packets generated (TFN, TFN2K, & Stacheldraht)
Mix Flood	Number of Mix packets generated (TFN2K only)
Mstream Flood	Number of Mstream packets generated (Stacheldraht only)
Null Flood	Number of Null packets generated (Stacheldraht only)
Smurf Flood	Number of Smurf packets generated (TFN, TFN2K, & Stacheldraht)
Syn Flood	Number of SYN packets generated (TFN, TFN2K, & Stacheldraht)

Measurement	Description
Targa Flood	Number of Targa packets generated (TFN2K only)
Udp Flood	Number of UDP packets generated (All DDoS Attacks only)

10

SiteScope Resource Monitoring

The SiteScope Resources monitor graph shows the SiteScope resources measured during the scenario. The SiteScope monitor can measure server, network, and processor performance counters. For detailed information on the performance counters that SiteScope can monitor, refer to the relevant SiteScope documentation.

To obtain data for this graph, you need to select the desired measurements for the online monitor (from the Controller) before running the scenario.

This chapter includes:

- ▶ Setting up the Monitoring Environment on page 113
- ▶ Adding a Machine to Monitor on page 114
- ▶ Configuring the SiteScope Monitor on page 115

Setting up the Monitoring Environment

You select measurements to poll from SiteScope using the SiteScope Monitor Configuration dialog box.

Before setting up the SiteScope monitor:

- ▶ Ensure that SiteScope has been installed on a server. You can install SiteScope on the same machine as the Controller, or on a dedicated server. If SiteScope is installed on a machine other than the Controller, verify that the SiteScope machine is accessible from the Controller machine.

Adding a Machine to Monitor

In order to monitor the SiteScope Resources of a particular machine from the Controller, you need to add the machine and the measurements you want to monitor.

To add a machine to the Controller:

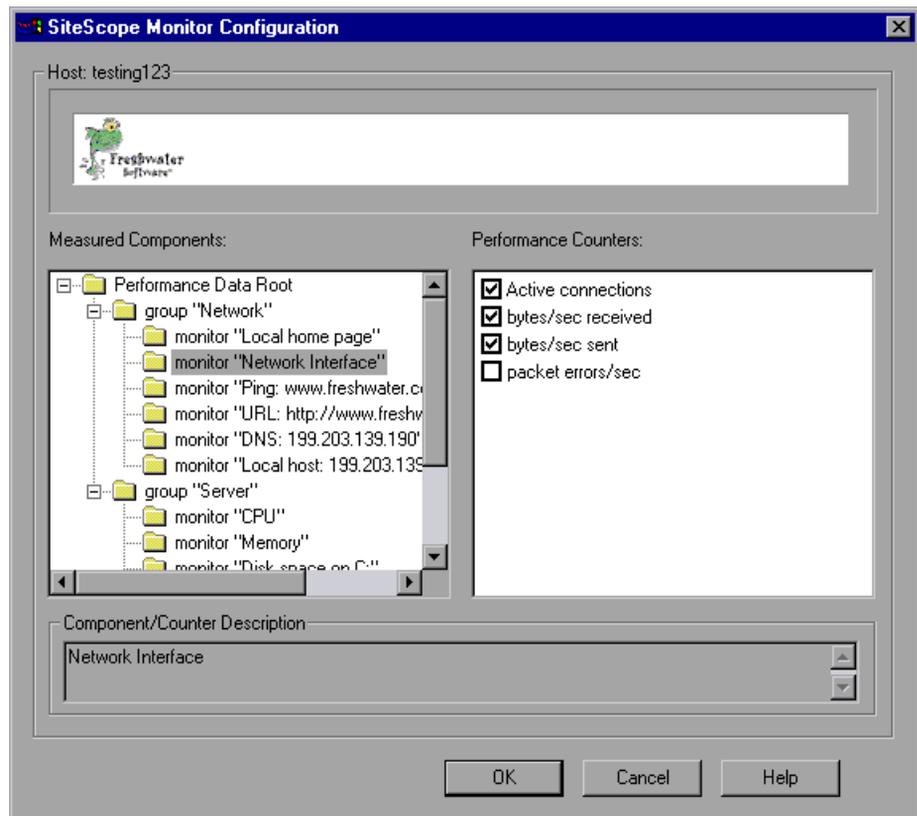
- 1** Click the SiteScope graph in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The SiteScope dialog box opens.
- 3** In the **Monitored Server Machines** section, click **Add**.
- 4** Enter the server name or IP address of the machine you want to monitor, and select the platform on which the machine runs, and then click **OK**.
- 5** In the **Resource Measurements** section of the SiteScope dialog box, click **Add**.
- 6** Continue with “Configuring the SiteScope Monitor” on page 115.

Configuring the SiteScope Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which measurements to monitor on the machine.

To configure the SiteScope monitor:

- 1 When you click **Add** in the **Resource Measurements on: <machine>** section of the SiteScope dialog box, the SiteScope Monitor Configuration dialog box opens displaying the available measurements.



- 2 Browse the Measured Components tree, and select performance counters, as described in “Understanding the SiteScope Monitor Configuration Dialog Box” on page 116.

- 3 Click **OK**. The components that you selected appear in the **Resource Measurements on: <machine>** section of the SiteScope dialog box.
- 4 Click **OK** in the SiteScope Monitor Configuration dialog box, and then in the SiteScope dialog box to activate the monitor.

Note: SiteScope can only be monitored by one Controller at a time.

Understanding the SiteScope Monitor Configuration Dialog Box

Lets you select the items to monitor on the SiteScope application server.

- **Host.** Displays the name of the monitored machine.
- **Measured Components.** Displays the available components. Browse the tree and select the component you want to monitor. A description of the highlighted component appears in the Component/Counter Description box.
- **Performance Counters.** Check the required performance counters. A description of the selected counter appears in the Component/Counter Description box.
- **Component/Counter Description.** Displays a description of the selected component or counter.

Part V

Network Delay Monitoring

11

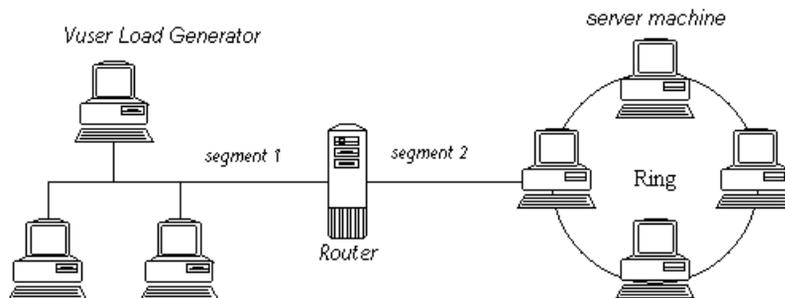
Introduction to Network Monitoring

You use Network monitoring to determine whether your network is causing a delay in the scenario. You can also determine the problematic network segment.

Network configuration is a primary factor in the performance of applications. A poorly designed network can slow client activity to unacceptable levels.

In a true Web or client/server system, there are many network segments. A single network segment with poor performance can affect the entire system.

The following diagram shows a typical network. To go from the server machine to the User machine, data must travel over several segments.



To measure network performance, the Network monitor sends packets of data across the network. When a packet returns, the monitor calculates the time it takes for the packet to go to the requested node and return. This time is the delay which appears in the Network Delay Time graph.

Using the online Network Delay Time graph, you can locate the network-related problem so that it can be fixed.

Note: The delays from the source machine to each of the nodes are measured concurrently, yet independently. It is therefore possible that the delay from the source machine to one of the nodes could be greater than the delay for the complete path between the source and destination machines.

12

Network Delay Monitoring

You use Network Delay monitoring to determine whether your network is causing a delay in the scenario. You can also determine the problematic network segment.

The Network Delay Time monitor shows the delays for the complete path between the source and destination machines (for example the database server and Vuser host). The graph maps the delay as a function of the elapsed scenario time. Each defined path is represented by a separate line with a different color in the graph.

Note: To run the Network monitor, you must have administrator privileges on the Windows source machine (unless you are using the ICMP protocol).

This chapter includes:

- ▶ Setting up the Monitoring Environment on page 122
- ▶ Adding a Machine to Monitor on page 126
- ▶ Configuring the Network Delay Time Monitor on page 128
- ▶ Network Monitoring over a Firewall on page 132
- ▶ Viewing the Network Delay Time Graph on page 133

Setting up the Monitoring Environment

- ▶ You configure the Network monitor from the Run view of the Controller before you begin running a scenario.

Note: To enable network monitoring, you must install the LoadRunner agent on the source machine. You do not have to install the LoadRunner agent on the destination machine.

- ▶ You can run the Network monitor on UNIX source machines, using UDP or ICMP. Before running the Network monitor from a UNIX source machine:
 - ▶ configure the source machine by assigning root permissions to the **merc_webtrace** process.
 - ▶ make the necessary adjustments to either connect to the source machine through RSH, or through the agent.

This section includes:

- ▶ Configuring the Unix Source Machine
- ▶ Connecting to the Unix Source Machine Through RSH
- ▶ Connecting to the Unix Source Machine Through the Agent

Configuring the Unix Source Machine

You configure the source machine by assigning root permissions to the **merc_webtrace** process.

To configure the source machine, where LoadRunner is installed locally:

- 1 Log in to the source machine as root.
- 2 Type: `cd <LoadRunner_installation>/bin` to change to the **bin** directory.
- 3 Type: `chown root merc_webtrace` to make the root user the owner of the **merc_webtrace** file.
- 4 Type: `chmod +s merc_webtrace` to add the s-bit to the file permissions.

- 5** To verify, type `ls -l merc_webtrace`. The permissions should look like this: `-rwsrwsr-x`.

To configure the source machine, where LoadRunner is installed on the network:

In a LoadRunner network installation, the `merc_webtrace` process is on the network, not on the source machine disk. The following procedure copies the `merc_webtrace` file to the local disk, configures `mdrv.dat` to recognize the process, and assigns root permissions to `merc_webtrace`:

- 1** Copy `merc_webtrace` from `<LoadRunner_installation>/bin` to anywhere on the local disk of the source machine. For example, to copy the file to the `/local/<LoadRunner>` directory, type: `cp /net/tools/LoadRunner_installation/bin/merc_webtrace /local/<LoadRunner>`

Note: All of the source machines that use the same network installation must copy `merc_webtrace` to the identical directory path on their local disk (for example, `/local/<LoadRunner>`), since all of them use the same `mdrv.dat`.

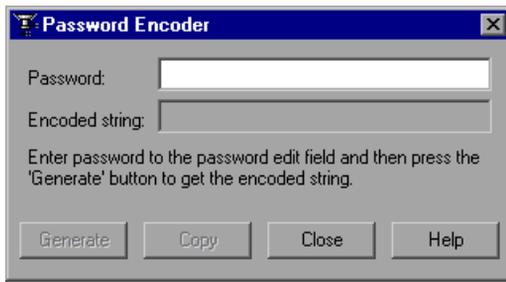
- 2** Add the following line to the `<LoadRunner_installation>/dat/mdrv.dat` file, in the `[monitors_server]` section:
- ```
ExtCmdLine=-merc_webtrace_path /local/xxx
```
- 3** Log in to the source machine as root.
- 4** Type: `cd LoadRunner_installation/bin` to change to the `bin` directory.
- 5** Type: `chown root merc_webtrace` to make the root user the owner of the `merc_webtrace` file.
- 6** Type: `chmod +s merc_webtrace` to add the s-bit to the file permissions.
- 7** To verify, type `ls -l merc_webtrace`. The permissions should look like: `-rwsrwsr-x`.

## Connecting to the Unix Source Machine Through RSH

If the Controller is connected to the source machine through RSH (default connection mode), you do not need to activate the agent daemon. Before running the Network monitor the first time, you enter an encrypted user name and password in the Network monitor configuration file.

To create an encrypted user name and password:

- 1 On the Windows taskbar, click **Start**, point to **Programs > LoadRunner > Tools**, and click **Password Encoder**. The Password Encoder window opens.



- 2 In the **Password** box, type your RSH user name and password, separated by a vertical bar symbol. For example, myname|mypw.
- 3 Click **Generate**. An encoded string is displayed in the Encoded string field.
- 4 Click **Copy** to copy the encoded string to the clipboard.
- 5 Add the following line to the `<LoadRunner_installation>/dat/monitors/ndm.cfg` file, in the [hosts] section:

Host = <encrypted string copied from clipboard>

- 6 Close and open the current scenario. LoadRunner will read the updated configuration file and recognize the source machine for monitoring.

## Connecting to the Unix Source Machine Through the Agent

If the Controller is not connected to the source machine through RSH, make sure that the agent daemon is active on the source machine before running the Network monitor. For more information about working without RSH, refer to the section titled “UNIX Shell” in Appendix D, “Troubleshooting the Controller” in the *HP LoadRunner Controller User's Guide*.

### To activate the agent daemon:

If you are not working in RSH, invoke the agent daemon on the source machine.

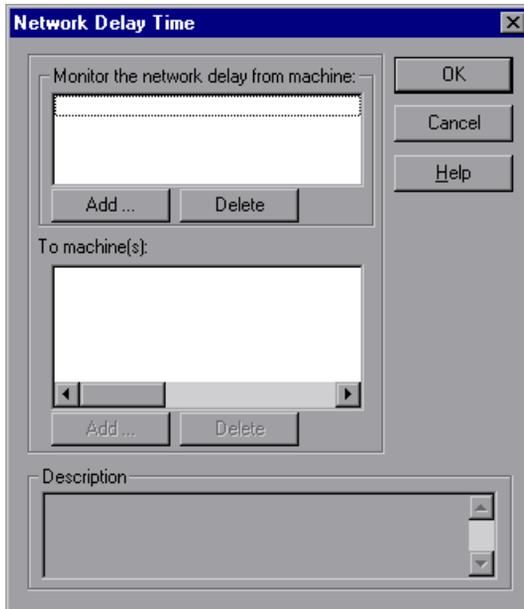
- 1** Type `m_daemon_setup -install` from the `<LoadRunner_installation>/bin` directory.
- 2** Make sure that the agent daemon is running whenever you activate the Network monitor.
- 3** To stop the Network Delay Monitor agent daemon, type `m_daemon_setup -remove`.

## Adding a Machine to Monitor

In order to monitor the resources of a particular machine you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

- 1 In the graph tree view, select the **Network Delay Time** graph and drag it into the right pane.
- 2 Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The Network Delay Time dialog box opens.



- 3 In the **Monitor the network delay from machine** section, click **Add**, and enter the server name or IP address of the source machine, from which you want the network path monitoring to begin. Select the platform on which the machine runs, and click **OK**.

- 4 In the **To machine(s)** section of the Network Delay Time dialog box, click **Add** to enter the name of the machine at the final destination of the path you want to monitor.
- 5 Continue with “Configuring the Network Delay Time Monitor” on page 128.

### Understanding the Network Delay Time Dialog Box

The Network Delay Time dialog box enables you to select the network path you want to monitor.

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**Note:** To run the Network monitor, you must have administrator privileges on the source machine (unless you are using the ICMP protocol).

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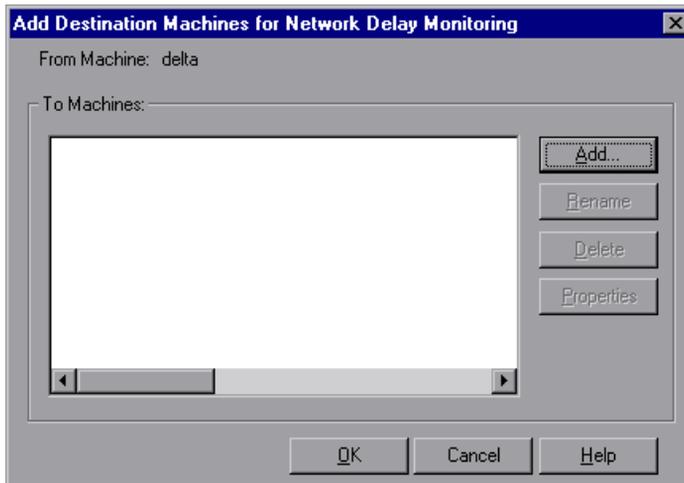
- **Monitor the network delay from machine.** Displays the name of the machine from which network monitoring begins. Click **Add** to enter the name of a machine.
  - **Add.** Opens the Add Machine dialog box. Enter the server name or IP address of the source machine, from which you want the network path monitoring to begin. Select the platform on which the machine runs, and click **OK**. Repeat this for each path you want to monitor.
  - **Delete.** Removes the source machine.
- **To machine(s).**
  - **Add.** Opens the Adding Destination Machines for Network Delay Monitoring dialog box.
  - **Delete.** Removes the destination machine.
- **Description.** Displays the name and platform of the highlighted machine.

## Configuring the Network Delay Time Monitor

You use the Add Destination Machines for Network Delay Monitoring dialog box to configure the Network Delay monitor.

**To configure the Network Delay monitor:**

- 1 When you click **Add** in the **To machine(s)** section of the Network Delay Time dialog box, the Add Destination Machines for Network Delay Monitoring dialog box opens.



To add a machine, click **Add**. The New Machine Name dialog box opens.

- 2 Enter the name of the destination machine and click **OK**. The name of the machine appears in the Add Destination Machines for Network Delay Monitoring dialog box. Repeat this procedure for each path you want to monitor, and then click **OK**.

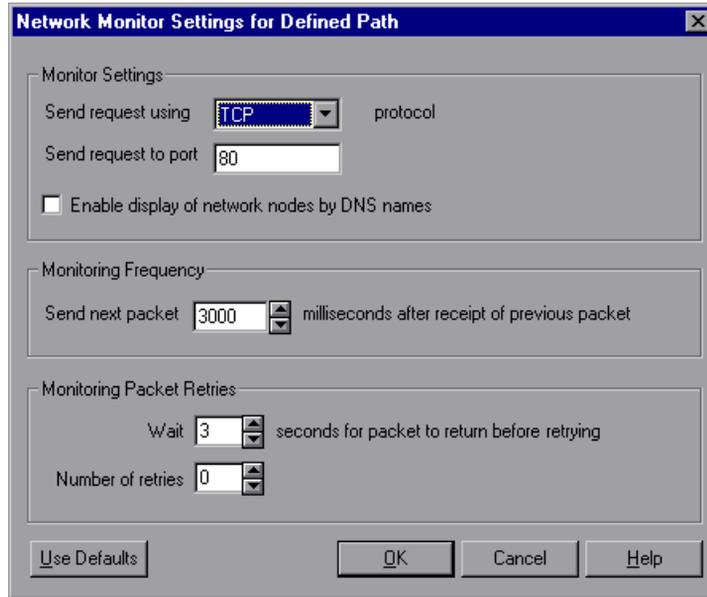
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**Note:** If the destination machine is localhost, enter the local machine's name and not localhost.

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- To rename a machine, click **Rename**, and enter a new name for the machine.

- ▶ To delete a machine, select it and click **Delete**.
- 3** Click **Properties** to configure additional network monitor settings. The Network Monitor Settings for Defined Path dialog box opens.



- 4** In the Monitor Settings box, select the protocol and enter the port number being used by the network path. The Network monitor supports three protocols: TCP, UDP, and ICMP. It is recommended that you use the default protocol. In Windows, the default is TCP, and in UNIX, the default is UDP.
- 5** Select **Enable display of network nodes by DNS names** if you want to view the DNS name of each node along the network path, in addition to its IP address.

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**Note:** Selecting this option will decrease the speed of the Network monitor.

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- 6** In the Monitoring Frequency box, select the number of milliseconds the monitor should wait between receiving a packet and sending out the next packet. The default value is 3000 milliseconds. If you have a long, steady scenario, you can increase the interval by several seconds.

- 7 In the Monitoring Packet Retries box, select the maximum number of seconds that the monitor should wait for a packet to return before it retries to send the packet. The default value is 3 seconds. If your network is very large and loaded (an internet connection with a low capacity), you should increase the value by several seconds. If you have a small network (such as a LAN), you can decrease the value.

In addition, select the number of times the Network monitor should try resending a packet to a node if the packet is not initially returned. The default value is 0.

### **Adding Destination Machines for Network Delay Monitoring Dialog Box**

Enables you to add destination machines for network delay monitoring, and configure additional network monitor settings.

- **From Machine.** Displays the name of the source machine.
- **To Machines.** Displays the names or URLs of the destination machines.
- **Add.** Enter the name or URL of the machine at the final destination of the path you want to monitor in the New Machine Name dialog box. Repeat this for each path you want to monitor.
- **Rename.** Renames the destination machine.
- **Delete.** Deletes the destination machine.
- **Properties.** Opens the Configuring Network Monitor Settings for Defined Path dialog box.

### **Configuring Network Monitor Settings for Defined Path Dialog Box**

Lets you set the protocol, port, monitoring frequency, and monitoring packet retries.

- **Monitor Settings.**
  - **Send request using X protocol.** Select the network protocol you want the monitor to use. The Network monitor supports three protocols: TCP, UDP, and ICMP. It is recommended that you use the default protocol, TCP, unless it is necessary for you to use UDP or ICMP.

**Note:** When you use TCP or UDP protocols, administrator privileges are required on the source machine.

- **Send request to port.** Enter the port number to be used by the network path.
- **Enable display of network nodes by DNS names.** Enables you to view the DNS name of each node along the network path, in addition to its IP address.

**Note:** Selecting this option will decrease the speed of the Network monitor.

➤ **Monitoring Frequency.**

- **Send next packet X milliseconds after receipt of previous packet.** Select the number of milliseconds the monitor should wait between receiving a packet and sending out the next packet. The default value is 3000 milliseconds.

**Note:** If you have a long, steady scenario, you can increase the interval by several seconds.

➤ **Monitoring Packet Retries.**

- **Wait X seconds for packet to return before retrying.** Select the maximum number of seconds that the monitor should wait for a packet to return before it retries to send the packet. The default value is 3 seconds.

If your network is very large and loaded (an internet connection with a low capacity), you should increase the value by several seconds. If you have a small network (such as a LAN), you can decrease the value.

- **Number of retries.** Select the number of times the monitor should try resending a packet to a node if the packet is not initially returned. The default value is 0.

➤ **Use Defaults.** Sets all settings to their default values.

## Network Monitoring over a Firewall

If you are monitoring a network in which there are firewalls between the source and the destination machines, you must configure the firewalls to allow the network data packets to reach their destinations.

- ▶ If you are using the TCP protocol, the firewall that protects the destination machine should not block outgoing ICMP\_TIMEEXCEEDED packets (packets that are sent outside the firewall from the machine). In addition, the firewall protecting the source machine should allow ICMP\_TIMEEXCEEDED packets to enter, as well as TCP packets to exit.
- ▶ If you are using the ICMP protocol, the destination machine's firewall should not block incoming ICMP\_ECHO\_REQUEST packets, or outgoing ICMP\_ECHO\_REPLY and ICMP\_ECHO\_TIMEEXCEEDED packets. In addition, the firewall protecting the source machine should allow ICMP\_ECHO\_REPLY and ICMP\_ECHO\_TIMEEXCEEDED packets to enter, and ICMP\_ECHO\_REQUEST packets to exit.
- ▶ If you are using the UDP protocol, ensure that the UDP protocol can access the destination machine from the source machine. The destination machine's firewall should not block outgoing ICMP\_DEST\_UNREACHABLE and ICMP\_ECHO\_TIMEEXCEEDED packets. In addition, the firewall protecting the source machine should allow ICMP\_DEST\_UNREACHABLE and ICMP\_ECHO\_TIMEEXCEEDED packets to enter.

---

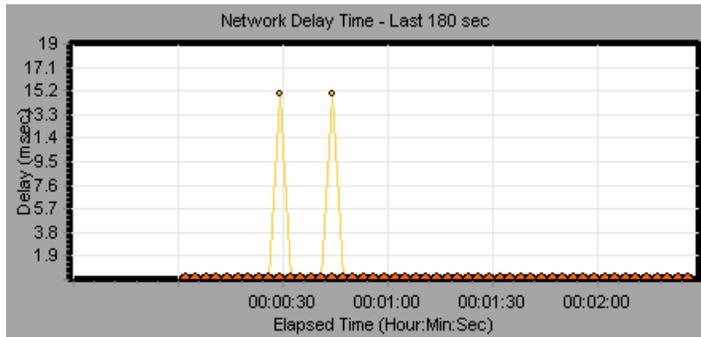
**Note:** To run the Network Delay monitor when there are firewalls between the Controller and the source machine, you must configure the LoadRunner agent, MI Listener, and Network Delay monitor for monitoring over a firewall. For more information about configuring LoadRunner Agents inside the firewall, installing and configuring the MI Listener outside the firewall, and configuring the Network Delay monitor over a firewall, see the relevant chapters in the *HP LoadRunner Controller User's Guide*.

---

## Viewing the Network Delay Time Graph

The **Network Delay Time** graph shows the delay for the complete path between the source and destination machines (y-axis) as a function of the elapsed scenario time (x-axis).

Each path defined in the Add Destination Machines for Network Delay Monitoring dialog box is represented by a separate line with a different color in the graph.



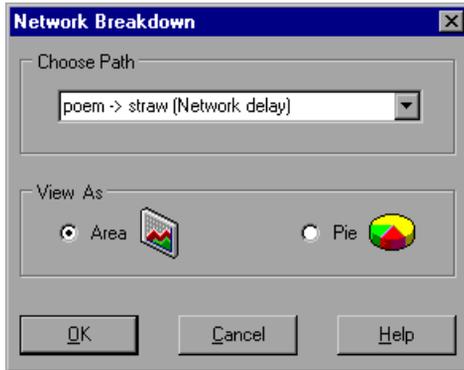
To view the DNS names of the measurements displayed in the legend, right-click the graph and select **View as DNS Name**.

To view the delay time from the source machine to each of the nodes along the network path, right-click the graph and select **Configure**. In the Graph Configuration dialog box, click **SubPaths**.

In addition, you can view the delay time for each segment of the path.

**To view the delay time for the network segments:**

- 1 Right-click the Network Delay Time graph, and select **View Segments**. The Network Breakdown dialog box opens.



- 2 Select the path that you want to break down.
- 3 Choose whether you want to view the network segments of the graph you chose as an area graph or a pie graph.
- 4 Click **OK** to close the Network Breakdown dialog box. The delay time for the network segments of the path you chose is displayed in the graph view area.

---

**Note:** The segment delays are measured approximately, and do not add up to the network path delay which is measured exactly. The delay for each segment of the path is estimated by calculating the delay from the source machine to one node and subtracting the delay from the source machine to another node. For example, the delay for segment B to C is calculated by measuring the delay from the source machine to point C, and subtracting the delay from the source machine to point B.

---

To return to the complete path delay time view, select **Hide Segments** from the right-click menu.

# **Part VI**

---

## **Firewall Monitoring**



# 13

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## Firewall Server Performance Monitoring

The Firewall server online monitor measures the performance of a Firewall server during scenario execution, which enables isolation of server performance bottlenecks.

The Check Point FireWall-1 monitor displays statistics about the resource usage on Check Point's FireWall during the scenario run.

### **This chapter includes:**

- ▶ Setting up the Monitoring Environment on page 137
- ▶ Adding a Machine to Monitor on page 138
- ▶ Configuring the Check Point FireWall-1 Server Monitor on page 139
- ▶ Check Point FireWall-1 Performance Counters on page 141

### **Setting up the Monitoring Environment**

To obtain performance data, you must activate the Firewall server monitor (before executing the scenario) and indicate which statistics and measurements you want to monitor.

## Adding a Machine to Monitor

In order to monitor the Check Point FireWall-1 resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

- 1** Click the Check Point FireWall-1 graph in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The Check Point FireWall-1 dialog box opens.

In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.

- 3** Enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs, and click **OK**.

---

**Note:** You can specify a machine name and port number in the Add Machine dialog box using the following format:  
<machine name>:<port number>

---

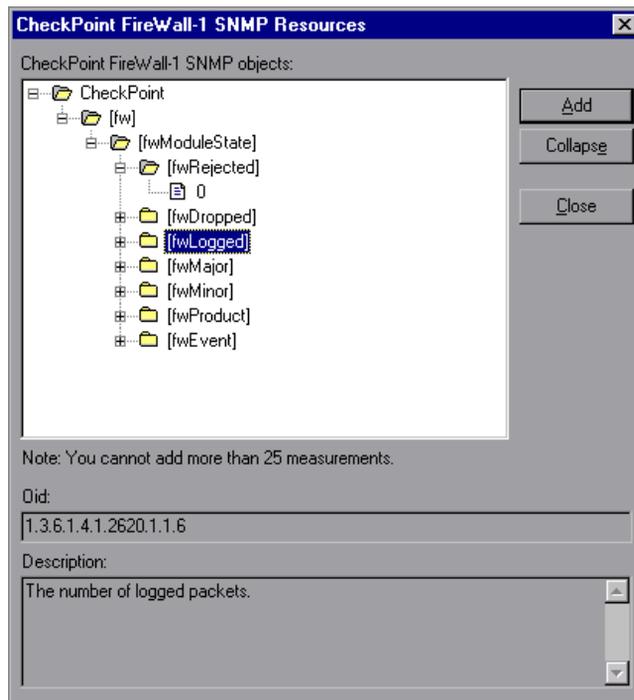
- 4** In the **Resource Measurements** section of the Check Point FireWall-1 dialog box, click **Add**.
- 5** Continue with Configuring the Check Point FireWall-1 Server Monitor below.

## Configuring the Check Point FireWall-1 Server Monitor

To monitor the Check Point FireWall-1 server, you must select the counters you want the Check Point FireWall-1 server monitor to measure (from the Controller). You select these counters using the Check Point FireWall-1 SNMP Resources dialog box.

**To configure the Check Point FireWall-1 server monitor:**

- 1 The Check Point FireWall-1 SNMP Resources dialog box opens.



- 2 Browse the FireWall-1 Objects list and select the measurements you want to monitor, as described in “Understanding the CheckPoint FireWall-1 Dialog Box” on page 141.

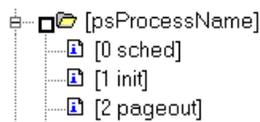
For a description of the available measurements, see “Check Point FireWall-1 Performance Counters” on page 141.

- 3 Add all the desired resources to the list, and click **Close**.
- 4 Click **OK** in the Check Point FireWall-1 dialog box to activate the monitor.

### Improving the Level of Measurement Information

You can improve the level of measurement information for the Check Point FireWall-1 monitor by enabling measurements with string values to be listed (in addition to measurements with numeric values), and by enabling the name modifier (which displays the string value as an identifying part of the measurement name).

In the following example of a measurement using the name modifier, the string value of ProcessName (sched) is displayed in addition to its instance ID (0):



To enable this feature, add the following line to the <LoadRunner root folder>\dat\monitors\snmp.cfg file:

```
SNMP_show_string_nodes=1
```

Usage Notes: You can select more than one name modifier, but the first in the hierarchy will be used. Each time the Check Point FireWall-1 Add Measurements dialog box opens, the information is reread from the **snmp.cfg** file. You cannot add the same measurement twice (once with a name modifier and once without it). If you do so, an error message is issued.

## Understanding the CheckPoint FireWall-1 Dialog Box

The CheckPoint FireWall-1 dialog box lets you select the CheckPoint FireWall-1 server resources to monitor using the Simple Network Management Protocol (SNMP).

- **CheckPoint FireWall-1 SNMP Objects.** Select each required object and click **Add**. Click **Explain** for the ID number and a description of the selected object.
- **Explain.** Displays a description of the selected object.

---

**Note:** The CheckPoint FireWall-1 monitor can only monitor up to 25 measurements.

---

## Check Point FireWall-1 Performance Counters

The following default counters can be monitored:

| Measurement | Description                     |
|-------------|---------------------------------|
| fwRejected  | The number of rejected packets. |
| fwDropped   | The number of dropped packets.  |
| fwLogged    | The number of logged packets.   |



# **Part VII**

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## **Web Server Resource Monitoring**



# 14

---

## Introduction to Web Server Resource Monitoring

Using LoadRunner's Web Server Resource monitors, you monitor the Apache, Microsoft IIS, iPlanet (SNMP), and iPlanet/Netscape servers during a scenario run and isolate server performance bottlenecks.

**This chapter includes:**

- ▶ About Web Server Resource Monitors on page 145
- ▶ Monitoring Using a Proxy Server on page 146

### About Web Server Resource Monitors

Web Server Resource monitors provide you with information about the resource usage of the Apache, Microsoft IIS, iPlanet (SNMP), and iPlanet/Netscape Web servers during scenario execution. To obtain this data, you need to activate the online monitor for the server and specify which resources you want to measure before executing the scenario.

The procedures for selecting monitor measurements and configuring the monitors vary according to server type. The following sections contain specific configuration instructions for each server type.

---

**Note:** Certain measurements or counters are especially useful for determining server performance and isolating the cause of a bottleneck during an initial stress test on a Web server. For more information about these counters, see "Useful Counters for Stress Testing" on page 544.

---

## Monitoring Using a Proxy Server

LoadRunner allows you to monitor using the Apache and Netscape monitors when there is a proxy server between the Controller and the monitored server. To enable this, you must define settings in your configuration file: in `<LoadRunner root folder>\dat\monitors\apache.cfg` for the Apache monitor, or in `<LoadRunner root folder>\dat\monitors\Netscape.cfg` for the Netscape monitor.

Before defining settings, you need to determine whether you want LoadRunner to obtain proxy settings from your Internet Explorer connection configuration, or from the proxy settings in the configuration file.

### To have LoadRunner read proxy settings from your Internet Explorer connection:

- 1 In the Proxy Settings section of the configuration file, assign **useProxy** a value of 1.
- 2 If the proxy requires a username, password, or domain, enter these parameters on the lines **proxyUsername**, **proxyPassword**, and **proxyDomain**.

### To have LoadRunner read proxy settings from the configuration file:

- 1 In the Proxy Settings section of the configuration file, enter the proxy information on the **httpProxy** line. Use the format:  
[<protocol>=][<scheme>://]<proxy>[:<port>][[<protocol>=][<scheme>://]  
<proxy>[:<port>]]

For example:

```
httpProxy=http=http://my_http_proxy:8080 https=https://my_https_proxy:9000
```

- 2 If the proxy requires a username, password, or domain, enter these parameters on the lines **proxyUsername**, **proxyPassword**, and **proxyDomain**.

### To have LoadRunner connect directly to the server (any proxy settings are ignored):

- In the Proxy Settings section of the configuration file, assign **useProxy** a value of 0.

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---

## Apache Monitoring

This Web Server Resource monitor displays statistics about the resource usage on the Apache server during the scenario run.

**This chapter includes:**

- ▶ Setting up the Monitoring Environment on page 147
- ▶ Adding a Machine to Monitor on page 148
- ▶ Configuring the Apache Monitor on page 149
- ▶ Apache Performance Counters on page 151

### Setting up the Monitoring Environment

- ▶ To obtain data for this graph, you need to configure the Apache online monitor (from the Controller) and select the measurements you want to display, before running the scenario.
- ▶ To monitor an Apache server you need to know the server statistics information URL. A simple way to verify the statistics information URL is to try to view it through the browser.

The URL should be in the following format:

`http://<server name/IP address>:<port number>/server-status?auto`

For example:

`http://stimpy:80/server-status?auto`

- To change the default server properties, open the **apache.cfg** file in the <LoadRunner root folder>\dat\monitors directory, and edit the following parameters after the Delimiter=: statement:

|                     |                                                                                                                                                                                                                                                                                           |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>InfoURL</b>      | server statistics information URL                                                                                                                                                                                                                                                         |
| <b>ServerPort</b>   | server port number                                                                                                                                                                                                                                                                        |
| <b>SamplingRate</b> | rate (milliseconds) at which the LoadRunner monitor will poll the server for the statistics information. If this value is greater than 1000, LoadRunner will use it as its sampling rate. Otherwise, it will use the sampling rate defined in the Monitors tab of the Options dialog box. |

---

**Note:** To monitor an Apache server through a firewall, use the Web server port (by default, port 80).

---

## Adding a Machine to Monitor

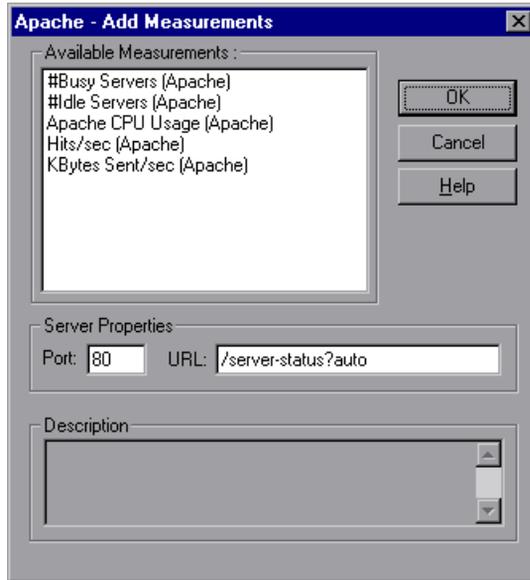
In order to monitor the Apache server from the Controller, you need to add the machine and the measurements you want to monitor.

### To add a machine to the Controller

- 1 Click the Apache graph in the graph tree, and drag it into the right pane of the Run view.
- 2 Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The Apache dialog box opens.  
  
In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.
- 3 Enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs, and click **OK**.
- 4 In the **Resource Measurements** section of the Apache dialog box, click **Add**.
- 5 Continue with “Configuring the Apache Monitor” on page 149.

## Configuring the Apache Monitor

When you click **Add** to add a measurement, a dialog box opens displaying the available measurements and server properties.



- 1 Select the required measurements, as described in “Understanding the Apache Dialog Box” on page 150.

For a description of the available measurements, see “Apache Performance Counters” on page 151.

- 2 In the Server Properties section, enter the Port number and URL (without the server name). The default URL is /server-status?auto.

---

**Note:** The default port number and URL can vary from one server to another. Please consult your Web server administrator.

---

- 3 Click **OK** in the Apache Add Measurements dialog box. The measurements that you selected appear in the **Resource Measurements on:** *<machine>* section of the Apache dialog box.
- 4 Click **OK** in the Apache dialog box to activate the monitor.

## Understanding the Apache Dialog Box

The Apache dialog box allows you select the items to monitor on the Apache server.

- **Available Measurements.** Select the required measurement(s). Select multiple measurements using the CTRL key. A description of the selected measurement appears in the Description box.
- **Server Properties.**
  - **Port.** Type the port number of the server.
  - **URL.** To monitor an Apache server you need to know the server statistics information URL. A simple way to verify the statistics information URL is to try to view it through the browser.

The URL should be in the following format:

```
http://<server_name/IP address>:<port_number>/server-status?auto
```

For example:

```
http://stimpy:80/server-status?auto
```

Enter the server statistics information URL, without the server name. The default URL is `/server-status?auto`.

---

**Note:** The default port number and URL can vary from one server to another. Please consult your Web server administrator.

---

- **Description.** Displays a description of the selected measurement.

## Apache Performance Counters

The following table describes the measurements and server properties that can be monitored:

| Measurement      | Description                                                     |
|------------------|-----------------------------------------------------------------|
| # Busy Servers   | The number of servers in the Busy state                         |
| # Idle Servers   | The number of servers in the Idle state                         |
| Apache CPU Usage | The percentage of time the CPU is utilized by the Apache server |
| Hits/sec         | The HTTP request rate                                           |
| KBytes Sent/sec  | The rate at which data bytes are sent from the Web server       |



# 16

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## iPlanet/Netscape Monitoring

This Web Server Resource monitor displays statistics about the resource usage on the iPlanet/Netscape Web server during the scenario run.

To obtain data for this graph, you need to configure the iPlanet/Netscape online monitor (from the Controller) and select the measurements you want to display, before running the scenario.

**This chapter includes:**

- ▶ Setting up the Monitoring Environment on page 154
- ▶ Adding a Machine to Monitor on page 155
- ▶ Configuring the iPlanet/Netscape Monitor on page 156
- ▶ iPlanet/Netscape Performance Counters on page 159

## Setting up the Monitoring Environment

To monitor an iPlanet/Netscape server, you need to know the administration server URL. A simple way to verify the administration server URL, is to try to view it through the browser.

The URL should be in the following format:

```
http://<admin_srv_name/IP address>:<port number>/https-<admin_srv_name/
IP address>/bin/sitemon?doit
```

For example:

```
http://lazarus:12000/https-lazarus.HP.co.il/bin/sitemon?doit
```

---

**Note:** In some server configurations, the URL must contain the administration server name and not the IP address.

In addition, the administration server name may differ from the iPlanet/Netscape server name.

---

## Adding a Machine to Monitor

In order to monitor the iPlanet/Netscape resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

- 1** Click the iPlanet/Netscape graph in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The iPlanet/Netscape dialog box opens.

In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.

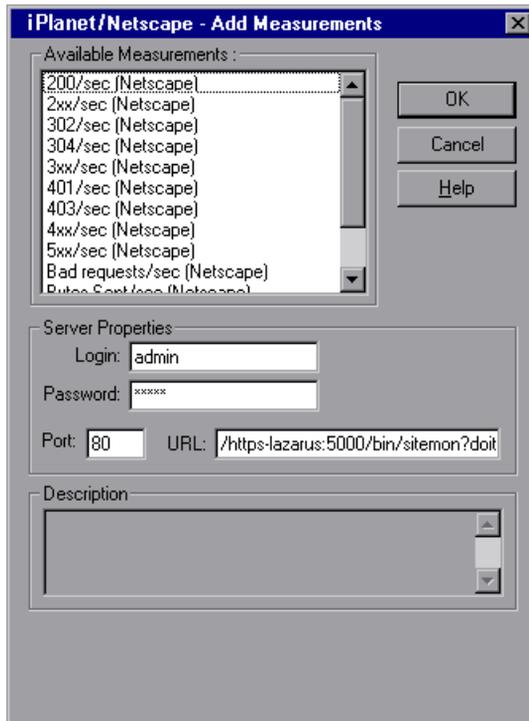
- 3** Enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs, and click **OK**.
- 4** In the **Resource Measurements** section of the iPlanet/Netscape dialog box, click **Add**.
- 5** Continue with “Configuring the iPlanet/Netscape Monitor” on page 156.

## Configuring the iPlanet/Netscape Monitor

To obtain data for this graph, you need to configure the iPlanet/Netscape online monitor (from the Controller) and select the measurements you want to display, before running the scenario.

**To configure the iPlanet/Netscape monitor:**

- 1 The iPlanet/Netscape - Add Measurements dialog box opens, displaying the available measurements and server properties.



Select the required measurements.

For a description of the available measurements, see “iPlanet/Netscape Performance Counters” on page 159.

- 2 Fill in the Server Properties:
  - Enter the user login name and password. The user must have administrator permissions on the server.

- Enter the port number and URL (without the server name), and click **OK**. The default URL is `/https-<admin_server>/bin/sitemon?doit`.
- 3** Click **OK** in the iPlanet/Netscape - Add Measurements dialog box and in the iPlanet/Netscape dialog box to activate the monitor.

### Understanding the iPlanet/Netscape Dialog Box

The iPlanet/Netscape dialog box lets you select the items to monitor on the iPlanet/Netscape server.

- **Available Measurements.** Select the required measurements. Select multiple measurements using the CTRL key. A description of the selected measurement appears in the Description box.
- **Server Properties.**
  - **Login.** Enter the user login name. The user must have administrator permissions on the server.
  - **Password.** Enter the user password.
  - **Port.** Enter the server's port number.
  - **URL.** To monitor an iPlanet/Netscape server, you need to know the server statistics information URL. A simple way to verify the statistics information URL is to try to view it through the browser.

The URL should be in the following format:

```
http://<admin_srv_name/IP address>:<port number>/https-
<admin_srv_name/IP address>/bin/sitemon?doit
```

For example:

```
http://lazarus:80/https-lazarus/bin/sitemon?doit
```

Enter the server's URL, without the server name. The default URL is `/https-<server>/bin/sitemon?doit`.

---

**Note:** The default port number and URL can vary from one server to another. Please consult the Web server administrator. In some server configurations, the URL must contain the server name and not the IP address.

---

- ▶ **Description.** Displays a description of the selected measurement.

## iPlanet/Netscape Performance Counters

The following table describes the measurements and server properties that can be monitored:

| Measurement             | Description                                                                                                                                 |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| <b>200/sec</b>          | The rate of successful transactions being processed by the server                                                                           |
| <b>2xx/sec</b>          | The rate at which the server handles status codes in the 200 to 299 range                                                                   |
| <b>302/sec</b>          | The rate of relocated URLs being processed by the server                                                                                    |
| <b>304/sec</b>          | The rate of requests for which the server tells the user to use a local copy of a URL instead of retrieving a newer version from the server |
| <b>3xx/sec</b>          | The rate at which the server handles status codes in the 300 to 399 range                                                                   |
| <b>401/sec</b>          | The rate of unauthorized requests handled by the server                                                                                     |
| <b>403/sec</b>          | The rate of forbidden URL status codes handled by the server                                                                                |
| <b>4xx/sec</b>          | The rate at which the server handles status codes in the 400 to 499 range                                                                   |
| <b>5xx/sec</b>          | The rate at which the server handles status codes 500 and higher                                                                            |
| <b>Bad requests/sec</b> | The rate at which the server handles bad requests                                                                                           |
| <b>Bytes sent/sec</b>   | The rate at which bytes of data are sent from the Web server                                                                                |
| <b>Hits/sec</b>         | The HTTP request rate                                                                                                                       |
| <b>xxx/sec</b>          | The rate of all status codes (2xx-5xx) handled by the server, excluding timeouts and other errors that did not return an HTTP status code   |

**To change the default server properties:**

**1** Open the **Netscape.cfg** file in the **<LoadRunner root folder>\dat\monitors** directory.

**2** Edit the following parameters in the [Netscape] section:

|                       |                                                                                                                                                                                                                                                                                           |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Counters</b>       | number of counters that the LoadRunner iPlanet/Netscape monitor will show you. This value should match the number of counters defined in the file.                                                                                                                                        |
| <b>InfoURL</b>        | server statistics information URL                                                                                                                                                                                                                                                         |
| <b>ServerPort</b>     | server port number                                                                                                                                                                                                                                                                        |
| <b>ServerLogin</b>    | login name to the server                                                                                                                                                                                                                                                                  |
| <b>ServerPassword</b> | login password for the login name                                                                                                                                                                                                                                                         |
| <b>SamplingRate</b>   | rate (milliseconds) at which the LoadRunner monitor will poll the server for the statistics information. If this value is greater than 1000, LoadRunner will use it as its sampling rate. Otherwise, it will use the sampling rate defined in the Monitors tab of the Options dialog box. |

---

**Note:** To monitor an iPlanet/Netscape server through a firewall, use the iPlanet/Netscape Administration server port. Configure this port during the server installation process.

---

# 17

---

## iPlanet (SNMP) Monitoring

This Web Server Resource monitor displays statistics about the resource usage on the iPlanet (SNMP) Web server during the scenario run. The iPlanet (SNMP) monitor uses the Simple Network Management Protocol (SNMP) to retrieve iPlanet (SNMP) server statistics.

To obtain data for this graph, you need to configure the iPlanet (SNMP) online monitor (from the Controller) and select the measurements you want to display, before running the scenario. You define the measurements for the iPlanet (SNMP) monitor using the iPlanet (SNMP) dialog box.

---

**Note:** To monitor a iPlanet (SNMP) server, use port 161 or 162, depending on the configuration of the agent.

---

**This chapter includes:**

- ▶ Adding a Machine to Monitor on page 162
- ▶ Configuring the iPlanet (SNMP) Monitor on page 163
- ▶ iPlanet (SNMP) Performance Counters on page 165

## Adding a Machine to Monitor

In order to monitor the iPlanet (SNMP) resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

- 1 Click the iPlanet (SNMP) graph in the graph tree, and drag it into the right pane of the Run view.
- 2 Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The iPlanet (SNMP) dialog box opens.

In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.

- 3 Enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs, and click **OK**.

---

**Note:** If the iPlanet SNMP agent is running on a different port than the default SNMP port, you need to define the port number. Enter the following information in the Add Machine dialog box:

<server name:port number>

For example: digi:8888

In addition, you can define the default port for your iPlanet server in the configuration file, **snmp.cfg**, located in <LoadRunner root folder>\dat\monitors. For example, if the port used by the SNMP agent on your iPlanet server is 8888, you should edit the **snmp.cfg** file as follows:

```
; iPlanet (WebServer)
[cm_snmp_mon_iws60]
port=8888
```

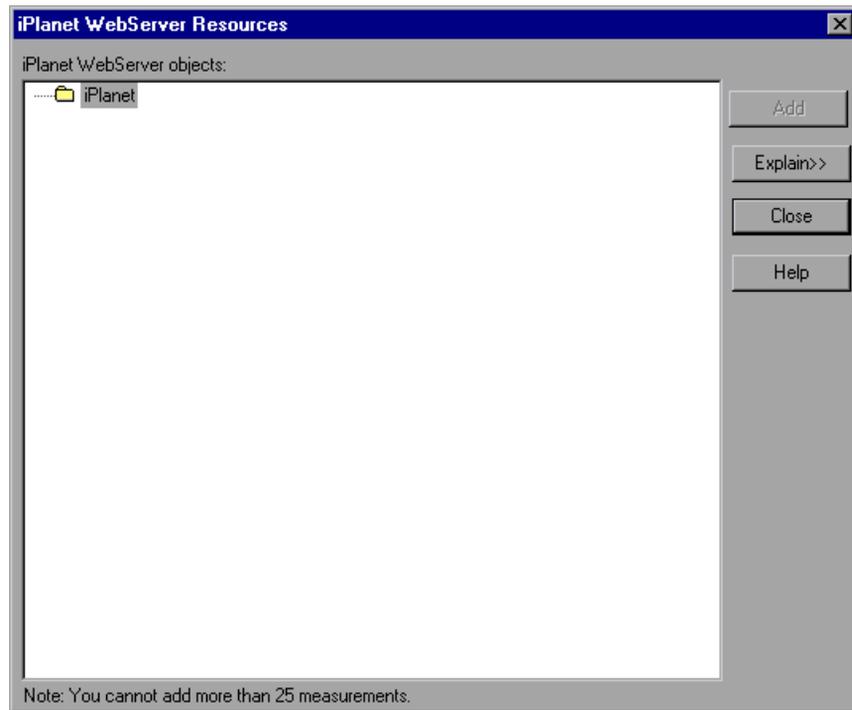
- 
- 4 In the **Resource Measurements** section of the iPlanet (SNMP) dialog box, click **Add**.
  - 5 Continue with “Configuring the iPlanet (SNMP) Monitor” on page 163.

## Configuring the iPlanet (SNMP) Monitor

Before running the scenario, you need to select the measurements you want to display on the iPlanet (SNMP) monitor.

**To configure the iPlanet (SNMP) monitor:**

- 1 When you click **Add** to add a measurement to monitor, the iPlanet WebServer Resources dialog box opens.



Browse the **iPlanet WebServer Object** tree as described in “Understanding the iPlanet (SNMP) Dialog Box” on page 165, and select performance counters.

For a description of the available measurements, see “iPlanet (SNMP) Performance Counters” on page 165.

---

**Note:** The iPlanet (SNMP) monitor can only monitor up to 25 measurements.

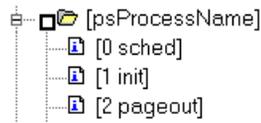
---

- 2 Add all the desired resources to the list, and click **Close**. The measurements that you selected appear in the **Resource Measurements on:** *<machine>* section of the iPlanet (SNMP) dialog box.
- 3 Click **OK** in the iPlanet (SNMP) dialog box to activate the monitor.

### Improving the Level of Measurement Information

You can improve the level of measurement information for the iPlanet (SNMP) monitor by enabling measurements with string values to be listed (in addition to measurements with numeric values), and by enabling the name modifier (which displays the string value as an identifying part of the measurement name).

In the following example of a measurement using the name modifier, the string value of `ProcessName` (`sched`) is displayed in addition to its instance ID (0):



To enable this feature, add the following line to the **<LoadRunner root folder>\dat\monitors\snmp.cfg** file:

```
SNMP_show_string_nodes=1
```

Usage Notes: You can select more than one name modifier, but the first in the hierarchy will be used. Each time the iPlanet SNMP Add Measurements dialog box opens, the information is reread from the **snmp.cfg** file. You cannot add the same measurement twice (once with a name modifier and once without it). If you do so, an error message is issued.

## Understanding the iPlanet (SNMP) Dialog Box

The iPlanet (SNMP) dialog box lets you select the iPlanet (SNMP) server resources to monitor using the Simple Network Management Protocol (SNMP).

- **iPlanet (SNMP) Objects.** Select each required object and click **Add**. Click **Explain** for the ID number and a description of the selected object.
- **Explain.** Displays a description of the selected object.

---

**Note:** The iPlanet (SNMP) monitor can only monitor up to 25 measurements.

---

## iPlanet (SNMP) Performance Counters

The following table describes the measurements and server properties that can be monitored:

| Measurement                          | Description                                                       |
|--------------------------------------|-------------------------------------------------------------------|
| <code>iwsInstanceTable</code>        | iPlanet Web Server instances                                      |
| <code>iwsInstanceEntry</code>        | iPlanet Web Server instances                                      |
| <code>iwsInstanceIndex</code>        | Server instance index                                             |
| <code>iwsInstanceId</code>           | Server instance identifier                                        |
| <code>iwsInstanceVersion</code>      | Server instance software version                                  |
| <code>iwsInstanceDescription</code>  | Description of server instance                                    |
| <code>iwsInstanceOrganization</code> | Organization responsible for server instance                      |
| <code>iwsInstanceContact</code>      | Contact information for person(s) responsible for server instance |
| <code>iwsInstanceLocation</code>     | Location of server instance                                       |
| <code>iwsInstanceStatus</code>       | Server instance status                                            |

| Measurement                               | Description                                                       |
|-------------------------------------------|-------------------------------------------------------------------|
| <b>iwsInstanceUptime</b>                  | Server instance uptime                                            |
| <b>iwsInstanceDeathCount</b>              | Number of times server instance processes have died               |
| <b>iwsInstanceRequests</b>                | Number of requests processed                                      |
| <b>iwsInstanceInOctets</b>                | Number of octets received                                         |
| <b>iwsInstanceOutOctets</b>               | Number of octets transmitted                                      |
| <b>iwsInstanceCount2xx</b>                | Number of 200-level (Successful) responses issued                 |
| <b>iwsInstanceCount3xx</b>                | Number of 300-level (Redirection) responses issued                |
| <b>iwsInstanceCount4xx</b>                | Number of 400-level (Client Error) responses issued               |
| <b>iwsInstanceCount5xx</b>                | Number of 500-level (Server Error) responses issued               |
| <b>iwsInstanceCountOther</b>              | Number of other (neither 2xx, 3xx, 4xx, nor 5xx) responses issued |
| <b>iwsInstanceCount200</b>                | Number of 200 (OK) responses issued                               |
| <b>iwsInstanceCount302</b>                | Number of 302 (Moved Temporarily) responses issued                |
| <b>iwsInstanceCount304</b>                | Number of 304 (Not Modified) responses issued                     |
| <b>iwsInstanceCount400</b>                | Number of 400 (Bad Request) responses issued                      |
| <b>iwsInstanceCount401</b>                | Number of 401 (Unauthorized) responses issued                     |
| <b>iwsInstanceCount403</b>                | Number of 403 (Forbidden) responses issued                        |
| <b>iwsInstanceCount404</b>                | Number of 404 (Not Found) responses issued                        |
| <b>iwsInstanceCount503</b>                | Number of 503 (Unavailable) responses issued                      |
| <b>iwsInstanceLoad<br/>1MinuteAverage</b> | System load average for 1 minute                                  |

| Measurement                                | Description                                                       |
|--------------------------------------------|-------------------------------------------------------------------|
| <b>iwsInstanceLoad<br/>5MinuteAverage</b>  | System load average for 5 minutes                                 |
| <b>iwsInstanceLoad<br/>15MinuteAverage</b> | System load average for 15 minutes                                |
| <b>iwsInstanceNetwork<br/>InOctets</b>     | Number of octets transmitted on the network per second            |
| <b>iwsInstanceNetwork<br/>OutOctets</b>    | Number of octets received on the network per second               |
| <b>iwsVsTable</b>                          | iPlanet Web Server virtual servers                                |
| <b>iwsVsEntry</b>                          | iPlanet Web Server virtual server                                 |
| <b>iwsVsIndex</b>                          | Virtual server index                                              |
| <b>iwsVsId</b>                             | Virtual server identifier                                         |
| <b>iwsVsRequests</b>                       | Number of requests processed                                      |
| <b>iwsVsInOctets</b>                       | Number of octets received                                         |
| <b>iwsVsOutOctets</b>                      | Number of octets transmitted                                      |
| <b>iwsVsCount2xx</b>                       | Number of 200-level (Successful) responses issued                 |
| <b>iwsVsCount3xx</b>                       | Number of 300-level (Redirection) responses issued                |
| <b>iwsVsCount4xx</b>                       | Number of 400-level (Client Error) responses issued               |
| <b>iwsVsCount5xx</b>                       | Number of 500-level (Server Error) responses issued               |
| <b>iwsVsCountOther</b>                     | Number of other (neither 2xx, 3xx, 4xx, nor 5xx) responses issued |
| <b>iwsVsCount200</b>                       | Number of 200 (OK) responses issued                               |
| <b>iwsVsCount302</b>                       | Number of 302 (Moved Temporarily) responses issued                |
| <b>iwsVsCount304</b>                       | Number of 304 (Not Modified) responses issued                     |

| Measurement                                | Description                                                        |
|--------------------------------------------|--------------------------------------------------------------------|
| <b>iwsVsCount400</b>                       | Number of 400 (Bad Request) responses issued                       |
| <b>iwsVsCount401</b>                       | Number of 401 (Unauthorized) responses issued                      |
| <b>iwsVsCount403</b>                       | Number of 403 (Forbidden) responses issued                         |
| <b>iwsVsCount404</b>                       | Number of 404 (Not Found) responses issued                         |
| <b>iwsVsCount503</b>                       | Number of 503 (Unavailable) responses issued                       |
| <b>iwsProcessTable</b>                     | iPlanet Web Server processes                                       |
| <b>iwsProcessEntry</b>                     | iPlanet Web Server process                                         |
| <b>iwsProcessIndex</b>                     | Process index                                                      |
| <b>iwsProcessId</b>                        | Operating system process identifier                                |
| <b>iwsProcessThreadCount</b>               | Number of request processing threads                               |
| <b>iwsProcessThreadIdle</b>                | Number of request processing threads currently idle                |
| <b>iwsProcessConnection QueueCount</b>     | Number of connections currently in connection queue                |
| <b>iwsProcessConnection QueuePeak</b>      | Largest number of connections that have been queued simultaneously |
| <b>iwsProcessConnection QueueMax</b>       | Maximum number of connections allowed in connection queue          |
| <b>iwsProcessConnection QueueTotal</b>     | Number of connections that have been accepted                      |
| <b>iwsProcessConnection QueueOverflows</b> | Number of connections rejected due to connection queue overflow    |
| <b>iwsProcessKeepalive Count</b>           | Number of connections currently in keepalive queue                 |
| <b>iwsProcessKeepaliveMax</b>              | Maximum number of connections allowed in keepalive queue           |
| <b>iwsProcessSizeVirtual</b>               | Process size in kbytes                                             |
| <b>iwsProcessSizeResident</b>              | Process resident size in kbytes                                    |

| Measurement                                     | Description                                                     |
|-------------------------------------------------|-----------------------------------------------------------------|
| <b>iwsProcessFraction<br/>SystemMemoryUsage</b> | Fraction of process memory in system memory                     |
| <b>iwsListenTable</b>                           | iPlanet Web Server listen sockets                               |
| <b>iwsListenEntry</b>                           | iPlanet Web Server listen socket                                |
| <b>iwsListenIndex</b>                           | Listen socket index                                             |
| <b>iwsListenId</b>                              | Listen socket identifier                                        |
| <b>iwsListenAddress</b>                         | Address socket is listening on                                  |
| <b>iwsListenPort</b>                            | Port socket is listening on                                     |
| <b>iwsListenSecurity</b>                        | Encryption support                                              |
| <b>iwsThreadPoolTable</b>                       | iPlanet Web Server thread pools                                 |
| <b>iwsThreadPoolEntry</b>                       | iPlanet Web Server thread pool                                  |
| <b>iwsThreadPoolIndex</b>                       | Thread pool index                                               |
| <b>iwsThreadPoolId</b>                          | Thread pool identifier                                          |
| <b>iwsThreadPoolCount</b>                       | Number of requests queued                                       |
| <b>iwsThreadPoolPeak</b>                        | Largest number of requests that have been queued simultaneously |
| <b>iwsThreadPoolMax</b>                         | Maximum number of requests allowed in queue                     |
| <b>iwsCpuTable</b>                              | iPlanet Web Server CPUs                                         |
| <b>iwsCpuEntry</b>                              | iPlanet Web Server CPU                                          |
| <b>iwsCpuIndex</b>                              | CPU index                                                       |
| <b>iwsCpuId</b>                                 | CPU identifier                                                  |
| <b>iwsCpuIdleTime</b>                           | CPU Idle Time                                                   |
| <b>iwsCpuUserTime</b>                           | CPU User Time                                                   |
| <b>iwsCpuKernelTime</b>                         | CPU Kernel Time                                                 |



# 18

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## Microsoft IIS Monitoring

This Web Server Resource monitor displays statistics about the resource usage on the Microsoft Internet Information Server (IIS) during the scenario run.

To obtain data for this graph, you need to configure the MS IIS online monitor (from the Controller) and select the measurements you want to display, before running the scenario. You select measurements for the Microsoft IIS Server monitor using the MS IIS dialog box.

---

**Note:** To monitor an IIS server through a firewall, use TCP, port 139.

---

**This chapter includes:**

- ▶ Adding a Machine to Monitor on page 172
- ▶ Configuring the Microsoft IIS Monitor on page 173
- ▶ Microsoft IIS Performance Counters on page 175

## Adding a Machine to Monitor

In order to monitor the Microsoft\_IIS server from the Controller, you need to add the machine and the measurements you want to monitor.

**To add a machine to the Controller:**

- 1** Click the MS IIS graph in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The MS IIS dialog box opens.

In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.

- 3** Enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs, and click **OK**.
- 4** In the **Resource Measurements on: <machine>** section of the MS-IIS dialog box, the default measurements are displayed.
  - To delete a measurement from the default list, select the measurement and click **Delete**.
  - To select additional measurements, click **Add**. A dialog box opens displaying all the available measurements.

For a description of the available measurements, see “Microsoft IIS Performance Counters” on page 175.

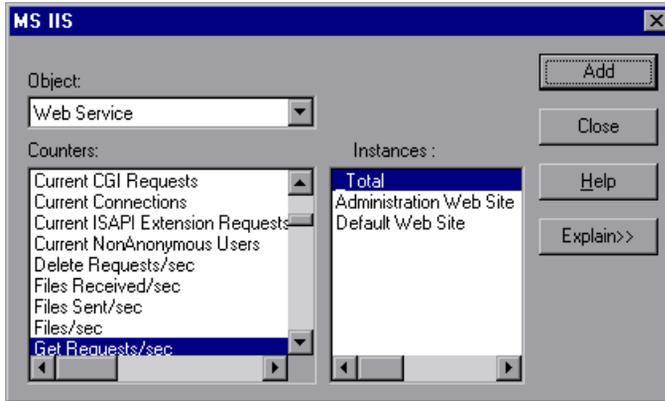
**Note:** To change the default counters for the Microsoft IIS Server monitor, see “Changing a Monitor’s Default Counters” on page 543.

- 5** Continue with Configuring the Microsoft IIS Monitor below.

## Configuring the Microsoft IIS Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which objects to monitor on the machine.

- 1 When you click **Add** to add a measurement, the MS IIS dialog box opens displaying the Web Service object, its counters, and instances opens.



For each measurement, select an object, counter, and instance, and then click **Add**, as described in “Understanding the MS IIS Dialog Box” on page 174.

For a description of the available measurements, see “Microsoft IIS Performance Counters” on page 175.

---

**Note:** To change the default counters for the Microsoft IIS Server monitor, see “Changing a Monitor’s Default Counters” on page 543.

---

- 2 Add all the desired resources to the list, and click **Close**.
- 3 Click **OK** in the MS IIS dialog box to activate the monitor.

## Understanding the MS IIS Dialog Box

The MS IIS dialog box lets you select the items to monitor on the MS IIS server.

- **Object.** Select the object being monitored on the specified machine.
- **Counters.** Select a resource counter to monitor. Select multiple counters using the CTRL key. For an explanation of each counter, click **Explain**.
- **Instances.** If multiple instances of the selected counter are running, select one or more instances to monitor for the selected counter.
- **Explain.** Displays a description of the selected counter.

## Microsoft IIS Performance Counters

The following table describes the default measurements that can be monitored:

| Object      | Measurement                | Description                                                                                                                                                                                           |
|-------------|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Web Service | Bytes Sent/sec             | The rate at which the data bytes are sent by the Web service                                                                                                                                          |
| Web Service | Bytes Received/sec         | The rate at which the data bytes are received by the Web service                                                                                                                                      |
| Web Service | Get Requests/sec           | The rate at which HTTP requests using the GET method are made. Get requests are generally used for basic file retrievals or image maps, though they can be used with forms.                           |
| Web Service | Post Requests/sec          | The rate at which HTTP requests using the POST method are made. Post requests are generally used for forms or gateway requests.                                                                       |
| Web Service | Maximum Connections        | The maximum number of simultaneous connections established with the Web service                                                                                                                       |
| Web Service | Current Connections        | The current number of connections established with the Web service                                                                                                                                    |
| Web Service | Current NonAnonymous Users | The number of users that currently have a non-anonymous connection using the Web service                                                                                                              |
| Web Service | Not Found Errors/sec       | The rate of errors due to requests that could not be satisfied by the server because the requested document could not be found. These are generally reported to the client as an HTTP 404 error code. |
| Process     | Private Bytes              | The current number of bytes that the process has allocated that cannot be shared with other processes.                                                                                                |



# Part VIII

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## Web Application Server Monitoring



# 19

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## Introduction to Web Application Server Resource Monitoring

You use LoadRunner's Web Application Server Resource monitors to monitor Web application servers during a scenario run and isolate application server performance bottlenecks.

Web Application Server Resource monitors provide you with information about the resource usage of the Ariba, ATG Dynamo, BroadVision, ColdFusion, Fujitsu INTERSTAGE, iPlanet (NAS), Microsoft ASP, Oracle9iAS HTTP, SilverStream, WebLogic (SNMP), WebLogic (JMX), and WebSphere application servers during scenario execution. To obtain performance data, you need to activate the online monitor for the server and specify which resources you want to measure before executing the scenario.

The procedures for selecting monitor measurements and configuring the monitors vary according to server type. The following sections contain specific configuration instructions for each server type.



# 20

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## Ariba Monitoring

The Ariba monitor displays statistics about the resource usage on the Ariba server during the scenario run.

To obtain data for this graph, you need to configure the Ariba online monitor (from the Controller) and select the measurements you want to display, before running the scenario. You select measurements to monitor the Ariba server using the Ariba Monitor Configuration dialog box.

---

**Note:** The port you use to monitor an Ariba server through a firewall depends on the configuration of your server.

---

**This chapter includes:**

- ▶ Adding a Machine to Monitor on page 182
- ▶ Configuring the Ariba Monitor on page 183
- ▶ Ariba Performance Counters on page 185

## Adding a Machine to Monitor

In order to monitor the Ariba resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

- 1** Click the Ariba graph in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The Ariba dialog box opens.

In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.

- 3** Enter the server name or IP address of the machine you want to monitor according to the following format: <server name>:<port number>.

For example: merc1:12130

Select the platform on which the machine runs, and click **OK**.

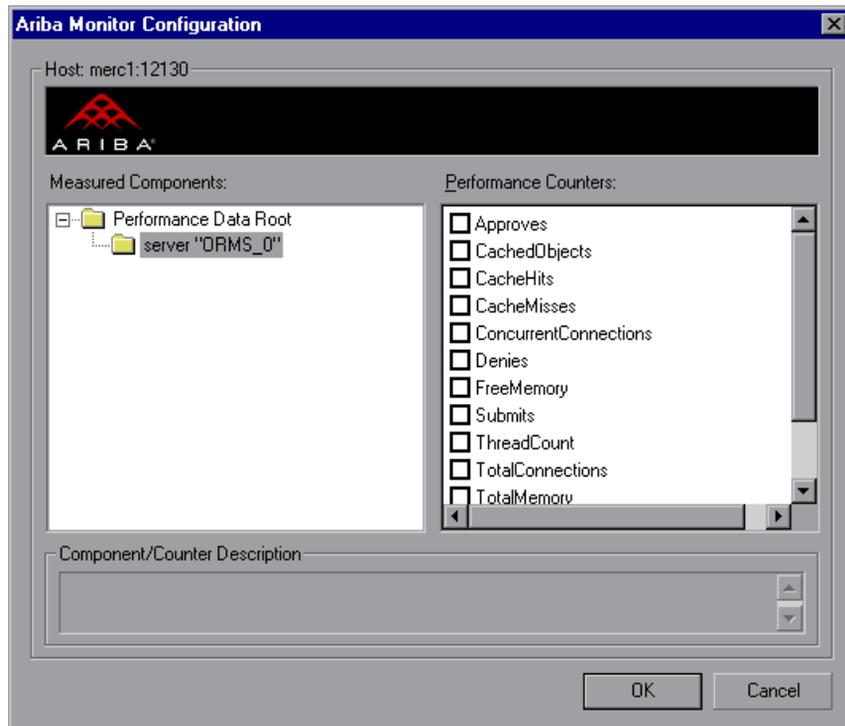
- 4** In the **Resource Measurements** section of the Ariba dialog box, click **Add**. Continue with Configuring the Ariba Monitor below.

## Configuring the Ariba Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which objects to monitor on the machine.

**To configure the Ariba monitor:**

- 1 When you click **Add** to add a measurement, the Ariba Monitor Configuration dialog box opens.



Browse the Measured Components tree, and select performance counters as described in “Understanding the Ariba Monitor Configuration Dialog Box” on page 184.

For a description of the available measurements, see “Ariba Performance Counters” on page 185.

- 2 Click **OK** in the Ariba Monitor Configuration dialog box, and in the Ariba dialog box, to activate the Ariba monitor.

## XML Accessibility Verification

Only browsers that are XML-compatible will allow you to view the performance XML file.

### To verify whether the XML file is accessible:

Display the XML file through the browser. The URL should be in the following format: `http://<server name:port number>/metrics?query=getStats`

For example: `http://merc1:12130/metrics?query=getStats`

---

**Note:** In some cases, although the browser is XML-compatible, it may still return the error: **The XML page cannot be displayed.** In these cases, the XML file can be accessed by the Ariba performance monitor, although it cannot be viewed by the browser.

---

## Understanding the Ariba Monitor Configuration Dialog Box

The Ariba dialog box lets you select the items to monitor on the Ariba application server.

- **Host.** Displays the name of the monitored machine.
- **Measured Components.** Displays the available components. Browse the tree and select the component you want to monitor. A description of the highlighted component appears in the Component/Counter Description box.
- **Performance Counters.** Check the required performance counters. A description of the selected counter appears in the Component/Counter Description box.
- **Component/Counter Description.** Displays a description of the selected component or counter.

---

**Note:** Only browsers that are XML-compatible will allow you to view the performance XML file.

To verify whether the XML file is accessible, display the XML file through the browser. The URL should be in the following format: `http://<server name:server port>/metrics?query=getStats`

For example: `http://merc1:12130/metrics?query=getStats`

---

## Ariba Performance Counters

The following tables describe the counters that can be monitored:

### Core Server Performance Counters

The following counters measure Core Server Performance:

| Measurement                   | Description                                                                                                                                                                        |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Total Connections</b>      | The cumulative number of concurrent user connections since Ariba Buyer was started.                                                                                                |
| <b>Requisitions Finished</b>  | The instantaneous reading of the length of the worker queue at the moment this metric is obtained. The longer the worker queue, the more user requests are delayed for processing. |
| <b>Worker Queue Length</b>    | The instantaneous reading of the length of the worker queue at the moment this metric is obtained. The longer the worker queue, the more user requests are delayed for processing. |
| <b>Concurrent Connections</b> | The instantaneous reading of the number of concurrent user connections at the moment this metric is obtained.                                                                      |
| <b>Total Memory</b>           | The instantaneous reading of the memory (in KB) being used by Ariba Buyer at the moment this metric is obtained.                                                                   |

| Measurement                     | Description                                                                                                                                                                                           |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Free Memory</b>              | The instantaneous reading of the reserved memory (in bytes) that is not currently in use at the moment this metric is obtained.                                                                       |
| <b>Up Time</b>                  | The amount of time (in hours and minutes) that Ariba Buyer has been running since the previous time it was started.                                                                                   |
| <b>Number of Threads</b>        | The instantaneous reading of the number of server threads in existence at the moment this metric is obtained.                                                                                         |
| <b>Number of Cached Objects</b> | The instantaneous reading of the number of Ariba Buyer objects being held in memory at the moment this metric is obtained.                                                                            |
| <b>Average Session Length</b>   | The average length of the user sessions (in seconds) of all users who logged out since previous sampling time. This value indicates how long, on average, a user stays connected to server.           |
| <b>Average Idle Time</b>        | The average idle time (in seconds) for all the users who have been active since previous sampling time. The idle time is the period of time between two consecutive user requests from the same user. |
| <b>Approves</b>                 | The cumulative count of the number of Approves that occurred during the sampling period. An Approve consists of a user approving one Approvable.                                                      |
| <b>Submits</b>                  | The cumulative count of the number of Approvals submitted since previous sampling time.                                                                                                               |
| <b>Denies</b>                   | The cumulative count of the number of submitted Approvals denied since previous sampling time.                                                                                                        |
| <b>Object Cache Accesses</b>    | The cumulative count of accesses (both reads and writes) to the object cache since previous sampling time.                                                                                            |
| <b>Object Cache Hits</b>        | The cumulative count of accesses to the object cache that are successful (cache hits) since previous sampling time.                                                                                   |

## System Related Performance Counters

The following counters measure System Related Performance:

| Measurement                       | Description                                                                                             |
|-----------------------------------|---------------------------------------------------------------------------------------------------------|
| <b>Database Response Time</b>     | The average response time (in seconds) to the database requests since the previous sampling time.       |
| <b>Buyer to DB server Traffic</b> | The cumulative number of bytes that Ariba Buyer sent to the DB server since the previous sampling time. |
| <b>DB to Buyer server Traffic</b> | The cumulative number of bytes that the DB server sent to Ariba Buyer since the previous sampling time. |
| <b>Database Query Packets</b>     | The average number of packets that Ariba Buyer sent to the DB server since the previous sampling time.  |
| <b>Database Response Packets</b>  | The average number of packets that the DB server sent to Ariba Buyer since the previous sampling time.  |



# 21

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## ATG Dynamo Monitoring

The ATG Dynamo monitor displays statistics about the resource usage on the ATG Dynamo server during the scenario run. The ATG Dynamo monitor uses SNMP to retrieve ATG Dynamo server statistics.

To obtain data for this graph, you need to configure the ATG Dynamo online monitor (from the Controller) and select the measurements you want to display, before running the scenario. You define the measurements for the ATG Dynamo monitor using the ATG Dynamo Resources dialog box.

**This chapter includes:**

- ▶ Adding a Machine to Monitor on page 190
- ▶ Configuring the ATG Dynamo Monitor on page 191
- ▶ ATG Dynamo Performance Counters on page 193

## Adding a Machine to Monitor

In order to monitor the ATG Dynamo resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

- 1 Click the ATG Dynamo graph in the graph tree, and drag it into the right pane of the Run view.
- 2 Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The ATG Dynamo dialog box opens.

In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.

- 3 Enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs, and click **OK**.

---

**Note:** If the ATG SNMP agent is running on a different port than the default ATG SNMP port 8870, you need to define the port number. Enter the following information in the Add Machine dialog box:

<server name:port number>

For example: digi:8888

In addition, you can define the default port for your ATG server in the configuration file, **snmp.cfg**, located in <LoadRunner root folder>\dat\monitors. For example, if the port used by the SNMP agent on your ATG system is 8888, you should edit the **snmp.cfg** file as follows:

```
; ATG Dynamo
[cm_snmp_mon_atg]
port=8888
```

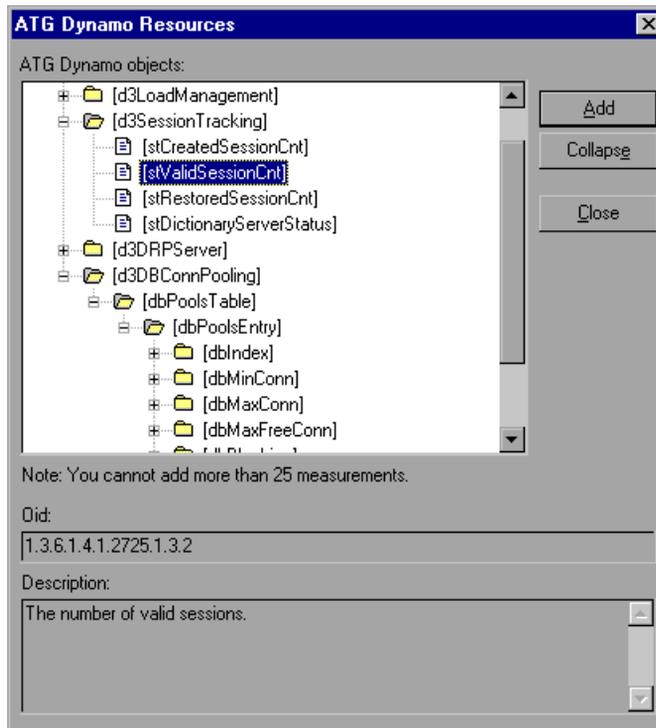
- 
- 4 In the **Resource Measurements** section of the ATG Dynamo dialog box, click **Add**.
  - 5 Continue with “Configuring the ATG Dynamo Monitor” on page 191.

## Configuring the ATG Dynamo Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which objects to monitor on the machine.

**To configure the ATG Dynamo monitor:**

- 1 When you click **Add** to add a measurement, the ATG Dynamo Resources dialog box opens.



Browse the ATG Dynamo Object tree, and select the measurements you want to monitor as described in “Understanding the ATG Dynamo Resources Dialog Box” on page 193.

For a description of the available measurements, see “ATG Dynamo Performance Counters” on page 193.

- 2 Add all the desired resources to the list, and click **Close**. The measurements that you selected appear in the **Resource Measurements on:** *<machine>* section of the ATG Dynamo dialog box.

---

**Note:** The ATG Dynamo monitor can only monitor up to 25 measurements.

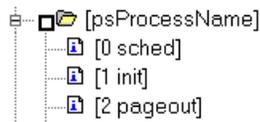
---

- 3 Click **OK** in the ATG Dynamo dialog box to activate the monitor.

### Improving the Level of Measurement Information

You can improve the level of measurement information for the ATG Dynamo monitor by enabling measurements with string values to be listed (in addition to measurements with numeric values), and by enabling the name modifier (which displays the string value as an identifying part of the measurement name).

In the following example of a measurement using the name modifier, the string value of `ProcessName (sched)` is displayed in addition to its instance ID (0):



To enable this feature, add the following line to the **<LoadRunner root folder>\dat\monitors\snmp.cfg** file:

```
SNMP_show_string_nodes=1
```

Usage Notes: You can select more than one name modifier, but the first in the hierarchy will be used. Each time the ATG Dynamo Add Measurements dialog box opens, the information is reread from the **snmp.cfg** file. You cannot add the same measurement twice (once with a name modifier and once without it). If you do so, an error message is issued.

## Understanding the ATG Dynamo Resources Dialog Box

The ATG Dynamo dialog box lets you select the ATG Dynamo server resources to monitor using the Simple Network Management Protocol (SNMP).

- ▶ **ATG Dynamo Objects.** Select each required object and click **Add**. Click **Explain** for the ID number and a description of the selected object.
- ▶ **Explain.** Displays a description of the selected object.

---

**Note:** The ATG Dynamo monitor can only monitor up to 25 measurements.

---

## ATG Dynamo Performance Counters

The following tables describe the measurements that can be monitored:

### d3System Measurements

The following table lists the d3System measurements:

| d3System Measurement     | Description                                                                                                |
|--------------------------|------------------------------------------------------------------------------------------------------------|
| <b>sysTotalMem</b>       | The total amount of memory (in bytes) currently available for allocating objects                           |
| <b>sysFreeMem</b>        | An approximation of the total amount of memory (in bytes) currently available for future allocated objects |
| <b>sysNumInfoMsgs</b>    | The number of system global info messages written                                                          |
| <b>sysNumWarningMsgs</b> | The number of system global warning messages written                                                       |
| <b>sysNumErrorMsgs</b>   | The number of system global error messages written                                                         |

### d3LoadManagement Measurements

The following table lists the d3LoadManagement measurements:

| d3LoadManagement Measurement | Description                                                                                                                                                                                                |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ImIsManager</b>           | True if the Dynamo server is running a load manager.                                                                                                                                                       |
| <b>ImManagerIndex</b>        | Returns the Dynamo server's offset into the list of load managing entities.                                                                                                                                |
| <b>ImIsPrimaryManager</b>    | True if the load manager is an acting primary manager.                                                                                                                                                     |
| <b>ImServicingCMs</b>        | True if the load manager has serviced any connection module requests in the amount of time set as the connection module polling interval.                                                                  |
| <b>ImCMLDRPPort</b>          | The port of the connection module agent.                                                                                                                                                                   |
| <b>ImIndex</b>               | A unique value for each managed entity.                                                                                                                                                                    |
| <b>ImSNMPPort</b>            | The port for the entry's SNMP agent.                                                                                                                                                                       |
| <b>ImProbability</b>         | The probability that the entry will be given a new session.                                                                                                                                                |
| <b>ImNewSessions</b>         | Indicates whether or not the entry is accepting new sessions, or if the load manager is allowing new sessions to be sent to the entry. This value includes any override indicated by ImNewSessionOverride. |
| <b>ImNewSessionOverride</b>  | The override set for whether or not a server is accepting new sessions.                                                                                                                                    |

### **d3SessionTracking Measurements**

The following table lists the d3SessionTracking measurements:

| <b>d3SessionTracking Measurement</b> | <b>Description</b>                            |
|--------------------------------------|-----------------------------------------------|
| <b>stCreatedSessionCnt</b>           | The number of created sessions                |
| <b>stValidSessionCnt</b>             | The number of valid sessions                  |
| <b>stRestoredSessionCnt</b>          | The number of sessions migrated to the server |
| <b>StDictionaryServerStatus</b>      | d3Session Tracking                            |

### **d3DRPServer Measurements**

The following table lists the d3DRPServer measurements:

| <b>d3DRPServer Measurement</b> | <b>Description</b>                                |
|--------------------------------|---------------------------------------------------|
| <b>drpPort</b>                 | The port of the DRP server                        |
| <b>drpTotalReqsServed</b>      | Total number of DRP requests serviced             |
| <b>drpTotalReqTime</b>         | Total service time in msec for all DRP requests   |
| <b>drpAvgReqTime</b>           | Average service time in msec for each DRP request |
| <b>drpNewSessions</b>          | True if the Dynamo is accepting new sessions      |

## d3DBConnPooling Measurements

The following table lists the d3DBConnPooling measurements:

| <b>d3DBConnPooling Measurement</b> | <b>Description</b>                                                                                                                                                                                                                                                                  |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>dbPoolsEntry</b>                | A pooling service entry containing information about the pool configuration and current status                                                                                                                                                                                      |
| <b>dbIndex</b>                     | A unique value for each pooling service                                                                                                                                                                                                                                             |
| <b>dbPoolID</b>                    | The name of the DB connection pool service                                                                                                                                                                                                                                          |
| <b>dbMinConn</b>                   | The minimum number of connections pooled                                                                                                                                                                                                                                            |
| <b>dbMaxConn</b>                   | The maximum number of connections pooled                                                                                                                                                                                                                                            |
| <b>dbMaxFreeConn</b>               | The maximum number of free pooled connections at a time                                                                                                                                                                                                                             |
| <b>dbBlocking</b>                  | Indicates whether or not the pool is to block out check outs                                                                                                                                                                                                                        |
| <b>dbConnOut</b>                   | Returns the number of connections checked out                                                                                                                                                                                                                                       |
| <b>dbFreeResources</b>             | Returns the number of free connections in the pool. This number refers to connections actually created that are not currently checked out. It does not include how many more connections are allowed to be created as set by the maximum number of connections allowed in the pool. |
| <b>dbTotalResources</b>            | Returns the number of total connections in the pool. This number refers to connections actually created and is not an indication of how many more connections may be created and used in the pool.                                                                                  |

# 22

---

## BroadVision Monitoring

The BroadVision monitor displays performance statistics for all the servers/services available on the BroadVision application during the scenario run.

To monitor a BroadVision server, you must grant the client permission to invoke or launch services on the server. You should also ensure that your Java environment is configured properly.

To obtain data for this graph, you need to configure the BroadVision online monitor (from the Controller) and select the measurements you want to display, before running the scenario.

---

**Note:** The port you use to monitor a BroadVision server through a firewall depends on the configuration of your server.

---

### **This chapter includes:**

- ▶ Setting up the Monitoring Environment on page 198
- ▶ Adding a Machine to Monitor on page 199
- ▶ Configuring the BroadVision Monitor on page 200
- ▶ BroadVision Performance Counters on page 201

## Setting up the Monitoring Environment

Before monitoring a BroadVision server, you must set up the server monitor environment.

### To grant permission for a BroadVision server:

- ▶ Use the Iona Technologies (Orbix) command for setting user and access permission on a load generator machine:

```
chmodit [-h <host>] [-v] { <server> | -a <dir> }
```

```
{i{+,-}{user,group} | l{+,-}{user,group} }
```

- ▶ If you experience problems connecting to the BroadVision monitor, you may need to redefine the permissions to "all."

To invoke permission for all, enter the following command at the BroadVision server command prompt:

```
chmodit <server> i+all
```

To launch permission for all, enter the following command at the BroadVision server command prompt:

```
chmodit <server> l+all
```

- ▶ Alternatively, set ORBIX\_ACL. Setting ORBIX\_ACL=i+all l+all in the BroadVision/Orbix configuration file gives permission to all.

In addition, to monitor a BroadVision server, you need to have JDK 1.2 or higher installed on the Controller.

You can install JDK 1.2 by following the download and installation instructions at the following Web site: <http://java.sun.com/products/jdk/1.2/>

Before activating the monitor, make sure that your Java environment is configured properly.

**To configure your Java environment:**

- 1** Open the Windows Registry.
- 2** The registry should contain the correct path to the Java executable (java.exe) under the JDK 1.2 installation directory. Verify the following registry key:

HKEY\_LOCAL\_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\App Paths\java.exe

- 3** The registry should contain the correct path to the Java run-time environment (JRE) under the JRE 1.2 installation directory. Verify the following registry key:

HKEY\_LOCAL\_MACHINE\SOFTWARE\JavaSoft\Java Runtime Environment\1.2\JavaHome

## Adding a Machine to Monitor

In order to monitor the BroadVision resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

- 1** Click the BroadVision graph in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and choose **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The BroadVision dialog box opens.

In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.

- 3** Enter the BroadVision server name or IP address with the port number according to the format: <server name>:<port number>.

For example: dnsqa:1221.

Select the machine platform, and click **OK**.

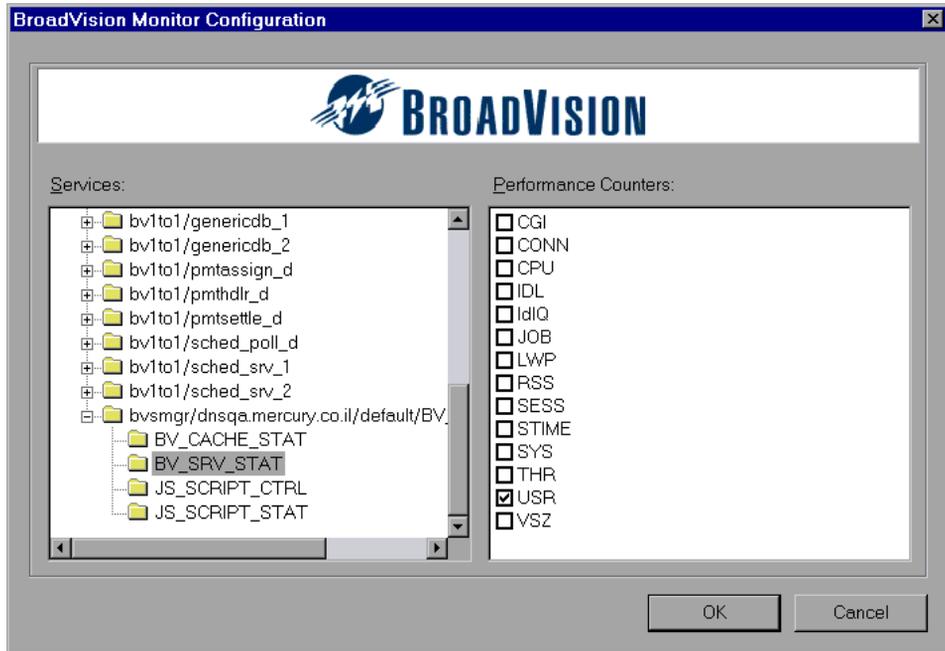
- 4 In the **Resource Measurements** section of the BroadVision dialog box, click **Add**.
- 5 Continue with Configuring the BroadVision Monitor below.

## Configuring the BroadVision Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which measurements to monitor on the machine.

**To configure the BroadVision monitor:**

- 1 When you click **Add** to add a measurement, the BroadVision Monitor Configuration dialog box opens, displaying the available measurements.



- 2 Browse the Services tree and select the required performance counters in the BroadVision Monitor Configuration window's right pane, as described in "Understanding the BroadVision Monitor Configuration Dialog Box" on page 201.

For a description of the available measurements, see “BroadVision Performance Counters” on page 201.

- 3 Click **OK**. The measurements that you selected appear in the **Resource Measurements on: <machine>** section of the BroadVision dialog box.
- 4 Click **OK** in the BroadVision dialog box, to activate the monitor.

### Understanding the BroadVision Monitor Configuration Dialog Box

The BroadVision Monitor Configuration dialog box lets you select the items to monitor on the BroadVision application server.

- **Services.** Displays the services available on the BroadVision application server. Browse the tree and select the service you want to monitor.
- **Performance Counters.** Check the performance counters you want to monitor.

## BroadVision Performance Counters

### Server/Services

The following table describes the servers/services that can be monitored:

| Server     | Multiple Instances | Description                                                         |
|------------|--------------------|---------------------------------------------------------------------|
| adm_srv    | No                 | One-To-One user administration server. There must be one.           |
| alert_srv  | No                 | Alert server handles direct IDL function calls to the Alert system. |
| bvconf_srv | No                 | One-To-One configuration management server. There must be one.      |
| cmsdb      | Yes                | Visitor management database server.                                 |
| cntdb      | Yes                | Content database server.                                            |

| Server              | Multiple Instances | Description                                                                                                                                                                                                                                                                                              |
|---------------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>deliv_smtp_d</b> | Yes                | Notification delivery server for e-mail type messages. Each instance of this server must have its own ID, numbered sequentially starting with "1".                                                                                                                                                       |
| <b>deliv_comp_d</b> | No                 | Notification delivery completion processor.                                                                                                                                                                                                                                                              |
| <b>extdbacc</b>     | Yes                | External database accessor. You need at least one for each external data source.                                                                                                                                                                                                                         |
| <b>genericdb</b>    | No                 | Generic database accessor handles content query requests from applications, when specifically called from the application. This is also used by the One-To-One Command Center.                                                                                                                           |
| <b>hostmgr</b>      | Yes                | Defines a host manager process for each machine that participates in One-To-One, but doesn't run any One-To-One servers. For example, you need a host manager on a machine that runs only servers. You don't need a separate host manager on a machine that already has one of the servers in this list. |
| <b>g1_ofbe_srv</b>  | No                 | Order fulfillment back-end server.                                                                                                                                                                                                                                                                       |
| <b>g1_ofdb</b>      | Yes                | Order fulfillment database server.                                                                                                                                                                                                                                                                       |
| <b>g1_om_srv</b>    | No                 | Order management server.                                                                                                                                                                                                                                                                                 |
| <b>pmtassign_d</b>  | No                 | The payment archiving daemon routes payment records to the archives by periodically checking the invoices table, looking for records with completed payment transactions, and then moving those records into an archive table.                                                                           |
| <b>pmthdlr_d</b>    | Yes                | For each payment processing method, you need one or more authorization daemons to periodically acquire the authorization when a request is made.                                                                                                                                                         |

| Server       | Multiple Instances | Description                                                                                                                                                                          |
|--------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| pmtsettle_d  | Yes                | The payment settlement daemon periodically checks the database for orders of the associated payment processing method that need to be settled, and then authorizes the transactions. |
| sched_poll_d | No                 | Notification schedule poller scans the database tables to determine when a notification must be run.                                                                                 |
| sched_srv    | Yes                | Notification schedule server runs the scripts that generate the visitor notification messages.                                                                                       |

### Performance Counters

Performance counters for each server/service are divided into logical groups according to the service type.

The following section describes all the available counters under each group.

---

**Note:** The same group can have a different number of counters, depending on the service.

---

**Counter groups:**

- BV\_DB\_STAT
- BV\_SRV\_CTRL
- BV\_SRV\_STAT
- NS\_STAT
- BV\_CACHE\_STAT
- JS\_SCRIPT\_CTRL
- JS\_SCRIPT\_STAT

**BV\_DB\_STAT**

The database accessor processes have additional statistics available from the BV\_DB\_STAT memory block. These statistics provide information about database accesses, including the count of selects, updates, inserts, deletes, and stored procedure executions.

|               |                                      |
|---------------|--------------------------------------|
| <b>DELETE</b> | Count of deletes executions          |
| <b>INSERT</b> | Count of inserts executions          |
| <b>SELECT</b> | Count of selects executions          |
| <b>SPROC</b>  | Count of stored procedure executions |
| <b>UPDATE</b> | Count of updates executions          |

**BV\_SRV\_CTRL**

The available counters are:

|                 |                                                                                   |
|-----------------|-----------------------------------------------------------------------------------|
| <b>SHUTDOWN</b> | Shut-down trigger. Setting this to non-zero value causes the server to shut down. |
|-----------------|-----------------------------------------------------------------------------------|

**BV\_SRV\_STAT**

The display for Interaction Manager processes includes information about the current count of sessions, connections, idle sessions, threads in use, and count of CGI requests processed.

|             |                                                                                                                                       |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <b>HOST</b> | Host machine running the process                                                                                                      |
| <b>ID</b>   | Instance of the process (of which multiple can be configured in the <b>bv1to1.conf</b> file), or engine ID of the Interaction Manager |
| <b>CGI</b>  | Current count of CGI requests processed                                                                                               |
| <b>CONN</b> | Current count of connections                                                                                                          |

|              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CPU</b>   | CPU percentage consumed by this process. If a process is using most of the CPU time, consider moving it to another host, or creating an additional process, possibly running on another machine. Both of these specifications are done in the <b>bv1to1.conf</b> file. The CPU % reported is against a single processor. If a server is taking up a whole CPU on a 4 processor machine, this statistic will report 100%, while the Windows Task Manager will report 25%. The value reported by this statistic is consistent with "% Processor Time" on the Windows Performance Monitor |
| <b>GROUP</b> | Process group (which is defined in the <b>bv1to1.conf</b> file), or Interaction Manager application name.                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>STIME</b> | Start time of server. The start times should be relatively close. Later times might be an indication that a server crashed and was automatically restarted.                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>IDL</b>   | Total count of IDL requests received, not including those to the monitor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>IdIQ</b>  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>JOB</b>   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>LWP</b>   | Number of light-weight processes (threads).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>RSS</b>   | Resident memory size of server process (in kilobytes).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>STIME</b> | System start time.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>SESS</b>  | Current count of sessions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>SYS</b>   | Accumulated system mode CPU time (seconds).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>THR</b>   | Current count of threads.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

|            |                                                                                                                                                                                                                                                                                                                            |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>USR</b> | Accumulated user mode CPU time (seconds).                                                                                                                                                                                                                                                                                  |
| <b>VSZ</b> | Virtual memory size of server process (in kilobytes). If a process is growing in size, it probably has a memory leak. If it is an Interaction Manager process, the culprit is most likely a component or dynamic object (though Interaction Manager servers do grow and shrink from garbage collection during normal use). |

### **NS\_STAT**

The NS process displays the namespace for the current One-To-One environment, and optionally can update objects in a name space.

|              |                                            |
|--------------|--------------------------------------------|
| <b>Bind</b>  | Count of bind() CORBA requests served      |
| <b>List</b>  | Count of list() CORBA requests served      |
| <b>New</b>   | Count of new NamingContext objects created |
| <b>Rebnd</b> | Count of rebind() CORBA requests served    |
| <b>Rsvlv</b> | Count of resolve() CORBA requests served   |
| <b>Unbnd</b> | Count of unbind() CORBA requests served    |

### **BV\_CACHE\_STAT**

Monitors the request cache status. The available counters for each request are:

|                               |                                                   |
|-------------------------------|---------------------------------------------------|
| <b>CNT- Request_Name-HIT</b>  | Count of requests found in the cache.             |
| <b>CNT- Request_Name-MAX</b>  | Maximum size of the cache in bytes.               |
| <b>CNT- Request_Name-SWAP</b> | Count of items that got swapped out of the cache. |
| <b>CNT- Request_Name-MISS</b> | Count of requests that were not in the cache.     |
| <b>CNT- Request_Name-SIZE</b> | Count of items currently in the cache.            |

## Cache Metrics

Cache metrics are available for the following items:

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>AD</b>               | Contains information about advertisements (current cache size, configured cache size, count of hits, count of misses, count of replacements).                                                                                                                                                                                                                                                                                                                         |
| <b>ALERTSCHED</b>       | Notification schedules are defined in the BV_ALERTSCHED and BV_MSGSCHED tables. They are defined by the One-To-One Command Center user or by an application.                                                                                                                                                                                                                                                                                                          |
| <b>CATEGORY_CONTENT</b> | Contains information about the category (current cache size, configured cache size, count of hits, count of misses, count of replacements).                                                                                                                                                                                                                                                                                                                           |
| <b>DISCUSSION</b>       | The One-To-One discussion groups provide moderated system of messages and threads of messages aligned to a particular topic. Use the Discussion group interfaces for creating, retrieving and deleting individual messages in a discussion group. To create, delete, or retrieve discussion groups, use the generic content management API. The BV_DiscussionDB object provides access to the threads and messages in the discussion group database.                  |
| <b>EXT_FIN_PRODUCT</b>  | Contains information about the external product (current cache size, configured cache size, count of hits, count of misses, count of replacements).                                                                                                                                                                                                                                                                                                                   |
| <b>EDITORIAL</b>        | Using the Editorials content module, you can point cast and community cast personalized editorial content, and sell published text on your One-To-One site. You can solicit editorial content, such as investment reports and weekly columns, from outside authors and publishers, and create your own articles, reviews, reports, and other informative media. In addition to text, you can use images, sounds, music, and video presentations as editorial content. |
| <b>INCENTIVE</b>        | Contains sales incentives                                                                                                                                                                                                                                                                                                                                                                                                                                             |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>MSGSCHEd</b>   | Contains the specifications of visitor-message jobs. Notification schedules are defined in the BV_ALERTSCHEd and BV_MSGSCHEd tables. They are defined by the One-To-One Command Center user or by an application.                                                                                                                                                                                                                                                                                                                                |
| <b>MSGSCRIPT</b>  | Contains the descriptions of the JavaScripts that generate visitor messages and alert messages. Contains the descriptions of the JavaScripts that generate targeted messages and alert messages. Use the Command Center to add message script information to this table by selecting the Visitor Messages module in the Notifications group. For more information, see the <i>Command Center User's Guide</i> .                                                                                                                                  |
| <b>PRODUCT</b>    | BV_PRODUCT contains information about the products that a visitor can purchase.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>QUERY</b>      | BV_QUERY contains queries.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>SCRIPT</b>     | BV_SCRIPT contains page scripts.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>SECURITIES</b> | Contains information about securities (current cache size, configured cache size, count of hits, count of misses, count of replacements)                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>TEMPLATE</b>   | The Templates content module enables you to store in the content database any BroadVision page templates used on your One-To-One site. Combining BroadVision page templates with BroadVision dynamic objects in the One-To-One Design Center application is one way for site developers to create One-To-One Web sites. If your developers use these page templates, you can use the Command Center to enter and manage them in your content database. If your site doesn't use BroadVision page template, you will not use this content module. |

**JS\_SCRIPT\_CTRL**

The available counters are:

|              |                                                                                                                                                                                                                   |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CACHE</b> | Script cache enabled. Initially 1 (on).                                                                                                                                                                           |
| <b>DUMP</b>  | Reference dump sequence. Increment this to cause all contexts to dump their references when they next run their next script. The dump information is appended to the jsctxdump.<pid> file in the BVLOG directory. |
| <b>FLUSH</b> | Cache flushing sequence. Increment this to cause all contexts to flush their script cache when they next run their next script.                                                                                   |
| <b>METER</b> | Metering enabled. Initially 0 (off).                                                                                                                                                                              |
| <b>TRACE</b> | Tracing level. Range is BVLOG_LEVEL_MIN to BVLOG_LEVEL_MAX. Lower level means more tracing. Initial value is BVLOG_DEBUG.                                                                                         |

**JS\_SCRIPT\_STAT**

The available counters are:

|                |                                                                     |
|----------------|---------------------------------------------------------------------|
| <b>ALLOC</b>   | Count of reference allocations                                      |
| <b>ERROR</b>   | Count of recoverable errors—how many times the Error object was set |
| <b>FAIL</b>    | Count of failed script runs                                         |
| <b>JSPERR</b>  | Count of preprocessor failures—also counted in FAIL                 |
| <b>RELEASE</b> | Count of reference releases                                         |
| <b>STOP</b>    | Count of stopped script runs                                        |
| <b>SUCC</b>    | Count of successful script runs                                     |
| <b>SYNTAX</b>  | Count of Javascript compilation failures—also counted in FAIL       |



# 23

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## ColdFusion Monitoring

The ColdFusion monitor displays statistics about the resource usage on the ColdFusion server during the scenario run.

To obtain data for this graph, you need to configure the ColdFusion online monitor (from the Controller) and select the measurements you want to display, before running the scenario. You select measurements to monitor the ColdFusion server using the ColdFusion Configuration dialog box.

---

**Note:** The ColdFusion monitor works via HTTP and supports UNIX platforms. If you want to monitor the ColdFusion server on Windows platforms, you can also use the Windows Resource monitor.

---

**This chapter includes:**

- ▶ Setting up the Monitoring Environment on page 212
- ▶ Adding a Machine to Monitor on page 212
- ▶ Configuring the ColdFusion Monitor on page 213
- ▶ ColdFusion Performance Counters on page 215

## Setting up the Monitoring Environment

Copy the <LoadRunner installation>\dat\monitors\perfmon.cfm file into the <ColdFusion Home>\cfide\administrator directory. By default, the ColdFusion monitor checks for the <ColdFusion Home>\cfide\administrator\perfmon.cfm file.

---

**Note:** The port you use to monitor a ColdFusion server through a firewall depends on the configuration of your server.

---

## Adding a Machine to Monitor

In order to monitor the ColdFusion resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

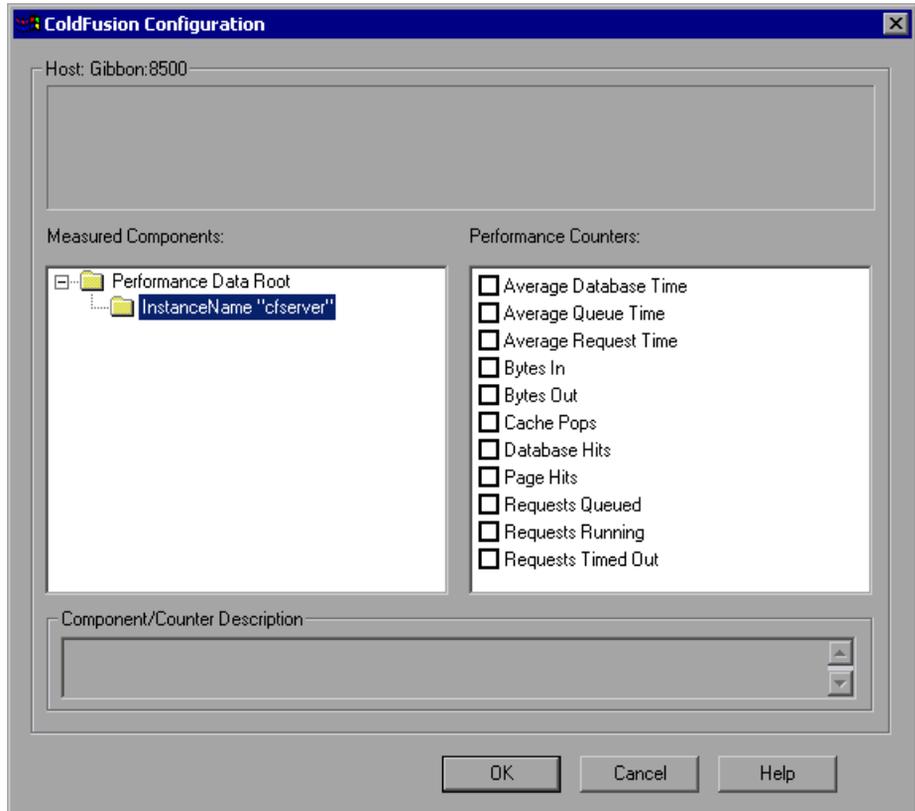
- 1** Click the ColdFusion graph in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The ColdFusion dialog box opens.  
  
In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.
- 3** Enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs, and click **OK**.
- 4** In the **Resource Measurements** section of the ColdFusion dialog box, click **Add**.
- 5** Continue with “Configuring the ColdFusion Monitor” on page 213.

## Configuring the ColdFusion Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which measurements to monitor on the machine.

**To configure the ColdFusion monitor:**

- 1 When you click **Add** to add a measurement, the ColdFusion Configuration dialog box opens, displaying the available measurements.



Browse the Measured Components tree, and check the required performance counters, as described in “Understanding the ColdFusion Configuration Dialog Box” on page 214.

For a description of the available measurements, see “ColdFusion Performance Counters” on page 215.

- 2 Click **OK**. The measurements that you selected appear in the **Resource Measurements on: <machine>** section of the ColdFusion dialog box.
- 3 Click **OK** in the ColdFusion dialog box, to activate the monitor.

### **Understanding the ColdFusion Configuration Dialog Box**

The ColdFusion Configuration dialog box lets you select the items to monitor on the ColdFusion application server.

- **Host.** Displays the name of the monitored machine.
- **Measured Components.** Displays the available components. Browse the tree and select the component you want to monitor. A description of the highlighted component appears in the Component/Counter Description box.
- **Performance Counters.** Check the required performance counters. A description of the selected counter appears in the Component/Counter Description box.
- **Component/Counter Description.** Displays a description of the selected component or counter.

## ColdFusion Performance Counters

The following table describes the default counters that can be measured:

| Measurement                      | Description                                                                                                                                                                                                                     |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Avg. Database Time (msec)</b> | The running average of the amount of time (in milliseconds) that it takes ColdFusion to process database requests.                                                                                                              |
| <b>Avg. Queue Time (msec)</b>    | The running average of the amount of time (in milliseconds) that requests spent waiting in the ColdFusion input queue before ColdFusion began to process the request.                                                           |
| <b>Avg Req Time (msec)</b>       | The running average of the total amount of time (in milliseconds) that it takes ColdFusion to process a request. In addition to general page processing time, this value includes both queue time and database processing time. |
| <b>Bytes In/sec</b>              | The number of bytes per second sent to the ColdFusion server.                                                                                                                                                                   |
| <b>Bytes Out/sec</b>             | The number of bytes per second returned by the ColdFusion server.                                                                                                                                                               |
| <b>Cache Pops</b>                | Cache pops.                                                                                                                                                                                                                     |
| <b>Database Hits/sec</b>         | The number of database hits generated per second by the ColdFusion server.                                                                                                                                                      |
| <b>Page Hits/sec</b>             | The number of Web pages processed per second by the ColdFusion server.                                                                                                                                                          |
| <b>Queued Requests</b>           | The number of requests currently waiting to be processed by the ColdFusion server.                                                                                                                                              |
| <b>Running Requests</b>          | The number of requests currently being actively processed by the ColdFusion server.                                                                                                                                             |
| <b>Timed Out Requests</b>        | The number of requests that timed out due to inactivity timeouts.                                                                                                                                                               |



# 24

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## Fujitsu INTERSTAGE Monitoring

The Fujitsu INTERSTAGE monitor displays statistics about the resource usage on the Fujitsu server during the scenario run. The Fujitsu INTERSTAGE monitor uses SNMP to retrieve Fujitsu INTERSTAGE server statistics.

To obtain data for this graph, you need to configure the Fujitsu INTERSTAGE online monitor (from the Controller) and select the measurements you want to display, before running the scenario. You define the measurements for the Fujitsu INTERSTAGE monitor using the Fujitsu INTERSTAGE SNMP Resources dialog box.

**This chapter includes:**

- ▶ Adding a Machine to Monitor on page 218
- ▶ Configuring the Fujitsu INTERSTAGE Monitor on page 219
- ▶ Fujitsu INTERSTAGE Performance Counters on page 221

## Adding a Machine to Monitor

In order to monitor the Fujitsu INTERSTAGE resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

- 1 Click the Fujitsu INTERSTAGE graph in the graph tree, and drag it into the right pane of the Run view.
- 2 Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The Fujitsu INTERSTAGE dialog box opens.

In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.

- 3 Enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs, and click **OK**.

---

**Note:** If the Fujitsu INTERSTAGE SNMP agent is running on a different port than the default SNMP port 161, you need to define the port number. Enter the following information in the Add Machine dialog box:

<server name:port number>

For example: digi:8888

In addition, you can define the default port for your Fujitsu INTERSTAGE server in the configuration file, **snmp.cfg**, located in <LoadRunner root folder>\dat\monitors. For example, if the port used by the SNMP agent on your Fujitsu INTERSTAGE system is 8888, you should edit the **snmp.cfg** file as follows:

```
; Fujitsu INTERSTAGE
[cm_snmp_mon_isp]
port=8888
```

---

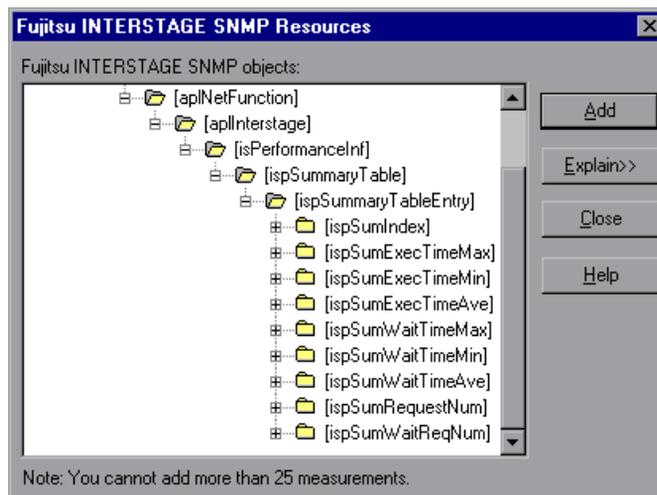
- 4 In the **Resource Measurements** section of the Fujitsu INTERSTAGE dialog box, click **Add**.
- 5 Continue with “Configuring the Fujitsu INTERSTAGE Monitor” on page 219.

## Configuring the Fujitsu INTERSTAGE Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which objects to monitor on the machine.

**To configure the Fujitsu INTERSTAGE monitor:**

- 1 When you click **Add** to add a measurement, the Fujitsu INTERSTAGE SNMP Resources dialog box opens.



- 2 Browse the Fujitsu INTERSTAGE SNMP Object tree, and select the measurements you want to monitor, as described in “Understanding the Fujitsu INTERSTAGE SNMP Resources Dialog Box” on page 220.

For a description of the available measurements, see “Fujitsu INTERSTAGE Performance Counters” on page 221.

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**Note:** The Fujitsu INTERSTAGE monitor can only monitor up to 25 measurements.

---

- 3 Add all the desired resources to the list, and click **Close**. The resources that you selected appear in the **Resource Measurements on:** <machine> section of the Fujitsu INTERSTAGE dialog box.
- 4 Click **OK** in the Fujitsu INTERSTAGE dialog box to activate the monitor.

### **Understanding the Fujitsu INTERSTAGE SNMP Resources Dialog Box**

The Fujitsu INTERSTAGE dialog box lets you select the Fujitsu INTERSTAGE server resources to monitor using the Simple Network Management Protocol (SNMP).

- **Fujitsu INTERSTAGE SNMP Objects.** Select each required object and click **Add**. Click **Explain** for the ID number and a description of the selected object.
- **Explain.** Displays a description of the selected object.

---

**Note:** The Fujitsu INTERSTAGE monitor can only monitor up to 25 measurements.

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## Fujitsu INTERSTAGE Performance Counters

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**Note:** The Fujitsu INTERSTAGE monitor can only monitor up to 25 measurements.

---

The following tables describe the measurements that can be monitored:

| Measurement              | Description                                                                                       |
|--------------------------|---------------------------------------------------------------------------------------------------|
| <b>IspSumObjectName</b>  | The object name of the application for which performance information is measured.                 |
| <b>IspSumExecTimeMax</b> | The maximum processing time of the application within a certain period of time.                   |
| <b>IspSumExecTimeMin</b> | The minimum processing time of the application within a certain period of time.                   |
| <b>IspSumExecTimeAve</b> | The average processing time of the application within a certain period of time.                   |
| <b>IspSumWaitTimeMax</b> | The maximum time required for INTERSTAGE to start an application after a start request is issued. |
| <b>IspSumWaitTimeMin</b> | The minimum time required for INTERSTAGE to start an application after a start request is issued. |
| <b>IspSumWaitTimeAve</b> | The average time required for INTERSTAGE to start an application after a start request is issued. |
| <b>IspSumRequestNum</b>  | The number of requests to start an application.                                                   |
| <b>IspSumWaitReqNum</b>  | The number of requests awaiting application activation.                                           |



# 25

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## iPlanet (NAS) Monitoring

This Web Application Server Resource displays statistics about the resource usage on the iPlanet (NAS) Web application server during the scenario run. The iPlanet (NAS) monitor uses the SNMP to retrieve iPlanet (NAS) server statistics.

To obtain data for this graph, you must first configure the iPlanet SNMP Service on the application server. You can then enable the iPlanet (NAS) online monitor (from the Controller) and select the measurements you want to display, before running the scenario. You define the measurements for the iPlanet (NAS) monitor using the iPlanet (NAS) dialog box.

**This chapter includes:**

- ▶ Setting Up the Monitoring Environment on page 224
- ▶ Adding a Machine to Monitor on page 228
- ▶ Configuring the iPlanet (NAS) Monitor on page 230
- ▶ iPlanet (NAS) Performance Counters on page 232

## Setting Up the Monitoring Environment

Before you can configure the monitor, you need to set up the application server for SNMP monitoring.

This section offers a short explanation on setting up SNMP monitoring of the iPlanet Application Server. It is intended to supplement the iPlanet documentation, not act as a replacement. For an explanation of the SNMP reporting architecture and theory, refer to the iPlanet documentation.

---

**Note:** The instructions below assume that SNMP statistics will be collected on the standard SNMP port 161.

---

### SNMP Summary

- ▶ Solaris has a native SNMP agent, **snmpdx**, that is started automatically at boot time by the script **/etc/rc3.d/S76snmpdx**. This daemon communicates on the standard SNMP port 161. The port number can be changed with the **-p <port>** option.
- ▶ Planet Products are shipped with their own SNMP agents. The architecture is such that there is one "master agent" per host, which a network management station communicates with, and one or more "subagents" that collect data from various iPlanet products and forward statistics to the master agent. The master agent also defaults to communicating on port 161.
- ▶ To run both the Solaris SNMP agent and the iPlanet SNMP agent, a proxy must be used that makes the Sun agent look like a subagent to the iPlanet master agent.

### Steps Overview

- Login to the system as root
- Change the port number for the Solaris SNMP agent
- Configure and run the iPlanet agents "magt" and "sagt"
- Start the Solaris SNMP agent
- Configure iPlanet Application Server for SNMP statistics
- Start SNMP subagents for iPlanet Directory Server and iPlanet Web Server (optional)

### Changing the Port Number for the Solaris SNMP Agent

- 1 Login to the system as root. (Only a root user can change the port number and run the agents).
- 2 Stop the SNMP agent by running `/etc/rc2.d/K76snmpdx stop`.
- 3 Edit `/etc/rc3.d/S76snmpdx` to run the Solaris daemon on a non-standard port number. For example, 1161:  
 Replace  
`/usr/lib/snmp/snmpdx -y -c /etc/snmp/conf`  
 with  
`/usr/lib/snmp/snmpdx -p 1161 -y -c /etc/snmp/conf`

### Configuring and Running the iPlanet Agents

The master and proxy agents and startup scripts are found in `<ias install directory>\snmp`.

- 1 In the script `S75snmpagt`, add a line to the environment variable `GX_ROOTDIR` so that it points to your iAS installation. For example, if the iPlanet Application Server is installed in `/usr/iplanet/ias6/ias`:  
`GX_ROOTDIR=/usr/iplanet/ias6/ias`  
`export GX_ROOTDIR`
- 2 Copy the script `S75snmpagt` to `/etc/rc3.d`
- 3 `chmod 755 /etc/rc3.d/S75snmpagt`
- 4 In `/etc/rc3.d/S75snmpagt` `/etc/rc2.d/K07snmpagt`

**5** You can configure system information and traps.

In the example below, information has been added about the system owner and location, and SNMP traps have been sent to a network manager station ("mde.uk.sun.com").

```
COMMUNITY public
ALLOW ALL OPERATIONS
INITIAL sysLocation "Under Joe Bloggs' Desk in Headquarters"
INITIAL sysContact "Joe Bloggs
Email: Joe.Bloggs@Sun.COM
Voice: +1 650 555 1212"
MANAGER mde.uk.sun.com
SEND ALL TRAPS TO PORT 162
WITH COMMUNITY public
```

---

**Note:** There is no need to edit the proxy agent's configuration file (CONFIG\_SAGT).

---

**6** Start the iPlanet agents by running the command:  
`/etc/rc3.d/S75snmpagt start`

**To start the Solaris SNMP agent:**

Restart the Solaris SNMP agent by running the command:  
`/etc/rc3.d/S76snmpdx start`

**Configuring the iPlanet Application Server for SNMP Statistics**

- 1** Start the iPlanet Application Server admin tool `ksvradmin`.
- 2** In the General View, select the instance name that you want to manage.
- 3** Click the **SNMP** tab in the management frame.
- 4** Select **Enable SNMP Administration and Monitoring** and **Enable SNMP Debug**.
- 5** Type `60` in the Connection Attempt Interval field, and exit `ksvradmin`.

- 6 Restart the iPlanet Application Server with the commands:

```
iascontrol stop
iascontrol kill
iascontrol start
```

- 7 Check in the logfile <iASInstallDir>/logs/ias.log that the application server successfully connected to the master agent. You should see the following line:  
kas> SNMP: Connected to master agent

### **Starting SNMP Subagents for the iPlanet Web Server**

- 1 Use your Web browser to access the iPlanet Web Server.
- 2 Choose the Web server you wish to administer, and click the **Manage** button.
- 3 Select the **Monitor** tab, and click **SNMP Subagent Configuration** on the left side of the page.
- 4 Type in the configuration information and set the radio button **Enable SNMP Statistics Collection** to **On**.
- 5 Click **SNMP Subagent Control**.
- 6 Click the **Start** button.

### **Starting SNMP Subagents for the iPlanet Directory Server**

- 1 Use the Netscape Administration Console to manage the iPlanet Directory Server.
- 2 Select the **Configuration** tab.
- 3 Click the **SNMP** tab in the Configuration frame.
- 4 Select the **Enable statistics collection** check box.
- 5 Set "Master Host" to "localhost".
- 6 Set "Master port" to 199.
- 7 In the other fields, enter the appropriate information.
- 8 Click the **Start Subagent** button.

### Summary Note

Use your SNMP management tool to query the SNMP master agent on port 161. You should see all the information provided by the Solaris SNMP agent as well as any iPlanet subagents that you have configured.

The next time that you boot Solaris, the Sun and iPlanet SNMP agents will be started automatically by the boot scripts which you have configured.

## Adding a Machine to Monitor

In order to monitor the iPlanet (NAS) resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

- 1** Click the iPlanet (NAS) graph in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The iPlanet (NAS) dialog box opens.  
  
In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.
- 3** Enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs, and click **OK**.

---

**Note:** If the iPlanet SNMP agent is running on a different port than the default SNMP port, you must define the port number. Enter the following information in the Add Machine dialog box:

<server name:port number>

For example: digi:8888

In addition, you can define the default port for your iPlanet server in the configuration file, **snmp.cfg**, located in <LoadRunner root folder>\dat\monitors. For example, if the port used by the SNMP agent on your iPlanet server is 8888, you should edit the **snmp.cfg** file as follows:

```
; iPlanet (NAS)
[cm_snmp_mon_nas]
port=8888
```

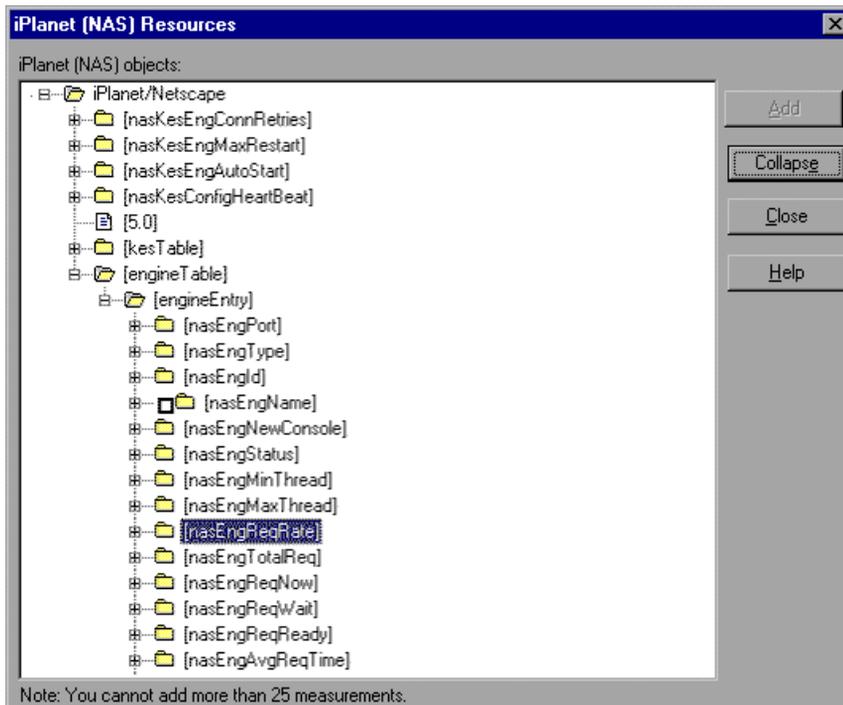
- 
- 4** In the **Resource Measurements** section of the iPlanet (NAS) dialog box, click **Add**.
  - 5** Continue with “Configuring the iPlanet (NAS) Monitor” on page 230.

## Configuring the iPlanet (NAS) Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which objects to monitor on the machine.

**To configure the iPlanet (NAS) monitor:**

- 1 When you click **Add** to add a measurement, the iPlanet (NAS) Resources dialog box opens.



- 2 Browse the iPlanet (NAS) Resources Object tree, and select performance counters, as described in “Understanding the iPlanet (NAS) Resources Dialog Box” on page 232.

For a description of the available measurements, see “iPlanet (NAS) Performance Counters” on page 232.

- 3 Add all the desired resources to the list, and click **Close**. The resources that you selected appear in the **Resource Measurements on: <machine>** section of the iPlanet (NAS) dialog box.

---

**Note:** The iPlanet (NAS) monitor can only monitor up to 25 measurements.

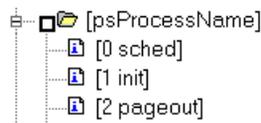
---

- 4 Click **OK** in the iPlanet (NAS) dialog box to activate the monitor.

### Improving the Level of Measurement Information

You can improve the level of measurement information for the iPlanet (NAS) monitor by enabling measurements with string values to be listed (in addition to measurements with numeric values), and by enabling the name modifier (which displays the string value as an identifying part of the measurement name).

In the following example of a measurement using the name modifier, the string value of ProcessName (sched) is displayed in addition to its instance ID (0):



```

[psProcessName]
├── [0 sched]
├── [1 init]
└── [2 pageout]

```

To enable this feature, add the following line to the **<LoadRunner root folder>\dat\monitors\snmp.cfg** file:

```
SNMP_show_string_nodes=1
```

Usage Notes: You can select more than one name modifier, but the first in the hierarchy will be used. Each time the iPlanet (NAS) Add Measurements dialog box opens, the information is reread from the **snmp.cfg** file. You cannot add the same measurement twice (once with a name modifier and once without it). If you do so, an error message is issued.

## Understanding the iPlanet (NAS) Resources Dialog Box

The iPlanet (NAS) dialog box lets you select the iPlanet (NAS) server resources to monitor using the Simple Network Management Protocol (SNMP).

- ▶ **iPlanet (NAS) SNMP Objects.** Select each required object and click **Add**. Click **Explain** for the ID number and a description of the selected object.
- ▶ **Explain.** Displays a description of the selected object.

---

**Note:** The iPlanet (NAS) monitor can only monitor up to 25 measurements.

---

## iPlanet (NAS) Performance Counters

The following tables describe the counters that can be monitored:

### Netscape Performance Counters

The following counters measure Netscape performance:

| Measurement                   | Description                                                                                   |
|-------------------------------|-----------------------------------------------------------------------------------------------|
| <b>nasKesEngConn Retries</b>  | The maximum number of times the administration server will try to connect to an engine.       |
| <b>nasKesEngMax Restart</b>   | The maximum number of times the administration server will restart an engine after a failure. |
| <b>nasKesEngAutoStart</b>     | Start all the engines at startup of the administration server.                                |
| <b>nasKesConfigHeart Beat</b> | Heart Beat.                                                                                   |

### KES Performance Counters

The following counters measure KES performance:

| Measurement                          | Description                                                                                                                                                                                                                                                           |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>nasKesId</b>                      | The ID of the KES this engine belongs to.                                                                                                                                                                                                                             |
| <b>nasKesMinThread</b>               | The default minimum number of threads per engine.                                                                                                                                                                                                                     |
| <b>nasKesMaxThread</b>               | The default maximum number of threads per engine.                                                                                                                                                                                                                     |
| <b>nasKesLoadBalancer Disable</b>    | Enable or disable the load balancer service.                                                                                                                                                                                                                          |
| <b>nasKesCpuLoad</b>                 | The total CPU usage on this host.                                                                                                                                                                                                                                     |
| <b>nasKesDiskLoad</b>                | The total disk usage on this host.                                                                                                                                                                                                                                    |
| <b>nasKesMemLoad</b>                 | The total memory usage on this host.                                                                                                                                                                                                                                  |
| <b>nasKesRequestLoad</b>             | The number of requests on this NAS.                                                                                                                                                                                                                                   |
| <b>nasKesCpuLoad Factor</b>          | The relative importance of CPU usage in computing the server load. This number is specified as a percent. The sum of all server load factors, CPUload, DiskLoad, MemLoad and ExecReqs must equal 100%.                                                                |
| <b>nasKesDiskLoad Factor</b>         | The relative importance of disk usage in computing the server load. This number is specified as a percent. The sum of all server load factors, CPUload, DiskLoad, MemLoad and ExecReqs must equal 100%.                                                               |
| <b>nasKesMemLoad Factor</b>          | The relative importance of memory usage in computing the server load. This number is specified as a percent. The sum of all server load factors, CPUload, DiskLoad, MemLoad and ExecReqs must equal 100%.                                                             |
| <b>nasKesAppLogics RunningFactor</b> | The relative importance of the number of times an AppLogic is run in computing the AppLogic execution performance. This figure is specified as a percent. The sum of all agent load factors, ResultCached, AvgExecTime, LastExecTime, and ServerLoad must equal 100%. |

| Measurement                                 | Description                                                                                                                                                                                                                                                             |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>nasKesResults<br/>CachedFactor</b>       | The relative importance of the cached results of an AppLogic in computing the AppLogic execution performance. This figure is specified as a percent. The sum of all agent load factors, ResultCached, AvgExecTime, LastExecTime, and ServerLoad must equal 100%         |
| <b>nasKesAvgExecTime<br/>Factor</b>         | The relative importance of the average execution time of an AppLogic in computing the AppLogic execution performance. This figure is specified as a percent. The sum of all agent load factors, ResultCached, AvgExecTime, LastExecTime, and ServerLoad must equal 100% |
| <b>nasKesLastExec<br/>TimeFactor</b>        | The relative importance of the last execution time of an AppLogic in computing the AppLogic execution performance. This figure is specified as a percent. The sum of all agent load factors, ResultCached, AvgExecTime, LastExecTime, and ServerLoad must equal 100%    |
| <b>nasKesHitsFactor</b>                     | The relative importance of the number of AppLogics running in computing the AppLogic execution performance. This figure is specified as a percent. The sum of all agent load factors, ResultCached, AvgExecTime, LastExecTime, and ServerLoad must equal 100%           |
| <b>nasKesServerLoad<br/>Factor</b>          | The relative importance of the server load (computed using the four server load factors) in computing AppLogic execution performance. The sum of all agent load factors, ResultCached, AvgExecTime, LastExecTime, and ServerLoad must equal 100%.                       |
| <b>nasKesBroadcast<br/>Interval</b>         | The length of time (in seconds) between each broadcast attempt from the load balancer daemon.                                                                                                                                                                           |
| <b>nasKesApplogic<br/>BroadcastInterval</b> | The length of time (in seconds) between each broadcast of AppLogic load information across all the servers in the cluster. This should be greater than nasKesBroadcastInterval.                                                                                         |

| Measurement                           | Description                                                                                                                                                                                            |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>nasKesServerBroadcastInterval</b>  | The length of time (in seconds) between each broadcast of server load information across all the servers in the cluster. This should be greater than <code>nasKesBroadcastInterval</code> .            |
| <b>nasKesServerLoadUpdateInterval</b> | The length of time (in seconds) between each update of server load information. A server load update applies to the server load data that has been sampled up until the moment when the update occurs. |
| <b>nasKesCpuLoadUpdateInterval</b>    | The length of time (in seconds) between each sampling of CPU usage.                                                                                                                                    |
| <b>nasKesDiskLoadUpdateInterval</b>   | The length of time (in seconds) between each sampling of disk usage.                                                                                                                                   |
| <b>nasKesMemLoadUpdateInterval</b>    | The length of time (in seconds) between each sampling of memory thrashes.                                                                                                                              |
| <b>nasKesTotalReqsUpdateInterval</b>  | The length of time (in seconds) between each sampling of the number of requests.                                                                                                                       |
| <b>nasKesMaxHops</b>                  | The maximum number of times a request can be loaded.                                                                                                                                                   |
| <b>nasKesODBCReqMinThread</b>         | The minimum number of threads reserved to process asynchronous requests.                                                                                                                               |
| <b>nasKesODBCReqMaxThread</b>         | The maximum number of threads reserved to process asynchronous requests.                                                                                                                               |
| <b>nasKesODBCCacheMaxConns</b>        | The maximum number of connections opened between NAS and the database.                                                                                                                                 |
| <b>nasKesODBCCacheFreeSlots</b>       | The minimum number of cached connections established between NAS and the database.                                                                                                                     |
| <b>nasKesODBCCacheTimeout</b>         | The time after which an idle connection is dropped.                                                                                                                                                    |
| <b>nasKesODBCCacheInterval</b>        | The interval (in seconds) at which the cache cleaner will try to disconnect connections already idle for longer than the specified timeout.                                                            |
| <b>nasKesODBCConnGiveupTime</b>       | The maximum amount of time the driver will try to connect to the database.                                                                                                                             |

| Measurement                         | Description                                                                                                                                 |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| <b>nasKesODBCCache Debug</b>        | Turns on the connection cache debug information.                                                                                            |
| <b>nasKesODBCResult SetInitRows</b> | The number of rows fetched at once from the database.                                                                                       |
| <b>nasKesODBCResult SetMaxRows</b>  | The maximum number of rows the cached result set can contain.                                                                               |
| <b>nasKesODBCResult SetMaxSize</b>  | The maximum size of result set the driver will cache.                                                                                       |
| <b>nasKesODBCSql Debug</b>          | Turns on SQL debug information.                                                                                                             |
| <b>nasKesODBCEnable Parser</b>      | Turns on SQL parsing.                                                                                                                       |
| <b>nasKesORCLReqMin Thread</b>      | The minimum number of threads reserved to process asynchronous requests.                                                                    |
| <b>nasKesORCLReq MaxThread</b>      | The maximum number of threads reserved to process asynchronous requests.                                                                    |
| <b>nasKesORCLCache MaxConns</b>     | The maximum number of connections opened between NAS and the database.                                                                      |
| <b>nasKesORCLCache FreeSlots</b>    | The minimum number of cached connections established between NAS and the database.                                                          |
| <b>nasKesORCLCache Timeout</b>      | The time after which an idle connection is dropped.                                                                                         |
| <b>nasKesORCLCache Interval</b>     | The interval (in seconds) at which the cache cleaner will try to disconnect connections already idle for longer than the specified timeout. |
| <b>nasKesORCLConn GiveupTime</b>    | The maximum amount of time the driver will spend trying to obtain a connection to Oracle.                                                   |
| <b>nasKesORCLCache Debug</b>        | Turns on the connection cache debug information.                                                                                            |
| <b>nasKesORCLResult SetInitRows</b> | The number of rows fetched at once from the database.                                                                                       |

| Measurement                       | Description                                                                                                                                 |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| <b>nasKesORCLResultSetMaxRows</b> | The maximum number of rows the cached result set can contain.                                                                               |
| <b>nasKesORCLResultSetMaxSize</b> | The maximum size of result set the driver will cache.                                                                                       |
| <b>nasKesORCLSqlDebug</b>         | Turns on sql debug information.                                                                                                             |
| <b>nasKesSYBReqMinThread</b>      | The minimum number of threads reserved to process asynchronous requests.                                                                    |
| <b>nasKesSYBReqMaxThread</b>      | The maximum number of threads reserved to process asynchronous request.                                                                     |
| <b>nasKesSYBCacheMaxConns</b>     | The maximum number of connections opened between NAS and the database.                                                                      |
| <b>nasKesSYBCacheFreeSlots</b>    | The minimum number of cached connections established between NAS and the database.                                                          |
| <b>nasKesSYBCacheTimeout</b>      | The time after which an idle connection is dropped.                                                                                         |
| <b>nasKesSYBCacheInterval</b>     | The interval (in seconds) at which the cache cleaner will try to disconnect connections already idle for longer than the specified timeout. |
| <b>nasKesSYBConnGiveupTime</b>    | The maximum time the driver will spend trying to obtain a connection to Sybase before giving up.                                            |
| <b>nasKesSYBCacheDebug</b>        | Turns on the connection cache debug information.                                                                                            |
| <b>nasKesSYBResultSetInitRows</b> | The number of rows fetched at once from the database.                                                                                       |
| <b>nasKesSYBResultSetMaxRows</b>  | The maximum number of rows the cached result set can contain.                                                                               |
| <b>nasKesSYBResultSetMaxSize</b>  | The maximum size of result set the driver will cache.                                                                                       |

## Engine Performance Counters

The following counters measure Engine performance:

| Measurement             | Description                                                                                                                                |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <b>nasEngKesPort</b>    | The port of the KXS this engine serves. This is supplied as part of the object ID and cannot be modified after creation.                   |
| <b>nasEngPort</b>       | The TCP/IP port this engine is listening on. The port can only be specified at the creation of the engine. It is not allowed to modify it. |
| <b>nasEngType</b>       | Type of the engine: executive(0), Java(1000), C++(3000).                                                                                   |
| <b>nasEngId</b>         | The ID is an incremental number starting at 0. The ID cannot be modified.                                                                  |
| <b>nasEngName</b>       | The name of this engine. This is an informational string that contains kcs, kxs or kjs.                                                    |
| <b>nasEngNewConsole</b> | Starts each engine in a new console window.                                                                                                |
| <b>nasEngStatus</b>     | The status column used to add, remove, enable or disable an engine. To create an engine, one needs to set. This follows rfc1443.           |
| <b>nasEngMinThread</b>  | The default minimum number of threads per engine.                                                                                          |
| <b>nasEngMaxThread</b>  | The default maximum number of threads per engine.                                                                                          |
| <b>nasEngReqRate</b>    | The rate at which requests arrive.                                                                                                         |
| <b>nasEngTotalReq</b>   | The total number of requests processed since engine startup.                                                                               |
| <b>nasEngReqNow</b>     | The number of requests being processed.                                                                                                    |
| <b>nasEngReqWait</b>    | The requests waiting to be serviced.                                                                                                       |
| <b>nasEngReqReady</b>   | The requests that are ready to be serviced.                                                                                                |
| <b>nasEngAvgReqTime</b> | The average request processing time.                                                                                                       |
| <b>nasEngThreadNow</b>  | Number of threads in use by the request manager.                                                                                           |
| <b>nasEngThreadWait</b> | The number of idle threads.                                                                                                                |

| Measurement                   | Description                                                               |
|-------------------------------|---------------------------------------------------------------------------|
| <b>nasEngWebReq Queue</b>     | The number of web requests that are queued.                               |
| <b>nasEngFailedReq</b>        | The number of requests that failed.                                       |
| <b>nasEngTotalConn</b>        | The total number of connections opened.                                   |
| <b>nasEngTotalConn Now</b>    | The total number of connections in use.                                   |
| <b>nasEngTotalAccept</b>      | The total number of connections listening to incoming requests.           |
| <b>nasEngTotalAccept Now</b>  | The total number of connections listening to incoming connections in use. |
| <b>nasEngTotalSent</b>        | The total number of packets sent.                                         |
| <b>nasEngTotalSentBytes</b>   | The total number of bytes sent.                                           |
| <b>nasEngTotalRecv</b>        | The total number of packets received.                                     |
| <b>nasEngTotalRecvBytes</b>   | The total number of bytes received.                                       |
| <b>nasEngBindTotal</b>        | The number of AppLogic bound since startup.                               |
| <b>nasEngBindTotal Cached</b> | The number of AppLogic cached since startup.                              |
| <b>nasEngTotalThreads</b>     | Total number of threads created in this process.                          |
| <b>nasEngCurrent Threads</b>  | Total number of threads in use in this process.                           |
| <b>nasEngSleeping Threads</b> | Number of threads sleeping in this process.                               |
| <b>nasEngDAETotal Query</b>   | Total number of queries executed since startup.                           |
| <b>nasEngDAEQuery Now</b>     | The number of queries being processed.                                    |
| <b>nasEngDAETotal Conn</b>    | The number of logical connections created since startup.                  |

| Measurement                          | Description                                                        |
|--------------------------------------|--------------------------------------------------------------------|
| <b>nasEngDAEConn Now</b>             | The number of logical connections in use.                          |
| <b>nasEngDAECache Count</b>          | The number of caches.                                              |
| <b>nasEngODBCQuery Total</b>         | Total number of queries executed since startup.                    |
| <b>nasEngODBC PreparedQueryTotal</b> | Total number of ODBC prepared queries executed since startup.      |
| <b>nasEngODBCConn Total</b>          | Total number of connections opened since startup.                  |
| <b>nasEngODBCConn Now</b>            | Number of connections currently opened.                            |
| <b>nasEngORCLQuery Total</b>         | Total number of queries executed since startup.                    |
| <b>nasEngORCL PreparedQueryTotal</b> | Total number of prepared queries executed since startup.           |
| <b>nasEngORCLConn Total</b>          | Total number of connections established with Oracle since startup. |
| <b>nasEngORCLConn Now</b>            | Number of connections opened with Oracle now.                      |
| <b>nasEngSYBQuery Total</b>          | Total number of queries the driver processed since startup.        |
| <b>nasEngSYBPreparedQueryTotal</b>   | Total number of prepared queries processed since startup.          |
| <b>nasEngSYBConnTotal</b>            | Total number of connections opened since startup.                  |
| <b>nasEngSYBConnNow</b>              | Number of SYB connections opened now.                              |
| <b>nasStatusTrapEntry</b>            | The KES definition.                                                |
| <b>nasTrapKesIpAddress</b>           | The IP Address of KES host.                                        |
| <b>nasTrapKesPort</b>                | The port of the main engine of this NAS.                           |

| Measurement            | Description                                   |
|------------------------|-----------------------------------------------|
| <b>nasTrapEngPort</b>  | The port of the engine generating this event. |
| <b>nasTrapEngState</b> | The port of the engine generating this event. |



# 26

---

## Microsoft Active Server Pages Monitoring

The Microsoft Active Server Pages (ASP) monitor displays statistics about the resource usage on the ASP server during the scenario run.

To obtain data for this graph, you need to configure the Microsoft ASP online monitor (from the Controller) and select the measurements you want to display, before running the scenario. You select measurements to monitor the Microsoft ASP application server using the MS Active Server Pages dialog box.

---

**Note:** To monitor an ASP server through a firewall, use TCP, port 139.

---

**This chapter includes:**

- ▶ Adding a Machine to Monitor on page 244
- ▶ Configuring the Microsoft Active Server Pages Monitor on page 245
- ▶ MS Active Server Pages Performance Counters on page 246

## Adding a Machine to Monitor

In order to monitor the MS Active Server resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

- 1 Click the MS Active Server Pages graph in the graph tree, and drag it into the right pane of the Run view.
- 2 Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The MS Active Server Pages dialog box opens.

In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.

- 3 Enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs, and click **OK**.
- 4 In the **Resource Measurements** section of the MS Active Server Pages dialog box, select the default measurements you want to monitor.

For a description of the available measurements, see “MS Active Server Pages Performance Counters” on page 246.

---

**Note:** To change the default counters for the Microsoft ASP monitor, see “Changing a Monitor’s Default Counters” on page 543.

---

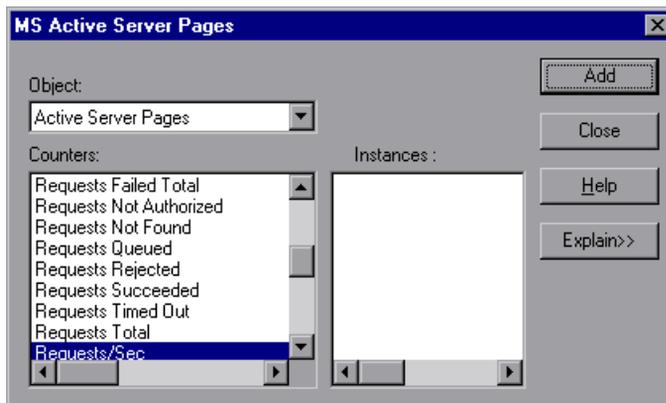
- 5 To select additional measurements, click **Add** in the **Resource Measurements** section.
- 6 Continue with Configuring the Microsoft Active Server Pages Monitor below.

## Configuring the Microsoft Active Server Pages Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which measurements to monitor on the machine.

**To configure the MS Active Server Pages monitor:**

- 1 When you click **Add** to add a measurement, the MS Active Server Pages dialog box opens displaying the Active Server Pages object, its counters, and instances.



For each measurement, select an object, counter, and instance, and then click **Add**, as described in “Understanding the Microsoft Active Server Pages Dialog Box” on page 246.

For a description of the available measurements, see “MS Active Server Pages Performance Counters” on page 246.

---

**Note:** To change the default counters for the Microsoft ASP monitor, see “Changing a Monitor’s Default Counters” on page 543.

---

- 2 Add all the desired resources to the list, and click **Close**. The counters that you selected appear in the **Resource Measurements on:** *<machine>* section of the MS Active Server Pages dialog box.
- 3 Click **OK** in the MS Active Server Pages dialog box to activate the monitor.

## Understanding the Microsoft Active Server Pages Dialog Box

The MS Active Server Pages dialog box lets you select the items to monitor on the MS Active Server Pages application server.

- **Object.** Select the object being monitored on the specified machine.
- **Counters.** Select a resource counter to monitor. Select multiple counters using the CTRL key. For an explanation of each counter, click **Explain**.
- **Instances.** If multiple instances of the selected counter are running, select one or more instances to monitor for the selected counter.
- **Explain.** Displays a description of the selected counter.

## MS Active Server Pages Performance Counters

The following table describes the default counters that can be monitored:

| Measurement                          | Description                                                                                          |
|--------------------------------------|------------------------------------------------------------------------------------------------------|
| <b>Errors per Second</b>             | The number of errors per second.                                                                     |
| <b>Requests Wait Time</b>            | The number of milliseconds the most recent request was waiting in the queue.                         |
| <b>Requests Executing</b>            | The number of requests currently executing.                                                          |
| <b>Requests Queued</b>               | The number of requests waiting in the queue for service.                                             |
| <b>Requests Rejected</b>             | The total number of requests not executed because there were insufficient resources to process them. |
| <b>Requests Not Found</b>            | The number of requests for files that were not found.                                                |
| <b>Requests/sec</b>                  | The number of requests executed per second.                                                          |
| <b>Memory Allocated</b>              | The total amount of memory, in bytes, currently allocated by Active Server Pages.                    |
| <b>Errors During Script Run-Time</b> | The number of failed requests due to run-time errors.                                                |

| Measurement      | Description                                    |
|------------------|------------------------------------------------|
| Sessions Current | The current number of sessions being serviced. |
| Transactions/sec | The number of transactions started per second. |



# 27

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## Oracle9iAS Server Monitoring

The Oracle9iAS HTTP monitor displays statistics about the resource usage on the Oracle9iAS HTTP server during the scenario run.

The SiteScope Oracle9i Application Server Monitor allows you to monitor multiple parameters or counters with a single monitor instance. This allows you to watch server loading for performance, availability, and capacity planning.

**This chapter includes:**

- ▶ Setting Up the Monitoring Environment on page 250
- ▶ Adding a Machine to Monitor on page 251
- ▶ Configuring the Oracle9i Server Monitor on page 252
- ▶ Oracle9i Server Performance Counters on page 257

## Setting Up the Monitoring Environment

### To set up the LR native monitor:

Before running the scenario, you need to configure the Oracle9iAS HTTP online monitor (from the Controller), and select the default measurements you want to display. You select measurements to monitor the Oracle9iAS HTTP server using the Oracle HTTP Server Monitor Configuration dialog box.

---

### Notes:

- ▶ You must start running the Oracle9iAS HTTP server before you begin selecting the measurements you want to monitor.
  - ▶ The port you use to monitor an Oracle9iAS HTTP server through a firewall depends on the configuration of your server.
- 

### To set up the SiteScope monitor:

- ▶ If you are using the SiteScope monitor engine, ensure that SiteScope has been installed on a server. You can install SiteScope on the same machine as the Controller, or on a dedicated server.
- ▶ Create a separate monitor instance for each Oracle9i Application server in your environment.
- ▶ You must enable Web caching on the Oracle9i Application Server in order to use the Oracle9i Application Server Monitor.
- ▶ The default run schedule for this monitor is every 3 seconds, but you can change it to run more or less often using the **Update every** setting.

## Adding a Machine to Monitor

In order to monitor the Oracle9i resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

- 1** Click **Oracle9iAS HTTP Server** in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The Oracle9iAS HTTP Server dialog box opens.
- 3** By default, LoadRunner monitors Oracle9i Server resources using the native LoadRunner monitor engine.

If you want to monitor Oracle9i Server resources using the SiteScope monitor engine, click **Advanced**.

In the Choose Monitor Engine dialog box, choose **SiteScope**, and click **OK** to close the Monitor Engine dialog box.

- 4** In the **Monitored Server Machines** section, click **Add**.

The Add Machine dialog box opens.

- In the **Monitored Machine Information** section, enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs.
- In the **SiteScope Server Information** section, enter the SiteScope machine name, and port (default: 8888), and specify whether you are using a Secure HTTP connection. If you are using a SiteScope account, fill in the relevant account information.

**Note:** If you are adding a native LoadRunner monitor, the **SiteScope Server Information** section does not appear.

Click **OK** to close the Add Machine dialog box.

- 5** In the **Resource Measurements** section of the Oracle9iAS HTTP Server dialog box, click **Add**.
- 6** Continue with “Configuring the Oracle9i Server Monitor” on page 252.

## Configuring the Oracle9i Server Monitor

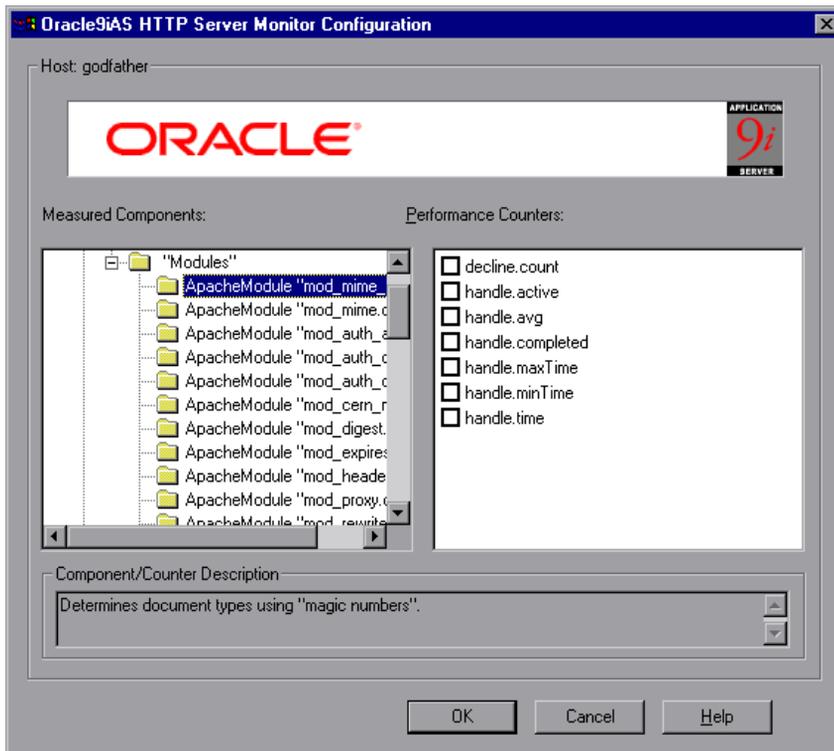
The configuration for this monitor differs slightly depending on whether you are adding a SiteScope or native LoadRunner monitor.

This section describes:

- Configuring the Native LoadRunner Oracle9i HTTP Server Monitor
- Configuring the SiteScope Oracle9iAS Monitor

### Configuring the Native LoadRunner Oracle9i HTTP Server Monitor

- 1 The Oracle9iAS HTTP Server Monitor Configuration dialog box opens, displaying the counters that can be monitored.



- 2 Browse the Measured Components tree, and select performance counters, as described in “Understanding the Oracle9iAS HTTP Server Monitor Configuration Dialog Box” on page 253.

For a description of the available measurements, see “Oracle9i Server Performance Counters” on page 257.

- 3 Click **OK** in the Oracle9iAS HTTP Server Monitor Configuration dialog box, and in the Oracle9iAS HTTP Server dialog box, to activate the monitor.

### **Understanding the Oracle9iAS HTTP Server Monitor Configuration Dialog Box**

The Oracle9iAS HTTP Server Monitor Configuration dialog box lets you select the items to monitor on the Oracle 9iAS HTTP server. You must start running the Oracle9iAS HTTP server before you begin selecting the measurements you want to monitor.

- **Host.** Displays the name of the monitored machine.
- **Measured Components.** Displays the available components. Browse the tree and select the component you want to monitor. A description of the highlighted component appears in the Component/Counter Description box.
- **Performance Counters.** Check the required performance counters. A description of the selected counter appears in the Component/Counter Description box.
- **Component/Counter Description.** Displays a description of the selected component or counter.

## Configuring the SiteScope Oracle9iAS Monitor

- 1 The first time you add a measurement to the monitor, you need to configure the monitor properties. When you click **Add** to add a measurement, the Configuring Oracle9i Monitor dialog box opens.

Enter values for the monitor properties as described in “Understanding the Configuring Oracle9i Monitor Dialog Box” on page 256, and click **OK**.

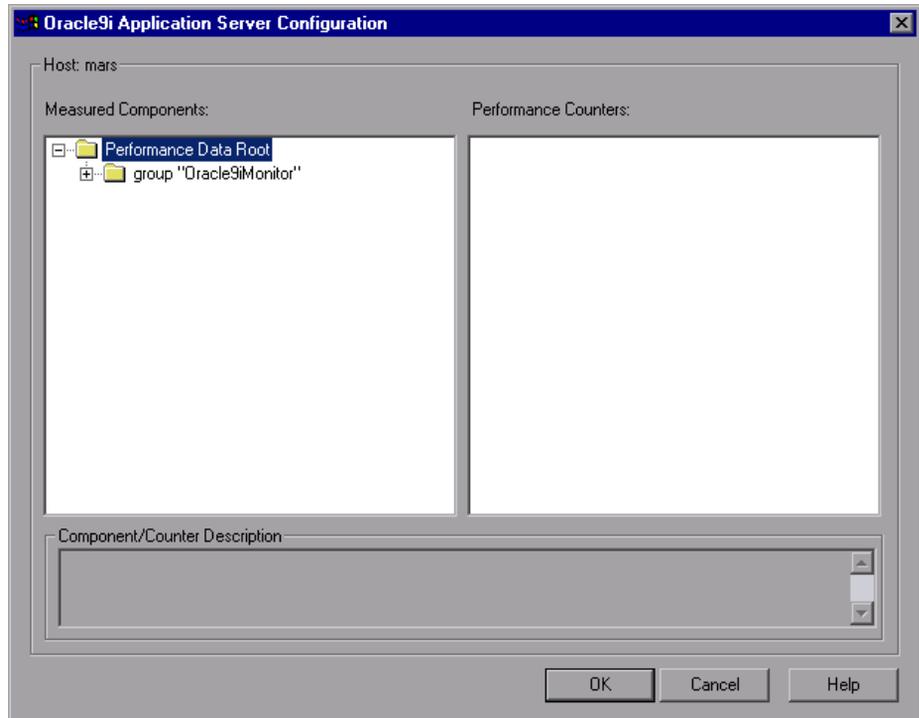
| Property                | Value                          |
|-------------------------|--------------------------------|
| Port                    |                                |
| URL                     | http://localhost:Port/webca... |
| HTTP Proxy              |                                |
| Authorization User Name |                                |
| Authorization Password  | *****                          |
| Proxy Server User Name  |                                |
| Update every            | 3                              |

Port  
the server port

OK Cancel Use Defaults

- 2 The Oracle9i Application Server Configuration dialog box opens.

Browse the **Measured Components** tree and select the performance counters on the right, as described in “Understanding the Oracle9iAS HTTP Server Monitor Configuration Dialog Box” on page 253. Click a component or counter to see its description in the **Component/Counter Description** section.



- 3 Click **OK** to close the Oracle9i Application Server Configuration dialog box. The components that you selected appear in the **Resource Measurements on: <machine>** section of the Oracle9iAS HTTP Server dialog box.
- 4 Click **OK** in the Oracle9iAS HTTP Server dialog box to activate the monitor.

## Understanding the Configuring Oracle9i Monitor Dialog Box

You configure the Oracle9iAS monitor using the Configuring Oracle9i Monitor dialog box.

- **Port.** Enter the number of the server port.
- **URL.** The server administration URL appears by default, and has the following form:

```
http://server:port/webcacheadmin?
SCREEN_ID=CGA.Site.Stats&ACTION=Show.
```

---

**Note:** You do not need to enter the server port number. This value is taken from the **Port** field.

---

- **HTTP Proxy.** Optionally, a proxy server can be used to access the server. Enter the domain name and port of an HTTP Proxy Server.
- **Authorization User Name.** If the server you want to monitor requires login information for access, enter the name in this box.
- **Authorization Password.** If the server you want to monitor requires login information for access, enter the password in this box.
- **Proxy Server User Name.** If the proxy server requires a name to access the server, enter it here. Technical note: Your proxy server must support Proxy-Authenticate for these options to function.
- **Update every.** Enter how frequently the monitor should read the server statistics. The drop-down list to the right of the text box lets you specify time increments of seconds, minutes, hours, or days. You must specify a time increment of at least 3 seconds. The default is 3 seconds.

## Oracle9i Server Performance Counters

The following tables describe the performance counters for the Oracle9i Server monitors.

- LoadRunner Oracle9iAS HTTP Server Monitor Performance Counters
- SiteScope Oracle9iAS Monitor Performance Counters

### LoadRunner Oracle9iAS HTTP Server Monitor Performance Counters

#### Modules

The following table describes some of the modules that can be monitored:

| Measurement                    | Description                                                               |
|--------------------------------|---------------------------------------------------------------------------|
| <code>mod_mime.c</code>        | Determines document types using file extensions                           |
| <code>mod_mime_magic.c</code>  | Determines document types using "magic numbers"                           |
| <code>mod_auth_anon.c</code>   | Provides anonymous user access to authenticated areas                     |
| <code>mod_auth_dbm.c</code>    | Provides user authentication using DBM files                              |
| <code>mod_auth_digest.c</code> | Provides MD5 authentication                                               |
| <code>mod_cern_meta.c</code>   | Supports HTTP header metafiles                                            |
| <code>mod_digest.c</code>      | Provides MD5 authentication (deprecated by <code>mod_auth_digest</code> ) |
| <code>mod_expires.c</code>     | Applies Expires: headers to resources                                     |
| <code>mod_headers.c</code>     | Adds arbitrary HTTP headers to resources                                  |
| <code>mod_proxy.c</code>       | Provides caching proxy abilities                                          |
| <code>mod_rewrite.c</code>     | Provides powerful URI-to-filename mapping using regular expressions       |
| <code>mod_speling.c</code>     | Automatically corrects minor typos in URLs                                |
| <code>mod_info.c</code>        | Provides server configuration information                                 |
| <code>mod_status.c</code>      | Displays server status                                                    |

| Measurement              | Description                                                                           |
|--------------------------|---------------------------------------------------------------------------------------|
| <b>mod_usertrack.c</b>   | Provides user tracking using cookies                                                  |
| <b>mod_dms.c</b>         | Provides access to DMS Apache statistics                                              |
| <b>mod_perl.c</b>        | Allows execution of Perl scripts                                                      |
| <b>mod_fastcgi.c</b>     | Supports CGI access to long-lived programs                                            |
| <b>mod_ssl.c</b>         | Provides SSL support                                                                  |
| <b>mod_plsql.c</b>       | Handles requests for Oracle stored procedures                                         |
| <b>mod_isapi.c</b>       | Provides Windows ISAPI extension support                                              |
| <b>mod_setenvif.c</b>    | Sets environment variables based on client information                                |
| <b>mod_actions.c</b>     | Executes CGI scripts based on media type or request method                            |
| <b>mod_imap.c</b>        | Handles imagemap files                                                                |
| <b>mod_asis.c</b>        | Sends files that contain their own HTTP headers                                       |
| <b>mod_log_config.c</b>  | Provides user-configurable logging replacement for mod_log_common                     |
| <b>mod_env.c</b>         | Passes environments to CGI scripts                                                    |
| <b>mod_alias.c</b>       | Maps different parts of the host file system in the document tree, and redirects URLs |
| <b>mod_userdir.c</b>     | Handles user home directories                                                         |
| <b>mod_cgi.c</b>         | Invokes CGI scripts                                                                   |
| <b>mod_dir.c</b>         | Handles the basic directory                                                           |
| <b>mod_autoindex.c</b>   | Provides automatic directory listings                                                 |
| <b>mod_include.c</b>     | Provides server-parsed documents                                                      |
| <b>mod_negotiation.c</b> | Handles content negotiation                                                           |
| <b>mod_auth.c</b>        | Provides user authentication using text files                                         |
| <b>mod_access.c</b>      | Provides access control based on the client host name or IP address                   |

| Measurement           | Description                                                                                                                            |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| <b>mod_so.c</b>       | Supports loading modules (.so on UNIX, .dll on Win32) at run-time                                                                      |
| <b>mod_oprocMgr.c</b> | Monitors JServ processes and restarts them if they fail                                                                                |
| <b>mod_jserv.c</b>    | Routes HTTP requests to JServ server processes. Balances load across multiple JServs by distributing new requests in round-robin order |
| <b>mod_ose.c</b>      | Routes requests to the JVM embedded in Oracle's database server                                                                        |
| <b>http_core.c</b>    | Handles requests for static Web pages                                                                                                  |

### Counters

The following table describes the counters that can be monitored:

| Measurement             | Description                                                      |
|-------------------------|------------------------------------------------------------------|
| <b>handle.minTime</b>   | The minimum time spent in the module handler.                    |
| <b>handle.avg</b>       | The average time spent in the module handler.                    |
| <b>handle.active</b>    | The number of threads currently in the handle processing phase.  |
| <b>handle.time</b>      | The total amount of time spent in the module handler.            |
| <b>handle.completed</b> | The number of times the handle processing phase was completed.   |
| <b>request.maxTime</b>  | The maximum amount of time required to service an HTTP request.  |
| <b>request.minTime</b>  | The minimum amount of time required to service an HTTP request.  |
| <b>request.avg</b>      | The average amount of time required to service an HTTP request.  |
| <b>request.active</b>   | The number of threads currently in the request processing phase. |

| Measurement                   | Description                                                                                                                                  |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>request.time</b>           | The total amount of time required to service an HTTP request.                                                                                |
| <b>request.completed</b>      | The number of times the request processing phase was completed.                                                                              |
| <b>connection.maxTime</b>     | The maximum amount of time spent servicing any HTTP connection.                                                                              |
| <b>connection.minTime</b>     | The minimum amount of time spent servicing any HTTP connection.                                                                              |
| <b>connection.avg</b>         | The average amount of time spent servicing HTTP connections.                                                                                 |
| <b>connection.active</b>      | The number of connections with currently open threads.                                                                                       |
| <b>connection.time</b>        | The total amount of time spent servicing HTTP connections.                                                                                   |
| <b>connection.completed</b>   | The number of times the connection processing phase was completed.                                                                           |
| <b>numMods.value</b>          | The number of loaded modules.                                                                                                                |
| <b>childFinish.count</b>      | The number of times the Apache parent server started a child server, for any reason.                                                         |
| <b>childStart.count</b>       | The number of times “children” finished “gracefully.” There are some ungraceful error/crash cases that are not counted in childFinish.count. |
| <b>Decline.count</b>          | The number of times each module declined HTTP requests.                                                                                      |
| <b>internalRedirect.count</b> | The number of times that any module passed control to another module using an “internal redirect”.                                           |
| <b>cpuTime.value</b>          | The total CPU time utilized by all processes on the Apache server (measured in CPU milliseconds).                                            |
| <b>heapSize.value</b>         | The total heap memory utilized by all processes on the Apache server (measured in kilobytes).                                                |

| Measurement  | Description                                                                |
|--------------|----------------------------------------------------------------------------|
| pid.value    | The process identifier of the parent Apache process.                       |
| upTime.value | The amount of time the server has been running (measured in milliseconds). |

### SiteScope Oracle9iAS Monitor Performance Counters

---

**Note:** The SiteScope Oracle9iAS monitor can monitor a maximum of 10 counters at one time.

---

The following table describes the counters that can be monitored by the SiteScope Oracle9iAS monitor:

| Measurement                     | Description                                                                                                  |
|---------------------------------|--------------------------------------------------------------------------------------------------------------|
| Up/Down Time(up/down)           | Status of the application Web server.                                                                        |
| Completed Requests (number/sec) | Number of requests that the application Web server processes per second.                                     |
| Completed Requests(max/sec)     | Maximum number of requests that the application Web server can process per second.                           |
| Completed Requests (avg/sec)    | Average number of requests that the application Web server has processed per second.                         |
| Completed Requests (total)      | Accumulated number of requests that the application Web server has processed                                 |
| Latency (avg this interval)     | Average latency for 10 second intervals to process requests for Oracle Web Cache.                            |
| Latency (avg since start)       | Average number of seconds to process requests for Oracle Web Cache since the application Web server started. |
| Load (now)                      | Current number of connections from Oracle Web Cache that the application Web server has open.                |

| Measurement                                                      | Description                                                                                                        |
|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| <b>Load (max)</b>                                                | Maximum number of connections that the application Web server has had open at one time.                            |
| <b>Active Sessions (now)</b>                                     | Current number of active connections from Oracle Web Cache to the application Web servers.                         |
| <b>Active Sessions (max)</b>                                     | Maximum number of active connections that the application Web server has had open at one time.                     |
| <b>Apology Pages Served (Network Error - number this second)</b> | Current number of apology pages that the Oracle Web Cache is serving to Web browsers due to a network error.       |
| <b>Apology Pages Served (Network Error - Total)</b>              | Total number of apology pages that the Oracle Web Cache is serving to Web browsers due to a network error.         |
| <b>Apology Pages Served (Site Busy - number this second)</b>     | Current number of apology pages that the Oracle Web Cache is serving to Web browsers due to a busy Web site error. |
| <b>Apology Pages Served (Site Busy - total)</b>                  | Total number of apology pages that the Oracle Web Cache is serving to Web browsers due to a busy Web site error.   |
| <b>Application Web Server Backlog (now)</b>                      | Current number of requests that the application Web server is processing for Oracle Web Cache.                     |
| <b>Application Web Server Backlog (max)</b>                      | Maximum number of requests that the application Web server has processed for Oracle Web Cache.                     |

# 28

---

## SilverStream Monitoring

The SilverStream monitor displays statistics about the resource usage on the SilverStream server during the scenario run. To obtain data for this graph, you need to configure the SilverStream online monitor (from the Controller) and select the measurements you want to display, before running the scenario.

To monitor a SilverStream server you need to know the server statistics information URL. A simple way to verify the statistics URL is to access it from a browser.

The URL should be in the following format:

`http://<server_name/IP_address>:<port_number>/SilverStream/Statistics`

For example:

`http://199.203.78.57:80/SilverStream/Statistics`

---

**Note:** To monitor a SilverStream server through a firewall, use the Web server port (by default, port 80).

---

### **This chapter includes:**

- ▶ Adding a Machine to Monitor on page 264
- ▶ Configuring the SilverStream Monitor on page 265
- ▶ SilverStream Performance Counters on page 267

## Adding a Machine to Monitor

In order to monitor the SilverStream resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

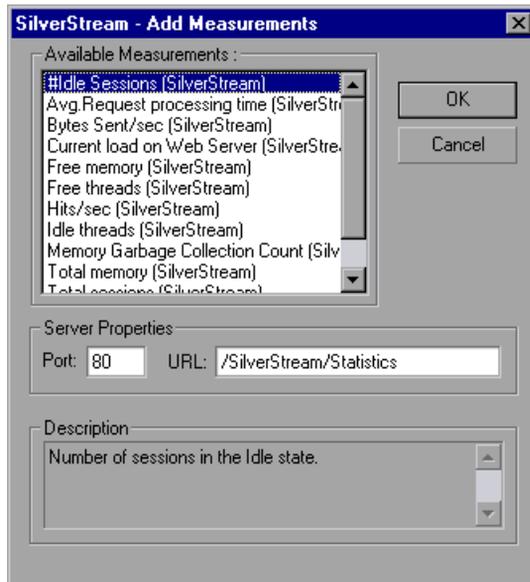
- 1** Click the SilverStream graph in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The SilverStream dialog box opens.
- 3** In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.
- 4** Enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs, and click **OK**.
- 5** In the **Resource Measurements** section of the SilverStream dialog box, click **Add**.
- 6** Continue with Configuring the SilverStream Monitor below.

## Configuring the SilverStream Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which measurements to monitor on the machine.

**To configure the SilverStream monitor:**

- 1 When you click **Add** to add a measurement, the SilverStream - Add Measurements dialog box opens displaying the available measurements and server properties.



- 2 Select the required measurements, as described in “Understanding the SilverStream - Add Measurements Dialog Box” on page 266.

For a description of the available measurements, see “SilverStream Performance Counters” on page 267.

- 3 In the Server Properties section, enter the Port number and URL (without the server name). The default URL is /SilverStream/Statistics.
- 4 Click **OK**.

- 5 Click **OK** in the SilverStream dialog box to activate the monitor.

---

**Note:** The default port number and URL can vary from one server to another. Please consult the Web server administrator.

---

**To change the default server properties:**

- 1 Open the **SilverStream.cfg** file in the <LoadRunner root folder>\dat\monitors directory.
- 2 Edit the following parameters at the end of the file:

|                     |                                                                                                                                                                                                                                                                                           |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>InfoURL</b>      | server statistics information URL                                                                                                                                                                                                                                                         |
| <b>ServerPort</b>   | server port number                                                                                                                                                                                                                                                                        |
| <b>SamplingRate</b> | rate (milliseconds) at which the LoadRunner monitor will poll the server for the statistics information. If this value is greater than 1000, LoadRunner will use it as its sampling rate. Otherwise, it will use the sampling rate defined in the Monitors tab of the Options dialog box. |

---

**Note:** To monitor a SilverStream server through a firewall, use the Web server port (by default, port 80).

---

## **Understanding the SilverStream - Add Measurements Dialog Box**

The SilverStream-Add Measurements dialog box lets you select the items to monitor on the SilverStream application server.

- **Available Measurements.** Select the required measurement(s). Select multiple measurements using the CTRL key. A description of the selected measurement appears in the Description box.

➤ **Server Properties**

- **Port.** Enter the server's port number.
- **URL.** To monitor a SilverStream server you need to know the server statistics information URL. A simple way to verify the statistics URL is to access it from a browser.

The URL should be in the following format:

`http://<server_name/IP_address>:<port_number>/SilverStream/Statistics`

For example:

`http://199.203.78.57:80/SilverStream/Statistics`

Enter the server's URL, without the server name. The default URL is `/SilverStream/Statistics`.

---

**Note:** The default port number and URL can vary from one server to another. Please consult the Web server administrator.

---

- **Description.** Displays a description of the selected measurement.

## SilverStream Performance Counters

The following table describes the measurements and server properties that can be monitored:

| Measurement                  | Description                                                |
|------------------------------|------------------------------------------------------------|
| #Idle Sessions               | The number of sessions in the Idle state.                  |
| Avg. Request processing time | The average request processing time.                       |
| Bytes Sent/sec               | The rate at which data bytes are sent from the Web server. |

| Measurement                            | Description                                                                                              |
|----------------------------------------|----------------------------------------------------------------------------------------------------------|
| <b>Current load on Web Server</b>      | The percentage of load utilized by the SilverStream server, scaled at a factor of 25.                    |
| <b>Hits/sec</b>                        | The HTTP request rate.                                                                                   |
| <b>Total sessions</b>                  | The total number of sessions.                                                                            |
| <b>Free memory</b>                     | The total amount of memory in the Java Virtual Machine currently available for future allocated objects. |
| <b>Total memory</b>                    | The total amount of memory in the Java Virtual Machine.                                                  |
| <b>Memory Garbage Collection Count</b> | The total number of times the JAVA Garbage Collector has run since the server was started.               |
| <b>Free threads</b>                    | The current number of threads not associated with a client connection and available for immediate use.   |
| <b>Idle threads</b>                    | The number of threads associated with a client connection, but not currently handling a user request.    |
| <b>Total threads</b>                   | The total number of client threads allocated.                                                            |

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## WebLogic (SNMP) Monitoring

The WebLogic (SNMP) monitor displays statistics about the resource usage on the WebLogic (SNMP) server (version 6.0 and earlier) during the scenario run. The WebLogic (SNMP) monitor uses SNMP to retrieve server statistics.

**This chapter includes:**

- ▶ Adding a Machine to Monitor on page 270
- ▶ Configuring the WebLogic (SNMP) Monitor on page 271
- ▶ WebLogic (SNMP) Performance Counters on page 273

To use this monitor, you must make sure that a version prior to WebLogic 6.0 is installed on your server, and that the SNMP agent is installed and activated on the server.

For instructions on installing the SNMP agent, see <http://edocs.bea.com/wls/docs51/admindocs/snmpagent.html>.

To obtain data for this graph, you need to configure the WebLogic (SNMP) online monitor (from the Controller) and select the measurements you want to display, before running the scenario.

---

**Note:** To monitor a WebLogic (SNMP) server, use port 161 or 162, depending on the configuration of the agent.

---

## Adding a Machine to Monitor

In order to monitor the WebLogic (SNMP) resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

- 1 Click the WebLogic (SNMP) graph in the graph tree, and drag it into the right pane of the Run view.
- 2 Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The WebLogic (SNMP) dialog box opens.

In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.

- 3 Enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs, and click **OK**.

---

**Note:** If the WebLogic SNMP agent is running on a different port than the default SNMP port, you must define the port number. Enter the following information in the Add Machine dialog box:

<server name:port number>

For example: digi:8888

In addition, you can define the default port for your WebLogic server in the configuration file, **snmp.cfg**, located in <LoadRunner root folder>\dat\monitors. For example, if the port used by the SNMP agent on your WebLogic server is 8888, you should edit the **snmp.cfg** file as follows:

```
; WebLogic
[cm_snmp_mon_isp]
port=8888
```

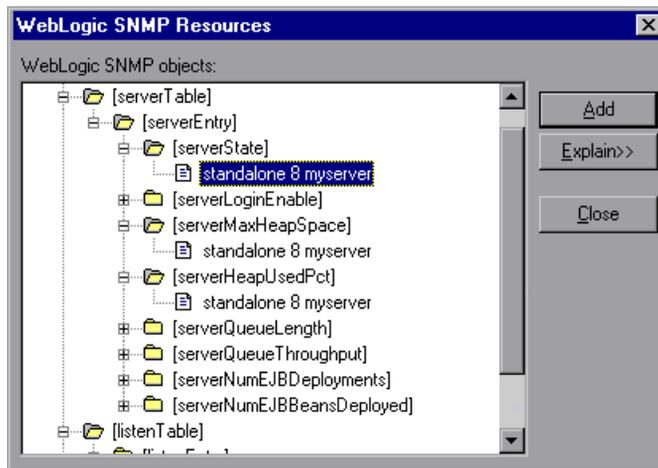
- 
- 4 In the **Resource Measurements** section of the WebLogic (SNMP) dialog box, click **Add**.
  - 5 Continue with “Configuring the WebLogic (SNMP) Monitor” on page 271.

## Configuring the WebLogic (SNMP) Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which measurements to monitor on the machine.

To configure the WebLogic (SNMP) monitor:

- 1 When you click **Add** to add a measurement, the WebLogic SNMP Resources dialog box opens, displaying the available measurements.



- 2 Browse the WebLogic SNMP Objects tree, and select performance counters, as described in “Understanding the WebLogic (SNMP) Resources Dialog Box” on page 272.

For a description of the available measurements, see “WebLogic (SNMP) Performance Counters” on page 273.

---

**Note:** The WebLogic (SNMP) monitor can only monitor up to 25 measurements.

---

- 3 After selecting and adding the required objects, click **Close**.
- 4 Click **OK** in the WebLogic (SNMP) dialog box to activate the monitor.

### **Understanding the WebLogic (SNMP) Resources Dialog Box**

The WebLogic (SNMP) dialog box lets you select the items to monitor on the WebLogic (SNMP) application server. To use this monitor, you must make sure that a version prior to WebLogic 6.0 is installed on your server, and that the SNMP agent is installed and activated on the server. For instructions on installing the SNMP agent, see <http://edocs.bea.com/wls/docs51/admindocs/snmpagent.html>.

- ▶ **WebLogic SNMP Objects.** Select each required object and click **Add** (you can select only one object at a time). Click **Explain** for a description of the selected object.
- ▶ **Explain.** Displays a description of the selected object.

---

**Note:** The WebLogic (SNMP) monitor can only monitor up to 25 measurements.

---

## WebLogic (SNMP) Performance Counters

The following tables describe the measurements and server properties that can be monitored.

### Server Table

The Server Table lists all WebLogic (SNMP) servers that are being monitored by the agent. A server must be contacted or be reported as a member of a cluster at least once before it will appear in this table. Servers are only reported as a member of a cluster when they are actively participating in the cluster, or shortly thereafter.

| Measurement                      | Description                                                                                                                                                                             |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ServerState</b>               | The state of the WebLogic server, as inferred by the SNMP agent. <b>Up</b> implies that the agent can contact the server. <b>Down</b> implies that the agent cannot contact the server. |
| <b>ServerLoginEnable</b>         | This value is true if client logins are enabled on the server.                                                                                                                          |
| <b>ServerMaxHeapSpace</b>        | The maximum heap size for this server, in KB                                                                                                                                            |
| <b>ServerHeapUsedPct</b>         | The percentage of heap space currently in use on the server                                                                                                                             |
| <b>ServerQueueLength</b>         | The current length of the server execute queue                                                                                                                                          |
| <b>ServerQueueThroughput</b>     | The current throughput of execute queue, expressed as the number of requests processed per second                                                                                       |
| <b>ServerNumEJBDeployment</b>    | The total number of EJB deployment units known to the server                                                                                                                            |
| <b>ServerNumEJBBeansDeployed</b> | The total number of EJB beans actively deployed on the server                                                                                                                           |

### Listen Table

The Listen Table is the set of protocols, IP addresses, and port combinations on which servers are listening. There will be multiple entries for each server: one for each protocol, ipAddr, port combination. If clustering is used, the clustering-related MIB objects will assume a higher priority.

| Measurement          | Description                                                                                                                                                                                                                                                                                                     |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ListenPort</b>    | Port number.                                                                                                                                                                                                                                                                                                    |
| <b>ListenAdminOK</b> | <b>True</b> if admin requests are allowed on this (protocol, ipAddr, port) combination; otherwise false.                                                                                                                                                                                                        |
| <b>ListenState</b>   | <b>Listening</b> if the (protocol, ipAddr, port) combination is enabled on the server; <b>Not Listening</b> if it is not. The server may be listening but not accepting new clients if its server Login Enable state is false. In this case, existing clients will continue to function, but new ones will not. |

### ClassPath Table

The ClassPath Table is the table of classpath elements for Java, WebLogic (SNMP) servers, and servlets. There are multiple entries in this table for each server. There may also be multiple entries for each path on a server. If clustering is used, the clustering-related MIB objects will assume a higher priority.

| Measurement    | Description                                                                                                                                                                                                                                                                                                                   |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CPType</b>  | The type of CP element: Java, WebLogic, servlet. A Java CPTYPE means the CP element is one of the elements in the normal Java classpath. A WebLogic CPTYPE means the CP element is one of the elements in weblogic.class.path. A servlet CPTYPE means the CP element is one of the elements in the dynamic servlet classpath. |
| <b>CPIndex</b> | The position of an element within its path. The index starts at 1.                                                                                                                                                                                                                                                            |



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## WebLogic (JMX) Monitoring

The WebLogic (JMX) monitor displays statistics about the resource usage on the BEA WebLogic (JMX) server during the scenario run. The BEA WebLogic (JMX) monitor uses the Java JMX interface to access run-time MBeans on the server. An MBean is a container that holds the performance data.

To use this monitor, you must set ensure permissions for a user to be able to monitor MBeans and ensure that Java 1.3 or later is installed on the Controller. In addition, if the servlet is disabled, or if you do not want to use the servlet, you can load classes directly from the file system.

**This chapter includes:**

- ▶ Setting up the Monitoring Environment on page 278
- ▶ Adding a Machine to Monitor on page 282
- ▶ Configuring the WebLogic (JMX) Monitor on page 283
- ▶ WebLogic (JMX) Performance Counters on page 290

## Setting up the Monitoring Environment

Before using the WebLogic (JMX) monitor, you need to set up the WebLogic (JMX) monitoring environment, configure the WebLogic (JMX) online monitor (from the Controller) and select the measurements you want to display, before running the scenario.

If you are using the SiteScope monitor engine, ensure that SiteScope has been installed on a server. You can install SiteScope on the same machine as the Controller, or on a dedicated server.

---

**Note:** To use the WebLogic (JMX) monitor, you must make sure that WebLogic 6.0 or above is installed on your server.

The WebLogic (JMX) monitor utilizes a built-in server called the ClasspathServlet to load classes directly and automatically from the server. For information about loading classes from the server, see the “Loading Classes from the Server” on page 281.

---

### To set up the environment:

- 1** Install Java on the Controller machine. You must install Java 1.3 or later to work with WebLogic 6.x or 7.x, and Java 1.4 to work with Weblogic 8.1. (Not relevant for the SiteScope monitor.)
- 2** Set permissions so that the user can monitor MBeans.
- 3** Ensure that classes load directly from the file system if the servlet is disabled or not used.

## Installing Java 1.3.x

This section describes how to install Java 1.3 or later.

---

**Note:** To install Java 1.4, see “Installing Java 1.4” below.

---

### To install Java 1.3 or later:

- 1 Install Java 1.3 or later on the Controller machine. If Java 1.3 or later is already installed, but is not the default Java version being used, specify the full path to the updated version.
- 2 Specify the path in the <LoadRunner root folder>\dat\monitors\WebLogicMon.ini file. Edit the JVM entry in the [WebLogicMon] section.

For example: JVM="E:\Program Files\JavaSoft\JRE\1.3.1\bin\javaw.exe"

## Installing Java 1.4

This section describes how to install Java 1.4.

### To install Java 1.4:

- 1 Install JDK 1.4 on the Controller machine. If Java 1.4 is already installed but is not the default Java version being used, specify the full path to the updated version in the command line.
- 2 Copy **weblogic.jar** from the <WebLogic Server installation>\..\lib to <LoadRunner root folder>\classes.
- 3 Remove **jmxri.jar** from <LoadRunner root folder>\classes.
- 4 Specify the path in the <LoadRunner root folder>\dat\monitors\WebLogicMon.ini file. Edit the JVM entry in the [WebLogicMon] section.

For example: JVM="E:\Program Files\JavaSoft\JRE\1.4\bin\javaw.exe"

- 5 Edit the JavaVersion entry in the [WebLogicMon] section.

## Setting Permissions for Monitoring

You must set certain permissions for a user to be able to monitor MBeans.

### To log on to the WebLogic (JMX) server:

- ▶ Enter the username and password of a user with administrative privileges.

### To set permissions for WebLogic version 6.x:

- 1 Open the WebLogic console (<http://<host:port>/console>).
- 2 In the tree on the left, select **Security > ACLs**.

If you are working with the WebLogic 6.1 console, click **Create a new ACL...** in the screen on the right.

- 3 In the New ACL Name box, type `weblogic.admin.mbean`, and click **Create**.

If you are working with the WebLogic 6.1 console, click **Add a new Permission...** in the screen on the right.

- 4 In the New Permission box (or Permission box, in the WebLogic 6.1 console), type `access`. In the WebLogic 6.0 console, click **Create**.
- 5 In the Users box and Groups box, enter the name of any user or group you want to use for monitoring.
- 6 Click **Grant Permission** in the WebLogic 6.0 console. In the WebLogic 6.1 console, click **Apply**.

### To set permissions for WebLogic versions 7.x and 8.x:

- 1 Open the WebLogic console (<http://<host:port>/console>).
- 2 In the tree on the left, select **Security > Realms > myrealm > Users**, and click **Configure a new User...** in the screen on the right. The Create User: General tab opens.
- 3 In the Name box, type `weblogic.admin.mbean`, enter a password, confirm the password, and then click **Apply**.
- 4 In the Groups tab, enter the name of any user or group you want to use for monitoring, and then click **Apply**.

## Loading Classes from the Server

The WebLogic (JMX) monitor utilizes a built-in server called the ClasspathServlet to load classes directly and automatically from the server. The advantages of this are easy installation and version independence. The disadvantages are a slight decrease in performance when loading classes for the first time (due to the size of the servlet), and the possibility of the servlet becoming disabled.

If the servlet is disabled, or if you do not want to use the servlet, you can load classes directly from the file system.

---

**Note:** For Weblogic version 8.1, you must load classes directly from the file system, as the WebLogic (JMX) monitor will not load the classes automatically.

---

### To load classes directly from the file system:

- 1** Copy the **weblogic.jar** file from the application server install folder (under the lib folder) to **<LoadRunner root folder>\classes**.
- 2** If the classes file is not located in the default **<LoadRunner root folder>** folder, you need to specify the full path to it in the **<LoadRunner root folder>\dat\monitors\WebLogicMon.ini** file. In this file, change the line **Weblogic=weblogic.jar** to **Weblogic=<full path to weblogic.jar>**.

You select measurements to monitor the WebLogic (JMX) application server using the BEA WebLogic Monitor Configuration dialog box.

## Adding a Machine to Monitor

In order to monitor the WebLogic (JMX) resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

- 1** Click **WebLogic (JMX)** in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The WebLogic (JMX) dialog box opens.
- 3** By default, LoadRunner monitors WebLogic (JMX) Server resources using the native LoadRunner monitor engine.

If you want to monitor WebLogic (JMX) Server resources using the SiteScope monitor engine, click **Advanced**.

In the Choose Monitor Engine dialog box, choose **SiteScope**, and click **OK** to close the Monitor Engine dialog box.

- 4** In the **Monitored Server Machines** section, click **Add**.

The Add Machine dialog box opens.

- 5** In the **Monitored Machine Information** section, enter the server name or IP address of the machine you want to monitor using the format:  
<server name>:<port number>.

For example: HP:8111

Select the platform on which the machine runs.

- 6** In the **SiteScope Server Information** section, enter the SiteScope machine name, and port (default: 8888), and specify whether you are using a Secure HTTP connection. If you are using a SiteScope account, fill in the relevant account information.

---

**Note:** If you are adding a native LoadRunner monitor, the **SiteScope Server Information** section does not appear.

---

- 7 Click **OK** to close the Add Machine dialog box.
- 8 In the **Resource Measurements** of the WebLogic (JMX) dialog box, click **Add**.
- 9 Continue with Configuring the WebLogic (JMX) Monitor below.

## Configuring the WebLogic (JMX) Monitor

After you have added the machine that you are monitoring, you choose the measurements to monitor on the machine.

This section describes:

- ▶ Configuring the Native LoadRunner Weblogic (JMX) Monitor
- ▶ Configuring the SiteScope Weblogic (JMX) Monitor

### Configuring the Native LoadRunner Weblogic (JMX) Monitor

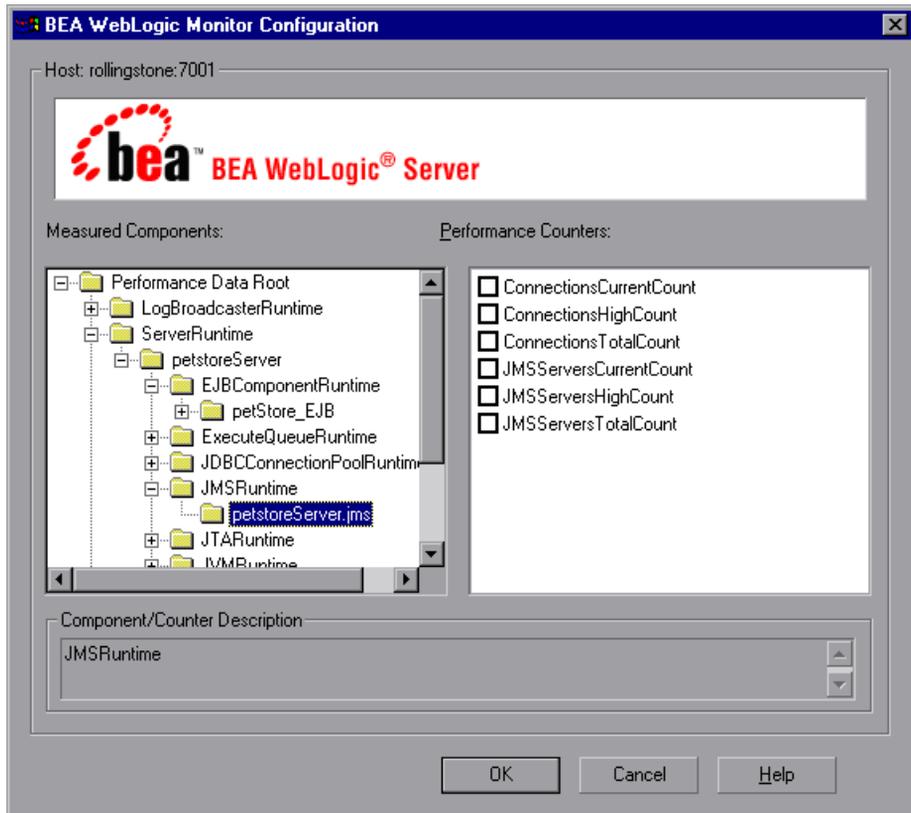
After you have added the machine that you are monitoring, you configure the monitor by choosing which measurements to monitor on the machine.

**To configure the WebLogic (JMX) monitor:**

- 1 When you click **Add** to add a measurement, the Enter Login Information dialog box opens. Enter the username and password of a user with administrative privileges to the WebLogic server.

For details on creating user permissions, see “Setting Permissions for Monitoring” on page 280.

- 2 Click **OK**. The BEA WebLogic Monitor Configuration dialog box opens, displaying the available measurements.



- 3 Browse the **Measured Components** tree and select performance counters, as described in “Understanding the BEA WebLogic Monitor Configuration Dialog Box” on page 285.

For a description of the available measurements, see “WebLogic (JMX) Performance Counters” on page 290.

- 4 Click **OK**. The measurements that you selected appear in the **Resource Measurements on:** *<machine>* section of the WebLogic (JMX) dialog box.
- 5 Click **OK** in the WebLogic (JMX) dialog box, to activate the monitor.

### **Understanding the BEA WebLogic Monitor Configuration Dialog Box**

The BEA WebLogic Monitor Configuration dialog box lets you select the items to monitor on the WebLogic (JMX) application server.

- **Host.** Displays the name of the monitored machine.
- **Measured Components.** Displays the available components. Browse the tree and select the component you want to monitor. A description of the highlighted component appears in the Component/Counter Description box.
- **Performance Counters.** Check the required performance counters. A description of the selected counter appears in the Component/Counter Description box.
- **Component/Counter Description.** Displays a description of the selected component or counter.

## Configuring the SiteScope Weblogic (JMX) Monitor

After you have added the machine that you are monitoring, you choose the measurements to monitor on the machine.

**To configure the WebLogic (JMX) monitor:**

- 1 The first time you add a measurement to the monitor, you need to configure the monitor properties. When you click **Add** to add a measurement, the Configuring WebLogic 6.x Monitor dialog box opens.

Enter values for the monitor properties as described in “Understanding the Configuring WebLogic 6.x Monitor Dialog Box” on page 288, and click **OK**.

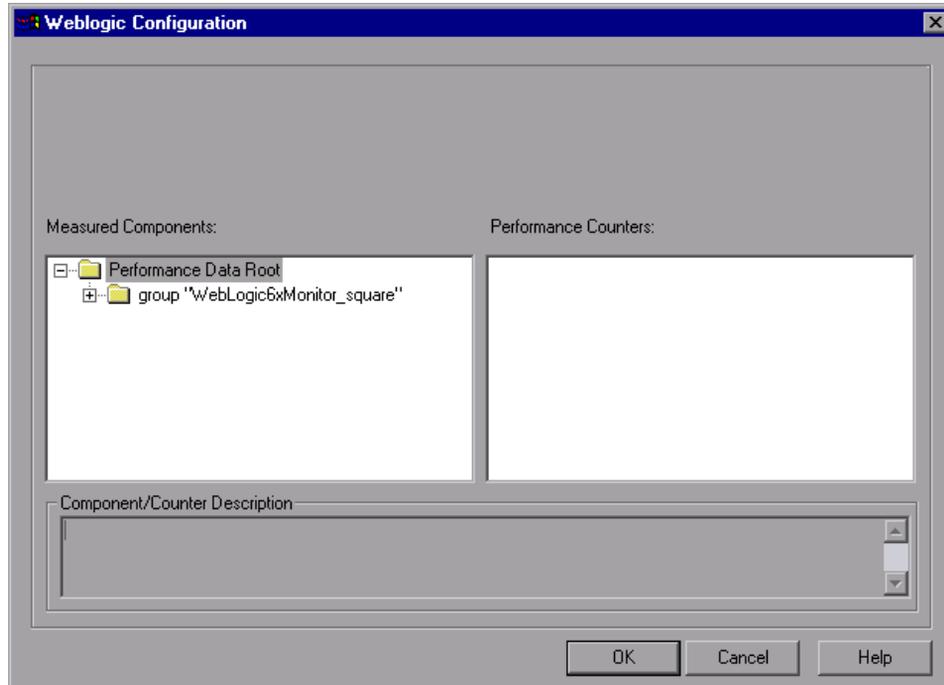
| Property                               | Value     |
|----------------------------------------|-----------|
| Port Number                            | 7001      |
| Password                               | *****     |
| User Name                              |           |
| <input type="checkbox"/> Secure Server |           |
| Server                                 | localhost |
| WebLogic Jar File                      |           |
| WLCipher Jar File                      |           |
| WebLogic License File                  |           |
| Location of JVM                        |           |
| Timeout                                | 180       |
| Update every                           | 3         |
|                                        |           |

Port Number  
the port number of WebLogic server

OK Cancel Use Defaults

- 2 The WebLogic Configuration dialog box opens.

Browse the **Measured Components** tree, as described in “Understanding the BEA WebLogic Monitor Configuration Dialog Box” on page 285, and select the performance counters on the right. Click a component or counter to see its description in the **Component/Counter Description** section.



- 3 Click **OK** to close the WebLogic Configuration dialog box. The components and counters that you selected appear in the **Resource Measurements on:** *<machine>* section of the WebLogic (JMX) dialog box.
- 4 Click **OK** in the WebLogic (JMX) dialog box to activate the monitor.

---

**Note:** You can modify the list of resources that you want to monitor at any point during the scenario. A scenario does not have to be active in order for you to monitor the resources on a remote machine.

---

## Understanding the Configuring WebLogic 6.x Monitor Dialog Box

You configure the WebLogic (JMX) monitor in the Configuring WebLogic 6.x Monitor dialog box.

- **Port Number:** Enter the port number of the WebLogic server. The default port is 7001.
- **Password:** Enter the password required to log on to the WebLogic server.
- **User Name:** Enter the username required to log on to the WebLogic server.
- **Secure Server:** Check this box if you are using a secure server connection option. Note: If you select this option, you must enter the applicable port number used by the WebLogic server for secure connections. The default secure server port is 7002.
- **Server:** Enter the name of the server where WebLogic is running.
- **WebLogic Jar File:** Enter the absolute path name to the **weblogic.jar** file on the SiteScope machine. This file must be installed on the SiteScope server and can be downloaded from the WebLogic server. An example path is:

c:\bea\weblogic7\ebcc\lib\ext\weblogic.jar.

This file is not strictly required for monitoring some earlier versions of WebLogic 6. In this case, leaving this box blank normally causes any necessary classes to be downloaded directly from the WebLogic server. This is not as efficient as loading the classes from the a \*.jar file on the server where SiteScope is running.

---

**Note:** Do not install the **weblogic.jar** file in the SiteScope directory tree. For example, do not install it in the <SiteScope install path>/SiteScope/java/lib/ext directory as this will cause the Weblogic monitor to fail. You must create a separate directory for this file on the server where SiteScope is running.

---

- ▶ **WLCipher Jar File:** (This option is used only with the Secure Server (SSL) option.)

For some versions of the WebLogic Server, you need to enter the absolute path to the **wlcipher.jar** file on the SiteScope machine.

For example: `c:\bea\weblogic81\lib\wlcipher.jar`.

- ▶ **WebLogic License File:** (This option is used only with the Secure Server (SSL) option.)

Enter the absolute path to a BEA license file on the SiteScope machine.

For example: `c:\bea\license.bea`

- ▶ **Location of JVM:** Specify the location of a JVM where the WebLogic monitoring process should run.

---

**Note:** For monitors which do not use the Secure Server (SSL) option, this is not required. For monitors that do use SSL, the version of the JVM must be 1.4.1 or earlier.

---

- ▶ **Timeout:** Enter the total time, in seconds, that SiteScope should wait for all WebLogic requests (including retries) to complete. The default is 180 seconds.
- ▶ **Update every:** Enter how frequently the monitor should read the server statistics. The drop-down list to the right of the text box lets you specify time increments of seconds, minutes, hours, or days. You must specify a time increment of at least 3 seconds. The default is 3 seconds.

## WebLogic (JMX) Performance Counters

The following measurements are available for the WebLogic (JMX) server:

### LogBroadcasterRuntime

The following table describes LogBroadcasterRuntime counters:

| Measurement     | Description                                                                         |
|-----------------|-------------------------------------------------------------------------------------|
| MessagesLogged  | The number of total log messages generated by this instance of the WebLogic server. |
| Registered      | Returns “false” if the MBean represented by this object has been unregistered.      |
| CachingDisabled | Private property that disables caching in proxies.                                  |

### ServerRuntime

For more information on the measurements contained in each of the following measurement categories, see the HP Software Web site’s Load Testing Monitors page (<http://www.mercury.com/us/products/performance-center/loadrunner/monitors/bealogic.html>).

- ServletRuntime
- WebAppComponentRuntime
- EJBStatefulHomeRuntime
- JTARuntime
- JVMRuntime
- EJBEntityHomeRuntime.
- DomainRuntime
- EJBComponentRuntime
- DomainLogHandlerRuntime
- JDBCConnectionPoolRuntime
- ExecuteQueueRuntime

- ClusterRuntime
- JMSRuntime
- TimeServiceRuntime
- EJBStatelessHomeRuntime
- WLECConnectionServiceRuntime

### ServerSecurityRuntime

The following table describes ServerSecurityRuntime counters:

| Measurement                               | Description                                                                                        |
|-------------------------------------------|----------------------------------------------------------------------------------------------------|
| <b>UnlockedUsersTotalCount</b>            | Returns the number of times a user has been unlocked on the server.                                |
| <b>InvalidLoginUsersHighCount</b>         | Returns the high-water number of users with outstanding invalid login attempts for the server.     |
| <b>LoginAttemptsWhileLockedTotalCount</b> | Returns the cumulative number of invalid logins attempted on the server while the user was locked. |
| <b>Registered</b>                         | Returns <b>False</b> if the MBean represented by this object has been unregistered.                |
| <b>LockedUsersCurrentCount</b>            | Returns the number of currently locked users on the server.                                        |
| <b>CachingDisabled</b>                    | Private property that disables caching in proxies.                                                 |
| <b>InvalidLoginAttemptsTotalCount</b>     | Returns the cumulative number of invalid logins attempted on the server.                           |
| <b>UserLockoutTotalCount</b>              | Returns the cumulative number of user lockouts that occurred on the server.                        |



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## WebSphere Monitoring

The WebSphere monitor displays statistics about the resource usage on the WebSphere 3.x, 4.x, or 5.x servers during the scenario run.

To obtain data for this graph, you need to configure the WebSphere online monitor (from the Controller) and select the measurements you want to display before running the scenario.

**This chapter includes:**

- ▶ Setting up the Monitoring Environment on page 294
- ▶ Adding a Machine to Monitor on page 296
- ▶ Configuring the WebSphere Monitor on page 297
- ▶ Specifying a Web Alias for the Servlet Directory on page 299
- ▶ WebSphere Performance Counters on page 300

## Setting up the Monitoring Environment

Before you can monitor the WebSphere server, you must first deploy the performance servlet. You may also choose to enable EPM counters on the application server.

### Deploying the Performance Servlet on the Application Server

To monitor WebSphere version 5.x, you need to deploy the performance servlet on the application server using the IBM WebSphere "Installing a New Application" wizard.

**To deploy the performance servlet on the application server for WebSphere 5.x:**

- 1** From the administrative console, click **Applications > Install New Application** in the console navigation tree.
- 2** For Path, specify the full path name of the source application file (**PerfServletApp.ear**) on the server machine and click **Next**.
- 3** Select the **Generate Default Bindings** check box and click **Next**.
- 4** On the Install New Application page, click **Summary**, and select the **Cell/Node/Server** option. **Click here**.
- 5** On the **Map modules to application servers** panel, select the server onto which the application files will install from the **Clusters and Servers** list, and select **Module** to select all of the application modules.
- 6** Click **Next**, and in the Summary panel click **Finish**.
- 7** Verify that the servlet is running properly and that the performance data is being generated. A simple way to verify that the performance data is accessible is to display it in a Web browser. The URL must be in the following format:

```
http://<server name>:port number/<servlet_folder>/com.ibm.ivb.epm.servlet.
PerformanceServlet
```

For example: `http://websphere.mercury.co.il:81/servlet/com.ibm.ivb.epm.servlet.  
PerformanceServlet`

---

**Note:** Only browsers that are XML-compatible will allow you to view the performance XML file.

---

## **Enabling the EPM Counters on the WebSphere 3.5.x Server**

### **To work with WebSphere version 3.5.x**

- 1** The EPM counters in 3.5.x are by default set to "none". To enable the counters, choose the application server you are monitoring in the WebSphere Administrator's Console browser.
- 2** Right-click the application server and select **Performance**. Select Performance Modules from the pop-up window.
- 3** Right-click Performance Modules to choose a performance level. Selecting various levels of counters enables the application server to manage varying levels of performance data.
- 4** Click the **Set** button.
- 5** In versions 3.5.2 and 3.5.3 the Servlet counters have been disabled. To enable the Servlet counters, you need to modify the contents of the `com/ibm/servlet/appserver.properties` file located in `<WAS_HOME>\lib\ibmwebas.jar`.

Extract the **jar** file and modify the `appserver.properties` as follows:

```
#listeners.application=com.ibm.servlet.engine.EPMApplicationListener
com.ibm.servlet.debug.OLTServletManager
listeners.application=
```

should be:

```
listeners.application=com.ibm.servlet.engine.EPMApplicationListener
com.ibm.servlet.debug.OLTServletManager
#listeners.application=
```

- 6** Repackage the **jar** file.

## Adding a Machine to Monitor

In order to monitor the WebSphere resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

- 1** Click the WebSphere or WebSphere 4.x - 5.x graph in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The WebSphere dialog box opens.

In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.

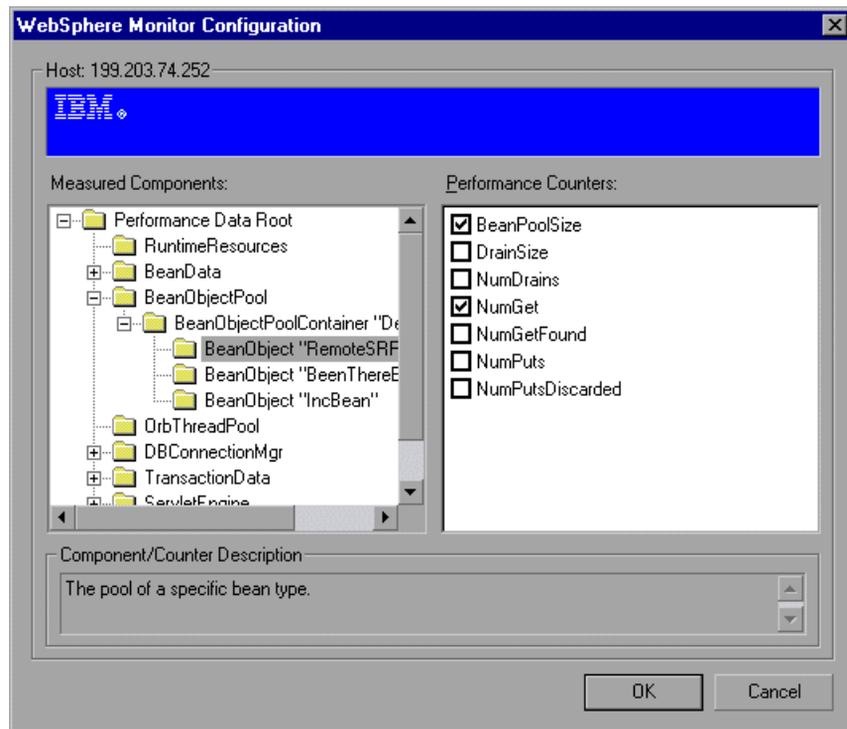
- 3** Enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs, and click **OK**.
- 4** In the **Resource Measurements** section of the WebSphere dialog box, click **Add**.
- 5** Continue with Configuring the WebSphere Monitor below.

## Configuring the WebSphere Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which measurements to monitor on the machine.

**To configure the WebSphere monitor:**

- 1 When you click **Add** to add a measurement, the WebSphere Monitor Configuration dialog box opens, displaying the available measurements.



- 2 Browse the Measured Components tree, and select performance counters, as described in “Understanding the WebSphere Monitor Configuration Dialog Box” on page 298.

For a description of the available measurements, see “WebSphere Performance Counters” on page 300.

- 3 Click **OK**. The components that you selected appear in the **Resource Measurements on:** *<machine>* section of the WebSphere dialog box.

- 4 Click **OK** in the WebSphere dialog box, to activate the WebSphere monitor.

---

**Note:** The port you use to monitor a WebSphere server through a firewall depends on the configuration of your server.

---

## **Understanding the WebSphere Monitor Configuration Dialog Box**

The WebSphere Monitor Configuration dialog box lets you select the resources to monitor on the WebSphere 3.x, 4.x, or 5.x application server.

- **Host.** Displays the name of the monitored machine.
- **Measured Components.** Displays the available components. Browse the tree and select the component you want to monitor. A description of the highlighted component appears in the Component/Counter Description box.
- **Performance Counters.** Check the required performance counters. A description of the selected counter appears in the Component/Counter Description box.
- **Component/Counter Description.** Displays a description of the selected component or counter.

## Specifying a Web Alias for the Servlet Directory

You can monitor as many application servers as you want by specifying a Web alias for the servlet directory.

### To specify another Web alias for the servlet directory:

By default, LoadRunner uses the alias `servlet` as the servlet directory Web alias. For example, if the WebSphere Server machine is named `HP` and the path for the servlets directory is:

`E:\AppServer\hosts\default_host\default_app\servlets`, LoadRunner will request the XML file in the following URL:

`http://HP/servlet/com.ibm.ivb.epm.servlet.PerformanceServlet`, where `servlet` is the default web alias for the servlet directory.

If the Web alias for the servlet directory is not `servlet`, you must specify the servlet directory Web alias in the Add Machine dialog box according to the following format:

`http://<server name:port number>/<servlet_dir_alias>`

For example: `http://HP/servlet2`

Using this method, you can monitor as many application servers as you want—whether they are installed on the same machine, or on different machines.

### To monitor other applications, in addition to the default application:

You can monitor as many applications as you want, regardless of whether they are installed on the same machine or different machines.

- 1** Copy the same files that you copied to the Servlets directory for the Default application to the Servlets directories for any other Web applications that you want to monitor.
- 2** Add the `com.ibm.ivb.epm.servlet.PerformanceServlet` to the configuration in the WebSphere Console for each Web application.
- 3** Add the Web application to be monitored to the WebSphere Performance Monitor using the following format:

`http://<server:port_number>/<servlet_dir_alias>/servlet`

For example: `http://HP/servlet3/servlet`

## WebSphere Performance Counters

The following tables describe the resources that can be monitored:

### Run-Time Resources

Contains resources related to the Java Virtual Machine run-time, as well as the ORB.

| Measurement | Description                                                     |
|-------------|-----------------------------------------------------------------|
| MemoryFree  | The amount of free memory remaining in the Java Virtual Machine |
| MemoryTotal | The total memory allocated for the Java Virtual Machine         |
| MemoryUse   | The total memory in use on the Java Virtual Machine             |

### BeanData

Every home on the server provides performance data, depending on the type of bean deployed in the home. The top level bean data holds an aggregate of all the containers.

| Measurement         | Description                                                                                                                                           |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| BeanCreates         | The number of beans created. Applies to an individual bean that is either 'stateful' or 'entity'.                                                     |
| EntityBeanCreates   | The number of entity beans created.                                                                                                                   |
| BeanRemoves         | The number of entity beans pertaining to a specific bean that have been removed. Applies to an individual bean that is either 'stateful' or 'entity'. |
| EntityBeanRemoves   | The number of entity beans removed.                                                                                                                   |
| StatefulBeanCreates | The number of stateful beans created.                                                                                                                 |
| StatefulBeanRemoves | The number of stateful bean removed.                                                                                                                  |

| Measurement                      | Description                                                                                                                       |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>BeanPassivates</b>            | The number of bean passivates pertaining to a specific bean. Applies to an individual bean that is either 'stateful' or 'entity'. |
| <b>EntityBeanPassivates</b>      | The number of entity bean passivates.                                                                                             |
| <b>StatefulBeanPassivates</b>    | The number of stateful bean passivates.                                                                                           |
| <b>BeanActivates</b>             | The number of bean activates pertaining to a specific bean. Applies to an individual bean that is either 'stateful' or 'entity'.  |
| <b>EntityBeanActivates</b>       | The number of entity bean activates.                                                                                              |
| <b>StatefulBeanActivates</b>     | The number of stateful bean activates.                                                                                            |
| <b>BeanLoads</b>                 | The number of times the bean data was loaded. Applies to entity.                                                                  |
| <b>BeanStores</b>                | The number of times the bean data was stored in the database. Applies to entity.                                                  |
| <b>BeanInstantiates</b>          | The number of times a bean object was created. This applies to an individual bean, regardless of its type.                        |
| <b>StatelessBeanInstantiates</b> | The number of times a stateless session bean object was created.                                                                  |
| <b>StatefulBeanInstantiates</b>  | The number of times a stateful session bean object was created.                                                                   |
| <b>EntityBeanInstantiates</b>    | The number of times an entity bean object was created.                                                                            |
| <b>BeanDestroys</b>              | The number of times an individual bean object was destroyed. This applies to any bean, regardless of its type.                    |
| <b>StatelessBeanDestroys</b>     | The number of times a stateless session bean object was destroyed.                                                                |
| <b>StatefulBeanDestroys</b>      | The number of times a stateful session bean object was destroyed.                                                                 |

| Measurement                | Description                                                                                                                                              |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>EntityBeanDestroys</b>  | The number of times an entity bean object was destroyed.                                                                                                 |
| <b>BeansActive</b>         | The average number of instances of active beans pertaining to a specific bean. Applies to an individual bean that is either 'stateful' or 'entity'.      |
| <b>EntityBeansActive</b>   | The average number of active entity beans.                                                                                                               |
| <b>StatefulBeansActive</b> | The average number of active session beans.                                                                                                              |
| <b>BeansLive</b>           | The average number of bean objects of this specific type instantiated but not yet destroyed. This applies to an individual bean, regardless of its type. |
| <b>StatelessBeansLive</b>  | The average number of stateless session bean objects instantiated but not yet destroyed.                                                                 |
| <b>StatefulBeansLive</b>   | The average number of stateful session bean objects instantiated but not yet destroyed.                                                                  |
| <b>EntityBeansLive</b>     | The average number of entity bean objects instantiated but not yet destroyed.                                                                            |
| <b>BeanMethodRT</b>        | The average method response time for all methods defined in the remote interface to this bean. Applies to all beans.                                     |
| <b>BeanMethodActive</b>    | The average number of methods being processed concurrently. Applies to all beans.                                                                        |
| <b>BeanMethodCalls</b>     | The total number of method calls against this bean.                                                                                                      |

## BeanObjectPool

The server holds a cache of bean objects. Each home has a cache and there is therefore one BeanObjectPoolContainer per container. The top level BeanObjectPool holds an aggregate of all the containers data.

| Measurement                    | Description                                                                                                     |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------|
| <b>BeanObjectPoolContainer</b> | The pool of a specific bean type                                                                                |
| <b>BeanObject</b>              | The pool specific to a home                                                                                     |
| <b>NumGet</b>                  | The number of calls retrieving an object from the pool                                                          |
| <b>NumGetFound</b>             | The number of calls to the pool that resulted in finding an available bean                                      |
| <b>NumPuts</b>                 | The number of beans that were released to the pool                                                              |
| <b>NumPutsDiscarded</b>        | The number of times releasing a bean to the pool resulted in the bean being discarded because the pool was full |
| <b>NumDrains</b>               | The number of times the daemon found the pool was idle and attempted to clean it                                |
| <b>DrainSize</b>               | The average number of beans discarded by the daemon during a clean                                              |
| <b>BeanPoolSize</b>            | The average number of beans in the pool                                                                         |

## OrbThreadPool

These are resources related to the ORB thread pool that is on the server.

| Measurement             | Description                                                                                                           |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <b>ActiveThreads</b>    | The average number of active threads in the pool                                                                      |
| <b>TotalThreads</b>     | The average number of threads in the pool                                                                             |
| <b>PercentTimeMaxed</b> | The average percent of the time that the number of threads in the pool reached or exceeded the desired maximum number |

| Measurement              | Description                                     |
|--------------------------|-------------------------------------------------|
| <b>ThreadCreates</b>     | The number of threads created                   |
| <b>ThreadDestroys</b>    | The number of threads destroyed                 |
| <b>ConfiguredMaxSize</b> | The configured maximum number of pooled threads |

### **DBConnectionMgr**

These are resources related to the database connection manager. The manager consists of a series of data sources, as well as a top-level aggregate of each of the performance metrics.

| Measurement                   | Description                                                                   |
|-------------------------------|-------------------------------------------------------------------------------|
| <b>DataSource</b>             | Resources related to a specific data source specified by the "name" attribute |
| <b>ConnectionCreates</b>      | The number of connections created                                             |
| <b>ConnectionDestroys</b>     | The number of connections released                                            |
| <b>ConnectionPoolSize</b>     | The average size of the pool, i.e., number of connections                     |
| <b>ConnectionAllocates</b>    | The number of times a connection was allocated                                |
| <b>ConnectionWaiters</b>      | The average number of threads waiting for a connection                        |
| <b>ConnectionWaitTime</b>     | The average time, in seconds, of a connection grant                           |
| <b>ConnectionTime</b>         | The average time, in seconds, that a connection is in use                     |
| <b>ConnectionPercentUsed</b>  | The average percentage of the pool that is in use                             |
| <b>ConnectionPercentMaxed</b> | The percentage of the time that all connections are in use                    |

## TransactionData

These are resources that pertain to transactions.

| Measurement                   | Description                                                          |
|-------------------------------|----------------------------------------------------------------------|
| <b>NumTransactions</b>        | The number of transactions processed                                 |
| <b>ActiveTransactions</b>     | The average number of active transactions                            |
| <b>TransactionRT</b>          | The average duration of each transaction                             |
| <b>BeanObjectCount</b>        | The average number of bean object pools involved in a transaction    |
| <b>RolledBack</b>             | The number of transactions rolled back                               |
| <b>Committed</b>              | The number of transactions committed                                 |
| <b>LocalTransactions</b>      | The number of transactions that were local                           |
| <b>TransactionMethodCount</b> | The average number of methods invoked as part of each transaction    |
| <b>Timeouts</b>               | The number of transactions that timed out due to inactivity timeouts |
| <b>TransactionSuspended</b>   | The average number of times that a transaction was suspended         |

## ServletEngine

These are resources that are related to servlets and JSPs.

| Measurement               | Description                                                                         |
|---------------------------|-------------------------------------------------------------------------------------|
| <b>ServletsLoaded</b>     | The number of servlets currently loaded                                             |
| <b>ServletRequests</b>    | The number of requests serviced                                                     |
| <b>CurrentRequests</b>    | The number of requests currently being serviced                                     |
| <b>ServletRT</b>          | The average response time for each request                                          |
| <b>ServletsActive</b>     | The average number of servlets actively processing requests                         |
| <b>ServletIdle</b>        | The amount of time that the server has been idle (that is, time since last request) |
| <b>ServletErrors</b>      | The number of requests that resulted in an error or an exception                    |
| <b>ServletBeanCalls</b>   | The number of bean method invocations that were made by the servlet                 |
| <b>ServletBeanCreates</b> | The number of bean references that were made by the servlet                         |
| <b>ServletDBCalls</b>     | The number of database calls made by the servlet                                    |
| <b>ServletDBConAlloc</b>  | The number of database connections allocated by the servlet                         |
| <b>SessionLoads</b>       | The number of times the servlet session data was read from the database             |
| <b>SessionStores</b>      | The number of times the servlet session data was stored in the database             |
| <b>SessionSize</b>        | The average size, in bytes, of a session data                                       |
| <b>LoadedSince</b>        | The time that has passed since the server was loaded (UNC time)                     |

## Sessions

These are general metrics regarding the HTTP session pool.

| Measurement                | Description                                                                                                       |
|----------------------------|-------------------------------------------------------------------------------------------------------------------|
| <b>SessionsCreated</b>     | The number of sessions created on the server.                                                                     |
| <b>SessionsActive</b>      | The number of currently active sessions.                                                                          |
| <b>SessionsInvalidated</b> | The number of invalidated sessions. May not be valid when using sessions in the database mode.                    |
| <b>SessionLifetime</b>     | Contains statistical data of sessions that have been invalidated. Does not include sessions that are still alive. |



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## WebSphere (EPM) Monitoring

The WebSphere (EPM) monitor displays statistics about the resource usage on the WebSphere 3.5.x server during the scenario run.

To monitor the IBM WebSphere application server (3.5.x), you must first install the IBM WebSphere Administrator's Console on the Controller machine. You may also need to copy the security keyring. Once you have installed the WebSphere Administrator's Console and enabled the EPM counters, you can configure the WebSphere (EPM) monitor before running the scenario.

### **This chapter includes:**

- ▶ Setting up the Monitoring Environment on page 309
- ▶ Adding a Machine to Monitor on page 319
- ▶ Configuring the WebSphere (EPM) Monitor on page 319

For information on WebSphere performance counters, see “WebSphere Performance Counters” on page 300.

### **Setting up the Monitoring Environment**

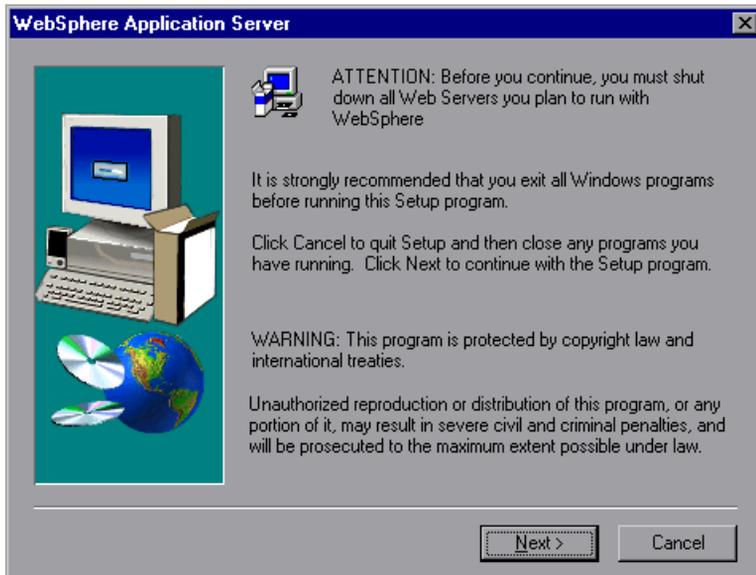
Before you can monitor the IBM WebSphere application server 3.5.x, you must install the IBM WebSphere Administrator's Console on the Controller machine. You may also need to copy the security keyring and enable the EPM counters on the application server.

## Installing the IBM WebSphere Administrator's Console

You must install the IBM WebSphere Administrator's Console on the Controller machine.

### To install the IBM WebSphere Administrator's Console:

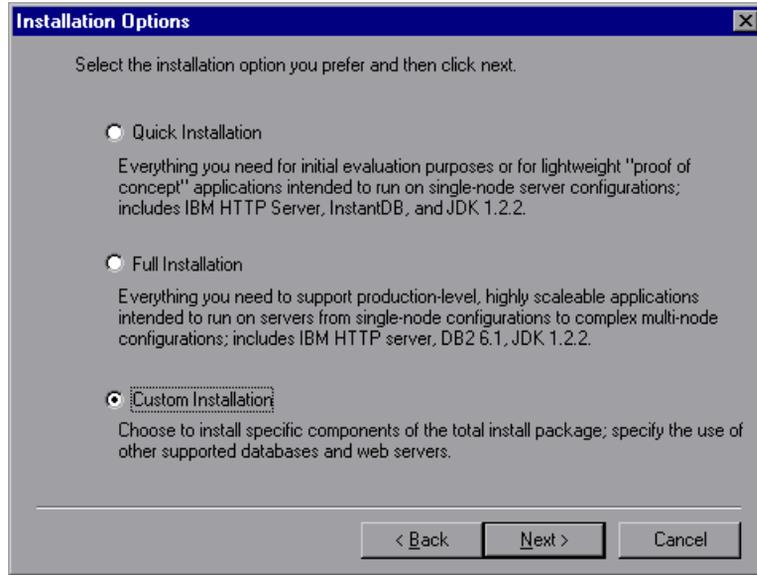
- 1 Start the WebSphere installation program from the WebSphere 3.5 Windows NT distribution CD-ROM. The WebSphere Application Server dialog box opens.



Disregard the instruction to shut down all Web servers that you plan to run with WebSphere. This is not relevant to the Administrator's Console installation.

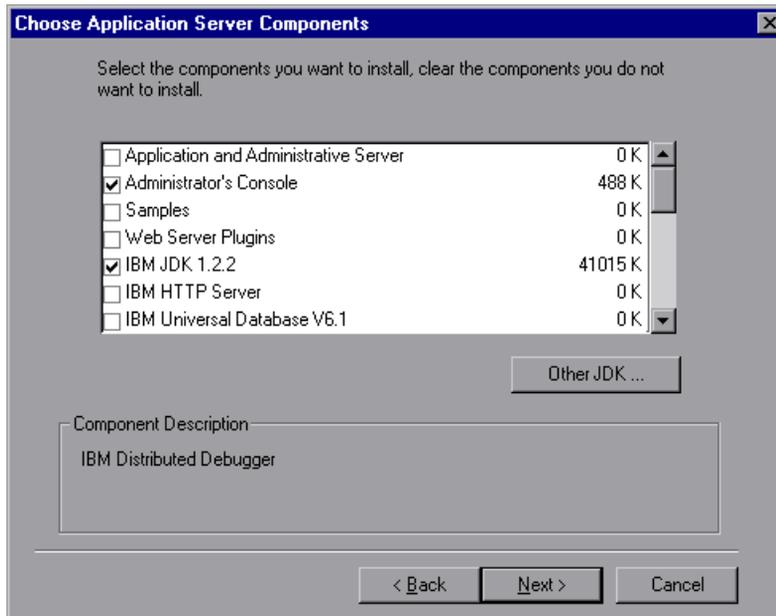
Click **Next**.

2 The Installation Options dialog box opens. Select **Custom Installation**.



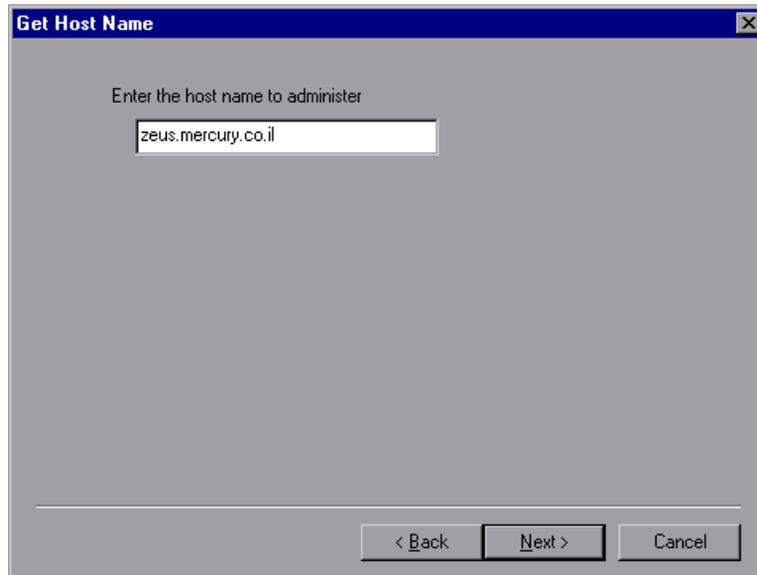
Click **Next**.

- 3 The Choose Application Server Components dialog box opens. Select **Administrator's Console** and **IBM JDK 1.2.2**. Clear all the other options.



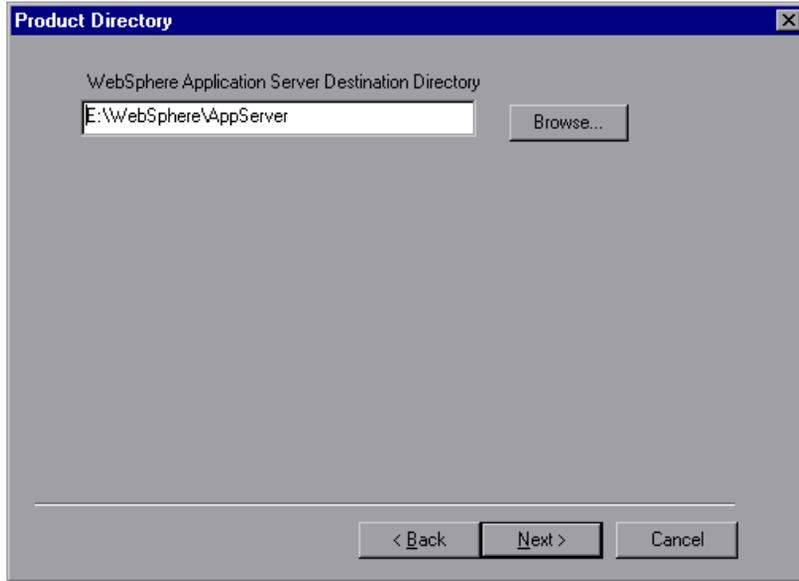
Click **Next**.

- 4 The Get Host Name dialog box opens. Type the name of the machine that you want to monitor.



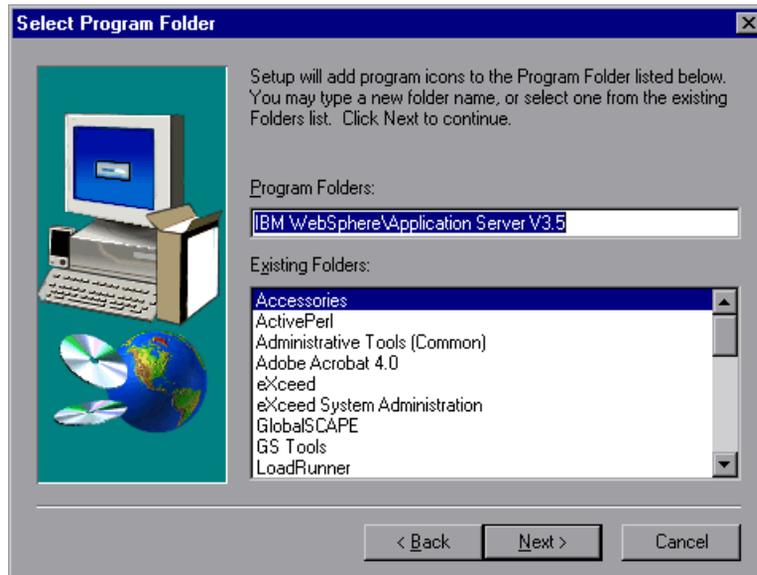
Click **Next**.

- 5 The Product Directory dialog box opens. Specify the folder in which to install the Administrator's Console. To select a different location, click **Browse**, choose a folder other than the default folder, and click **OK**.



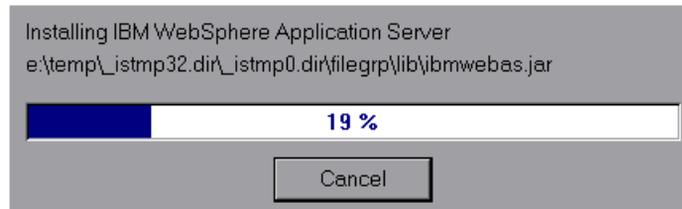
Click **Next**.

- 6 The Select Program Folder dialog box opens. Specify a program folder, or accept the default folder, IBM WebSphere\Application Server V3.5.

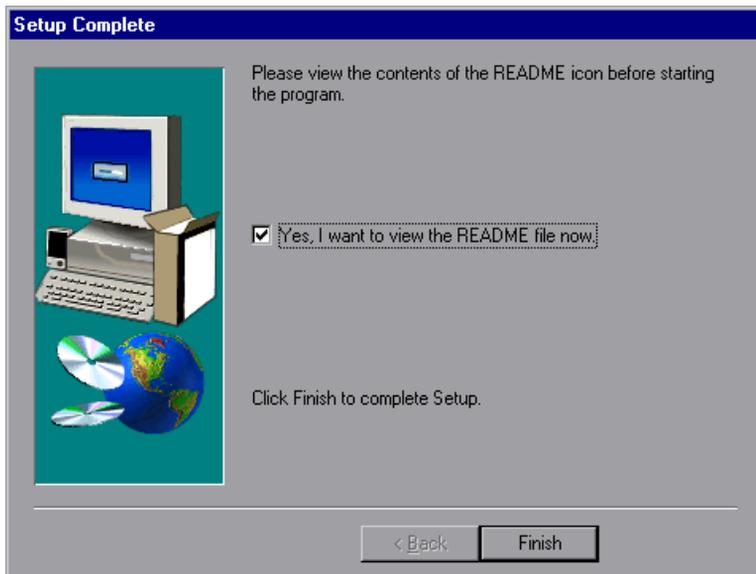


Click **Next**.

The installation process begins. To pause or quit the installation, click **Cancel**.



- 7 When the installation is complete, the Setup Complete dialog box opens. Select the check box to view the readme file before starting the program. You can view the readme file at any time by selecting **Start > Programs > Application Server V3.5 > IBM WebSphere > README**.



- 8 Click **Finish** to complete the installation program. The Restarting Windows dialog box opens.



- 9 Select either to restart your computer and complete the installation now (recommended) or to wait and complete the installation later.
- 10 Click **OK** to complete the installation of the Administrator's Console.

### **Copying the Security Keyring**

If you enabled security on the WebSphere server, you must copy the security keyring from the server to the admin client. (One way to tell whether security is enabled is to see whether the Administrator's Console can connect to the admin server.) A keyring is a certification used by the server to identify the client.

You need to copy the **jar** file containing the keyring from the server lib folder to the client lib folder. You also need to add the **jar** file containing the keyring to the monitoring client command line.

---

**Note:** The keyring used in this file (**353Keyring.jar**) is the IBM dummy keyring that must be installed on servers using versions 3.52 and below. If your server is using the IBM dummy keyring and is version 3.52 or below, you do not need to change the line. If you are using the dummy keyring and are running version 3.53 or later, you do not need to do anything.

---

**To copy the keyring:**

- 1 Copy the keyring **jar** file from the server to the admin client lib folder (by default, **C:\WebSphere\Appserver\lib**):

The **jar** file containing the keyring, **xxxKeyring.jar**, is located by default in the following location:

|             |                             |
|-------------|-----------------------------|
| NT Server   | C:\WebSphere\Appserver\lib  |
| UNIX Server | OPT/websphere/Appserver/lib |

- 2 Open the **<LoadRunner root folder>\dat\monitors\WebSphere35Mon.ini** file in a text editor.
- 3 Locate the following line:  
JVM\_CLASSES4=C:\WebSphere\AppServer\lib\353Keyring.jar

---

**Note:** If you did not use the default location for the WebSphere installation, the line will be different.

---

- 4 Change **353Keyring.jar** to the keyring you are using.

### **Enabling EPM Counters on the WebSphere 3.5.x Server**

To enable the EPM counters, which are by default set to "none," right-click the application you are monitoring in the WebSphere Administrator's Console browser, and select **Performance**. Expand the Performance Modules tree in the dialog box that opens. To manage different levels of performance data, right-click the performance modules and choose a performance level. Click the **Set** button.

Alternatively, ensure that the application server is started, select the **Advanced** tab in the WebSphere Administrator's Console browser, and in the EPM Specification box, type:  
epm=high:epm.beanMethodData=none

## Adding a Machine to Monitor

In order to monitor the WebSphere (EPM) resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

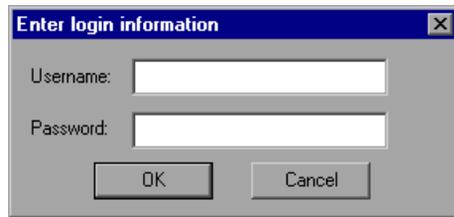
- 1 Click the WebSphere (EPM) graph in the graph tree, and drag it into the right pane of the Run view.
- 2 Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The WebSphere (EPM) dialog box opens.
- 3 In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.
- 4 Enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs, and click **OK**.
- 5 In the **Resource Measurements** section of the WebSphere (EPM) dialog box, click **Add**.
- 6 Continue with “Configuring the WebSphere (EPM) Monitor” on page 319.

## Configuring the WebSphere (EPM) Monitor

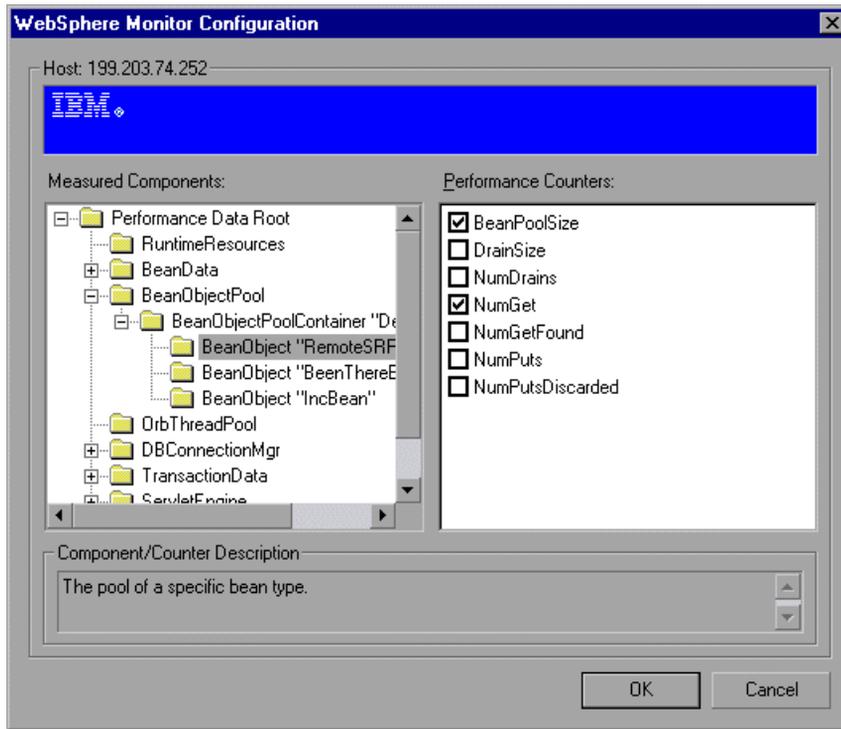
After you have added the machine that you are monitoring, you configure the monitor by choosing which measurements to monitor on the machine.

**To configure the WebSphere (EPM) monitor:**

- 1 When you click **Add** to add a measurement, the WebSphere (EPM) Logon dialog box opens. Enter your username and password and click **OK**.



- 2 The WebSphere Monitor Configuration dialog box opens, displaying the available measurements.



- 3 Browse the Measured Components tree, and select performance counters, as described in “Understanding the WebSphere Monitor Configuration Dialog Box” on page 321, and then click **OK**.

For a description of the available measurements, see “WebSphere Performance Counters” on page 300.

- 4 Click **OK**. The components that you selected appear in the **Resource Measurements on: <machine>** section of the WebSphere dialog box.
- 5 Click **OK** in the WebSphere (EPM) dialog box, to activate the monitor.

## Understanding the WebSphere Monitor Configuration Dialog Box

The WebSphere Monitor Configuration dialog box lets you select the resources to monitor on the WebSphere (EPM) application server (3.5.x).

- **Host.** Displays the name of the monitored machine.
- **Measured Components.** Displays the available components. Browse the tree and select the component you want to monitor. A description of the highlighted component appears in the Component/Counter Description box.
- **Performance Counters.** Check the required performance counters. A description of the selected counter appears in the Component/Counter Description box.
- **Component/Counter Description.** Displays a description of the selected component or counter.



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---

## WebSphere Application Server Monitoring

The WebSphere Application Server Monitor allows you to monitor the availability and server statistics of a IBM WebSphere Application Server 3.5.x, 4.x, and 5.x. The error and warning thresholds for the monitor can be set on as many as ten WebSphere Application Server performance statistics.

The WebSphere Application Server Monitor monitors the server performance statistics from IBM WebSphere servers using the performance monitoring interfaces provided with WebSphere. You can monitor multiple parameters or counters with a single monitor instance. This allows you to watch server loading for performance, availability, and capacity planning. Create a separate WebSphere Application Server Monitor instance for each WebSphere Application Server in your environment.

To obtain data for this graph, you need to configure the WebSphere Application Server online monitor (from the Controller) and select the measurements you want to display before running the scenario.

### **This chapter includes:**

- ▶ Setting up the Monitoring Environment on page 324
- ▶ Adding a Machine to Monitor on page 327
- ▶ Configuring the WebSphere Application Server Monitor on page 328
- ▶ WebSphere Application Server Performance Counters on page 332

## Setting up the Monitoring Environment

Before you can use the WebSphere Application Server monitor, you need to configure the server environment.

Ensure that SiteScope has been installed on a server. You can install SiteScope on the same machine as the Controller, or on a dedicated server.

### For WebSphere 3.5.x and 4.x

- ▶ You must first install the IBM WebSphere Administrator's Console on the SiteScope server if you are monitoring WebSphere versions 3.5.x or 4.x. When installing the Administrator's Console:
  - ▶ Select the **Custom** installation option.
  - ▶ In the Choose Application Server Components dialog box, select **Administrator's Console** and **IBM JDK 1.2.2**.
  - ▶ You will need to specify the machine you want to monitor during the installation.
- ▶ You must enable the WebSphere servers to be monitored.
  - ▶ For WebSphere 3.5.x, enable EPM Counters on the WebSphere server.
  - ▶ For WebSphere 4.x and 5.x, enable PMI Counters or enable the Performance Monitoring Service on the WebSphere server.

You enable the counters for the application you want to monitor via the WebSphere Administrator's Console.

For WebSphere 4.x:

- ▶ When you have selected resources to monitor, select the **Performance** option.
- ▶ In the dialog box that opens, expand the **Performance Modules** tree. In order to manage different levels of performance data, select the performance modules and choose a performance level, and click **Set**.

- Alternatively, on WebSphere 3.5.x, you can set the EPM Specification to:  
epm=high:epm.beanMethodData=none  
  
through the WebSphere Administrator's Console.
- If security has been enabled on the WebSphere server, the server security ring must be copied to the admin client.

### **For WebSphere 5.x**

In the server environment:

- 1** Select **Servers > Application Servers**, and select the server to be monitored from the Application Server list.
- 2** In the Configuration tab's **Additional Properties** list, click **Performance Monitoring Service**.
- 3** Select the **Start Up** check box.
- 4** In the **Initial specification level** section select **Standard** or **Custom**.
- 5** Click **Apply**.

To monitor WebSphere version 5.x, the necessary WebSphere libraries must be available on the SiteScope server. This means that a WebSphere 5.x client must be installed on the SiteScope server.

#### **To install the correct client software on a SiteScope server:**

- 1** When installing WebSphere 5.x, select the following options from the Custom Options menu:
  - Administration and Administrative Console
  - Performance and Analysis Tools

---

**Note:** Certain trial versions of IBM WebSphere do not include the Performance Analysis option required by the SiteScope WebSphere Application Server monitor. The SiteScope monitor will only work when a complete WebSphere production installation is available.

---

- 2 Copy all of the files from the *<WebSphere 5.x Application Server installation>\lib* folder to the *<client installation>\lib* folder (see step 1 above).
- 3 The WebSphere 5.x server and client settings have to match. This means that the SiteScope WebSphere Application Server Monitor will not be able to monitor a WebSphere 5.1 application server if the client libraries are from a WebSphere 5.0 application server, and vice versa.  
  
Client libraries should be installed in separate folders with clearly distinct directory names, such as *WebSphere50* and *WebSphere51*, to avoid confusion and SiteScope setup errors.
- 4 The **sas.props** file should be replaced with **soap.props** for WebSphere 5.x installations.

---

**Note:** The WebSphere 5.x SiteScope monitor uses the WebSphere JMX interface, so the port number used to communicate with the application server is the SOAP port number. By default, the SOAP port number is **8880**.

---

- 5 If security has been enabled on the WebSphere server, the server security ring must be copied to the admin client.

### **General information**

If security has been enabled on the WebSphere server, you must copy the security keyring from the WebSphere server to SiteScope. A keyring is a certification used by the server to identify the client.

## Adding a Machine to Monitor

In order to monitor the WebSphere Application Server of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

### To add a machine to the Controller

- 1 Click the **WebSphere Application Server** graph in the graph tree, and drag it into the right pane of the Run view.
- 2 Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The WebSphere Application Server dialog box opens.

In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.

- 3 Enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs, and click **OK**.

In the **SiteScope Server Information** section, enter the SiteScope machine name, and port (default: 8888), and specify whether you are using a Secure HTTP connection. If you are using a SiteScope account, fill in the relevant account information.

- 4 In the **Resource Measurements** section of the WebSphere Application Server dialog box, click **Add**.
- 5 Continue with “Configuring the WebSphere Application Server Monitor” on page 328.

## Configuring the WebSphere Application Server Monitor

After you have added the machine that you are monitoring, you need to configure the monitor and choose which measurements to monitor.

**To configure the WebSphere Application Server monitor:**

- 1 The first time you add a measurement to the monitor, you need to configure the monitor properties. When you click **Add** to add a measurement, the Configuring WebSphere Application Server Monitor dialog box opens.
- 2 Enter values for the monitor properties as described in “Understanding the Configuring WebSphere Application Server Monitor Dialog Box” on page 330, and click **OK**.

The screenshot shows a dialog box titled "Configuring WebSphere Application Server monitor". The main content is a table with two columns: "Property" and "Value".

| Property               | Value                  |
|------------------------|------------------------|
| Client Properties File | sas.client.props       |
| Version                |                        |
| WebSphere Directory    | C:\WebSphere\AppServer |
| Port Number            | 900                    |
| Classpath              |                        |
| Password               | *****                  |
| Security Realm         |                        |
| User Name              |                        |
| Server                 | rakefet                |
| Update every           | 3                      |
|                        |                        |
|                        |                        |

Below the table is a text area labeled "Client Properties File" containing the following text:

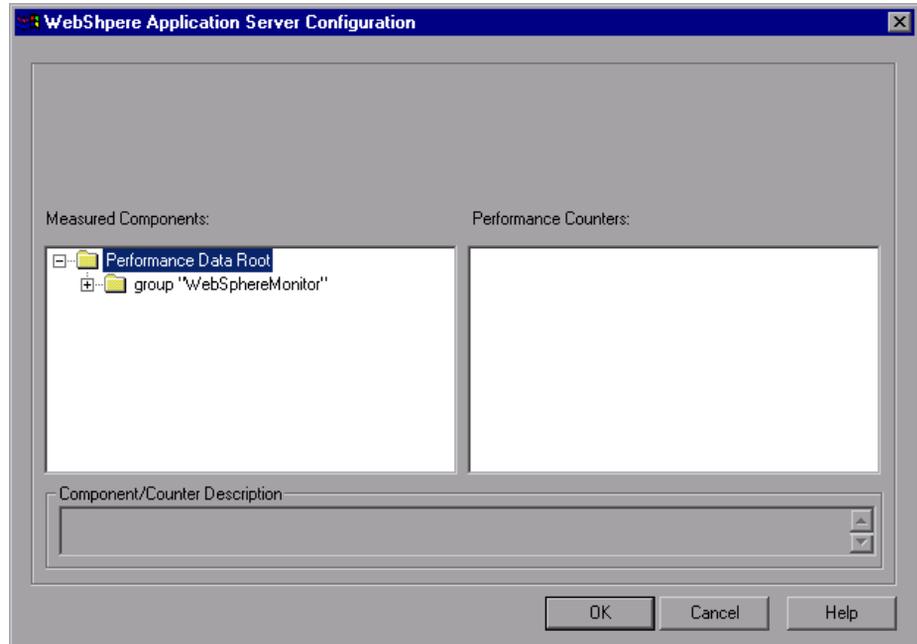
custom client properties file. For WebSphere 5.x+, you should select an appropriate soap.client.props file. <WebSphereDir>/properties/soap.client.props will be used by default.

At the bottom of the dialog are three buttons: "OK", "Cancel", and "Use Defaults".

- 3 The WebSphere Application Server Configuration dialog box opens.

Browse the **Measured Components** tree and select the performance counters on the right, as described in “Understanding the WebSphere Application Server Configuration Dialog Box” on page 331.

Click a component or counter to see its description in the **Component/Counter Description** section.



- 4 Click **OK** to close the WebSphere Application Server Configuration dialog box. The counters that you selected appear in the **Resource Measurements on: <machine>** section of the WebSphere Application Server dialog box.
- 5 Click **OK** in the WebSphere Application Server dialog box to activate the WebSphere Application Server monitor.

## Understanding the Configuring WebSphere Application Server Monitor Dialog Box

You configure the WebSphere Application Server monitor in the Configuring WebSphere Application Server Monitor dialog box.

- **Client Properties File.** Enter the custom client properties file. Select an appropriate soap.client.props file. By default, the <WebSphere>/properties/soap.client.props file is used.
- **Version.** Enter the version of the WebSphere server.
- **WebSphere Directory.** Enter the path to the WebSphere directory. This directory should contain at least an Admin Console installation.
- **Port Number.** Enter the port number of WebSphere server. This should be the SOAP port for WebSphere 5.x+. The default port number is 8880.
- **Classpath.** Enter any extra classpath elements needed for the monitor program.
- **Password.** Enter the password that SiteScope should use to log on to WebSphere server.
- **Security Realm.** Enter the security realm for the WebSphere server (3.5x only).
- **User Name.** Enter the user name that SiteScope should use to log on to WebSphere server.
- **Server.** Enter the name of the server where the WebSphere application is running. Do not enter backslashes (\\) that indicate a UNC path as part of the name of the server.
- **Update every.** The number entered here indicates the amount of time, in seconds, between one monitor check and the next. By default the monitor updates every 3 seconds.

## **Understanding the WebSphere Application Server Configuration Dialog Box**

The WebSphere Application Server Configuration dialog box enables you to select the performance counters to monitor using the WebSphere application server.

- **Host.** Displays the name of the monitored machine.
- **Measured Components.** Displays the available components. Browse the tree and select the component you want to monitor. A description of the highlighted component appears in the Component/Counter Description box.
- **Performance Counters.** Check the required performance counters. A description of the selected counter appears in the Component/Counter Description box.
- **Component/Counter Description.** Displays a description of the selected component or counter.

## WebSphere Application Server Performance Counters

There is a large number of counters available for the WebSphere Application Server monitor. The list of available counters will vary depending on which version of WebSphere you are running.

The list of available counters may include the following:

### Run-Time Resources

These are resources related to the Java Virtual Machine run time, as well as the ORB.

| Measurement        | Description                                                      |
|--------------------|------------------------------------------------------------------|
| <b>MemoryFree</b>  | The amount of free memory remaining in the Java Virtual Machine. |
| <b>MemoryTotal</b> | The total memory allocated for the Java Virtual Machine.         |
| <b>MemoryUse</b>   | The total memory in use on the Java Virtual Machine.             |

### BeanData

Every home on the server provides performance data, depending on the type of bean deployed in the home. The top level bean data holds an aggregate of all the containers.

| Measurement                  | Description                                                                                                    |
|------------------------------|----------------------------------------------------------------------------------------------------------------|
| <b>BeanDestroys</b>          | The number of times an individual bean object was destroyed. This applies to any bean, regardless of its type. |
| <b>StatelessBeanDestroys</b> | The number of times a stateless session bean object was destroyed.                                             |
| <b>StatefulBeanDestroys</b>  | The number of times a stateful session bean object was destroyed.                                              |

## BeanObjectPool

The server holds a cache of bean objects. Each home has a cache and there is therefore one BeanObjectPoolContainer per container. The top level, BeanObjectPool, holds an aggregate of all the containers data.

| Measurement             | Description                                                                                                      |
|-------------------------|------------------------------------------------------------------------------------------------------------------|
| <b>NumGetFound</b>      | The number of calls to the pool that resulted in finding an available bean.                                      |
| <b>NumPutsDiscarded</b> | The number of times releasing a bean to the pool resulted in the bean being discarded because the pool was full. |

## OrbThreadPool

These are resources related to the ORB thread pool that is on the server.

| Measurement             | Description                                                                                                            |
|-------------------------|------------------------------------------------------------------------------------------------------------------------|
| <b>ActiveThreads</b>    | The average number of active threads in the pool.                                                                      |
| <b>TotalThreads</b>     | The average number of threads in the pool.                                                                             |
| <b>PercentTimeMaxed</b> | The average percent of the time that the number of threads in the pool reached or exceeded the desired maximum number. |

## DBConnectionMgr

These are resources related to the database connection manager. The manager consists of a series of data sources, as well as a top-level aggregate of each of the performance metrics.

| Measurement                  | Description                                                |
|------------------------------|------------------------------------------------------------|
| <b>ConnectionWaitTime</b>    | The average time (in seconds) of a connection grant.       |
| <b>ConnectionTime</b>        | The average time (in seconds) that a connection is in use. |
| <b>ConnectionPercentUsed</b> | The average percentage of the pool that is in use.         |

### TransactionData

These are resources that pertain to transactions.

| Measurement          | Description                                                           |
|----------------------|-----------------------------------------------------------------------|
| NumTransactions      | The number of transactions processed.                                 |
| ActiveTransactions   | The average number of active transactions.                            |
| TransactionRT        | The average duration of each transaction.                             |
| RolledBack           | The number of transactions rolled back.                               |
| Timeouts             | The number of transactions that timed out due to inactivity timeouts. |
| TransactionSuspended | The average number of times that a transaction was suspended.         |

### ServletEngine

These are resources that are related to servlets and JSPs.

| Measurement   | Description                                                       |
|---------------|-------------------------------------------------------------------|
| ServletErrors | The number of requests that resulted in an error or an exception. |

### Sessions

These are general metrics regarding the HTTP session pool.

| Measurement         | Description                                                                                    |
|---------------------|------------------------------------------------------------------------------------------------|
| SessionsInvalidated | The number of invalidated sessions. May not be valid when using sessions in the database mode. |

# **Part IX**

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## **Database Server Resource Monitoring**



# 34

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## Introduction to Database Resource Monitoring

You monitor DB2, Oracle, SQL Server, or Sybase database resource usage during a scenario run using LoadRunner's Database Server Resource monitors.

The DB2, Oracle, SQL Server, or Sybase database server resource monitors measure statistics for DB2, Oracle, SQL Server, or Sybase database servers. During a scenario run, you use these monitors to isolate database server performance bottlenecks.

For each database server, you configure the measurements you want to monitor before running your scenario. To run the DB2, Oracle, and Sybase monitors, you must also install the client libraries on the database server you want to monitor.



# 35

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## DB2 Monitoring

The DB2 monitor shows the resource usage on the DB2 database server machine.

To monitor the DB2 database server machine, you must first set up the DB2 monitor environment. You then enable the DB2 monitor (from the Controller) by selecting the counters you want the monitor to measure. You select these counters using the DB2 Monitor Configuration dialog box.

---

**Note:** If there is no application working with a database, you can only monitor the database manager instance.

---

**This chapter includes:**

- ▶ Setting Up the Monitoring Environment on page 340
- ▶ Adding a Machine to Monitor on page 341
- ▶ Configuring the DB2 Monitor on page 342
- ▶ DB2 Performance Counters on page 345

## Setting Up the Monitoring Environment

Before monitoring a DB2 database server, you must set up the monitor environment.

**To set up the DB2 monitor environment:**

- 1** Install all the client files and libraries on the Controller machine.
- 2** Select **Start > Programs > DB2 for Windows NT > Control Center**. Enter your DB2 server username and password (with administrative privileges).
- 3** In the console that opens, right-click **Systems**, and select **Add**.
- 4** Enter the following settings in the dialog box:
  - **System Name.** <server name>
  - **Remote Instance.** DB2
  - **Host Name.** <server name>
  - **Service Name.** The DB2 server port. The default value is 50000.
- 5** Click **Retrieve**, and then **OK**.

---

**Note:** If you receive an error message after clicking **Retrieve**, repeat steps 3 and 4, and click **OK**.

---

- 6** Expand the <server name> node in the console tree.
- 7** Right-click **Instance**, and select **Add**.
- 8** Enter the following settings in the dialog box:
  - **Remote Instance.** DB2
  - **Instance Name.** the database instance to be called from the Controller
  - **Host Name.** <server name>
  - **Service Name.** The DB2 server port. The default value is 50000.

- 9 Click **OK** and close the Control Center.

---

**Note:** You can only work with a single Database Manager instance during each monitoring session.

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## Adding a Machine to Monitor

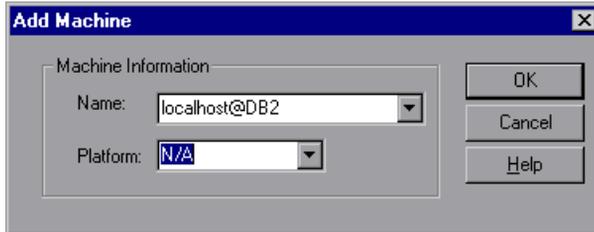
In order to monitor the DB2 resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

- 1 Click the DB2 graph in the graph tree, and drag it into the right pane of the Run view.
- 2 Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The DB2 dialog box opens.

In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.

- 3 Enter the DB2 server machine name followed by the @ sign and the database instance you specified in the DB2 Control Center. In the Platform box, select N/A.



Click **OK** to save the information you entered and close the dialog box.

- 4 In the **Resource Measurements** section of the DB2 dialog box, click **Add**.
- 5 Continue with Configuring the DB2 Monitor below.

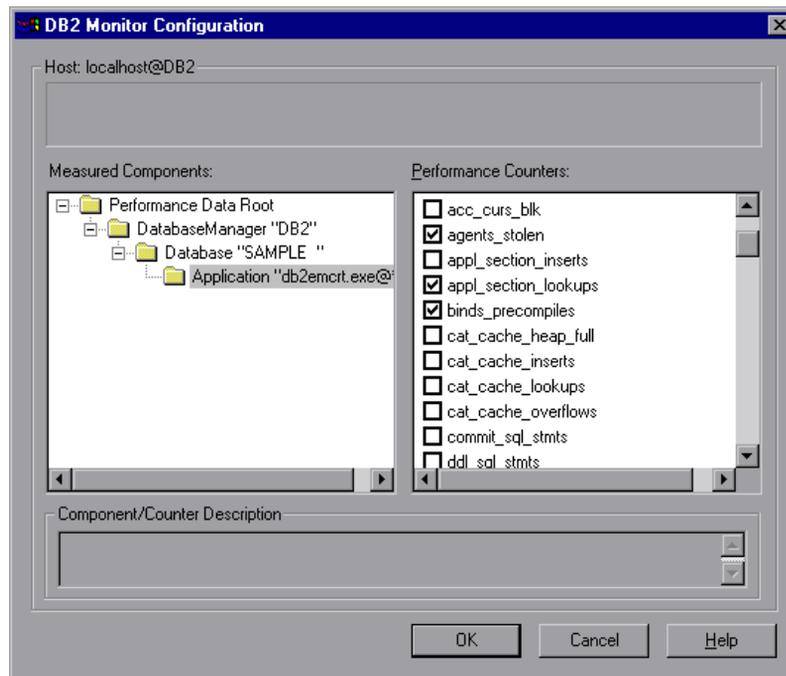
## Configuring the DB2 Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which measurements to monitor on the machine.

**To configure the DB2 monitor:**

- 1 When you click **Add** to add a measurement, a dialog box opens requesting your DB2 Server username and password. Enter the details and click **OK**.

- 2 The DB2 Monitor Configuration dialog box opens, displaying the available measurements.



Browse the Measured Components tree, and select performance counters, as described in “Understanding the DB2 Monitor Configuration Dialog Box” on page 344, and then click **OK**.

For a description of the available measurements, see “DB2 Performance Counters” on page 345.

- 3 Click **OK**. The measurements that you selected appear in the **Resource Measurements on: <machine>** section of the DB2 dialog box.
- 4 Click **OK** in the DB2 dialog box to activate the monitor.

## Understanding the DB2 Monitor Configuration Dialog Box

The DB2 Monitor Configuration dialog box lets you select the measurements to monitor the resource usage on a DB2 database during a scenario run.

---

**Note:** If there is no application working with a database, you can only monitor the database manager instance.

---

- **Host.** Displays the name of the monitored machine.
- **Measured Components.** Displays the available components. Browse the tree and select the component you want to monitor. A description of the highlighted component appears in the Component/Counter Description box.
- **Performance Counters.** Check the required performance counters. A description of the selected counter appears in the Component/Counter Description box.
- **Component/Counter Description.** Displays a description of the selected component or counter.

## DB2 Performance Counters

The following tables describe the default counters that can be monitored.

### DatabaseManager

The following table lists the DatabaseManager counters:

| Measurement                    | Description                                                                                                                                                                    |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>rem_cons_in</b>             | The current number of connections initiated from remote clients to the instance of the database manager that is being monitored.                                               |
| <b>rem_cons_in_exec</b>        | The number of remote applications that are currently connected to a database and are currently processing a unit of work within the database manager instance being monitored. |
| <b>local_cons</b>              | The number of local applications that are currently connected to a database within the database manager instance being monitored.                                              |
| <b>local_cons_in_exec</b>      | The number of local applications that are currently connected to a database within the database manager instance being monitored and are currently processing a unit of work.  |
| <b>con_local_databases</b>     | The number of local databases that have applications connected.                                                                                                                |
| <b>agents_registered</b>       | The number of agents registered in the database manager instance that is being monitored (coordinator agents and subagents).                                                   |
| <b>agents_waiting_on_token</b> | The number of agents waiting for a token so they can execute a transaction in the database manager.                                                                            |
| <b>idle_agents</b>             | The number of agents in the agent pool that are currently unassigned to an application and are therefore "idle".                                                               |
| <b>agents_from_pool</b>        | The number of agents assigned from the agent pool.                                                                                                                             |

| Measurement                      | Description                                                                                                                                                                           |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>agents_created_empty_pool</b> | The number of agents created because the agent pool was empty.                                                                                                                        |
| <b>agents_stolen</b>             | The number of times that agents are stolen from an application. Agents are stolen when an idle agent associated with an application is reassigned to work on a different application. |
| <b>comm_private_mem</b>          | The amount of private memory that the instance of the database manager has currently committed at the time of the snapshot.                                                           |
| <b>inactive_gw_agents</b>        | The number of DRDA agents in the DRDA connections pool that are primed with a connection to a DRDA database, but are inactive.                                                        |
| <b>num_gw_conn_switches</b>      | The number of times that an agent from the agents pool was primed with a connection and was stolen for use with a different DRDA database.                                            |
| <b>sort_heap_allocated</b>       | The total number of allocated pages of sort heap space for all sorts at the level chosen and at the time the snapshot was taken.                                                      |
| <b>post_threshold_sorts</b>      | The number of sorts that have requested heaps after the sort heap threshold has been reached.                                                                                         |
| <b>pipedsorts_requested</b>      | The number of piped sorts that have been requested.                                                                                                                                   |
| <b>pipedsorts_accepted</b>       | The number of piped sorts that have been accepted.                                                                                                                                    |

## Database

The following table lists the Database counters:

| Measurement                | Description                                                                                                                                                            |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>appls_cur_cons</b>      | Indicates the number of applications that are currently connected to the database.                                                                                     |
| <b>appls_in_db2</b>        | Indicates the number of applications that are currently connected to the database, and for which the database manager is currently processing a request.               |
| <b>total_sec_cons</b>      | The number of connections made by a sub-agent to the database at the node.                                                                                             |
| <b>num_assoc_agents</b>    | At the application level, this is the number of sub-agents associated with an application. At the database level, it is the number of sub-agents for all applications. |
| <b>sort_heap_allocated</b> | The total number of allocated pages of sort heap space for all sorts at the level chosen and at the time the snapshot was taken.                                       |
| <b>total_sorts</b>         | The total number of sorts that have been executed.                                                                                                                     |
| <b>total_sort_time</b>     | The total elapsed time (in milliseconds) for all sorts that have been executed.                                                                                        |
| <b>sort_overflows</b>      | The total number of sorts that ran out of sort heap and may have required disk space for temporary storage.                                                            |
| <b>active_sorts</b>        | The number of sorts in the database that currently have a sort heap allocated.                                                                                         |
| <b>total_hash_joins</b>    | The total number of hash joins executed.                                                                                                                               |
| <b>total_hash_loops</b>    | The total number of times that a single partition of a hash join was larger than the available sort heap space.                                                        |
| <b>hash_join_overflows</b> | The number of times that hash join data exceeded the available sort heap space.                                                                                        |

| Measurement                      | Description                                                                                                                                                                                                                            |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>hash_join_small_overflows</b> | The number of times that hash join data exceeded the available sort heap space by less than 10%.                                                                                                                                       |
| <b>pool_data_l_reads</b>         | Indicates the number of logical read requests for data pages that have gone through the buffer pool.                                                                                                                                   |
| <b>pool_data_p_reads</b>         | The number of read requests that required I/O to get data pages into the buffer pool.                                                                                                                                                  |
| <b>pool_data_writes</b>          | Indicates the number of times a buffer pool data page was physically written to disk.                                                                                                                                                  |
| <b>pool_index_l_reads</b>        | Indicates the number of logical read requests for index pages that have gone through the buffer pool.                                                                                                                                  |
| <b>pool_index_p_reads</b>        | Indicates the number of physical read requests to get index pages into the buffer pool.                                                                                                                                                |
| <b>pool_index_writes</b>         | Indicates the number of times a buffer pool index page was physically written to disk.                                                                                                                                                 |
| <b>pool_read_time</b>            | Provides the total amount of elapsed time spent processing read requests that caused data or index pages to be physically read from disk to buffer pool.                                                                               |
| <b>pool_write_time</b>           | Provides the total amount of time spent physically writing data or index pages from the buffer pool to disk.                                                                                                                           |
| <b>files_closed</b>              | The total number of database files closed.                                                                                                                                                                                             |
| <b>pool_async_data_reads</b>     | The number of pages read asynchronously into the buffer pool.                                                                                                                                                                          |
| <b>pool_async_data_writes</b>    | The number of times a buffer pool data page was physically written to disk by either an asynchronous page cleaner, or a pre-fetcher. A pre-fetcher may have written dirty pages to disk to make space for the pages being pre-fetched. |

| Measurement                      | Description                                                                                                                                                                                                                             |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>pool_async_index_writes</b>   | The number of times a buffer pool index page was physically written to disk by either an asynchronous page cleaner, or a pre-fetcher. A pre-fetcher may have written dirty pages to disk to make space for the pages being pre-fetched. |
| <b>pool_async_index_reads</b>    | The number of index pages read asynchronously into the buffer pool by a pre-fetcher.                                                                                                                                                    |
| <b>pool_async_read_time</b>      | The total elapsed time spent reading by database manager pre-fetchers.                                                                                                                                                                  |
| <b>pool_async_write_time</b>     | The total elapsed time spent writing data or index pages from the buffer pool to disk by database manager page cleaners.                                                                                                                |
| <b>pool_async_data_read_reqs</b> | The number of asynchronous read requests.                                                                                                                                                                                               |
| <b>pool_lsn_gap_clns</b>         | The number of times a page cleaner was invoked because the logging space used had reached a pre-defined criterion for the database.                                                                                                     |
| <b>pool_drty_pg_steal_clns</b>   | The number of times a page cleaner was invoked because a synchronous write was needed during the victim buffer replacement for the database.                                                                                            |
| <b>pool_drty_pg_thrsh_clns</b>   | The number of times a page cleaner was invoked because a buffer pool had reached the dirty page threshold criterion for the database.                                                                                                   |
| <b>prefetch_wait_time</b>        | The time an application spent waiting for an I/O server (pre-fetcher) to finish loading pages into the buffer pool.                                                                                                                     |
| <b>pool_data_to_estore</b>       | The number of buffer pool data pages copied to extended storage.                                                                                                                                                                        |
| <b>pool_index_to_estore</b>      | The number of buffer pool index pages copied to extended storage.                                                                                                                                                                       |
| <b>pool_data_from_estore</b>     | The number of buffer pool data pages copied from extended storage.                                                                                                                                                                      |
| <b>pool_index_from_estore</b>    | The number of buffer pool index pages copied from extended storage.                                                                                                                                                                     |

| Measurement                | Description                                                                                                                                                                                                                 |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>direct_reads</b>        | The number of read operations that do not use the buffer pool.                                                                                                                                                              |
| <b>direct_writes</b>       | The number of write operations that do not use the buffer pool.                                                                                                                                                             |
| <b>direct_read_reqs</b>    | The number of requests to perform a direct read of one or more sectors of data.                                                                                                                                             |
| <b>direct_write_reqs</b>   | The number of requests to perform a direct write of one or more sectors of data.                                                                                                                                            |
| <b>direct_read_time</b>    | The elapsed time (in milliseconds) required to perform the direct reads.                                                                                                                                                    |
| <b>direct_write_time</b>   | The elapsed time (in milliseconds) required to perform the direct writes.                                                                                                                                                   |
| <b>cat_cache_lookups</b>   | The number of times that the catalog cache was referenced to obtain table descriptor information.                                                                                                                           |
| <b>cat_cache_inserts</b>   | The number of times that the system tried to insert table descriptor information into the catalog cache.                                                                                                                    |
| <b>cat_cache_overflows</b> | The number of times that an insert into the catalog cache failed due the catalog cache being full.                                                                                                                          |
| <b>cat_cache_heap_full</b> | The number of times that an insert into the catalog cache failed due to a heap-full condition in the database heap.                                                                                                         |
| <b>pkg_cache_lookups</b>   | The number of times that an application looked for a section or package in the package cache. At a database level, it indicates the overall number of references since the database was started, or monitor data was reset. |
| <b>pkg_cache_inserts</b>   | The total number of times that a requested section was not available for use and had to be loaded into the package cache. This count includes any implicit prepares performed by the system.                                |

| Measurement                    | Description                                                                                                                                                                                                 |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>pkg_cache_num_overflows</b> | The number of times that the package cache overflowed the bounds of its allocated memory.                                                                                                                   |
| <b>appl_section_lookups</b>    | Lookups of SQL sections by an application from its SQL work area.                                                                                                                                           |
| <b>appl_section_inserts</b>    | Inserts of SQL sections by an application from its SQL work area.                                                                                                                                           |
| <b>sec_logs_allocated</b>      | The total number of secondary log files that are currently being used for the database.                                                                                                                     |
| <b>log_reads</b>               | The number of log pages read from disk by the logger.                                                                                                                                                       |
| <b>log_writes</b>              | The number of log pages written to disk by the logger.                                                                                                                                                      |
| <b>total_log_used</b>          | The total amount of active log space currently used (in bytes) in the database.                                                                                                                             |
| <b>locks_held</b>              | The number of locks currently held.                                                                                                                                                                         |
| <b>lock_list_in_use</b>        | The total amount of lock list memory (in bytes) that is in use.                                                                                                                                             |
| <b>deadlocks</b>               | The total number of deadlocks that have occurred.                                                                                                                                                           |
| <b>lock_escals</b>             | The number of times that locks have been escalated from several row locks to a table lock.                                                                                                                  |
| <b>x_lock_escals</b>           | The number of times that locks have been escalated from several row locks to one exclusive table lock, or the number of times an exclusive lock on a row caused the table lock to become an exclusive lock. |
| <b>lock_timeouts</b>           | The number of times that a request to lock an object timed-out instead of being granted.                                                                                                                    |
| <b>lock_waits</b>              | The total number of times that applications or connections waited for locks.                                                                                                                                |
| <b>lock_wait_time</b>          | The total elapsed time waited for a lock.                                                                                                                                                                   |

| Measurement               | Description                                                                                        |
|---------------------------|----------------------------------------------------------------------------------------------------|
| <b>locks_waiting</b>      | Indicates the number of agents waiting on a lock.                                                  |
| <b>rows_deleted</b>       | The number of row deletions attempted.                                                             |
| <b>rows_inserted</b>      | The number of row insertions attempted.                                                            |
| <b>rows_updated</b>       | The number of row updates attempted.                                                               |
| <b>rows_selected</b>      | The number of rows that have been selected and returned to the application.                        |
| <b>int_rows_deleted</b>   | The number of rows deleted from the database as a result of internal activity.                     |
| <b>int_rows_updated</b>   | The number of rows updated from the database as a result of internal activity.                     |
| <b>int_rows_inserted</b>  | The number of rows inserted into the database as a result of internal activity caused by triggers. |
| <b>static_sql_stmts</b>   | The number of static SQL statements that were attempted.                                           |
| <b>dynamic_sql_stmts</b>  | The number of dynamic SQL statements that were attempted.                                          |
| <b>failed_sql_stmts</b>   | The number of SQL statements that were attempted, but failed.                                      |
| <b>commit_sql_stmts</b>   | The total number of SQL COMMIT statements that have been attempted.                                |
| <b>rollback_sql_stmts</b> | The total number of SQL ROLLBACK statements that have been attempted.                              |
| <b>select_sql_stmts</b>   | The number of SQL SELECT statements that were executed.                                            |
| <b>uid_sql_stmts</b>      | The number of SQL UPDATE, INSERT, and DELETE statements that were executed.                        |
| <b>ddl_sql_stmts</b>      | The number of SQL Data Definition Language (DDL) statements that were executed.                    |
| <b>int_auto_rebinds</b>   | The number of automatic rebinds (or recompiles) that have been attempted.                          |

| Measurement                  | Description                                                                                                                                                                                                               |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>int_commits</b>           | The total number of commits initiated internally by the database manager.                                                                                                                                                 |
| <b>int_rollback</b>          | The total number of rollbacks initiated internally by the database manager.                                                                                                                                               |
| <b>int_deadlock_rollback</b> | The total number of forced rollbacks initiated by the database manager due to a deadlock. A rollback is performed on the current unit of work in an application selected by the database manager to resolve the deadlock. |
| <b>binds_precompiles</b>     | The number of binds and pre-compiles attempted.                                                                                                                                                                           |

## Application

The following table lists the Application counters:

| Measurement             | Description                                                                                                                                                                           |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>agents_stolen</b>    | The number of times that agents are stolen from an application. Agents are stolen when an idle agent associated with an application is reassigned to work on a different application. |
| <b>num_assoc_agents</b> | At the application level, this is the number of sub-agents associated with an application. At the database level, it is the number of sub-agents for all applications.                |
| <b>total_sorts</b>      | The total number of sorts that have been executed.                                                                                                                                    |
| <b>total_sort_time</b>  | The total elapsed time (in milliseconds) for all sorts that have been executed.                                                                                                       |
| <b>sort_overflows</b>   | The total number of sorts that ran out of sort heap and may have required disk space for temporary storage.                                                                           |
| <b>total_hash_joins</b> | The total number of hash joins executed.                                                                                                                                              |

| Measurement                      | Description                                                                                                                                              |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>total_hash_loops</b>          | The total number of times that a single partition of a hash join was larger than the available sort heap space.                                          |
| <b>hash_join_overflows</b>       | The number of times that hash join data exceeded the available sort heap space                                                                           |
| <b>hash_join_small_overflows</b> | The number of times that hash join data exceeded the available sort heap space by less than 10%.                                                         |
| <b>pool_data_l_reads</b>         | The number of logical read requests for data pages that have gone through the buffer pool.                                                               |
| <b>pool_data_p_reads</b>         | The number of read requests that required I/O to get data pages into the buffer pool.                                                                    |
| <b>pool_data_writes</b>          | The number of times a buffer pool data page was physically written to disk.                                                                              |
| <b>pool_index_l_reads</b>        | The number of logical read requests for index pages that have gone through the buffer pool.                                                              |
| <b>pool_index_p_reads</b>        | The number of physical read requests to get index pages into the buffer pool.                                                                            |
| <b>pool_index_writes</b>         | The number of times a buffer pool index page was physically written to disk.                                                                             |
| <b>pool_read_time</b>            | Provides the total amount of elapsed time spent processing read requests that caused data or index pages to be physically read from disk to buffer pool. |
| <b>prefetch_wait_time</b>        | The time an application spent waiting for an I/O server (pre-fetcher) to finish loading pages into the buffer pool.                                      |
| <b>pool_data_to_estore</b>       | The number of buffer pool data pages copied to extended storage.                                                                                         |
| <b>pool_index_to_estore</b>      | The number of buffer pool index pages copied to extended storage.                                                                                        |
| <b>pool_data_from_estore</b>     | The number of buffer pool data pages copied from extended storage.                                                                                       |

| Measurement                   | Description                                                                                                                                                                                                                 |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>pool_index_from_estore</b> | The number of buffer pool index pages copied from extended storage.                                                                                                                                                         |
| <b>direct_reads</b>           | The number of read operations that do not use the buffer pool.                                                                                                                                                              |
| <b>direct_writes</b>          | The number of write operations that do not use the buffer pool.                                                                                                                                                             |
| <b>direct_read_reqs</b>       | The number of requests to perform a direct read of one or more sectors of data.                                                                                                                                             |
| <b>direct_write_reqs</b>      | The number of requests to perform a direct write of one or more sectors of data.                                                                                                                                            |
| <b>direct_read_time</b>       | The elapsed time (in milliseconds) required to perform the direct reads.                                                                                                                                                    |
| <b>direct_write_time</b>      | The elapsed time (in milliseconds) required to perform the direct writes.                                                                                                                                                   |
| <b>cat_cache_lookups</b>      | The number of times that the catalog cache was referenced to obtain table descriptor information.                                                                                                                           |
| <b>cat_cache_inserts</b>      | The number of times that the system tried to insert table descriptor information into the catalog cache.                                                                                                                    |
| <b>cat_cache_overflows</b>    | The number of times that an insert into the catalog cache failed due to the catalog cache being full.                                                                                                                       |
| <b>cat_cache_heap_full</b>    | The number of times that an insert into the catalog cache failed due to a heap-full condition in the database heap.                                                                                                         |
| <b>pkg_cache_lookups</b>      | The number of times that an application looked for a section or package in the package cache. At a database level, it indicates the overall number of references since the database was started, or monitor data was reset. |

| Measurement                 | Description                                                                                                                                                                                                 |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>pkg_cache_inserts</b>    | The total number of times that a requested section was not available for use and had to be loaded into the package cache. This count includes any implicit prepares performed by the system.                |
| <b>appl_section_lookups</b> | Lookups of SQL sections by an application from its SQL work area.                                                                                                                                           |
| <b>appl_section_inserts</b> | Inserts of SQL sections by an application from its SQL work area.                                                                                                                                           |
| <b>uow_log_space_used</b>   | The amount of log space (in bytes) used in the current unit of work of the monitored application.                                                                                                           |
| <b>locks_held</b>           | The number of locks currently held.                                                                                                                                                                         |
| <b>deadlocks</b>            | The total number of deadlocks that have occurred.                                                                                                                                                           |
| <b>lock_escals</b>          | The number of times that locks have been escalated from several row locks to a table lock.                                                                                                                  |
| <b>x_lock_escals</b>        | The number of times that locks have been escalated from several row locks to one exclusive table lock, or the number of times an exclusive lock on a row caused the table lock to become an exclusive lock. |
| <b>lock_timeouts</b>        | The number of times that a request to lock an object timed-out instead of being granted.                                                                                                                    |
| <b>lock_waits</b>           | The total number of times that applications or connections waited for locks.                                                                                                                                |
| <b>lock_wait_time</b>       | The total elapsed time waited for a lock.                                                                                                                                                                   |
| <b>locks_waiting</b>        | Indicates the number of agents waiting on a lock.                                                                                                                                                           |
| <b>uow_lock_wait_time</b>   | The total amount of elapsed time this unit of work has spent waiting for locks.                                                                                                                             |
| <b>rows_deleted</b>         | The number of row deletions attempted.                                                                                                                                                                      |

| Measurement              | Description                                                                                                                  |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------|
| <b>rows_inserted</b>     | The number of row insertions attempted.                                                                                      |
| <b>rows_updated</b>      | The number of row updates attempted.                                                                                         |
| <b>rows_selected</b>     | The number of rows that have been selected and returned to the application.                                                  |
| <b>rows_written</b>      | The number of rows changed (inserted, deleted or updated) in the table.                                                      |
| <b>rows_read</b>         | The number of rows read from the table.                                                                                      |
| <b>int_rows_deleted</b>  | The number of rows deleted from the database as a result of internal activity.                                               |
| <b>int_rows_updated</b>  | The number of rows updated from the database as a result of internal activity.                                               |
| <b>int_rows_inserted</b> | The number of rows inserted into the database as a result of internal activity caused by triggers.                           |
| <b>open_rem_curs</b>     | The number of remote cursors currently open for this application, including those cursors counted by 'open_rem_curs_blk'.    |
| <b>open_rem_curs_blk</b> | The number of remote blocking cursors currently open for this application.                                                   |
| <b>rej_curs_blk</b>      | The number of times that a request for an I/O block at server was rejected and the request was converted to non-blocked I/O. |
| <b>acc_curs_blk</b>      | The number of times that a request for an I/O block was accepted.                                                            |
| <b>open_loc_curs</b>     | The number of local cursors currently open for this application, including those cursors counted by 'open_loc_curs_blk'.     |
| <b>open_loc_curs_blk</b> | The number of local blocking cursors currently open for this application.                                                    |
| <b>static_sql_stmts</b>  | The number of static SQL statements that were attempted.                                                                     |

| Measurement                   | Description                                                                                                                                                                                                               |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>dynamic_sql_stmts</b>      | The number of dynamic SQL statements that were attempted.                                                                                                                                                                 |
| <b>failed_sql_stmts</b>       | The number of SQL statements that were attempted, but failed.                                                                                                                                                             |
| <b>commit_sql_stmts</b>       | The total number of SQL COMMIT statements that have been attempted.                                                                                                                                                       |
| <b>rollback_sql_stmts</b>     | The total number of SQL ROLLBACK statements that have been attempted.                                                                                                                                                     |
| <b>select_sql_stmts</b>       | The number of SQL SELECT statements that were executed.                                                                                                                                                                   |
| <b>uid_sql_stmts</b>          | The number of SQL UPDATE, INSERT, and DELETE statements that were executed.                                                                                                                                               |
| <b>ddl_sql_stmts</b>          | The number of SQL Data Definition Language (DDL) statements that were executed.                                                                                                                                           |
| <b>int_auto_rebinds</b>       | The number of automatic rebinds (or recompiles) that have been attempted.                                                                                                                                                 |
| <b>int_commits</b>            | The total number of commits initiated internally by the database manager.                                                                                                                                                 |
| <b>int_rollbacks</b>          | The total number of rollbacks initiated internally by the database manager.                                                                                                                                               |
| <b>int_deadlock_rollbacks</b> | The total number of forced rollbacks initiated by the database manager due to a deadlock. A rollback is performed on the current unit of work in an application selected by the database manager to resolve the deadlock. |
| <b>binds_precompiles</b>      | The number of binds and pre-compiles attempted.                                                                                                                                                                           |

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## Oracle Monitoring

The Oracle monitor displays information from Oracle V\$ tables: Session statistics, V\$SESSTAT, system statistics, V\$SYSSTAT, and other table counters defined by the user in the custom query.

The SiteScope Oracle JDBC Monitor monitors the server performance statistics from Oracle Database servers. You can monitor multiple parameters or counters with a single monitor instance. This allows you to watch server loading for performance, availability, and capacity planning. You can create a separate Oracle JDBC Monitor instance for each Oracle database server in your environment.

To obtain data for this graph, you must first set up the monitoring environment. You then configure the Oracle online monitor (from the Controller) and select the measurements you want to display, before running the scenario.

### **This chapter includes:**

- ▶ Setting Up the Monitoring Environment on page 360
- ▶ Adding a Machine to Monitor on page 364
- ▶ Configuring the Oracle Monitor on page 365
- ▶ Oracle Performance Counters on page 371
- ▶ Custom Queries on page 372

---

**Note:** The port you use to monitor an Oracle server through a firewall depends on the configuration of the Oracle server. Configuration information for the connection between the client and server is located in the Oracle client **tnsnames.ora** file.

---

## Setting Up the Monitoring Environment

- ▶ If you are using the SiteScope monitor engine, ensure that SiteScope has been installed on a server. You can install SiteScope on the same machine as the Controller, or on a dedicated server.
- ▶ The Oracle server measures information from the V\$SESSTAT and V\$SYSSTAT Oracle V\$ tables, and other table counters defined by the user in the custom query. In order to monitor the Oracle server, you must set up the monitoring environment as described below before you can configure the monitor.

### To set up the native LoadRunner Oracle monitor environment:

- 1** Ensure that the Oracle client libraries are installed on the Controller machine.
- 2** Verify that **%OracleHome%\bin** is included in the path environment variable. If it is not, add it.
- 3** Configure the **tnsnames.ora** file on the Controller machine so that the Oracle client can communicate with the Oracle server(s) you plan to monitor.

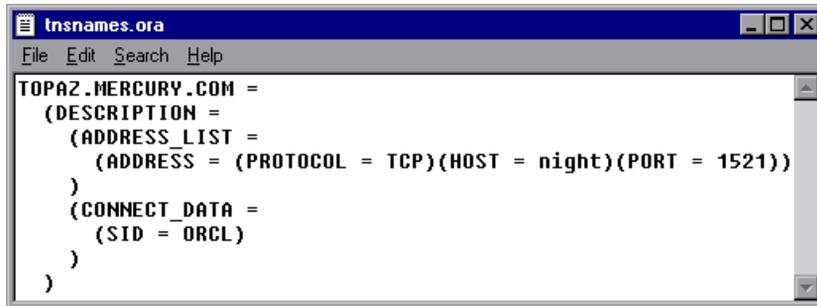
You can configure connection parameters either manually, by editing the **tnsnames.ora** file in a text editor, or using the Oracle service configuration tool (for example, select **Start > Programs > Oracle for Windows NT > Oracle Net8 Easy Config**).

You specify:

- ▶ a new service name (TNS name) for the Oracle instance
- ▶ TCP protocol

- the host name (name of monitored server machine)
- the port number (usually 1521)
- the database SID (the default SID is ORCL)

For example:



```

tnsnames.ora
File Edit Search Help
TOPAZ.MERCURY.COM =
 (DESCRIPTION =
 (ADDRESS_LIST =
 (ADDRESS = (PROTOCOL = TCP)(HOST = night)(PORT = 1521))
)
 (CONNECT_DATA =
 (SID = ORCL)
)
)

```

---

**Note:** Only the 32-bit Oracle client should be installed on the Controller machine running the Oracle monitor. If you have a 16-bit and a 32-bit Oracle client installation on the Controller machine, the 16-bit installation should be uninstalled.

---

- 4 Obtain a username and password for the service from your database administrator, and ensure that the Controller has database administrator privileges for the Oracle V\$tables (V\$SESSTAT, V\$SYSSTAT, V\$STATNAME, V\$INSTANCE, V\$SESSION).
- 5 Verify connection with the Oracle server by performing **tns ping** from the Controller machine.

---

**Note:** here may be a problem connecting if the Oracle server is behind a DMZ/firewall that limits its communication to application servers accessing it.

---

- 6 Ensure that the registries are updated for the version of Oracle that you are using and that they have the following key:  
HKEY\_LOCAL\_MACHINE\SOFTWARE\ORACLE
- 7 Verify that the Oracle server you want to monitor is up and running.

---

**Note:** It is possible to monitor several Oracle database servers concurrently.

---

- 8 Run SQL\*Plus from the Controller and attempt to log in to the Oracle server(s) with the desired username/password/server combination.
- 9 Type `SELECT * FROM V$SYSSTAT` to verify that you can view the V\$SYSSTAT table on the Oracle server. Use similar queries to verify that you can view the V\$SESSTAT, V\$SESSION, V\$INSTANCE, V\$STATNAME, and V\$PROCESS tables on the server. Make sure that the Oracle **bin** directory is in the search path.
- 10 To change the length of each monitoring sample (in seconds), you need to edit the `dat\monitors\vmmon.cfg` file in the LoadRunner root folder. The default rate is 10 seconds.

---

**Note:** The minimum sampling rate for the Oracle Monitor is 10 seconds. If you set the sampling rate at less than 10 seconds, the Oracle Monitor will continue to monitor at 10 second intervals.

If a problem occurs in setting up the Oracle environment, view the error message issued by the Oracle server.

---

**To set up the SiteScope Oracle JDBC monitor environment:**

- 1 You must have a copy of the applicable Oracle JDBC database driver file (for example, **classes12.zip**) on the SiteScope server.

Copy the downloaded driver file into the **<SiteScope install path>\SiteScope\java\lib\ext** subdirectory. DO NOT unzip the file.

Stop and restart the SiteScope service after copying the driver file to the SiteScope machine.

---

**Note:** More than one driver file is available for download. Some drivers support more than one version of Oracle database (for example, the **classes12.zip** Oracle JDBC thin driver) while others only support a particular version. If you are monitoring a recent version of Oracle database, you should download the latest version of the database driver.

---

- 2 You must supply the correct Database Connection URL, a database username and password when setting up the monitor. The syntax of the Database Connection URL usually has the form of:

`jdbc:oracle:thin:@<tcp address>:<tcp port>:<database sid>.`

For example to connect to the ORCL database on a machine using port 1521 you would use:

`jdbc:oracle:thin:@206.168.191.19:1521:ORCL`

---

**Note:** The colon and @ symbols must be included as shown.

---

- 3 You must specify the Oracle Database Driver that was installed on the SiteScope server when setting up the monitor. The Database Driver for the Oracle thin JDBC driver is:

`oracle.jdbc.driver.OracleDriver`

- 4 You should only have one Oracle client installed on the SiteScope machine. If there is more than one client installed, SiteScope may report an error and be unable to connect to the database.
- 5 You must have an Oracle user login that SiteScope will use to access the Oracle server. In order to retrieve the Oracle database counters, the user that SiteScope will use for the Oracle JDBC Monitor should be able to execute all the SQL statements as found in the file `SiteScope\templates.applications\commands.oraclejdbc`.

## Adding a Machine to Monitor

In order to monitor the Oracle database resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

### To add a machine to the Controller

- 1 Click the Oracle graph in the graph tree, and drag it into the right pane of the Run view.
- 2 Right-click the graph and select **Add Measurements**, or click anywhere on graph and choose **Monitors > Add Measurements**. The Oracle dialog box opens.
- 3 By default, LoadRunner monitors Oracle database resources using the native LoadRunner monitor engine.

If you want to monitor the Oracle database using a SiteScope monitor, click **Advanced**.

In the Choose Monitor Engine dialog box, choose **SiteScope**, and click **OK** to close the Monitor Engine dialog box.

- 4 In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.
  - In the **Monitored Machine Information** section, enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs.
  - In the **SiteScope Server Information** section, enter the SiteScope machine name, and port (default: 8888), and specify whether you are using a Secure HTTP connection. If you are using a SiteScope account, fill in the relevant account information.

**Note:** If you are adding a native LoadRunner monitor, the **SiteScope Server Information** section does not appear.

Click **OK** to close the Add Machine dialog box.

- 5 In the **Resource Measurements on:** *<machine>* section of the Oracle dialog box, click **Add**.
- 6 Continue with Configuring the Oracle Monitor below.

## Configuring the Oracle Monitor

The configuration for this monitor differs slightly depending on whether you are adding a SiteScope or native LoadRunner monitor.

This section describes:

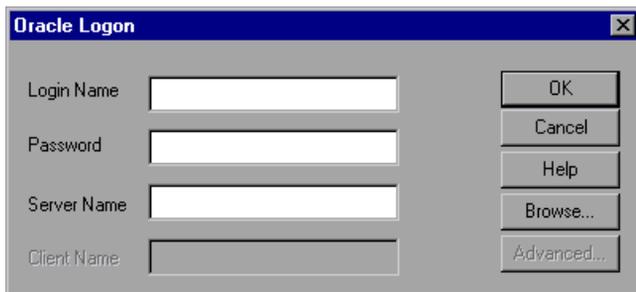
- Configuring the Native LoadRunner Oracle Database Monitor
- Configuring the SiteScope Oracle JDBC Monitor

## Configuring the Native LoadRunner Oracle Database Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which objects to monitor on the machine.

**To configure the Oracle Database monitor:**

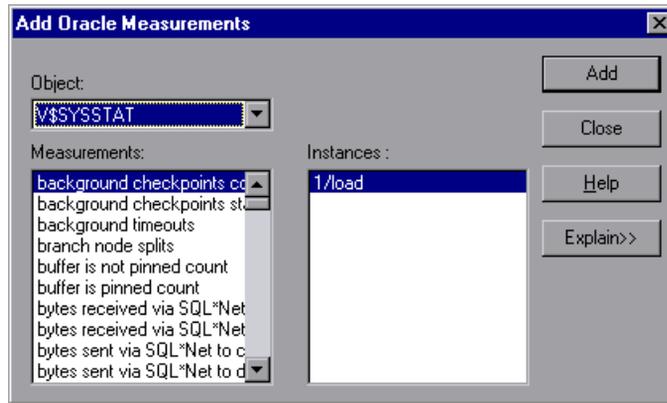
- 1 When you click Add to add a measurement, the Oracle Logon dialog box opens.



Enter the following information, and then click **OK**.

- **Login Name.** Enter your login name.
- **Password.** Enter your password.
- **Server Name.** Enter the name of the server.

- 2 The Add Oracle Measurements dialog box opens, displaying the available measurements.



- 3 For each measurement, select an object, measurement, and instance, and then click **Add**, as described in “Understanding the Add Oracle Measurements Dialog Box” below.

For a description of the available measurements, see “Oracle Performance Counters” on page 371.

- 4 Click **Close**. The measurements that you selected appear in the **Resource Measurements on: <machine>** section of the Oracle dialog box.
- 5 Click **OK** in the Oracle dialog box to activate the monitor.

---

**Note:** By default, the database returns the absolute value of a counter. However, by changing the `IsRate` setting in the `dat\monitors\vmon.cfg` file to 1, you can instruct the database to report a counter’s rate value—the change in the counter per unit time.

---

## Understanding the Add Oracle Measurements Dialog Box

The Add Oracle Measurements dialog box lets you select the resources to monitor from the `V$SESSTAT` and `V$SYSSTAT` Oracle `V$` tables.

- **Object.** Select the object being monitored on the specified machine.

- **Measurements.** Select a resource measurement to monitor. Select multiple measurements using the CTRL key. For an explanation of each measurement, click **Explain**.
- **Instances.** If multiple instances of the selected measurement are running, select one or more instances to monitor for the selected measurement.
- **Explain.** Displays a description of the selected measurement.

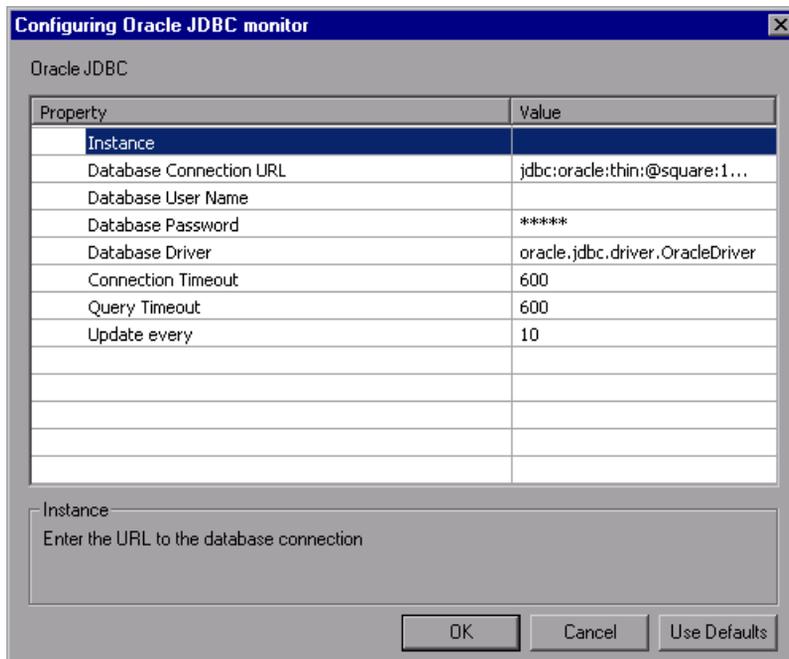
## Configuring the SiteScope Oracle JDBC Monitor

After you have added the machine that you are monitoring, you choose the measurements to monitor on the machine.

**To configure the Oracle JDBC monitor:**

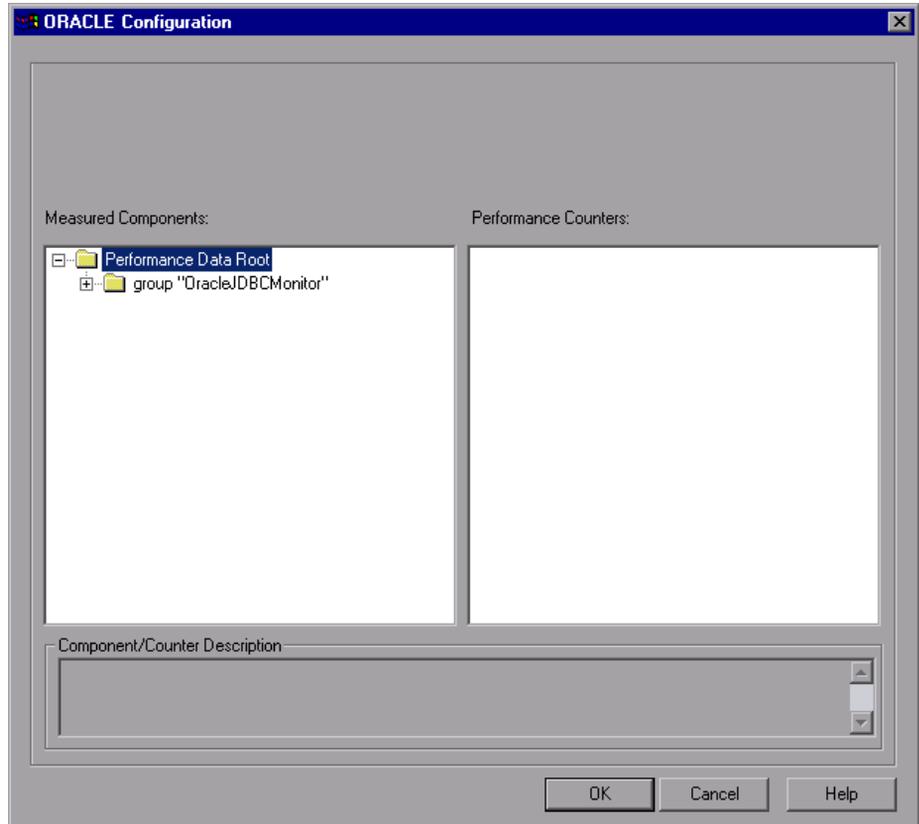
- 1** The first time you add a measurement to the monitor, you need to configure the monitor properties. When you click **Add** to add a measurement, the Configuring Oracle JDBC Monitor dialog box opens.

Enter values for the monitor properties as described in “Understanding the Configuring Oracle JDBC Monitor Dialog Box” on page 370, and click **OK**.



- 2 The Oracle Configuration dialog box opens.

Browse the **Measured Components** tree and select the performance counters on the right, as described in “Understanding the Oracle Configuration Dialog Box” on page 371. Click a component or counter to see its description in the **Component/Counter Description** section.



- 3 Click **OK** to close the Oracle Configuration dialog box. The components that you selected appear in the **Resource Measurements on: <machine>** section of the Oracle dialog box.
- 4 Click **OK** in the Oracle dialog box to activate the monitor.

## Understanding the Configuring Oracle JDBC Monitor Dialog Box

You use the Configuring Oracle JDBC Monitor dialog box to configure the Oracle JDBC monitor.

- **Instance.** Enter the database SID. For example, ORCL.
- **Database Connection URL.** Enter the connection URL to the database you want to monitor. For example, jdbc:oracle:thin:@206.168.191.19:1521:ORCL
- **Database User Name.** Enter the user name that SiteScope should use to connect to the database.
- **Database Password.** Enter the password for the user name that SiteScope should use to connect to the database.
- **Database Driver.** Enter the driver used to connect to the database. For example, oracle.jdbc.driver.OracleDriver.
- **Connection Timeout.** Enter an optional the time out value, in seconds, that SiteScope should to wait for a database connection to respond.
- **Query Timeout.** Enter an optional the time out value, in seconds, that SiteScope should to wait for a response from the database query. If the database does not respond within the period specified, SiteScope will report an error.
- **Update every.** Select how often the monitor should read the server statistics. The default interval is to run or update the monitor once every 10 seconds.

---

### Notes:

- The sum of the **Connection Timeout** value and **Query Timeout** value should always be less than the **Update every** value for the monitor.
  - Some commonly used databases and database drivers do not support the Query Timeout feature. In these cases the Query Timeout value should be set to zero.
-

## Understanding the Oracle Configuration Dialog Box

The Oracle Configuration dialog box enables you to select the performance counters to monitor.

- **Host.** The name of the host machine.
- **Measured Components.** Displays a tree containing all the available measured components.
- **Performance Counters.** Displays the performance counters for a selected measured component.
- **Component/Counter Description.** Displays a description of the selected measured component or performance counter.

## Oracle Performance Counters

The following measurements are most commonly used when monitoring the Oracle server (from the V\$SYSSTAT table):

| Measurement                                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CPU used by this session</b>               | The amount of CPU time (in 10s of milliseconds) used by a session between the time a user call started and ended. Some user calls can be completed within 10 milliseconds and, as a result, the start and end-user call time can be the same. In this case, 0 milliseconds are added to the statistic. A similar problem can exist in the operating system reporting, especially on systems that suffer from many context switches. |
| <b>Bytes received via SQL*Net from client</b> | The total number of bytes received from the client over Net8.                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Logons current</b>                         | The total number of current logons                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Opens of replaced files</b>                | The total number of files that needed to be reopened because they were no longer in the process file cache.                                                                                                                                                                                                                                                                                                                         |

| Measurement                              | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>User calls</b>                        | Oracle allocates resources (Call State Objects) to keep track of relevant user call data structures every time you log in, parse, or execute. When determining activity, the ratio of user calls to RPI calls gives you an indication of how much internal work is generated as a result of the type of requests the user is sending to Oracle.                                                                                                                                         |
| <b>SQL*Net roundtrips to/from client</b> | The total number of Net8 messages sent to, and received from, the client.                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Bytes sent via SQL*Net to client</b>  | The total number of bytes sent to the client from the foreground process(es).                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Opened cursors current</b>            | The total number of current open cursors.                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>DB block changes</b>                  | Closely related to consistent changes, this statistic counts the total number of changes that were made to all blocks in the SGA that were part of an update or delete operation. These are changes that generate redo log entries and hence will cause permanent changes to the database if the transaction is committed. This statistic is a rough indication of total database work and indicates (possibly on a per-transaction level) the rate at which buffers are being dirtied. |
| <b>Total file opens</b>                  | The total number of file opens being performed by the instance. Each process needs a number of files (control file, log file, database file) to work against the database.                                                                                                                                                                                                                                                                                                              |

## Custom Queries

Using the custom query feature, you can define your own query to the Oracle database and view the result of this query—a single numerical value—in the Oracle online monitor graph. By defining your own query, you can monitor not only the V\$SYSSTAT and V\$SESSTAT table counters that are currently provided by the Oracle monitor, but other tables that contain useful performance information as well.

**To create a custom query:**

- 1** In the third line of the **vmon.cfg** file, **CustomCounters=**, indicate the number of custom counters you want to create.
- 2** Create a new section in the **vmon.cfg** file for the new counter. Each section has the following format:  

```
[Custom2]
Name=Number of sessions
Description=This counter returns the number of sessions active.
Query=SELECT COUNT(*) FROM V$SESSION
IsRate=1
```
- 3** In the **[Custom#]** line, assign the next number in the sequence of counters to the new custom counter. The custom counters must be in consecutive order, beginning with the number 0.
- 4** In the **Name** line, enter the name of the new counter.
- 5** In the **Description** line, enter the description of the counter that you want the help message to contain.
- 6** In the **Query** line, enter the text of the SQL query (on one line of the **vmon.cfg** file) that returns exactly one row from the database. This row must contain one column, a numerical value. Custom queries should not exceed 512 characters.
- 7** In the **IsRate** line, enter 0 if you want the database to report the counter as an absolute number. If you want the database to report the change in the counter per unit time, enter 1. Custom queries cannot return negative values.



# 37

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## SQL Server Monitoring

The SQL Server monitor shows the standard Windows resources on the SQL server machine.

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**Note:** To monitor an SQL server through a firewall, use TCP, port 139.

---

**This chapter includes:**

- ▶ Setting up the Monitoring Environment on page 375
- ▶ Adding a Machine to Monitor on page 376
- ▶ Configuring the SQL Server Monitor on page 377
- ▶ SQL Server Performance Counters on page 380

### Setting up the Monitoring Environment

- ▶ If you are using the SiteScope monitor engine, ensure that SiteScope has been installed on a server. You can install SiteScope on the same machine as the Controller, or on a dedicated server.
- ▶ To obtain data for this graph, you enable the SQL Server online monitor (from the Controller) and select the measurements you want to display, before running the scenario.

## Adding a Machine to Monitor

In order to monitor the SQL Server resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

### To add a machine to the Controller

- 1 Click **SQL Server** in the graph tree, and drag it into the right pane of the Run view.
- 2 Right-click the graph and select **Add Measurements**, or click anywhere on graph and choose **Monitors > Add Measurements**. The SQL Server dialog box opens.
- 3 By default, LoadRunner monitors SQL Server resources using the native LoadRunner monitor engine.

If you want to monitor the SQL Server using a SiteScope monitor, click **Advanced**.

In the Choose Monitor Engine dialog box, choose **SiteScope**, and click **OK** to close the Monitor Engine dialog box.

- 4 In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.
  - ▶ In the **Monitored Machine Information** section, enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs.
  - ▶ In the **SiteScope Server Information** section, enter the SiteScope machine name, and port (default: 8888), and specify whether you are using a Secure HTTP connection. If you are using a SiteScope account, fill in the relevant account information.

**Note:** If you are adding a native LoadRunner monitor, the **SiteScope Server Information** section does not appear.

Click **OK** to close the Add Machine dialog box.

- 5 Click **Add** in the **Resource Measurements on: <machine>** section of the SQL Server dialog box
- 6 Continue with Configuring the SQL Server Monitor below.

## Configuring the SQL Server Monitor

The configuration for this monitor differs slightly depending on whether you are adding a SiteScope or native LoadRunner monitor.

### Configuring the Native LoadRunner SQL Server Monitor

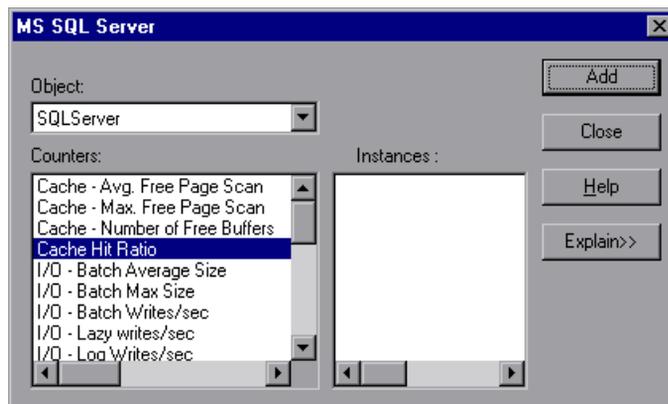
- 1 When you add a machine in the SQL Server dialog box, the default measurements are displayed in the **Resource Measurements on: <machine>** section.

---

**Note:** To change the default counters for the SQL Server monitor, see “Changing a Monitor’s Default Counters” on page 543.

---

- To delete a measurement from the default list, select the measurement and click **Delete**.
  - To select additional measurements, click **Add**.
- 2 The MS SQL Server dialog box opens displaying the SQL Server resources.



For each measurement select an object, counter, and instance, as described in “Understanding the Add MS SQL Server Measurements Dialog Box” on page 378, and then click **Add**.

For a description of the available measurements, see “SQL Server Performance Counters” on page 380.

- 3 When you have finished selecting the measurements to monitor, click **Close**. The counters that you selected appear in the **Resource Measurements on: <machine>** section of the SQL Server dialog box.
- 4 Click **OK** in the SQL Server dialog box to activate the monitor.

---

**Note:** Certain measurements or counters are especially useful for determining server performance and isolating the cause of a bottleneck during an initial stress test on the SQL Server. For more information about these counters, see “Useful Counters for Stress Testing” on page 544.

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### **Understanding the Add MS SQL Server Measurements Dialog Box**

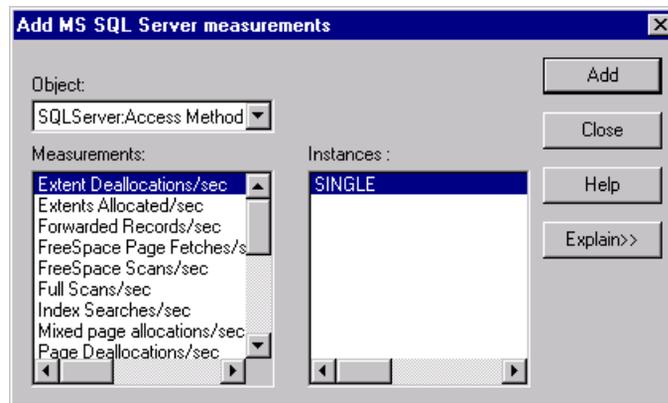
The Add MS SQL Server Measurements dialog box lets you select additional resources to monitor on the SQL Server.

- **Object.** Select the object being monitored on the specified machine.
- **Counters/Measurements.** Select a resource counter/measurement to monitor. Select multiple counters using the CTRL key. For an explanation of each counter/measurement, click **Explain**.
- **Instances.** If multiple instances of the selected counter/measurement are running, select one or more instances to monitor for the selected counter/measurement.
- **Explain/Collapse.** Displays/Collapses the Measurement Description box that describes the selected counter/measurement.

## Configuring the SiteScope SQL Server Monitor

- 1 The first time you add measurements you need to configure the remote machine properties. When you click **Add** in the **Resource Measurements on: <machine>** section of the SQL Server dialog box, a dialog box opens to configure the remote machine as follows:
  - ▶ If you are monitoring a machine on a UNIX platform, the Configuring UNIX Remote Machine dialog box opens.
  - ▶ If you are monitoring a machine on an NT platform, the Configuring NT Remote Machine dialog box opens.

Enter the remote machine's configuration information, as described in "Configuring the Remote Machine for SiteScope Monitors" on page 28, and click **OK**.
- 2 The Configuring SQL Server Monitor dialog box opens. Verify the **Server** and **Update every** properties, and click **OK**.
- 3 The Add MS SQL Server Measurements dialog box opens displaying the available measurements and server properties.



For each measurement select an object, measurement, and instance, as described in "Understanding the Add MS SQL Server Measurements Dialog Box" on page 378, and then click **Add**.

For a description of the available measurements, see "SQL Server Performance Counters" on page 380.

- 4 When you have finished selecting the measurements to monitor, click **Close**. The measurements that you selected appear in the **Resource Measurements on: <machine>** section of the SQL Server dialog box.
- 5 Click **OK** in the SQL Server dialog box to activate the monitor.

## SQL Server Performance Counters

The following table describes the default counters that can be monitored on version 6.5 of the SQL Server:

| Measurement                        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>% Total Processor Time (NT)</b> | The average percentage of time that all the processors on the system are busy executing non-idle threads. On a multi-processor system, if all processors are always busy, this is 100%, if all processors are 50% busy this is 50% and if 1/4 of the processors are 100% busy this is 25%. It can be viewed as the fraction of the time spent doing useful work. Each processor is assigned an Idle thread in the Idle process which consumes those unproductive processor cycles not used by any other threads.                                                                                                                                                                                                            |
| <b>% Processor Time (Win 2000)</b> | The percentage of time that the processor is executing a non-idle thread. This counter was designed as a primary indicator of processor activity. It is calculated by measuring the time that the processor spends executing the thread of the idle process in each sample interval, and subtracting that value from 100%. (Each processor has an idle thread which consumes cycles when no other threads are ready to run). It can be viewed as the percentage of the sample interval spent doing useful work. This counter displays the average percentage of busy time observed during the sample interval. It is calculated by monitoring the time the service was inactive, and then subtracting that value from 100%. |
| <b>Cache Hit Ratio</b>             | The percentage of time that a requested data page was found in the data cache (instead of being read from disk).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

| Measurement                     | Description                                                                                                                 |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <b>I/O - Batch Writes/sec</b>   | The number of 2K pages written to disk per second, using Batch I/O. The checkpoint thread is the primary user of Batch I/O. |
| <b>I/O - Lazy Writes/sec</b>    | The number of 2K pages flushed to disk per second by the Lazy Writer.                                                       |
| <b>I/O - Outstanding Reads</b>  | The number of physical reads pending.                                                                                       |
| <b>I/O - Outstanding Writes</b> | The number of physical writes pending.                                                                                      |
| <b>I/O - Page Reads/sec</b>     | The number of physical page reads per second.                                                                               |
| <b>I/O - Transactions/sec</b>   | The number of Transact-SQL command batches executed per second.                                                             |
| <b>User Connections</b>         | The number of open user connections.                                                                                        |



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## Sybase Monitoring

The Sybase monitor enables monitoring of Sybase Adaptive Server Enterprise (Sybase ASE) servers (version 11 or later) on Windows and UNIX. The monitor connects to the Sybase ASE server (via the Adaptive Server Enterprise Monitor Server) and retrieves metrics from the server using standard, Sybase-provided libraries.

**This chapter includes:**

- ▶ Setting Up the Monitoring Environment on page 383
- ▶ Adding a Machine to Monitor on page 385
- ▶ Configuring the Sybase Monitor on page 386
- ▶ Sybase Performance Counters on page 391

### Setting Up the Monitoring Environment

To monitor the Sybase database server machine, you must first set up the Sybase monitoring environment. You then enable the Sybase online monitor (from the Controller) and select the measurements you want to display, before running the scenario.

If you are using the SiteScope monitor engine, ensure that SiteScope has been installed on a server. You can install SiteScope on the same machine as the Controller, or on a dedicated server.

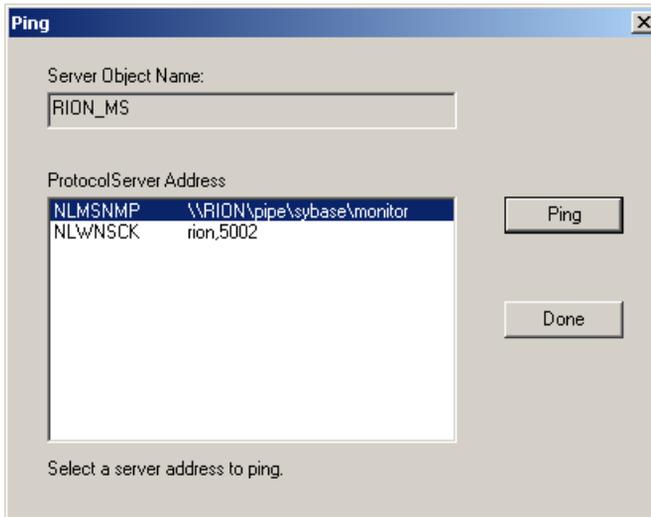
---

**Note:** When connecting to the monitored server, you connect to the Adaptive Server Enterprise Monitor Server, not the Sybase ASE server. The Adaptive Server Enterprise Monitor Server is an application that runs on the same machine as Sybase ASE server and retrieves performance information from it. The Adaptive Server Enterprise Monitor Server usually has the same name as the Sybase server, but with the suffix **\_ms**.

---

**To set up the Sybase monitor environment:**

- 1 Install the Sybase client files and libraries on the Controller machine.
- 2 Verify a connection between the client and server on the Controller machine. To do so, use the Sybase client's **dsedit** tool to ping the Adaptive Server Enterprise Monitor Server.



---

**Note:** The port you use to monitor a Sybase server through a firewall depends on the configuration of the Sybase server. Configuration information for the connection between the client and server is located in the Sybase client **sql.ini** file.

---

After you have set up the Sybase monitor environment, you can select the objects you want the monitor to measure.

## Adding a Machine to Monitor

In order to monitor the Sybase resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

### To add a machine to the Controller:

- 1 Click the **Sybase** graph in the graph tree, and drag it into the right pane of the Run view.
- 2 Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The Sybase dialog box opens.
- 3 By default, LoadRunner monitors Sybase resources using the native LoadRunner monitor engine.

If you want to monitor Sybase resources using the SiteScope monitor, click **Advanced**.

In the Choose Monitor Engine dialog box, choose **SiteScope**, and click **OK**.

- 4 In the **Monitored Server Machines** section, click **Add**.

The Add Machine dialog box opens.

- In the **Monitored Machine Information** section, enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs.
- In the **SiteScope Server Information** section, enter the SiteScope machine name, and port (default: 8888), and specify whether you are using a Secure HTTP connection. If you are using a SiteScope account, fill in the relevant account information.

**Note:** If you are adding a native LoadRunner monitor, the **SiteScope Server Information** section does not appear.

Click **OK** to close the Add Machine dialog box.

- 5 In the **Resource Measurements on:** <machine> section of the Sybase dialog box, click **Add**.
- 6 Continue with Configuring the Sybase Monitor below.

## Configuring the Sybase Monitor

The configuration for this monitor differs slightly depending on whether you are adding a SiteScope or native LoadRunner monitor.

This section describes:

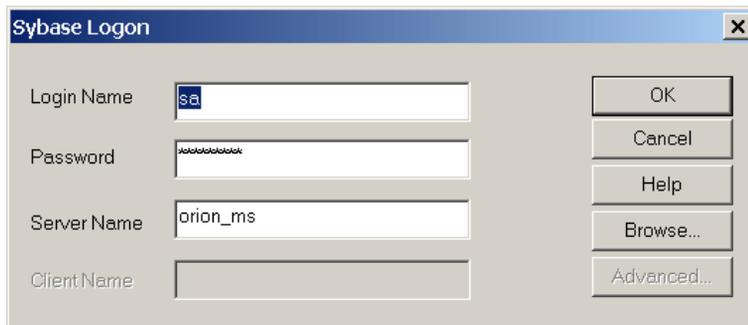
- ▶ Configuring the Native LoadRunner Sybase Monitor
- ▶ Configuring the SiteScope Sybase Monitor

### Configuring the Native LoadRunner Sybase Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which measurements to monitor on the machine.

**To configure the Sybase monitor:**

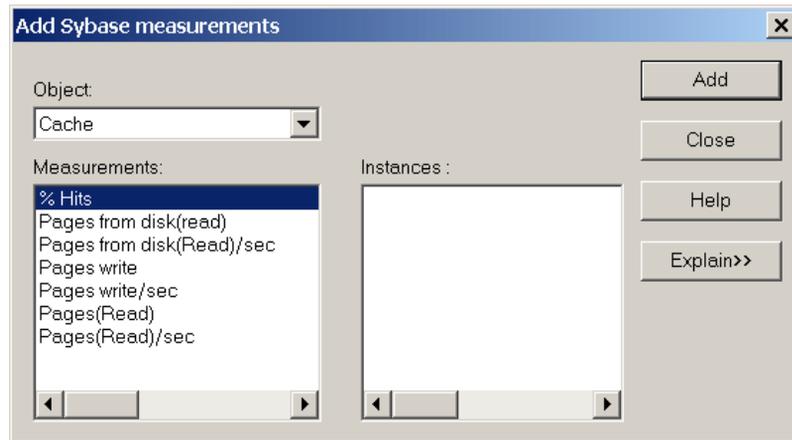
- 1 When you click **Add** to add a measurement, the Sybase Logon dialog box opens.



Enter the following information, and then click OK.

- ▶ **Login Name:** Enter your login name.
- ▶ **Password:** Enter your password.

- **Server Name:** Enter the name of the server (usually the same name as the Sybase server but with the suffix `_ms`).
- 2 Click **OK**. The Add Sybase Measurements dialog box opens.



For each measurement, select an object, measurement, and instance, and then click **Add**, as described in “Understanding the Add Sybase Measurements Dialog Box” on page 387.

For a description of the available measurements, see “Sybase Performance Counters” on page 391.

- 3 Add all the desired resources to the list, and click **Close**. The measurements that you selected appear in the **Resource Measurements on:** `<machine>` section of the Sybase dialog box.
- 4 Click **OK** in the Sybase dialog box to activate the monitor.

### Understanding the Add Sybase Measurements Dialog Box

The Add Sybase Measurements dialog box lets you select additional resources to monitor on the Sybase server.

- **Object.** Select the object being monitored on the specified machine.
- **Measurements.** Select a resource measurement to monitor. Select multiple measurements using the CTRL key. For an explanation of each measurement, click **Explain**.

- **Instances.** If multiple instances of the selected measurement are running, select one or more instances to monitor for the selected measurement.
- **Explain.** Displays a description of the selected measurement.

## Configuring the SiteScope Sybase Monitor

After you have added the machine that you are monitoring, you choose the measurements to monitor on the machine.

**To configure the Sybase monitor:**

- 1 The first time you add a measurement to the monitor, you need to configure the monitor properties. When you click **Add** to add a measurement, the Configuring Sybase Monitor dialog box opens.

Enter values for the monitor properties as described in “Understanding the Configuring Sybase Monitor Dialog Box” on page 390, and click **OK**.

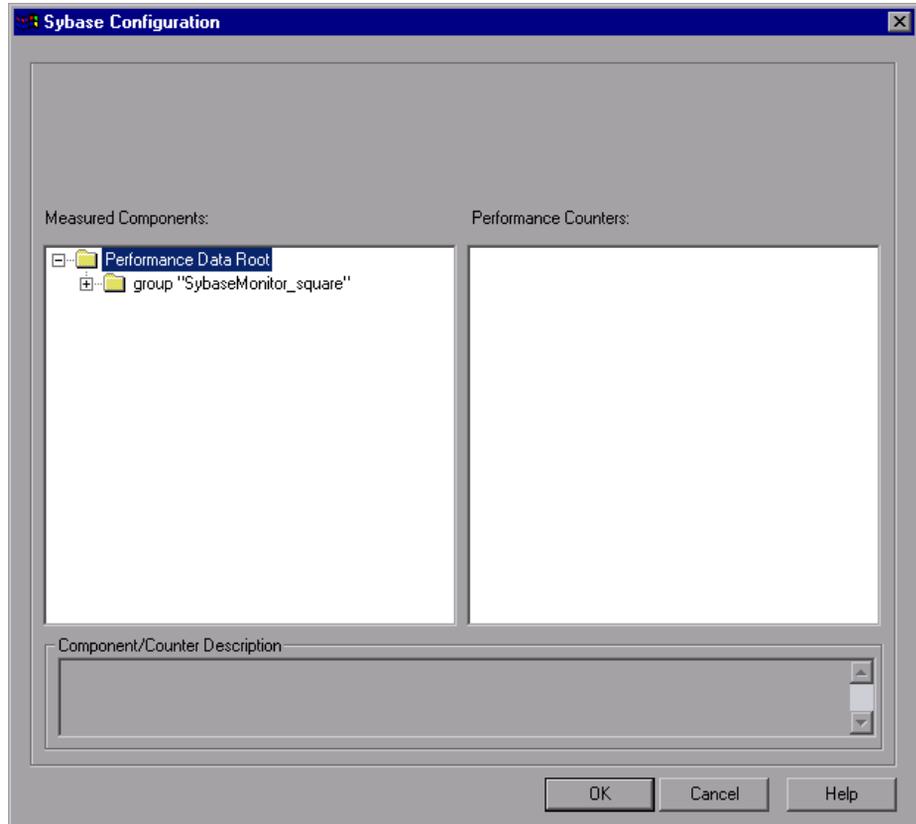
| Property     | Value     |
|--------------|-----------|
| Server       | localhost |
| Username     |           |
| Password     | *****     |
| Update every | 3         |
|              |           |

Server  
Sybase server name.

OK Cancel Use Defaults

- 2 The Sybase Configuration dialog box opens.

Browse the **Measured Components** tree and select the performance counters on the right, as described in “Understanding the Configuring Sybase Monitor Dialog Box” on page 390. Click a component or counter to see its description in the **Component/Counter Description** section.



- 3 Click **OK** to close the Sybase Configuration dialog box. The components that you selected appear in the **Resource Measurements on: <machine>** section of the Sybase dialog box.
- 4 Click **OK** in the Sybase dialog box to activate the monitor.

## Understanding the Configuring Sybase Monitor Dialog Box

- **Server.** Choose the server you want to monitor. Use the choose server link to view a list of servers or to enter a path name. On UNIX servers, enter the full pathname of the database server.
- **Username.** Enter the username of the Sybase server.
- **Password.** Enter the password of the Sybase server.
- **Update every.** Enter how frequently the monitor should read the server statistics. The drop-down list to the right of the text box lets you specify time increments of seconds, minutes, hours, or days. You must specify a time increment of at least 3 seconds. The default is 3 seconds.

## Understanding the Sybase Configuration Dialog Box

The Sybase Configuration dialog box enables you to select the Sybase performance counters to monitor.

- **Host.** The name of the host machine.
- **Measured Components.** Displays a tree containing all the available measured components.
- **Performance Counters.** Displays the performance counters for a selected measured component.
- **Component/Counter Description.** Displays a description of the selected measured component or performance counter.

## Sybase Performance Counters

The following measurements are available when monitoring a Sybase server:

| Object  | Measurement                | Description                                                                |
|---------|----------------------------|----------------------------------------------------------------------------|
| Network | Average packet size (Read) | Reports the number of network packets received                             |
|         | Average packet size (Send) | Reports the number of network packets sent                                 |
|         | Network bytes (Read)       | Reports the number of bytes received, over the sampling interval           |
|         | Network bytes (Read)/sec   | Reports the number of bytes received, per second                           |
|         | Network bytes (Send)       | Reports the number of bytes sent, over the sampling interval               |
|         | Network bytes (Send)/sec   | Reports the number of bytes sent, per second                               |
|         | Network packets (Read)     | Reports the number of network packets received, over the sampling interval |
|         | Network packets (Read)/sec | Reports the number of network packets received, per second                 |
|         | Network packets (Send)     | Reports the number of network packets sent, over the sampling interval     |
|         | Network packets (Send)/sec | Reports the number of network packets sent, per second                     |
| Memory  | Memory                     | Reports the amount of memory, in bytes, allocated for the page cache       |

| <b>Object</b>            | <b>Measurement</b>                        | <b>Description</b>                                                                            |
|--------------------------|-------------------------------------------|-----------------------------------------------------------------------------------------------|
| <b>Disk</b>              | <b>Reads</b>                              | Reports the number of reads made from a database device                                       |
|                          | <b>Writes</b>                             | Reports the number of writes made to a database device                                        |
|                          | <b>Waits</b>                              | Reports the number of times that access to a device had to wait                               |
| <b>Disk</b>              | <b>Grants</b>                             | Reports the number of times access to a device was granted                                    |
| <b>Engine</b>            | <b>Server is busy (%)</b>                 | Reports the percentage of time during which the Adaptive Server is in a "busy" state          |
|                          | <b>CPU time</b>                           | Reports how much "busy" time was used by the engine                                           |
|                          | <b>Logical pages (Read)</b>               | Reports the number of data page reads, whether satisfied from cache or from a database device |
|                          | <b>Pages from disk (Read)</b>             | Reports the number of data page reads that could not be satisfied from the data cache         |
|                          | <b>Pages stored</b>                       | Reports the number of data pages written to a database device                                 |
| <b>Stored Procedures</b> | <b>Executed (sampling period)</b>         | Reports the number of times a stored procedure was executed, over the sampling interval       |
|                          | <b>Executed (session)</b>                 | Reports the number of times a stored procedure was executed, during the session               |
|                          | <b>Average duration (sampling period)</b> | Reports the time, in seconds, spent executing a stored procedure, over the sampling interval  |
|                          | <b>Average duration (session)</b>         | Reports the time, in seconds, spent executing a stored procedure, during the session          |

| Object  | Measurement               | Description                                                                                                       |
|---------|---------------------------|-------------------------------------------------------------------------------------------------------------------|
| Locks   | % Requests                | Reports the percentage of successful requests for locks                                                           |
|         | Locks count               | Reports the number of locks. This is an accumulated value.                                                        |
| Locks   | Granted immediately       | Reports the number of locks that were granted immediately, without having to wait for another lock to be released |
|         | Granted after wait        | Reports the number of locks that were granted after waiting for another lock to be released                       |
|         | Not granted               | Reports the number of locks that were requested but not granted                                                   |
|         | Wait time (avg.)          | Reports the average wait time for a lock                                                                          |
| SqlSrvr | Locks/sec                 | Reports the number of locks. This is an accumulated value.                                                        |
|         | % Processor time (server) | Reports the percentage of time that the Adaptive Server is in a "busy" state                                      |
|         | Transactions              | Reports the number of committed Transact-SQL statement blocks (transactions)                                      |
|         | Deadlocks                 | Reports the number of deadlocks                                                                                   |

| <b>Object</b> | <b>Measurement</b>                | <b>Description</b>                                                                                                         |
|---------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| <b>Cache</b>  | <b>% Hits</b>                     | Reports the percentage of times that a data page read could be satisfied from cache without requiring a physical page read |
|               | <b>Pages (Read)</b>               | Reports the number of data page reads, whether satisfied from cache or from a database device                              |
|               | <b>Pages (Read)/sec</b>           | Reports the number of data page reads, whether satisfied from cache or from a database device, per second                  |
| <b>Cache</b>  | <b>Pages from disk (Read)</b>     | Reports the number of data page reads that could not be satisfied from the data cache                                      |
|               | <b>Pages from disk (Read)/sec</b> | Reports the number of data page reads, per second, that could not be satisfied from the data cache                         |
|               | <b>Pages (Write)</b>              | Reports the number of data pages written to a database device                                                              |
|               | <b>Pages (Write)/sec</b>          | Reports the number of data pages written to a database device, per second                                                  |

| Object             | Measurement                       | Description                                                                                                                                                           |
|--------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Process</b>     | <b>% Processor time (process)</b> | Reports the percentage of time that a process running a given application was in the "Running" state (out of the time that all processes were in the "Running" state) |
|                    | <b>Locks/sec</b>                  | Reports the number of locks, by process. This is an accumulated value.                                                                                                |
|                    | <b>% Cache hit</b>                | Reports the percentage of times that a data page read could be satisfied from cache without requiring a physical page read, by process                                |
|                    | <b>Pages (Write)</b>              | Reports the number of data pages written to a database device, by process                                                                                             |
| <b>Transaction</b> | <b>Transactions</b>               | Reports the number of committed Transact-SQL statement blocks (transactions), during the session                                                                      |
|                    | <b>Rows (Deleted)</b>             | Reports the number of rows deleted from database tables during the session                                                                                            |

| Object             | Measurement                 | Description                                                                                                             |
|--------------------|-----------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Transaction</b> | <b>Inserts</b>              | Reports the number of insertions into a database table during the session                                               |
|                    | <b>Updates</b>              | Reports the updates to database tables during the session                                                               |
|                    | <b>Updates in place</b>     | Reports the sum of expensive, in-place and not-in-place updates (everything except updates deferred) during the session |
|                    | <b>Transactions/sec</b>     | Reports the number of committed Transact-SQL statement blocks (transactions) per second                                 |
|                    | <b>Rows (Deleted)/sec</b>   | Reports the number of rows deleted from database tables, per second                                                     |
|                    | <b>Inserts/sec</b>          | Reports the number of insertions into a database table, per second                                                      |
|                    | <b>Updates/sec</b>          | Reports the updates to database tables, per second                                                                      |
|                    | <b>Updates in place/sec</b> | Reports the sum of expensive, in-place and not-in-place updates (everything except updates deferred), per second        |

# Part X

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## Streaming Media Monitoring



# 39

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## Introduction to Streaming Media Monitoring

To isolate server and client performance bottlenecks during a scenario run, you monitor the Windows Media Server and RealPlayer audio/video servers, as well as the RealPlayer and Media Player clients.

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**Note:** For instructions on recording a script containing streaming media functions, see the HP Virtual User Generator.

---

The streaming media monitors provide you with performance information for the Windows Media Server and RealPlayer audio/video servers, as well as the RealPlayer and Media Player clients. To obtain data for the Windows Media Server and RealPlayer Server, you need to activate the streaming media monitor before executing the scenario, and indicate which statistics and measurements you want to monitor. The RealPlayer Client and Media Player Client do not require pre-session or scenario activation or configuration.



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## Windows Media Server Monitoring

The Windows Media Server monitor displays statistics about the resource usage on the Windows Media Server during the scenario run.

To obtain data for this graph, you need to configure the Windows Media Server online monitor (from the Controller) and select the measurements you want to display, before running the scenario. You select these counters using the Windows Media Server dialog box.

### **This chapter includes:**

- ▶ Adding a Machine to Monitor on page 401
- ▶ Configuring the Windows Media Server Monitor on page 402
- ▶ Windows Media Server Performance Counters on page 403

### **Adding a Machine to Monitor**

In order to monitor the Windows Media resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

#### **To add a machine to the Controller:**

- 1** Click the Windows Media Server graph in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere in the graph and choose **Monitors > Add Measurements**. The Windows Media Server dialog box opens.
- 3** In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.

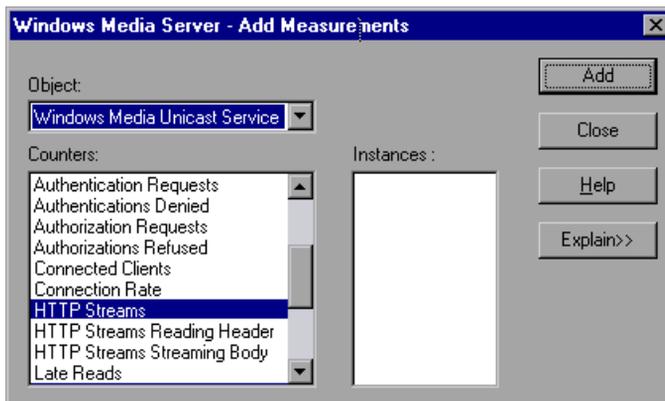
- 4 Enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs, and click **OK**.
- 5 In the **Resource Measurements** section of the Windows Media Server dialog box, select the default measurements you want to monitor.  
For a description of the available measurements, see “Windows Media Server Performance Counters” on page 403.
- 6 To select additional measurements, click **Add**.
- 7 Continue with Configuring the Windows Media Server Monitor below.

## Configuring the Windows Media Server Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which measurements to monitor on the machine.

**To configure the Windows Media Server monitor:**

- 1 When you click **Add** to add a measurement, the Windows Media Server - Add Measurements dialog box opens, displaying the Windows Media Unicast Service object, its counters, and instances.



For each measurement, select an object, a counter, and an instance, and then click **Add**, as described in “Understanding the Windows Media Server - Add Measurements Dialog Box” on page 403.

For a description of the available measurements, see “Windows Media Server Performance Counters” on page 403.

- 2 Add all the desired resources to the list, and click **Close**. The measurements that you selected appear in the **Resource Measurements on: <machine>** section of the Windows Media Server dialog box.
- 3 Click **OK** in the Windows Media Server dialog box to activate the monitor.

### Understanding the Windows Media Server - Add Measurements Dialog Box

The Windows Media Server - Add Measurements dialog box lets you select the resources to monitor on the Windows Media Server.

- **Object.** Select the object being monitored on the specified machine.
- **Counters.** Select a resource counter to monitor. Select multiple counters using the CTRL key. For an explanation of each counter, click **Explain**.
- **Instances.** If multiple instances of the selected counter are running, select one or more instances to monitor for the selected counter.
- **Explain.** Displays a description of the selected counter.

## Windows Media Server Performance Counters

The following table describes the default counters that can be monitored:

| Measurement                                  | Description                                                   |
|----------------------------------------------|---------------------------------------------------------------|
| <b>Active Live Unicast Streams (Windows)</b> | The number of live unicast streams that are being streamed.   |
| <b>Active Streams</b>                        | The number of streams that are being streamed.                |
| <b>Active TCP Streams</b>                    | The number of TCP streams that are being streamed.            |
| <b>Active UDP Streams</b>                    | The number of UDP streams that are being streamed.            |
| <b>Aggregate Read Rate</b>                   | The total, aggregate rate (bytes/sec) of file reads.          |
| <b>Aggregate Send Rate</b>                   | The total, aggregate rate (bytes/sec) of stream transmission. |

| Measurement                | Description                                                                                                                                                                                                                                        |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Connected Clients</b>   | The number of clients connected to the server.                                                                                                                                                                                                     |
| <b>Connection Rate</b>     | The rate at which clients are connecting to the server.                                                                                                                                                                                            |
| <b>Consoles</b>            | The number of Consoles currently connected to the server.                                                                                                                                                                                          |
| <b>HTTP Streams</b>        | The number of HTTP streams being streamed.                                                                                                                                                                                                         |
| <b>Late Reads</b>          | The number of late read completions per second.                                                                                                                                                                                                    |
| <b>Pending Connections</b> | The number of clients that are attempting to connect to the server, but are not yet connected. This number may be high if the server is running near maximum capacity and cannot process a large number of connection requests in a timely manner. |
| <b>Stations</b>            | The number of station objects that currently exist on the server.                                                                                                                                                                                  |
| <b>Streams</b>             | The number of stream objects that currently exist on the server.                                                                                                                                                                                   |
| <b>Stream Errors</b>       | The cumulative number of errors occurring per second.                                                                                                                                                                                              |

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## RealPlayer Server Monitoring

The Real Server monitor displays statistics about the resource usage on the RealPlayer Server during the scenario run.

To obtain data for this graph, you need to configure the RealPlayer Server online monitor (from the Controller) and select the measurements you want to display, before running the scenario. You select these counters using the Real Server dialog box.

### **This chapter includes:**

- ▶ Adding a Machine to Monitor on page 405
- ▶ Configuring the RealPlayer Server Monitor on page 406
- ▶ Real Server Performance Counters on page 408

### **Adding a Machine to Monitor**

In order to monitor the RealPlayer resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

#### **To add a machine to the Controller:**

- 1** Click the Real Server graph in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The Real Server dialog box opens
- 3** In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.

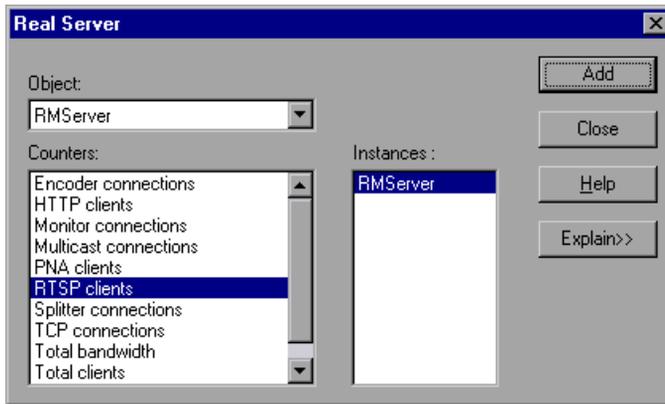
- 4 Enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs, and click **OK**.
- 5 In the **Resource Measurements** section of the Real Server dialog box, click **Add**.
- 6 Continue with Configuring the RealPlayer Server Monitor below.

## Configuring the RealPlayer Server Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which measurements to monitor on the machine.

**To configure the RealPlayer Server monitor:**

- 1 When you click **Add** to add a measurement, the Real Server dialog box opens, displaying the counters that can be monitored.



For each measurement, select an object, counter, and instance, and then click **Add**, as described in “Understanding the Real Server Dialog Box” on page 407.

For a description of the available measurements, see “Real Server Performance Counters” on page 408.

- 2 Add all the desired resources to the list, and click **Close**. The measurements that you selected appear in the **Resource Measurements on:** *<machine>* section of the Real Server dialog box.
- 3 Click **OK** in the Real Server dialog box to activate the monitor.

### **Understanding the Real Server Dialog Box**

The Real Server dialog box lets you select the resources to monitor on the Real Server.

- **Object.** Select the object being monitored on the specified machine.
- **Counters.** Select a resource counter to monitor. Select multiple counters using the CTRL key. For an explanation of each counter, click **Explain**.
- **Instances.** If multiple instances of the selected counter are running, select one or more instances to monitor for the selected counter.
- **Explain.** Displays a description of the selected counter.

## Real Server Performance Counters

The following table describes the default counters that can be monitored:

| Measurement                  | Description                                     |
|------------------------------|-------------------------------------------------|
| <b>Encoder Connections</b>   | The number of active encoder connections        |
| <b>HTTP Clients</b>          | The number of active clients using HTTP         |
| <b>Monitor Connections</b>   | The number of active server monitor connections |
| <b>Multicast Connections</b> | The number of active multicast connections      |
| <b>PNA Clients</b>           | The number of active clients using PNA          |
| <b>RTSP Clients</b>          | The number of active clients using RTSP         |
| <b>Splitter Connections</b>  | The number of active splitter connections       |
| <b>TCP Connections</b>       | The number of active TCP connections            |
| <b>Total Bandwidth</b>       | The number of bits per second being consumed    |
| <b>Total Clients</b>         | The total number of active clients              |
| <b>UDP Clients</b>           | The number of active UDP connections            |

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## RealPlayer Client Monitoring

The Real Client monitor shows statistics on the RealPlayer client machine as a function of the elapsed scenario time. The x-axis represents the time that has elapsed since the start of the scenario run. The y-axis represents the resource usage.

**This chapter includes:**

- ▶ Configuring the Real Client Monitor on page 410
- ▶ RealPlayer Client Performance Counters on page 410

## Configuring the Real Client Monitor

You can view the RealPlayer Client online monitor graph by dragging it from the graph tree into the right pane of the Run view. The graph appears in the graph view area.

## RealPlayer Client Performance Counters

The following table describes the RealPlayer Client measurements that are monitored:

| Measurement                                  | Description                                                                               |
|----------------------------------------------|-------------------------------------------------------------------------------------------|
| <b>Current Bandwidth (Kbits/sec)</b>         | The number of kilobytes in the last second                                                |
| <b>Buffering Event Time (sec)</b>            | The average time spent on buffering                                                       |
| <b>Network Performance</b>                   | The ratio (percentage) between the current bandwidth and the actual bandwidth of the clip |
| <b>Percentage of Recovered Packets</b>       | The percentage of error packets that were recovered                                       |
| <b>Percentage of Lost Packets</b>            | The percentage of packets that were lost                                                  |
| <b>Percentage of Late Packets</b>            | The percentage of late packets                                                            |
| <b>Time to First Frame Appearance (sec)</b>  | The time for first frame appearance (measured from the start of the replay)               |
| <b>Number of Buffering Events</b>            | The average number of all buffering events                                                |
| <b>Number of Buffering Seek Events</b>       | The average number of buffering events resulting from a seek operation                    |
| <b>Buffering Seek Time</b>                   | The average time spent on buffering events resulting from a seek operation                |
| <b>Number of Buffering Congestion Events</b> | The average number of buffering events resulting from network congestion                  |
| <b>Buffering Congestion Time</b>             | The average time spent on buffering events resulting from network congestion              |

| Measurement                                  | Description                                                          |
|----------------------------------------------|----------------------------------------------------------------------|
| <b>Number of Buffering Live Pause Events</b> | The average number of buffering events resulting from live pause     |
| <b>Buffering Live Pause Time</b>             | The average time spent on buffering events resulting from live pause |



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## Media Player Client Monitoring

The Media Player Client monitor graph shows statistics on the Windows Media Player client machine as a function of the elapsed scenario time. The x-axis represents the time that has elapsed since the start of the scenario run. The y-axis represents the resource usage.

**This chapter includes:**

- ▶ Configuring the Windows Media Player Client Monitor on page 413
- ▶ Media Player Client Performance Counters on page 414

### Configuring the Windows Media Player Client Monitor

You can view the Windows Media Player Client online monitor graph by dragging it from the graph tree into the right pane of the Run view. The graph appears in the graph view area.

## Media Player Client Performance Counters

The following table describes the Media Player Client measurements that are monitored:

| Measurement                              | Description                                                                                                                                                                                                                                   |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Average Buffering Events</b>          | The number of times Media Player Client had to buffer incoming media data due to insufficient media content.                                                                                                                                  |
| <b>Average Buffering Time (sec)</b>      | The time spent by Media Player Client waiting for sufficient amount of media data in order to continue playing media clip.                                                                                                                    |
| <b>Current bandwidth (Kbits/sec)</b>     | The number of kbits per second received.                                                                                                                                                                                                      |
| <b>Number of Packets</b>                 | The number of packets sent by server for a particular media clip.                                                                                                                                                                             |
| <b>Stream Interruptions</b>              | The number of interruptions encountered by media player client while playing a media clip. This measurement includes the number of times Media Player Client had to buffer incoming media data, and any errors that occurred during playback. |
| <b>Stream Quality (Packet-level)</b>     | The percentage ratio of packets received to total packets.                                                                                                                                                                                    |
| <b>Stream Quality (Sampling-level)</b>   | The percentage of stream samples received on time (no delays in reception).                                                                                                                                                                   |
| <b>Total number of recovered packets</b> | The number of lost packets that were recovered. This value is only relevant during network playback.                                                                                                                                          |
| <b>Total number of lost packets</b>      | The number of lost packets that were not recovered. This value is only relevant during network playback.                                                                                                                                      |

# **Part XI**

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## **ERP/CRM Server Resource Monitoring**



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## Introduction to ERP/CRM Server Resource Monitoring

You use LoadRunner's ERP/CRM server resource monitors to monitor ERP/CRM servers during a scenario run and isolate server performance bottlenecks.

**This chapter includes:**

- ▶ About ERP/CRM Server Resource Monitoring on page 418
- ▶ Choosing Between Different SAP Monitors on page 418

## About ERP/CRM Server Resource Monitoring

The ERP/CRM server resource monitors provide you with performance information for ERP/CRM servers. To display this data, you must activate the monitors before executing the scenario and select the statistics and measurements you want to monitor.

## Choosing Between Different SAP Monitors

You can monitor the resource usage of SAP solutions R/3, BW, CRM, APO, SAP Enterprise Portal, and SAPGUI for HTML during a scenario run using the SAP server monitors. Use the support matrix below to help you select the appropriate SAP monitor.

### Support Matrix

| SAP Application                                                                                                                | Server Release                                                    | LoadRunner Monitor                                                                             | Required SAPGUI |
|--------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-----------------|
| <ul style="list-style-type: none"> <li>➤ R/3 3.1-4.6D</li> <li>➤ BW 2.x</li> </ul>                                             | SAP R/3 Kernel 3.1-4.6D (based on the SAP Application Server)     | <ul style="list-style-type: none"> <li>➤ SAP CCMS Monitor</li> </ul>                           | SAPGUI 3.1-6.20 |
| <ul style="list-style-type: none"> <li>➤ R/3 4.7 Enterprise</li> <li>➤ BW 3.1</li> <li>➤ CRM 4.0</li> <li>➤ APO 3.x</li> </ul> | SAP R/3 Kernel WAS 6.20 (based on the SAP Web Application Server) | <ul style="list-style-type: none"> <li>➤ SAPGUI Monitor</li> <li>➤ SAP CCMS Monitor</li> </ul> | SAPGUI 6.20     |

| SAP Application       | Server Release                                  | LoadRunner Monitor                                                                                                           | Required SAPGUI                                                 |
|-----------------------|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| SAP Enterprise Portal | No SAP System integration                       | <ul style="list-style-type: none"> <li>▶ SAP Portal Monitor</li> </ul>                                                       |                                                                 |
|                       | SAP 3.1-4.6 kernel based SAP System integration | <ul style="list-style-type: none"> <li>▶ SAP CCMS Monitor</li> <li>▶ SAP Portal Monitor</li> </ul>                           | LoadRunner Controller machine: SAPGUI 3.1-6.20 (see note below) |
|                       | SAP 6.20 kernel based SAP System integration    | <ul style="list-style-type: none"> <li>▶ SAPGUI Monitor</li> <li>▶ SAP CCMS Monitor</li> <li>▶ SAP Portal Monitor</li> </ul> | LoadRunner Controller machine: SAPGUI 6.20 (see note below)     |
| SAPGUI for HTML       | SAP 3.1-4.6 kernel based SAP System integration | <ul style="list-style-type: none"> <li>▶ SAP CCMS Monitor</li> </ul>                                                         | LoadRunner Controller machine: SAPGUI 3.1-6.20 (see note below) |
|                       | SAP 6.20 kernel based SAP System integration    | <ul style="list-style-type: none"> <li>▶ SAPGUI Monitor</li> <li>▶ SAP CCMS Monitor</li> </ul>                               | LoadRunner Controller machine: SAPGUI 6.20 (see note below)     |

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**Note:** A connection from the Controller to the SAP System using SAPGUI is only required for monitoring purposes. SAPGUI is not required on the load generator machines.

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## SAP Portal Server Resource Monitoring

The SAP Portal monitor displays statistics about the resource usage of an SAP Enterprise Portal environment during the scenario run.

To obtain data on the SAP R/3 system server, you need to configure the SAP online monitor (from the Controller) before executing the scenario, and indicate which statistics and measurements you want to monitor. You select these counters using the SAP Portal dialog box.

**This chapter includes:**

- ▶ Setting up the Monitoring Environment on page 422
- ▶ Adding a Machine to Monitor on page 422
- ▶ Configuring the SAP Portal Monitor on page 423
- ▶ SAP Portal Performance Counters on page 426

## Setting up the Monitoring Environment

Before monitoring an SAP Portal server:

- ▶ Ensure that SiteScope has been installed on a server. You can install it on the same machine as the Controller, or on a dedicated server.

## Adding a Machine to Monitor

In order to monitor the SAP Portal resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

- 1** Click the SAP Portal graph in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The SAP Portal dialog box opens.

In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.

- ▶ In the **Monitored Machine Information** section, enter the server name or IP address of the machine you want to monitor, and select the platform on which the machine runs.
- ▶ In the **SiteScope Server Information** section, enter the SiteScope machine name, and port (default: 8888), and specify whether you are using a Secure HTTP connection. If you are using a SiteScope account, fill in the relevant account information.

Click **OK**. The SAP Portal dialog box is redisplayed.

- 3** In the **Resource Measurements** section, click **Add**.
- 4** Continue with Configuring the SAP Portal Monitor below.

## Configuring the SAP Portal Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which measurements to monitor on the machine.

**To configure the SAP Portal monitor:**

- 1 When you click **Add** to add a measurement, the Configuring SAP Portal Monitor dialog box opens. Enter the SAP Portal monitor information, as described in “Understanding the Configuring SAP Portal Monitor Dialog Box” on page 425.

**Configuring SAP Portal monitor**

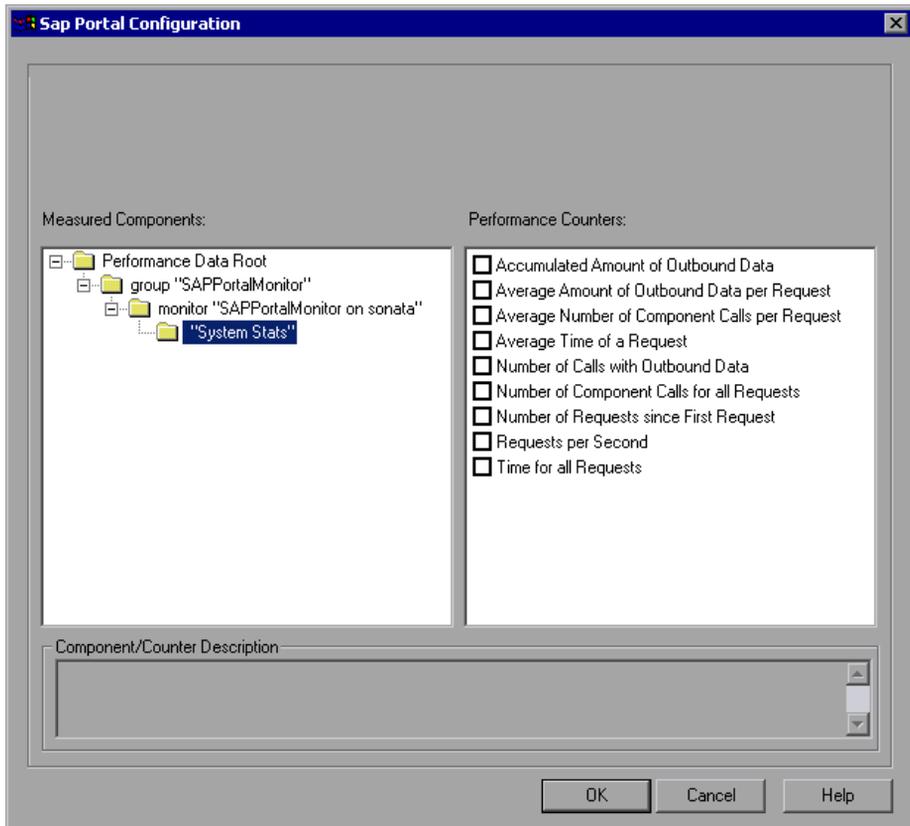
SAP Portal

| Property               | Value                   |
|------------------------|-------------------------|
| Application URL        | http://sonata/sappor... |
| Username               |                         |
| Password               | *****                   |
| HTTP Proxy             |                         |
| Proxy Server User Name |                         |
| Proxy Server Password  | *****                   |
| Update every           | 30                      |

Application URL  
URL of the administrator server for the application.

OK Cancel Use Defaults

- 2 Click **OK**. The SAP Portal Configuration dialog box opens, displaying the available measurements.



- 3 Browse the Measured Components tree, and select performance counters, as described in “Understanding the SAP Portal Configuration Dialog Box” on page 425.

For a description of the available measurements, see “SAP Portal Performance Counters” on page 426.

- 4 Click **OK**. The measurements that you selected appear in the **Resource Measurements on:** <machine> section of the SAP Portal dialog box.

- 5 Click **OK** in the SAP Portal dialog box, to activate the monitor.

---

**Note:** The minimum recommended SiteScope monitor refresh rate is 30 seconds. If you choose a lower refresh rate, the Controller may not get all the data in time.

---

## **Understanding the Configuring SAP Portal Monitor Dialog Box**

The Configuring SAP Portal Monitor Dialog Box enables you to configure the SAP Portal monitor.

- **Application URL.** Enter the URL of the administrator server for the application.
- **Username.** Enter the user name for the server administrator page.
- **Password.** Enter the password for the server administrator page.
- **HTTP Proxy.** Enter a proxy server to use, including the port (optional).
- **Proxy Server User Name.** If the proxy server requires authorization, enter the user name.
- **Proxy Server Password.** If the proxy server requires authorization, enter the password.
- **Update every.** Enter the amount of time lapse between the SiteScope check of the monitor.

## **Understanding the SAP Portal Configuration Dialog Box**

The SAP Portal dialog box enables you to select the SAP Portal resources to monitor.

- **Host.** Displays the name of the monitored machine.
- **Measured Components.** Displays the available components. Browse the tree and select the component you want to monitor. A description of the highlighted component appears in the Component/Counter Description box.

- **Performance Counters.** Check the required performance counters. A description of the selected counter appears in the Component/Counter Description box.
- **Component/Counter Description.** Displays a description of the selected component or counter.

## SAP Portal Performance Counters

The following table shows the default counters that can be measured:

| Measurement                                                  | Description                                                              |
|--------------------------------------------------------------|--------------------------------------------------------------------------|
| <b>Accumulated Amount of Outbound Data (bytes)</b>           | The accumulated amount of outbound data, measured in bytes.              |
| <b>Average Amount of Outbound Data per Request (bytes)</b>   | The average amount of outbound data per request, measured in bytes.      |
| <b>Average Number of Component Calls per Request (bytes)</b> | The average number of component calls per request, measured in bytes.    |
| <b>Average Time of a Request (ms)</b>                        | The average amount of time, in milliseconds, taken to process a request. |
| <b>Number of Calls with Outbound Data</b>                    | The total number of calls with outbound data.                            |
| <b>Number of Component Calls for all Requests</b>            | The total number of component calls for all requests.                    |
| <b>Number of Requests since First Request</b>                | The total number of requests since the first request was made.           |
| <b>Requests per Second</b>                                   | The number of requests made per second.                                  |
| <b>Time for all Requests (ms)</b>                            | The total time, in milliseconds, taken for processing all requests.      |

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## SAP CCMS Resource Monitoring

The SAP CCMS (Computer Center Management System) monitor displays statistics about the resource usage of all servers, components, and resources in any SAP R/3 landscape during the scenario run. You can also use the SAP CCMS monitor for SAP Portal and SAP GUI environments, but the amount of measurements provided by the SAP CCMS monitor is much greater.

To obtain data on the SAP R/3 landscape resources, you need to configure the SAP CCMS online monitor (from the Controller) before executing the scenario, and select the statistics and measurements you want to monitor. You select these counters using the SAP CCMS dialog box.

**This chapter includes:**

- ▶ Setting up the Monitoring Environment on page 428
- ▶ Adding a Machine to Monitor on page 429
- ▶ Configuring the SAP CCMS Monitor on page 430

## Setting up the Monitoring Environment

Before monitoring an SAP CCMS server:

- ▶ Ensure that SiteScope has been installed on a server. You can install it on the same machine as the Controller, or on a dedicated server.
- ▶ Ensure that the SAP Java Connector (SAP JCo 2.0.6 and above) component is installed on the same server where SiteScope is running (or at least is accessible on a shared or remote location). To install the SAP Java Connector, perform the following:
  - ▶ Download the SAP Java Connector from the SAP Software Distribution Center at <http://www.service.sap.com/connectors>. Click **SAP Java Connector** and **Tools and Services**. You will need a valid Service Marketplace login (username and password) to access this site.
  - ▶ Follow the installation instructions that come with the SAP JCo download for your appropriate platform. On Windows, add the JCo installation location in the System Environment PATH variable. This change usually requires you to reboot Windows for the system PATH to be updated. Once completed, make the SAP JCo library file available to SiteScope by copying **sapjco.jar** (which comes with the JCo install) to **/SiteScope/java/lib/ext** before starting SiteScope.
- ▶ Consult your SAP documentation to determine if your R/3 landscape components may need additional software installed to run or work with CCMS.

---

**Note:** The BC-XAL 1.0 interface is supported on SAP R/3 systems 4.5B and above only.

---

## Adding a Machine to Monitor

In order to monitor the SAP CCMS resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

- 1** Click the SAP CCMS graph in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The SAP CCMS dialog box opens.
- 3** In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.
  - In the **Monitored Machine Information** section, enter the server name or IP address of the machine you want to monitor, and select the platform on which the machine runs.
  - In the **SiteScope Server Information** section, enter the SiteScope machine name, and port (default: 8888), and specify whether you are using a Secure HTTP connection. If you are using a SiteScope account, fill in the relevant account information.

Click **OK**. The SAP CCMS dialog box is redisplayed.

- 4** In the **Resource Measurements** section, click **Add**.
- 5** Continue with “Configuring the SAP CCMS Monitor” on page 430.

## Configuring the SAP CCMS Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which measurements to monitor on the machine.

To configure the SAP CCMS monitor:

- 1 When you click **Add** to add a measurement, the Configuring SAP CCMS Monitor dialog box opens.

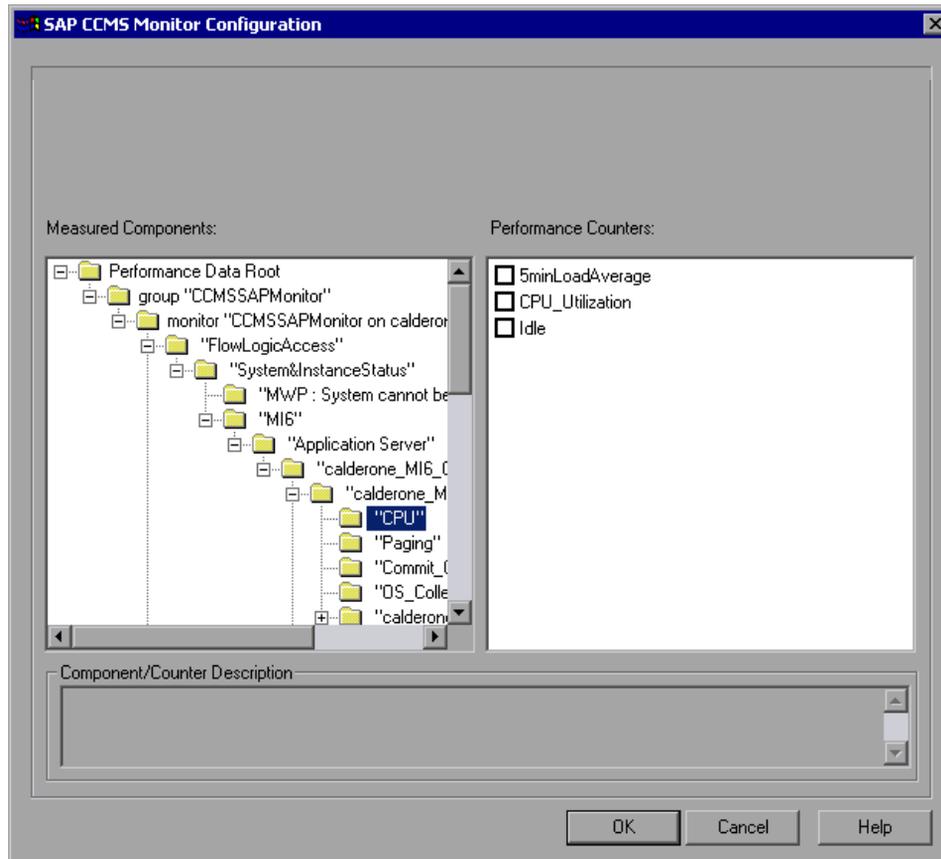
| Property                | Value     |
|-------------------------|-----------|
| Application Server      | calderone |
| SAP Client              | 800       |
| System Number           | 00        |
| Authorization User Name |           |
| Authorization Password  |           |
| SAP Router String       |           |
| Update every            | 30        |
|                         |           |

Application Server  
URL of the Central Monitoring server (example: http://www.mysap.com)

OK Cancel Use Defaults

Enter the SAP CCMS configuration values, as described in “Understanding the Configuring SAP CCMS Monitor Dialog Box” on page 432.

- 2 Click **OK**. The SAP CCMS Monitor Configuration dialog box opens, displaying the available measurements.




---

**Note:** Due to the large amount of metrics that are retrieved, it may take several minutes to display the performance counters tree. However, once the tree has been successfully retrieved, it will be cached to a file, so that the next time you retrieve metrics from the same server and username, the wait time will be greatly reduced.

---

- 3 Browse the Measured Components tree, and select performance counters, as described in “Understanding the SAP CCMS Monitor Configuration Dialog Box” on page 433.

For more information on the available measurements, refer to the SAP CCMS documentation.

- 4 Click **OK**. The measurements that you selected appear in the **Resource Measurements on: <machine>** section of the SAP CCMS dialog box.
- 5 Click **OK** in the SAP CCMS Monitor Configuration dialog box, and in the SAP CCMS dialog box, to activate the monitor.

---

**Note:** The minimum recommended SiteScope monitor refresh rate is 30 seconds. If you choose a lower refresh rate, the Controller may not get all the data in time.

---

## Understanding the Configuring SAP CCMS Monitor Dialog Box

The Configuring SAP CCMS Monitor dialog box enables you to configure the SAP CCMS monitor.

- **Application Server.** Enter the address of the SAP server you want to monitor.
- **SAP Client.** Enter the Client to use for connecting to SAP. A default client of 800 is typically used.
- **System Number.** Enter the System number for the SAP server. A default system number of 00 is typically used.
- **Authorization User Name.** Enter the Username required to connect to the SAP server.
- **Authorization Password.** Enter the Password required to connect to the SAP server.
- **SAP Router String.** If your connection is being made through a router, enter a router address string. You can find the router address using the SAP Logon tool from the SAP Client software. Open the Logon console, select the server you want to monitor and then select Properties to view the router address.

- **Update every.** Enter how frequently (in seconds) the monitor should check the SAP server. SAP CCMS metrics are generally updated once every five minutes.

### **Understanding the SAP CCMS Monitor Configuration Dialog Box**

The SAP CCMS dialog box lets you select the SAP CCMS resources to monitor.

- **Host.** Displays the name of the monitored machine.
- **Measured Components.** Displays the available components. Browse the tree and select the component you want to monitor. A description of the highlighted component appears in the Component/Counter Description box.
- **Performance Counters.** Check the required performance counters. A description of the selected counter appears in the Component/Counter Description box.
- **Component/Counter Description.** Displays a description of the selected component or counter.



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## SAPGUI Server Resource Monitoring

The SAPGUI monitor displays statistics about the resource usage of an SAP R/3 system during the scenario run.

You can use the SAPGUI monitor to view:

- ▶ the number of configured instances for each SAP system
- ▶ data for all application instances (not just the one you logged on to)
- ▶ transactions used and the users that call them
- ▶ number of users working on the different instances
- ▶ performance history for recent periods of all instances
- ▶ response time distribution
- ▶ resource consumption for any application server
- ▶ application server workload for the current day or for a recent period

To obtain data on the SAP R/3 system server, you need to configure the SAPGUI online monitor (from the Controller) before executing the scenario, and indicate which statistics and measurements you want to monitor. You select these counters using the Add SAPGUI Monitor Measurements dialog box.

---

**Note:** The SAPGUI monitor supports SAP server versions 3.1 to 4.6, regardless of the SAP R/3 server's operating system and the platform on which it is installed.

---

**This chapter includes:**

- Setting Up the Monitoring Environment on page 436
- Adding a Machine to Monitor on page 437
- Configuring the SAPGUI Monitor on page 438
- SAPGUI Performance Counters on page 442

## Setting Up the Monitoring Environment

Before monitoring an SAP R/3 system server, perform the following:

- Install the SAPGUI for Windows 6.20 client on the Controller machine.
- Install the latest patch for the SAPGUI for Windows 6.20 client. The lowest supported level is patch 36. (SAPGUI patches can be downloaded from <https://websmp104.sap-ag.de/patches>. You will need a valid Service Marketplace username and password to access this site.)
- From the SAPGUI client application, press **F6** to determine whether you can access the st03 transaction and query for **last minute load** information. If this functionality is not already enabled, enable it from the SAP R/3 client on the Controller machine, using the username and password defined in the Controller.

## Adding a Machine to Monitor

In order to monitor the SAPGUI resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

---

**Limitation:** Once the SAPGUI monitor is activated on the Controller machine, you cannot record a SAPGUI protocol script on that machine.

---

### To add a machine to the Controller:

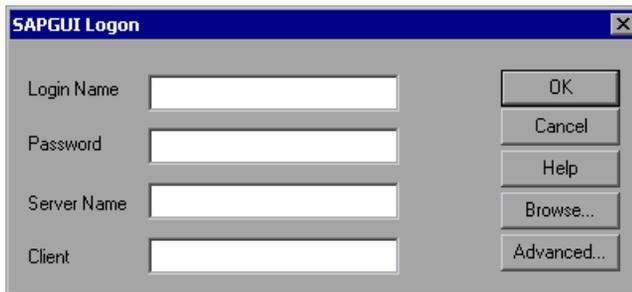
- 1 Click the SAPGUI graph in the graph tree, and drag it into the right pane of the Run view.
- 2 Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The SAPGUI dialog box opens.
- 3 In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.
- 4 Enter the logical name of the server you want to monitor, select the platform on which the machine runs, and click **OK**. To determine the logical name, see the status bar of the SAP user interface when you are connected to a server, as displayed in the figure above.  
The SAPGUI dialog box is redisplayed.
- 5 In the **Resource Measurements** section of the SAPGUI dialog box, click **Add**.
- 6 Continue with Configuring the SAPGUI Monitor below.

## Configuring the SAPGUI Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which measurements to monitor on the machine.

To configure the SAPGUI monitor:

- 1 When you click **Add** to add a measurement, the SAPGUI Logon dialog box opens.



Enter the following information in the SAPGUI Logon dialog box:

- **Login Name.** Login name used to access the SAPGUI server.
- **Password.** Password for the login name.
- **Server Name.** Name of the SAPGUI server.
- **Client.** Number used in the Client field of the SAP logon details

You can enter the server name in the following ways:

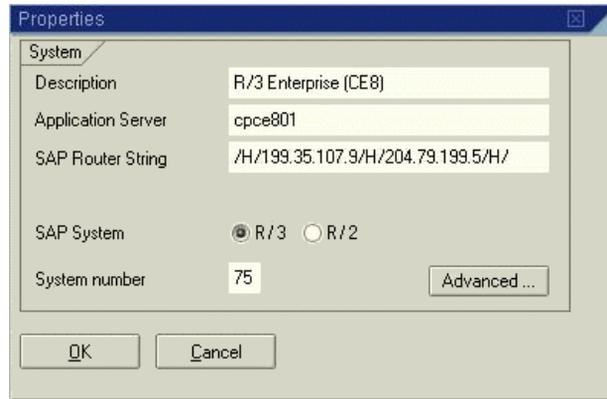
- ▶ The server description, as displayed in the SAP Logon application (for example BW 3.0 in the SAP Logon dialog box displayed below).



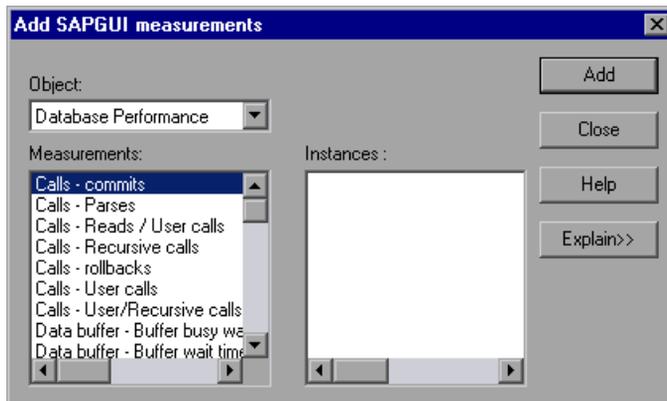
- ▶ A string, in the format: `server_network_name[:system_number]`

where `server_network_name` is the name or IP address of the application server as it is displayed in the Server Name field of the LoadRunner SAPGUI Logon dialog box (for example: `pipeline.HP.com`), and `system_number` (preceded by ":") is the system number as it is displayed in the Properties dialog box. If the system number is omitted, "00" is used by default.

If an SAP router string is also specified in the Properties dialog box, the `server_network_name` should be the concatenation of the router string and the application server (for example, `/H/199.35.107.9/H/204.79.199.5/H/cpce801` in the Properties dialog box displayed below).



- 2 To change the default language, click **Advanced** in the LoadRunner SAPGUI Logon dialog box, and enter a 2-letter string in the Language field.
- 3 Click **OK**. The Add SAPGUI Measurements dialog box opens.



- 4 For each measurement, select an object, measurement, and instance, and then click **Add**, as described in “Understanding the Add SAPGUI Measurements Dialog Box” on page 441.

For a description of the available measurements, see “SAPGUI Performance Counters” on page 442.

- 5 Click **Add** to place the selected measurement on the resource list. Add all the desired resources to the list, and click **Close**. The measurements that you selected appear in the **Resource Measurements on: <machine>** section of the SAPGUI dialog box.
- 6 Click **OK** in the SAPGUI dialog box to activate the monitor.

### **Understanding the Add SAPGUI Measurements Dialog Box**

The Add SAPGUI Measurements dialog box enables you to select the SAP resources to monitor.

- **Object.** Select the object being monitored on the specified machine.
- **Measurements.** Select resource measurements to monitor. You can select multiple measurements using the CTRL key.
- **Instances.** If multiple instances of the selected measurement are running, select one or more instances to monitor for the selected measurement.
- **Add.** Click to add the selected object, measurement, and instance to the monitored measurement list.
- **Explain.** Displays a description of the selected measurement.

## SAPGUI Performance Counters

The following table lists the most commonly monitored counters:

| Measurement                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Average CPU time</b>      | The average CPU time used in the work process.                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Average response time</b> | The average response time, measured from the time a dialog sends a request to the dispatcher work process, through the processing of the dialog, until the dialog is completed and the data is passed to the presentation layer. The response time between the SAP GUI and the dispatcher is not included in this value.                                                                                                                                                                                   |
| <b>Average wait time</b>     | The average amount of time that an unprocessed dialog step waits in the dispatcher queue for a free work process. Under normal conditions, the dispatcher work process should pass a dialog step to the application process immediately after receiving the request from the dialog step. Under these conditions, the average wait time would be a few milliseconds. A heavy load on the application server or on the entire system causes queues at the dispatcher queue.                                 |
| <b>Average load time</b>     | The time needed to load and generate objects, such as ABAP source code and screen information, from the database.                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Database calls</b>        | The number of parsed requests sent to the database.                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Database requests</b>     | The number of logical ABAP requests for data in the database. These requests are passed through the R/3 database interface and parsed into individual database calls. The proportion of database calls to database requests is important. If access to information in a table is buffered in the SAP buffers, database calls to the database server are not required. Therefore, the ratio of calls/requests gives an overall indication of the efficiency of table buffering. A good ratio would be 1:10. |

| Measurement                             | Description                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Roll ins</b>                         | The number of rolled-in user contexts.                                                                                                                                                                                                                                                                                                                 |
| <b>Roll outs</b>                        | The number of rolled-out user contexts.                                                                                                                                                                                                                                                                                                                |
| <b>Roll in time</b>                     | The processing time for roll ins.                                                                                                                                                                                                                                                                                                                      |
| <b>Roll out time</b>                    | The processing time for roll outs.                                                                                                                                                                                                                                                                                                                     |
| <b>Roll wait time</b>                   | The queue time in the roll area. When synchronous RFCs are called, the work process executes a roll out and may have to wait for the end of the RFC in the roll area, even if the dialog step is not yet completed. In the roll area, RFC server programs can also wait for other RFCs sent to them.                                                   |
| <b>Average time per logical DB call</b> | The average response time for all commands sent to the database system (in milliseconds). The time depends on the CPU capacity of the database server, the network, the buffering, and on the input/output capabilities of the database server. Access times for buffered tables are many magnitudes faster and are not considered in the measurement. |



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## Siebel Web Server Resource Monitoring

The Siebel Web Server monitor displays statistics about the resource usage of a Siebel Web Server during the scenario run.

To obtain data on the Siebel Web Server, you need to configure the Siebel Web Server online monitor (from the Controller) before executing the scenario, and indicate which statistics and measurements you want to monitor. You select these counters using the Siebel Web Server dialog box.

### **This chapter includes:**

- ▶ Setting up the Monitoring Environment on page 445
- ▶ Adding a Machine to Monitor on page 446
- ▶ Configuring the Siebel Web Server Monitor on page 447
- ▶ Siebel Web Server Performance Counters on page 451

### **Setting up the Monitoring Environment**

Before monitoring a Siebel Web Server, perform the following:

- ▶ Ensure that the Siebel Web server plug-in is installed and configured to enable the display of the statistics you want to monitor. This may require that stats page sections be enabled by editing the **eapps.cfg** file for the Siebel server. For more information, refer to the Siebel documentation.
- ▶ Ensure that SiteScope has been installed on a server. You can install SiteScope on the same machine as the Controller, or on a dedicated server.

## Adding a Machine to Monitor

In order to monitor the Siebel Web resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

- 1** Click the Siebel Web Server graph in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The Siebel Web Server dialog box opens.
- 3** In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.
  - ▶ In the **Monitored Machine Information** section, enter the server name or IP address of the machine you want to monitor, and select the platform on which the machine runs.
  - ▶ In the **SiteScope Server Information** section, enter the SiteScope machine name, and port (default: 8888), and specify whether you are using a Secure HTTP connection. If you are using a SiteScope account, fill in the relevant account information.

Click **OK**. The Siebel Web Server dialog box is redisplayed.

- 4** In the **Resource Measurements** section of the Siebel Web Server dialog box, click **Add**.
- 5** Continue with “Configuring the Siebel Web Server Monitor” on page 447.

## Configuring the Siebel Web Server Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which measurements to monitor on the machine.

To configure the Siebel Web Server monitor:

- 1 When you click **Add** to add a measurement, the Configuring Siebel Web Server Monitor dialog box opens.

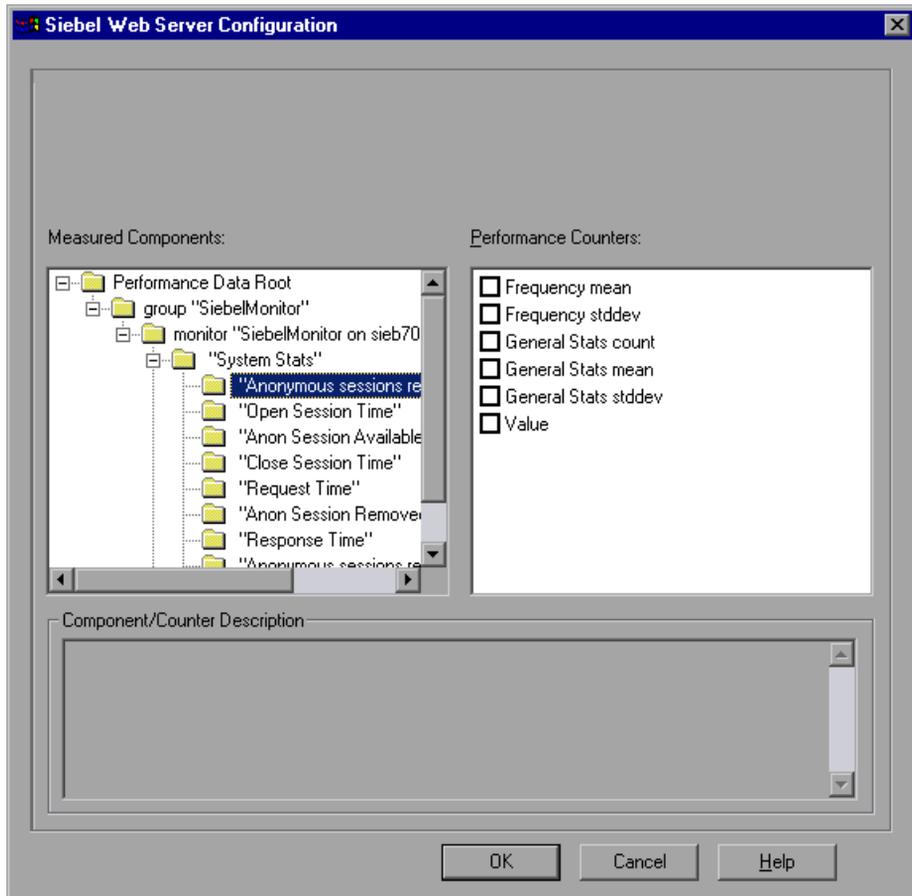
| Property               | Value                         |
|------------------------|-------------------------------|
| Service                |                               |
| Application URL        | http://sieb704e:80/SERVICE... |
| Username               |                               |
| Password               | *****                         |
| HTTP Proxy             |                               |
| Proxy Server User Name |                               |
| Proxy Server Password  | *****                         |
| Update every           | 30                            |
|                        |                               |
|                        |                               |
|                        |                               |

Service

OK Cancel Use Defaults

Enter the Siebel Web Server information, as described in “Understanding the Configuring Siebel Web Server Monitor Dialog Box” on page 449.

- 2 Click **OK**. The Siebel Web Server Configuration dialog box opens, displaying the available measurements.



- 3 Browse the Measured Components tree, and select performance counters, as described in “Understanding the Siebel Web Server Configuration Dialog Box” on page 450.

For a description of the available measurements, see “Siebel Web Server Performance Counters” on page 451.

- 4 Click **OK**. The measurements that you selected appear in the **Resource Measurements on: <machine>** section of the Siebel Web Server dialog box.
- 5 Click **OK** in the Siebel Web Server dialog box, to activate the monitor.

---

**Note:** The minimum recommended SiteScope monitor refresh rate is 30 seconds. If you choose a lower refresh rate, the Controller may not get all the data in time.

---

## Understanding the Configuring Siebel Web Server Monitor Dialog Box

The Configuring Siebel Web Server Monitor dialog box enables you to configure the Siebel Web Server monitor.

- **Service.** Enter the name of a valid Siebel virtual directory (for example, callcenter or sales), one whose URL is an entry point defined in the Siebel SWSE configuration file (eapps.cfg).

- **Application URL.** Displays the default URL of the web plug-in server stats page for the application you want to monitor.

For example, [http://siebelsrv/<service>/\\_stats.swe](http://siebelsrv/<service>/_stats.swe).

If the Siebel web server is configured to support verbose mode, and you want to include information on "Locks" and "Current Operations Processing," you can add `verbose=high`.

For example: [http://siebelsrv/<service>/\\_stats.swe?verbose=high](http://siebelsrv/<service>/_stats.swe?verbose=high).

- **Username.** Enter the user name to access the web server stats page.
- **Password.** Enter the password to accessing the web server stats page.
- **HTTP Proxy.** If you are using a proxy to access the Siebel server, enter the proxy server to use including the port (for example, `proxy.sitescope.com:8080`).
- **Proxy Server User Name.** If the proxy server requires authorization, enter the proxy user name.
- **Proxy Server Password.** If the proxy server requires authorization, enter the proxy password.
- **Update every.** Enter how frequently the monitor should check the Database server.

## **Understanding the Siebel Web Server Configuration Dialog Box**

The Siebel Web Server Configuration dialog box lets you select the Siebel Web Server resources to monitor.

- **Host.** Displays the name of the monitored machine.
- **Measured Components.** Displays the available components. Browse the tree and select the component you want to monitor. A description of the highlighted component appears in the Component/Counter Description box.
- **Performance Counters.** Check the required performance counters. A description of the selected counter appears in the Component/Counter Description box.
- **Component/Counter Description.** Displays a description of the selected component or counter.

## Siebel Web Server Performance Counters

The following tables shows the default counters that can be measured:

### System Statistics

| Measurement                                       | Description                                               |
|---------------------------------------------------|-----------------------------------------------------------|
| <b>Anonymous sessions requested from the pool</b> | The number of anonymous sessions requested from the pool. |
| <b>Open Session Time</b>                          | The time taken for users to log on to the system.         |
| <b>Anon Session Available</b>                     | The number of anonymous sessions available in the pool.   |
| <b>Close Session Time</b>                         | The time taken for users to log off the system.           |
| <b>Request Time</b>                               | The time taken to process the user request.               |
| <b>Anon Session Removed</b>                       | The number of anonymous sessions removed from the pool.   |
| <b>Response Time</b>                              | The time taken to respond to a user request.              |
| <b>Anonymous sessions returns to the pool</b>     | The number of anonymous sessions returned to the pool.    |

### Application Statistics

| Measurement             | Description                                                          |
|-------------------------|----------------------------------------------------------------------|
| <b>Session Lifespan</b> | The duration during which a client session ran in the Siebel system. |



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## Siebel Server Manager Resource Monitoring

The Siebel Server Manager monitor displays statistics about the resource usage of a Siebel Server Manager during the scenario run.

To monitor Siebel Server Manager performance, you first install the Siebel Server Manager client on the SiteScope machine. You must then enable the Siebel Server Manager online monitor (from the Controller) before executing the scenario, and indicate which statistics and measurements you want to monitor. You select these counters using the Siebel Server Manager dialog box.

**This chapter includes:**

- ▶ Setting up the Monitoring Environment on page 454
- ▶ Adding a Machine to Monitor on page 456
- ▶ Configuring the Siebel Server Manager Monitor on page 457
- ▶ Siebel Server Manager Performance Counters on page 459

## Setting up the Monitoring Environment

Before you set up the monitor, perform the following:

- ▶ Ensure that SiteScope has been installed on a server. You can install it on the Controller, or on a dedicated server. If SiteScope is installed on a machine other than the Controller, verify that the SiteScope machine is accessible from the Controller machine.
- ▶ On the machine where SiteScope is installed, configure SiteScope to monitor the required Siebel Server Manager machine. For more information, see “Configuring the Siebel Server Manager Client on the SiteScope Machine” on page 454.
- ▶ Verify that SiteScope is collecting the required data from the servers it is monitoring. From the SiteScope Panel, select the monitor group polling the Siebel Server Manager machine, and check that the monitor displays a list of server measurements in the Status column.

### Configuring the Siebel Server Manager Client on the SiteScope Machine

- 1** Verify connectivity to the Siebel SWSE page by opening the following URL from the machine where SiteScope is installed:  
`http://<your_siebel_server>/callcenter/_stats.swe`
- 2** In the SiteScope main panel, select an existing group or create a new group.
- 3** In the **Add to Group** section, click **Monitor** and select **Siebel Server Manager** from the list of monitors.
- 4** Click **Choose server**, and enter the name of the Siebel Server in the **Application server** field, the Enterprise Server in the **Enterprise server** field, and the Gateway Server in the **Gateway server** field.
- 5** If necessary, enter the user name and password for the Siebel Server Manager client.
- 6** Enter the path to the Siebel Server Manager in the **Path to Script** field.
- 7** Click **Browse**, select your desired counters, and then click **Choose Counters**.

- 8** In the **Title** field, enter a name for the monitor.

---

**Note:** When you assign a name to a monitor, include the server name in the monitor name. This avoids any confusion as to which host the monitor belongs. For example, SiebelManager on sieb07.

Do not use "\" in the Title field.

---

- 9** Click **Add Monitor**.

### Troubleshooting the Siebel Server Manager Monitor

The Siebel Server Manager monitor uses a Siebel command line utility (srvrmgr) to gather its statistics. If you are having trouble getting the Siebel Server Manager monitor to work, run this command from the Siebel Server Manager client:

```
srvrmgr /s <server> /g <gateway> /e <enterprise> /u <user> /p <pw>
```

If this command works from the command line, but SiteScope has trouble executing the command, open **/sitescope/templates/applications/commandline.siebel**, and verify that you can run the following command from the command line:

```
CONNECT_COMMAND:$PATH$/srvrmgr /g $GATEWAY$ /e $ENTERPRISE$ /s $SERVERS$ /u $USERNAME$ /p $PASSWORD$
```

---

**Note:** On a Windows 2000 Advanced Server platform this command must be changed to:

```
CONNECT_COMMAND:$PATH$/srvrmgr.exe /g $GATEWAY$ /e $ENTERPRISE$ /s $SERVERS$ /u $USERNAME$ /p $PASSWORD$
```

---

## Adding a Machine to Monitor

In order to monitor the Siebel Server Manager resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

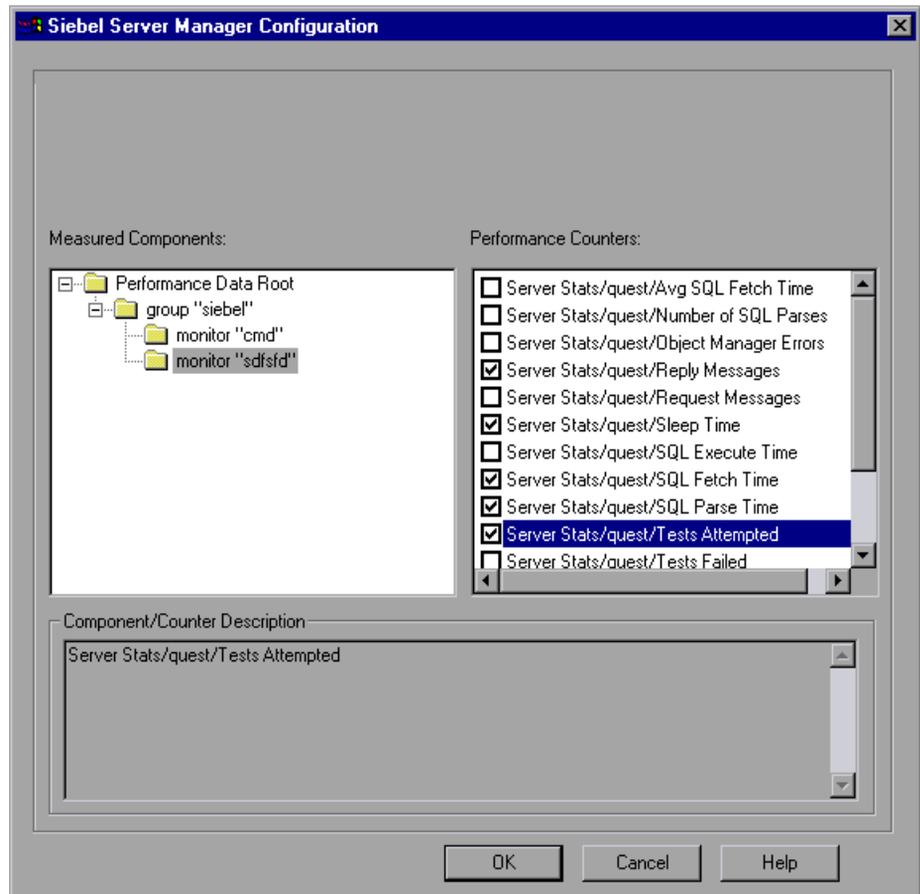
- 1** Click the Siebel Server Manager graph in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The Siebel Server Manager dialog box opens.
- 3** In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.
- 4** Enter the server name or IP address of the machine you want to monitor, select the platform on which the machine runs, and click **OK**. The Siebel Server Manager dialog box is redisplayed.
- 5** In the **Resource Measurements** section of the Siebel Server Manager dialog box, click **Add**.
- 6** Continue with Configuring the Siebel Server Manager Monitor below.

## Configuring the Siebel Server Manager Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which measurements to monitor on the machine.

To configure the Siebel Server Manager monitor:

- 1 When you click **Add** to add a measurement, the Siebel Server Manager Configuration dialog box opens, displaying the available measurements.



- 2 Browse the Measured Components tree, select the required performance counters, as described in “Understanding the Siebel Server Manager Configuration Dialog Box” on page 458.

For a description of the available measurements, see “Siebel Server Manager Performance Counters” on page 459.

- 3 Click **OK**. The measurements that you selected appear in the **Resource Measurements on: <machine>** section of the Siebel Server Manager dialog box.
- 4 Click **OK** in the Siebel Server Manager dialog box to activate the monitor.

---

**Note:** The minimum recommended SiteScope monitor refresh rate is 30 seconds. If you choose a lower refresh rate, the Controller may not get all the data in time.

---

### Limitations

The SiteScope monitor has the following limitations when it retrieves information from a Siebel Server Manager:

- ▶ The component counters (for example, Average SQL Time for <component>) are updated with the aggregated Siebel data only at the end of a user session.
- ▶ The SiteScope monitor consumes very high CPU resources (approximately 40%).

### Understanding the Siebel Server Manager Configuration Dialog Box

The Siebel Server Manager Configuration dialog box enables you to select the Siebel Server Manager resources to monitor.

- ▶ **Host.** Displays the name of the monitored machine.

- **Measured Components.** Displays the available components. Browse the tree and select the component you want to monitor. A description of the highlighted component appears in the Component/Counter Description box.
- **Performance Counters.** Select performance counters.
- **Component/Counter Description.** Displays a description of the selected component or counter.

## Siebel Server Manager Performance Counters

The following table shows the default counters that can be measured:

| Measurement                         | Description                                                                  |
|-------------------------------------|------------------------------------------------------------------------------|
| <b>Average Connect Time</b>         | The average connection time.                                                 |
| <b>Average Reply Size</b>           | The average size of a user reply.                                            |
| <b>Average Request Size</b>         | The average size of a user request.                                          |
| <b>Average Requests Per Session</b> | The average number of user requests per session.                             |
| <b>Average Response Time</b>        | The average amount of time that it takes the server to respond to a request. |
| <b>Average Think Time</b>           | The average amount of think time taken to respond to a request.              |
| <b>Avg SQL Execute Time</b>         | The average SQL execute time.                                                |
| <b>Avg SQL Fetch Time</b>           | The average SQL fetch time.                                                  |
| <b>Avg SQL Parse Time</b>           | The average SQL parse time.                                                  |
| <b>CPU Time</b>                     | The CPU time used in the work process.                                       |
| <b>Elapsed Time</b>                 | The total amount of elapsed time.                                            |
| <b>Num of DBConn Retries</b>        | The number of database connection retries.                                   |
| <b>Num of DLRbk Retries</b>         | The number of DLRbk retries.                                                 |

| Measurement                     | Description                                |
|---------------------------------|--------------------------------------------|
| <b>Num of Exhausted Retries</b> | The total number of retries that expired.  |
| <b>Number of SQL Executes</b>   | The total number of SQL executes.          |
| <b>Number of SQL Fetches</b>    | The total number of SQL fetches.           |
| <b>Number of SQL Parses</b>     | The total number of SQL parses.            |
| <b>Number of Sleeps</b>         | The number of sleeps.                      |
| <b>Object Manager Errors</b>    | The total number of object manager errors. |
| <b>Reply Messages</b>           | The total number of reply messages.        |
| <b>Request Messages</b>         | The total number of request messages.      |
| <b>SQL Execute Time</b>         | The total SQL execute time.                |
| <b>SQL Fetch Time</b>           | The total SQL fetch time.                  |
| <b>SQL Parse Time</b>           | The total SQL parse time.                  |
| <b>Sleep Time</b>               | The total sleep time.                      |
| <b>Tests Attempted</b>          | The number of tests attempted.             |
| <b>Tests Failed</b>             | The number of tests that failed.           |
| <b>Tests Successful</b>         | The number of tests that were successful.  |
| <b>Total Reply Size</b>         | The total reply size, measured in bytes.   |
| <b>Total Request Size</b>       | The total request size, measured in bytes. |
| <b>Total Response Time</b>      | The total response time.                   |
| <b>Total Tasks</b>              | The total number of tasks.                 |
| <b>Total Think Time</b>         | The total think time.                      |

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## PeopleSoft (Tuxedo) Resource Monitoring

The PeopleSoft (Tuxedo) monitor displays statistics about the resource usage of a PeopleSoft (Tuxedo) server during the scenario run.

To obtain data for this graph, you need to configure the PeopleSoft (Tuxedo) online monitor (from the Controller) and select the measurements you want to display, before running the scenario. You select these counters using the PeopleSoft (Tuxedo) dialog box.

### **This chapter includes:**

- ▶ Setting up the Monitoring Environment on page 461
- ▶ Adding a Machine to Monitor on page 462
- ▶ Configuring the PeopleSoft (Tuxedo) Monitor on page 463
- ▶ PeopleSoft (Tuxedo) Performance Counters on page 466

### **Setting up the Monitoring Environment**

If Tuxedo 7.1 or later is installed, you can monitor more than one PeopleSoft (Tuxedo) application server at a time. If Tuxedo 6.5 or earlier is installed, you can monitor only one PeopleSoft (Tuxedo) application server at a time.

Before you set up the monitor, perform the following:

- ▶ Ensure that a Tuxedo workstation client (not a native client) is installed on the Controller machine. Use a Tuxedo 6.x client if a Tuxedo 6.x server is used, and Tuxedo 7.1 or later client if a Tuxedo 7.1 or later server is used. If you use a Tuxedo 6.5 or earlier server, you can still use a Tuxedo 7.1 or later client in order to monitor it, provided that you set the WSINTOPPRE71 environment variable to “yes”.

---

**Note:** A Tuxedo workstation client communicates with the application server over the network, and is not required to run the Tuxedo application server on the same machine. A native client can only communicate with the Tuxedo application server if it is part of the relevant Tuxedo domain.

---

- ▶ Define the Tuxedo environment variables on the Controller machine—set the TUXDIR variable to the Tuxedo installation directory (for example, V:\enviro\n\32\Tuxedo 8.0), and add the Tuxedo **bin** directory to the PATH variable.
- ▶ Ensure that the workstation listener (WSL) process is running. This enables the application server to accept requests from workstation clients. The address and port number used to connect to the application server must match those dedicated to the WSL process.

---

**Note:** For information on configuring the WSL, refer to the BEA Tuxedo Web site (<http://edocs.beasys.com/tuxedo/tux81/rf5/rf5101.htm#1534543>).

---

## Adding a Machine to Monitor

In order to monitor the PeopleSoft (Tuxedo) resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

### To add a machine to the Controller:

- 1** Click the PeopleSoft (Tuxedo) graph in the graph tree, and drag it into the right pane of the **Run** view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Online Measurement**. The PeopleSoft (Tuxedo) dialog box opens.
- 3** In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.

- 4 Enter the server name or IP address of the Tuxedo machine you want to monitor.

---

**Note:** If you are using multiple instances of the PeopleSoft (Tuxedo) monitor on the same machine, then enter the port number of PeopleSoft (Tuxedo) monitor in order to distinguish one instance from another. The entry should have the following format: <machine name>:<port number>

---

Select the platform on which the machine runs, and click **OK**.

- 5 In the **Resource Measurements** section of the PeopleSoft (Tuxedo) dialog box, click **Add**.
- 6 Continue with Configuring the PeopleSoft (Tuxedo) Monitor below.

## Configuring the PeopleSoft (Tuxedo) Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which measurements to monitor on the machine.

**To configure the PeopleSoft (Tuxedo) monitor:**

- 1 When you click **Add** to add a measurement, the PeopleSoft (Tuxedo) Logon dialog box opens.

The screenshot shows a dialog box titled "PeopleSoft (Tuxedo) Logon". It features four text input fields on the left and a vertical column of five buttons on the right. The input fields are labeled "Login Name", "Password", "Server Name", and "Client Name". The "Login Name" field contains the text "PS", the "Password" field contains "xx", and the "Server Name" field contains "//psft1:7000". The "Client Name" field is currently empty. The buttons on the right are labeled "OK", "Cancel", "Help", "Browse...", and "Advanced..." from top to bottom.

Enter the following information:

- **Login Name.** Enter the login name used to access the PeopleSoft (Tuxedo) server. The default is PS.
- **Password.** Enter the password for the login name. The default is PS.
- **Server Name.** Enter the name of the PeopleSoft (Tuxedo) server in the format of `//<machine name>:<port number>`. The default port is 7000. Alternatively, you can specify the IP address or the hexadecimal format used by old versions of Tuxedo.  
  
**Note:** You cannot use quotation marks.
- **Client.** Enter the name of the client machine.

---

**Note:** If you are using PeopleSoft 7.x, you can determine the logon information from the **Logon** section of the **tpinit.ini** file in the recorded script's directory.

---

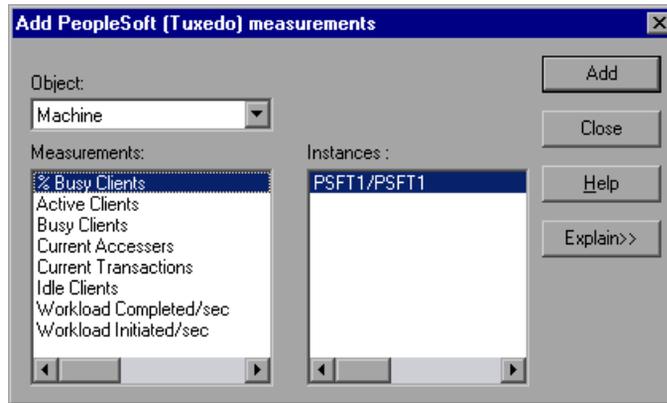
- 2** To authenticate the PeopleSoft (Tuxedo) monitor, click **Advanced**, and enter the authentication data as a hexadecimal string (beginning with "0x") in the **Data** field. The authentication data value can be obtained from the **tpinit.ini** file of an existing Tuxedo script.

---

**Note:** If you are using Tuxedo 6.5 or below, the monitor can only connect to one application server during a Controller scenario. Once it connects to an application server, that server is the only one used by the monitor until the Controller is closed. This applies even when all of the counters are deleted from the monitor.

---

- 3 Click **OK**. The Add PeopleSoft (Tuxedo) Measurements dialog box opens.



- 4 For each measurement, select an object, measurement, and instance, and then click **Add**, as described in “Understanding the Add PeopleSoft (Tuxedo) Measurements Dialog Box” on page 466.

For a description of the available measurements, see “PeopleSoft (Tuxedo) Performance Counters” on page 466.

- 5 When you have finished adding measurements, click **Close**. The measurements that you selected appear in the **Resource Measurements on:** *<machine>* section of the PeopleSoft (Tuxedo) dialog box.
- 6 Click **OK** in the PeopleSoft (Tuxedo) dialog box to activate the monitor.

## Understanding the Add PeopleSoft (Tuxedo) Measurements Dialog Box

The Add PeopleSoft (Tuxedo) Measurements dialog box enables you to select the PeopleSoft (Tuxedo) resources to monitor.

- **Object.** Select the object being monitored on the specified machine.
- **Measurements.** Select a resource measurement to monitor. Select multiple measurements using the CTRL key. For an explanation of each measurement, click **Explain**.
- **Instances.** If multiple instances of the selected measurement are running, select one or more instances to monitor for the selected measurement.
- **Explain.** Displays a description of the selected measurement.

## PeopleSoft (Tuxedo) Performance Counters

The following table describes the default counters that can be measured. It is recommended to pay particular attention to the following measurements: % Busy Clients, Active Clients, Busy Clients, Idle Clients, and all the queue counters for the APPQ/PSAPPSRV queue.

| Monitor        | Measurements                                                                                                                                                                       |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Machine</b> | <b>% Busy Clients</b> - The percent of active clients currently logged in to the Tuxedo application server that are waiting for a response from the application server.            |
|                | <b>Active Clients</b> - The total number of active clients currently logged in to the Tuxedo application server.                                                                   |
|                | <b>Busy Clients</b> - The total number of active clients currently logged in to the Tuxedo application server that are waiting for a response from the application server.         |
|                | <b>Current Accessers</b> - The number of clients and servers currently accessing the application either directly on this machine or through a workstation handler on this machine. |
|                | <b>Current Transactions</b> - The number of in use transaction table entries on this machine.                                                                                      |
|                | <b>Idle Clients</b> - The total number of active clients currently logged in to the Tuxedo application server that are not waiting for a response from the application server.     |
|                | <b>Workload Completed/second</b> - The total workload on all the servers for the machine that was completed, per unit time.                                                        |
|                | <b>Workload Initiated/second</b> - The total workload on all the servers for the machine that was initiated, per unit time.                                                        |

| Monitor                   | Measurements                                                                                                                                                                                                    |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Queue                     | <b>% Busy Servers</b> - The percent of active servers currently handling Tuxedo requests.                                                                                                                       |
|                           | <b>Active Servers</b> - The total number of active servers either handling or waiting to handle Tuxedo requests.                                                                                                |
|                           | <b>Busy Servers</b> - The total number of active servers currently busy handling Tuxedo requests.                                                                                                               |
|                           | <b>Idle Servers</b> - The total number of active servers currently waiting to handle Tuxedo requests.                                                                                                           |
|                           | <b>Number Queued</b> - The total number of messages which have been placed on the queue.                                                                                                                        |
| Server                    | <b>Requests/second</b> - The number of server requests handled per second.                                                                                                                                      |
|                           | <b>Workload/second</b> -The workload is a weighted measure of the server requests. Some requests could have a different weight than others. By default, the workload is always 50 times the number of requests. |
| Workstation Handler (WSH) | <b>Bytes Received/sec</b> - The total number of bytes received by the workstation handler, per second.                                                                                                          |
|                           | <b>Bytes Sent/sec</b> - The total number of bytes sent back to the clients by the workstation handler, per second.                                                                                              |
|                           | <b>Messages Received/sec</b> - The number of messages received by the workstation handler, per second.                                                                                                          |
|                           | <b>Messages Sent/sec</b> - The number of messages sent back to the clients by the workstation handler, per second.                                                                                              |
|                           | <b>Number of Queue Blocks/sec</b> - The number of times the queue for the workstation handler blocked, per second. This gives an idea of how often the workstation handler was overloaded.                      |

# **Part XII**

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## **Application Component Monitoring**



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## Introduction to Application Component Monitoring

Using LoadRunner's Application Component monitors, you can monitor the Microsoft COM+ server during a scenario run in order to isolate server performance bottlenecks.

Application Component monitors provide you with information about the resource usage of the Microsoft COM+ server during scenario execution. In order to obtain this data, you need to activate the online monitor for the server and specify which resources you want to measure before executing the scenario.



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## Microsoft COM+ Server Monitoring

The Microsoft COM+ monitor is an Application Component monitor that provides performance information for the Microsoft COM+ server. Before monitoring a Microsoft COM+ server, you install the Microsoft COM+ Server Monitor Probe on the server machine. You can then specify which measurements and resources you want the Microsoft COM+ monitor to measure. You select these counters using the Controller's monitor configuration dialog box.

### **This chapter includes:**

- ▶ Setting up the Monitoring Environment on page 473
- ▶ Adding and Configuring a Machine to Monitor on page 474
- ▶ Configuring the Microsoft COM+ Monitor Over a Firewall on page 477
- ▶ Microsoft COM+ Performance Counters on page 477

### **Setting up the Monitoring Environment**

To monitor the Microsoft COM+ server performance, you must first install the Microsoft COM+ Server Monitor Probe on the server machine. You can then specify which measurements and resources you want the Microsoft COM+ monitor to measure. You select these counters using the Controller's monitor configuration dialog box.

For more information on installing the Microsoft COM+ server add-in, refer to the *HP LoadRunner Installation Guide*.

## Adding and Configuring a Machine to Monitor

In order to monitor the MS-COM+ resources of a particular machine you need to add the machine, and add the measurements that you want to monitor.

You select measurements to monitor the COM+ server using the Microsoft COM+ Performance Monitors dialog box.

**To add the MS-COM+ monitor:**

- 1** Click the Microsoft COM+ graph in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The Microsoft COM+ dialog box opens.

In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.

For regular monitoring without a firewall, enter the server name or IP address of the machine you want to monitor, select the platform on which the machine runs, and click **OK**.

- 3** To connect to the monitor over a firewall, enter the server name or IP address of the machine you want to monitor, according to the following format, and click **OK**:

<Ml Listener machine>:<server machine key>

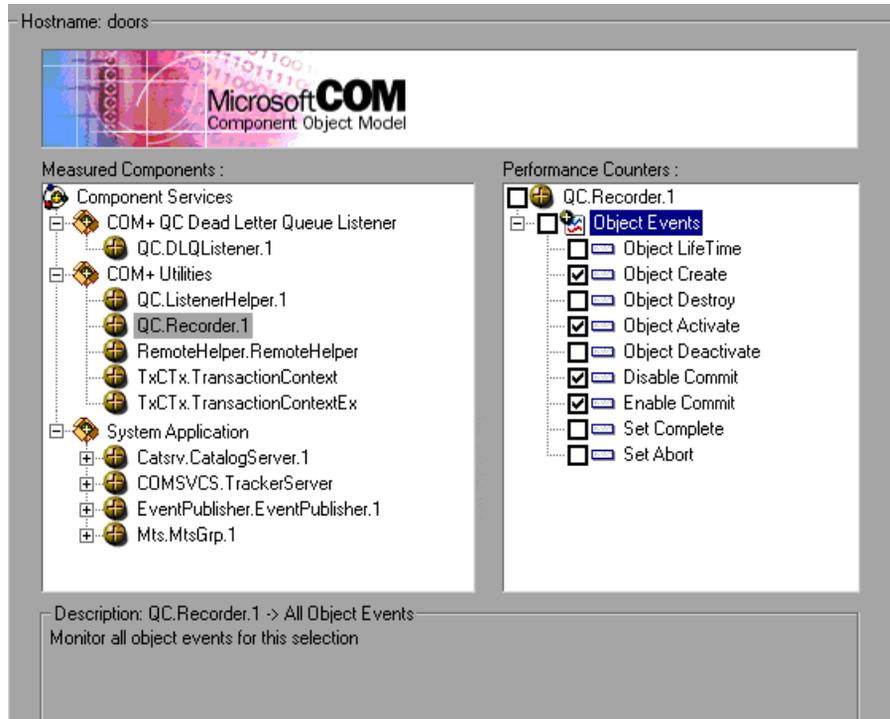
where **server machine key** is the unique key that you chose when configuring the firewall Agent on the server machine.

For example: 12.12.12.3:serverid

### To configure the MS-COM+ monitor:

- 1 In the **Resource Measurements** section of the Microsoft COM+ dialog box, click **Add** to select the measurements that you want to monitor.

The Microsoft COM+ Monitors Configuration dialog box opens displaying the available measurements.



- 2 Browse the Measured Components tree, and check the required performance counters, as described in “Understanding the COM+ Monitor Configuration Dialog Box” on page 476.

For a description of the available measurements, see “Microsoft COM+ Performance Counters” on page 477.

- 3 Click **OK**. The measurements that you selected appear in the **Resource Measurements on: <machine>** section of the Microsoft COM+ dialog box.
- 4 Click **OK** in the Microsoft COM+ dialog box to activate the Microsoft COM+ monitor.

---

**Note:** The data sampling rate for the COM+ monitor is fixed and cannot be modified using the Controller **Tools > Options > Monitors** dialog.

---

### **Understanding the COM+ Monitor Configuration Dialog Box**

The Microsoft COM+ Monitors Configuration dialog box lets you select the items to monitor on the Microsoft COM+ server.

- **Hostname.** Displays the name of the monitored machine.
- **Measured Components.** Displays the available components. Browse the tree and select the component you want to monitor. A description of the highlighted component appears in the Component/Counter Description box.
- **Performance Counters.** Check the required performance counters. A description of the selected counter appears in the Component/Counter Description box.
- **Component/Counter Description.** Displays a description of the selected component or counter.

## Configuring the Microsoft COM+ Monitor Over a Firewall

Before running the Microsoft COM+ Monitor over a firewall:

- Make sure that the MI Listener is installed on any machine (including the Controller machine) outside of the firewall. Refer to the *HP LoadRunner Installation Guide* for installation instructions.
- Configure the firewall agent on the server machine. For more information, refer to the chapter called “Working with Firewalls in LoadRunner”, in the *HP LoadRunner Controller User’s Guide*.
- Specify the correct connection string on the client machine, as described in step 3 of “Adding and Configuring a Machine to Monitor” on page 474.

## Microsoft COM+ Performance Counters

The following tables describe the default counters that can be measured:

### Authentication Metrics

| Measurement                | Description                                                                                                                                                                                                         |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Authenticate</b>        | Frequency of successful method call level authentication. When you set an authentication level for an application, you determine what degree of authentication is performed when clients call into the application. |
| <b>Authenticate Failed</b> | Frequency of failed method call level authentication.                                                                                                                                                               |

### Application Events

| Measurement       | Description                                       |
|-------------------|---------------------------------------------------|
| <b>Activation</b> | Frequency of application activation or startup.   |
| <b>Shutdown</b>   | Frequency of application shutdown or termination. |

## Thread Events

| Measurement             | Description                                                                                                                                            |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Thread Start</b>     | Rate at which single-threaded apartment (STA) thread for application have been started.                                                                |
| <b>Thread Terminate</b> | Rate at which single-threaded apartment (STA) thread for application have been terminated.                                                             |
| <b>Work Enque</b>       | Event sent if a work is queued in single thread apartment object (STA). Note: These events are not signaled/sent in Windows Server 2003 and later.     |
| <b>Work Reject</b>      | Event sent if a work is rejected from single thread apartment object (STA). Note: These events are not signaled/sent in Windows Server 2003 and later. |

## Transaction Events

| Measurement                 | Description                                                                            |
|-----------------------------|----------------------------------------------------------------------------------------|
| <b>Transaction Duration</b> | Duration of COM+ transactions for selected application.                                |
| <b>Transaction Start</b>    | Rate at which transactions have started.                                               |
| <b>Transaction Prepared</b> | Rate at which transactions have completed the prepare phase of the two-phase protocol. |
| <b>Transaction Aborted</b>  | Rate at which transactions have been aborted.                                          |
| <b>Transaction Commit</b>   | Rate at which transactions have completed the commit protocol.                         |

## Object Events

| Measurement                | Description                                                                                                                                                                                                                                     |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Object Life Time</b>    | Duration of object existence (from instantiation to destruction).                                                                                                                                                                               |
| <b>Object Create</b>       | Rate at which new instances of this object are created.                                                                                                                                                                                         |
| <b>Object Destroy</b>      | Rate at which instances of the object are destroyed.                                                                                                                                                                                            |
| <b>Object Activate</b>     | Rate of retrieving instances of a new JIT-activated object.                                                                                                                                                                                     |
| <b>Object Deactivation</b> | Rate of freeing JIT-activated object via SetComplete or SetAbort.                                                                                                                                                                               |
| <b>Disable Commit</b>      | Rate of client calls to DisableCommit on a context. DisableCommit declares that the object's transactional updates are inconsistent and can't be committed in their present state.                                                              |
| <b>Enable Commit</b>       | Rate of client calls to EnableCommit on a context. EnableCommit declares that the current object's work is not necessarily finished, but that its transactional updates are consistent and could be committed in their present form.            |
| <b>Set Complete</b>        | Rate of client calls to SetComplete on a context. SetComplete declares that the transaction in which the object is executing can be committed, and that the object should be deactivated on returning from the currently executing method call. |
| <b>Set Abort</b>           | Rate of client calls to SetAbort on a context. SetAbort declares that the transaction in which the object is executing must be aborted, and that the object should be deactivated on returning from the currently executing method call.        |

### Method Events

| Measurement       | Description                                                                 |
|-------------------|-----------------------------------------------------------------------------|
| Method Duration   | Average duration of method.                                                 |
| Method Frequency  | Frequency of method invocation.                                             |
| Method Failed     | Frequency of failed methods (i.e. methods that return error HRESULT codes). |
| Method Exceptions | Frequency of exceptions thrown by selected method.                          |

# **Part XIII**

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## **Application Deployment Monitoring**



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## Introduction to Application Deployment Solution Monitoring

Using LoadRunner's Application Deployment Solution monitor, you can isolate server performance bottlenecks by monitoring the Citrix MetaFrame XP or 1.8 server during a scenario run.

LoadRunner's Citrix MetaFrame XP monitor provides you with information about the application deployment usage of the Citrix MetaFrame XP and 1.8 servers during a scenario execution. The Citrix Monitor allows you to monitor the server performance statistics from Citrix MetaFrame Servers. You can monitor multiple parameters (counters) with a single monitor instance. This allows you to watch server loading for performance, availability, and capacity planning.

To obtain performance data, you need to activate the online monitor for the server and specify which resources you want to measure before executing the scenario.



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## Citrix MetaFrame XP Monitoring

The Citrix MetaFrame XP monitor displays statistics about the resource usage on the Citrix MetaFrame XP or 1.8 server machine during the scenario run.

**This chapter includes:**

- ▶ Setting up the Monitoring Environment on page 485
- ▶ Adding a Machine to Monitor on page 487
- ▶ Configuring the Citrix MetaFrame XP Monitor on page 488
- ▶ Citrix MetaFrame Performance Counters on page 492

### Setting up the Monitoring Environment

- ▶ If you are using the SiteScope monitor engine, ensure that SiteScope has been installed on a server. You can install SiteScope on the same machine as the Controller, or on a dedicated server.
- ▶ To obtain data for this graph, you need to activate the Citrix MetaFrame XP monitor on the application server machine before executing the scenario, enable the counters you want to monitor on the Citrix server, and specify which measurements and resources you want the Citrix monitor to measure.

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**Note:** The port you use to monitor a Citrix MetaFrame server through a firewall depends on the configuration of your server.

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**Before setting up the Citrix MetaFrame Server monitor:**

- 1** Make sure that Citrix MetaFrame Server has been installed and is running on a computer. If the computer running Citrix MetaFrame Server is running Windows 2000, make sure that the Remote Registry service is running on it.
- 2** Make sure that the computer on which you are running LoadRunner has administrator privileges on the machine running Citrix.
- 3** From the Controller machine, map a network drive to the Citrix server machine. This ensures that the required authentication is provided to the Controller to access the resource counters.
- 4** Launch PerfMon from the Controller machine to enable the counters on the Citrix server. This allows you to monitor the same counters for the ICA Session object on the Citrix monitor.
- 5** You can configure the Citrix monitor to view ICA Session object counters only if at least one session is being run on the Citrix server. If no “real” user has opened a connection with the Citrix server, you need to first initialize or run a Citrix Vuser against the server, and only then configure the Citrix Monitor and add the ICA Session counters. If you configure the Citrix monitor without first initializing or running a Citrix Vuser (or connecting to the Citrix server as a “real” user), you will not be able to view the ICA Session object.

---

**Note:** Measurements that monitor instances are valid for the currently running Citrix session only. If you run this scenario again, you will need to reconfigure the measurements that are instance-oriented.

To monitor the different instances, ensure that the server login and logout procedures are recorded in the **Vuser\_init** and **Vuser\_end** sections respectively, and not in the Action section of the script. For more information, see the *HP Virtual User Generator User's Guide*.

---

## Adding a Machine to Monitor

In order to monitor the Citrix resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

- 1** Click **Citrix MetaFrame XP** in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on graph and choose **Monitors > Add Measurements**. The Citrix MetaFrame XP dialog box opens.
- 3** By default, LoadRunner monitors Citrix MetaFrame XP resources using the native LoadRunner monitor engine.

If you want to monitor the Citrix MetaFrame XP resources using a SiteScope monitor, click **Advanced**.

In the Choose Monitor Engine dialog box, choose **SiteScope**, and click **OK** to close the Monitor Engine dialog box.

- 4** In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.
  - In the **Monitored Machine Information** section, enter the server name or IP address of the machine you want to monitor. Select the platform on which the machine runs.
  - In the **SiteScope Server Information** section, enter the SiteScope machine name, and port (default: 8888), and specify whether you are using a Secure HTTP connection. If you are using a SiteScope account, fill in the relevant account information.

**Note:** If you are adding a native LoadRunner monitor, the **SiteScope Server Information** section does not appear.

Click **OK** to close the Add Machine dialog box.

- 5** Click **Add** in the **Resource Measurements on: <machine>** section of the Citrix MetaFrame XP dialog box
- 6** Continue with Configuring the Citrix MetaFrame XP Monitor below.

## Configuring the Citrix MetaFrame XP Monitor

The configuration for this monitor differs slightly depending on whether you are adding a SiteScope or native LoadRunner monitor.

This section describes:

- Configuring the Native LoadRunner Citrix MetaFrame XP Monitor
- Configuring the SiteScope Citrix MetaFrame XP Monitor

### Configuring the Native LoadRunner Citrix MetaFrame XP Monitor

- 1 When you add a machine in the Citrix MetaFrame XP dialog box, the default measurements are displayed in the **Resource Measurements on:** *<machine>* section.

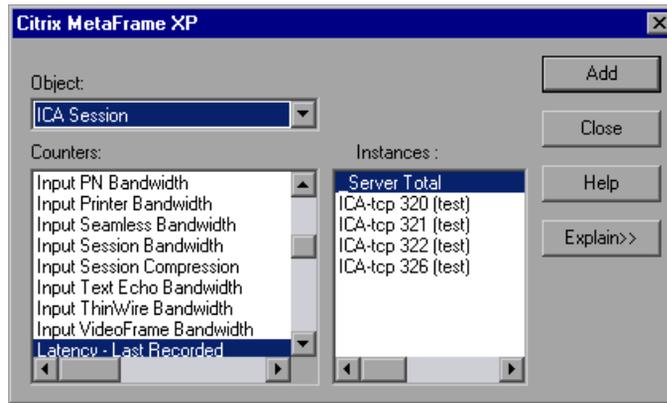
---

**Note:** To change the default counters for the Citrix monitor, see “Changing a Monitor’s Default Counters” on page 543.

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- To delete a measurement from the default list, select the measurement and click **Delete**.
- To select additional measurements, click **Add**.

- 2 When you click **Add**, the Citrix MetaFrame XP dialog box opens displaying the Citrix resources.



For each measurement, select an object, counter, and instance, and then click **Add**, as described in “Understanding the Citrix MetaFrame XP Dialog Box” on page 490.

For a description of the available measurements, see “Citrix MetaFrame Performance Counters” on page 492.

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**Note:** If the dialog box freezes after clicking **Add**, you may need to rebuild the localhost cache on the Citrix server machine. For more information, refer to Document IDs CTX003648 and CTX759510 in the Citrix Knowledge Base (<http://knowledgebase.citrix.com/cgi-bin/webcgi.exe?New,KB=CitrixKB>).

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- 3 When you have finished selecting the measurements to monitor, click **Close**. The counters that you selected appear in the **Resource Measurements on: <machine>** section of the Citrix MetaFrame XP dialog box.
- 4 Click **OK** in the Citrix MetaFrame XP dialog box to activate the monitor.

## Understanding the Citrix MetaFrame XP Dialog Box

The Citrix MetaFrame XP dialog box lets you select the items to monitor on the Citrix MetaFrame XP or 1.8 server.

- **Object.** Select the object being monitored on the specified machine.
- **Counters.** Select a resource counter to monitor. Select multiple counters using the CTRL key. For a definition of each counter, click **Explain**.
- **Instances.** If multiple instances of the selected counter are running, select one or more instances to monitor for the selected counter.
- **Add.** Click **Add** to add the measurement that you selected. The measurement is added to the list of measurements in the **Resource Measurements on: <machine>** section of the Citrix MetaFrame XP dialog box.
- **Explain.** Displays a definition of the selected counter.

## Configuring the SiteScope Citrix MetaFrame XP Monitor

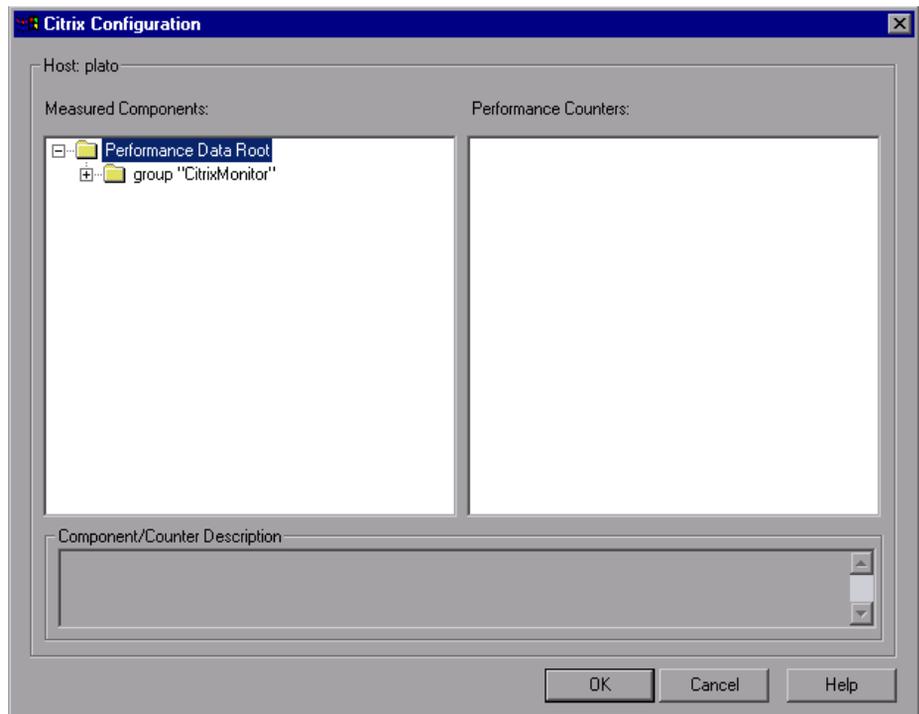
- 1** The first time you add measurements you need to configure the remote machine properties. When you click **Add** in the **Resource Measurements on: <machine>** section of the Citrix MetaFrame XP dialog box, a dialog box opens to configure the remote machine as follows:

- If you are monitoring a machine on a UNIX platform, the Configuring UNIX Remote Machine dialog box opens.
- If you are monitoring a machine on an NT platform, the Configuring NT Remote Machine dialog box opens.

Enter the remote machine's configuration information, as described in "Configuring the Remote Machine for SiteScope Monitors" on page 28, and click **OK**.

- 2** The Configuring Citrix Server dialog box opens. Verify the **Server** and **Update every** properties, and click **OK**.

- 3** The Citrix Configuration dialog box opens, displaying the **Measured Components** list.



For each measured component select the performance counters you want to monitor, as described in “Understanding the Citrix Configuration Dialog Box” on page 492.

For a description of the available measurements, see “Citrix MetaFrame Performance Counters” on page 492.

- 4** When you have finished selecting the measurements to monitor, click **OK**. The counters that you selected appear in the **Resource Measurements on:** *<machine>* section of the Citrix MetaFrame XP dialog box.
- 5** Click **OK** to activate the monitor.

## Understanding the Citrix Configuration Dialog Box

The Citrix Configuration dialog box enables you to select the performance counters to monitor using the Citrix MetaFrame XP monitor.

- **Host.** The name of the host machine.
- **Measured Components.** Displays a tree containing all the available measured components.
- **Performance Counters.** Displays the performance counters for a selected measured component.
- **Component/Counter Description.** Displays a description of the selected measured component or performance counter.

## Citrix MetaFrame Performance Counters

The following table describes some of the counters that can be measured.

### Non-Virtual Counters

The following table describes non-virtual counters:

| Measurement             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>% Disk Time</b>      | The percentage of elapsed time that the selected disk drive services read or write requests.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>% Processor Time</b> | The percentage of time that the processor executes a non-Idle thread. This counter is a primary indicator of processor activity. It is calculated by measuring the time that the processor spends executing the thread of the Idle process in each sample interval, and subtracting that value from 100%. (Each processor has an Idle thread which consumes cycles when no other threads are ready to run.) It can be viewed as the percentage of the sample interval spent doing useful work. This counter displays the average percentage of busy time observed during the sample interval. It is calculated by monitoring the time the service was inactive, and then subtracting that value from 100%. |

| Measurement                      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>File data Operations/sec</b>  | The rate that the computer issues Read and Write operations to file system devices. This does not include File Control Operations.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Interrupts/sec</b>            | The average number of hardware interrupts the processor receives and services per second. It does not include DPCs, which are counted separately. This value is an indirect indicator of the activity of devices that generate interrupts, such as the system clock, the mouse, disk drivers, data communication lines, network interface cards and other peripheral devices. These devices normally interrupt the processor when they have completed a task or require attention. Normal thread execution is suspended during interrupts. Most system clocks interrupt the processor every 10 milliseconds, creating a background of interrupt activity. This counter displays the difference between the values observed in the last two samples, divided by the duration of the sample interval. |
| <b>Output Session Line Speed</b> | This value represents the line speed from server to client for a session in bps.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Input Session Line Speed</b>  | This value represents the line speed from client to server for a session in bps.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Page Faults/sec</b>           | A count of the Page Faults in the processor. A page fault occurs when a process refers to a virtual memory page that is not in its Working Set in main memory. A Page Fault will not cause the page to be fetched from disk if that page is on the standby list, and hence already in main memory, or if it is in use by another process with whom the page is shared.                                                                                                                                                                                                                                                                                                                                                                                                                              |

| Measurement                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Pages/sec</b>              | The number of pages read from the disk or written to the disk to resolve memory references to pages that were not in memory at the time of the reference. This is the sum of Pages Input/sec and Pages Output/sec. This counter includes paging traffic on behalf of the system Cache to access file data for applications. This value also includes the pages to/from non-cached mapped memory files. This is the primary counter to observe if you are concerned about excessive memory pressure (that is, thrashing), and the excessive paging that may result. |
| <b>Pool Nonpaged Bytes</b>    | The number of bytes in the Nonpaged Pool, a system memory area where space is acquired by operating system components as they accomplish their appointed tasks. Nonpaged Pool pages cannot be paged out to the paging file, but instead remain in main memory as long as they are allocated.                                                                                                                                                                                                                                                                       |
| <b>Private Bytes</b>          | The current number of bytes this process has allocated that cannot be shared with other processes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Processor Queue Length</b> | The instantaneous length of the processor queue in units of threads. This counter is always 0 unless you are also monitoring a thread counter. All processors use a single queue in which threads wait for processor cycles. This length does not include the threads that are currently executing. A sustained processor queue length greater than two generally indicates processor congestion. This is an instantaneous count, not an average over the time interval.                                                                                           |
| <b>Threads</b>                | The number of threads in the computer at the time of data collection. Notice that this is an instantaneous count, not an average over the time interval. A thread is the basic executable entity that can execute instructions in a processor.                                                                                                                                                                                                                                                                                                                     |

| Measurement                        | Description                                                                                         |
|------------------------------------|-----------------------------------------------------------------------------------------------------|
| <b>Latency – Session Average</b>   | This value represents the average client latency over the life of a session.                        |
| <b>Latency – Last Recorded</b>     | This value represents the last recorded latency measurement for this session.                       |
| <b>Latency – Session Deviation</b> | This value represents the difference between the minimum and maximum measured values for a session. |
| <b>Input Session Bandwidth</b>     | This value represents the bandwidth from client to server traffic for a session in bps.             |
| <b>Input Session Compression</b>   | This value represents the compression ratio for client to server traffic for a session.             |
| <b>Output Session Bandwidth</b>    | This value represents the bandwidth from server to client traffic for a session in bps.             |
| <b>Output Session Compression</b>  | This value represents the compression ratio for server to client traffic for a session.             |
| <b>Output Session Linespeed</b>    | This value represents the line speed from server to client for a session in bps.                    |

## Virtual Channel Counters

The following table describes virtual channel counters:

| Measurement                            | Description                                                                                                                                         |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Input Audio Bandwidth</b>           | This value represents the bandwidth from client to server traffic on the audio mapping channel. This is measured in bps.                            |
| <b>Input Clipboard Bandwidth</b>       | This value represents the bandwidth from client to server traffic on the clipboard mapping channel. This is measured in bps.                        |
| <b>Input COM1 Bandwidth</b>            | This value represents the bandwidth from client to server traffic on the COM1 channel. This is measured in bps.                                     |
| <b>Input COM2 Bandwidth</b>            | This value represents the bandwidth from client to server traffic on the COM2 channel. This is measured in bps.                                     |
| <b>Input COM Bandwidth</b>             | This value represents the bandwidth from client to server traffic on the COM channel. This is measured in bps.                                      |
| <b>Input Control Channel Bandwidth</b> | This value represents the bandwidth from client to server traffic on the ICA control channel. This is measured in bps.                              |
| <b>Input Drive Bandwidth</b>           | This value represents the bandwidth from client to server traffic on the client drive mapping channel. This is measured in bps.                     |
| <b>Input Font Data Bandwidth</b>       | This value represents the bandwidth from client to server traffic on the local text echo font and keyboard layout channel. This is measured in bps. |
| <b>Input Licensing Bandwidth</b>       | This value represents the bandwidth from server to client traffic on the licensing channel. This is measured in bps.                                |
| <b>Input LPT1 Bandwidth</b>            | This value represents the bandwidth from client to server traffic on the LPT1 channel. This is measured in bps.                                     |

| Measurement                       | Description                                                                                                                     |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| <b>Input LPT2 Bandwidth</b>       | This value represents the bandwidth from client to server traffic on the LPT2 channel. This is measured in bps.                 |
| <b>Input Management Bandwidth</b> | This value represents the bandwidth from client to server traffic on the client management channel. This is measured in bps.    |
| <b>Input PN Bandwidth</b>         | This value represents the bandwidth from client to server traffic on the Program Neighborhood channel. This is measured in bps. |
| <b>Input Printer Bandwidth</b>    | This value represents the bandwidth from client to server traffic on the printer spooler channel. This is measured in bps.      |
| <b>Input Seamless Bandwidth</b>   | This value represents the bandwidth from client to server traffic on the Seamless channel. This is measured in bps.             |
| <b>Input Text Echo Bandwidth</b>  | This value represents the bandwidth from client to server traffic on the local text echo data channel. This is measured in bps. |
| <b>Input Thinwire Bandwidth</b>   | This value represents the bandwidth from client to server traffic on the Thinwire (graphics) channel. This is measured in bps.  |
| <b>Input VideoFrame Bandwidth</b> | This value represents the bandwidth from client to server traffic on the VideoFrame channel. This is measured in bps.           |
| <b>Output Audio Bandwidth</b>     | This value represents the bandwidth from server to client traffic on the audio mapping channel. This is measured in bps.        |
| <b>Output Clipboard Bandwidth</b> | This value represents the bandwidth from server to client traffic on the clipboard mapping channel. This is measured in bps.    |
| <b>Output COM1 Bandwidth</b>      | This value represents the bandwidth from server to client traffic on the COM1 channel. This is measured in bps.                 |

| Measurement                             | Description                                                                                                                                         |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Output COM2 Bandwidth</b>            | This value represents the bandwidth from server to client traffic on the COM2 channel. This is measured in bps.                                     |
| <b>Output COM Bandwidth</b>             | This value represents the bandwidth from server to client traffic on the COM channel. This is measured in bps.                                      |
| <b>Output Control Channel Bandwidth</b> | This value represents the bandwidth from server to client traffic on the ICA control channel. This is measured in bps.                              |
| <b>Output Drive Bandwidth</b>           | This value represents the bandwidth from server to client traffic on the client drive channel. This is measured in bps.                             |
| <b>Output Font Data Bandwidth</b>       | This value represents the bandwidth from server to client traffic on the local text echo font and keyboard layout channel. This is measured in bps. |
| <b>Output Licensing Bandwidth</b>       | This value represents the bandwidth from server to client traffic on the licensing channel. This is measured in bps.                                |
| <b>Output LPT1 Bandwidth</b>            | This value represents the bandwidth from server to client traffic on the LPT1 channel. This is measured in bps.                                     |
| <b>Output LPT2 Bandwidth</b>            | This value represents the bandwidth from server to client traffic on the LPT2 channel. This is measured in bps.                                     |
| <b>Output Management Bandwidth</b>      | This value represents the bandwidth from server to client traffic on the client management channel. This is measured in bps.                        |
| <b>Output PN Bandwidth</b>              | This value represents the bandwidth from server to client traffic on the Program Neighborhood channel. This is measured in bps.                     |
| <b>Output Printer Bandwidth</b>         | This value represents the bandwidth from server to client traffic on the printer spooler channel. This is measured in bps.                          |

| Measurement                        | Description                                                                                                                     |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| <b>Output Seamless Bandwidth</b>   | This value represents the bandwidth from server to client traffic on the Seamless channel. This is measured in bps.             |
| <b>Output Text Echo Bandwidth</b>  | This value represents the bandwidth from server to client traffic on the local text echo data channel. This is measured in bps. |
| <b>Output Thinwire Bandwidth</b>   | This value represents the bandwidth from server to client traffic on the Thinwire (graphics) channel. This is measured in bps.  |
| <b>Output VideoFrame Bandwidth</b> | This value represents the bandwidth from server to client traffic on the VideoFrame channel. This is measured in bps.           |



# Part XIV

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## Middleware Performance Monitoring



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## Introduction to Middleware Performance Monitoring

Using LoadRunner's Middleware Performance monitors, you can monitor the Tuxedo and the IBM WebSphere MQ servers during a scenario run and isolate server performance bottlenecks.

A primary factor in a transaction's response time is the Middleware performance usage. LoadRunner's Middleware Performance monitors provide you with information about the Middleware performance usage of the Tuxedo and IBM WebSphere MQ servers during a scenario execution. To obtain performance data, you need to activate the online monitor for the server and specify which resources you want to measure before executing the scenario.

The Tuxedo monitor can monitor the server, load generator machine, workstation handler, and queue in a Tuxedo system. To run the Tuxedo monitor, you must install the Tuxedo client libraries on the machine you want to monitor.

The IBM WebSphere MQ monitor is used to monitor channel and queue performance counters on an IBM WebSphere MQ (version 5.x) Server.

The procedures for selecting monitor measurements and configuring the monitors vary according to server type. The following sections contain specific configuration instructions for each server type.



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## Tuxedo Monitoring

The Tuxedo monitor allows you to measure and view your Tuxedo server performance. It provides information about the host machine, workstation handler, and queue in a Tuxedo system.

To obtain data for this graph, you need to configure the Tuxedo monitor (from the Controller) and select the measurements you want to display, before running the scenario.

---

**Note:** If Tuxedo 7.1 or higher is installed on the Controller machine, more than one Tuxedo application server can be monitored at a time. However, if Tuxedo 6.5 or below is installed on the Controller machine, only one Tuxedo application server can be monitored at a time.

---

### **This chapter includes:**

- ▶ Setting up the Tuxedo Monitor on page 506
- ▶ Adding a Machine to Monitor on page 507
- ▶ Configuring the Tuxedo Monitor on page 508
- ▶ Tuxedo Performance Counters on page 511

## Setting up the Tuxedo Monitor

Before you set up the monitor, perform the following:

- ▶ Ensure that a Tuxedo workstation client (not a native client) is installed on the Controller machine. Use a Tuxedo 6.x client if a Tuxedo 6.x server is used, and Tuxedo 7.1 or above client if a Tuxedo 7.1 or above server is used. If you use a Tuxedo 6.5 or earlier server, you can still use a Tuxedo 7.1 or later client to monitor it, provided that you set the WSINTOPPRE71 environment variable to “yes”.

---

**Note:** A Tuxedo workstation client communicates with the application server over the network, and is not required to run the Tuxedo application server on the same machine. A native client can only communicate with the Tuxedo application server if it is part of the relevant Tuxedo domain.

---

- ▶ Define the Tuxedo environment variables on the Controller machine—set the TUXDIR variable to the Tuxedo installation directory (for example, V:\environ\32\Tuxedo8.0), and add the Tuxedo **bin** directory to the PATH variable.
- ▶ Ensure that the workstation listener (WSL) process is running. This enables the application server to accept requests from workstation clients.

---

**Note:** The address and port number used to connect to the application server must match those dedicated to the WSL process.

---

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**Note:** For information on configuring the WSL, refer to the BEA Tuxedo Web site (<http://edocs.beasys.com/tuxedo/tux81/rf5/rf5101.htm#1534543>).

---

## Adding a Machine to Monitor

In order to monitor the Tuxedo resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

- 1** Click the Tuxedo graph in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The Tuxedo dialog box opens.
- 3** In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.
- 4** Enter the server name or IP address of the machine you want to monitor.

---

**Note:** If you are using multiple instances of the Tuxedo monitor on the same machine, then enter the port number of each Tuxedo monitor in order to distinguish one instance from another. The entry should have the following format: <machine name>:<port number>

---

Select the platform on which the machine runs, and click **OK**.

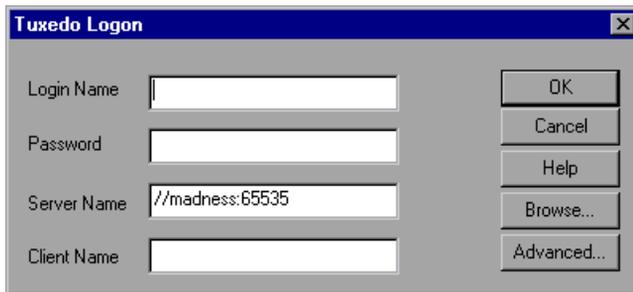
- 5** In the **Resource Measurements** section of the Tuxedo dialog box, click **Add**.
- 6** Continue with “Configuring the Tuxedo Monitor” on page 508.

## Configuring the Tuxedo Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which measurements to monitor on the machine.

**To configure the Tuxedo monitor:**

- 1 When you click **Add** to add a measurement, the Tuxedo Logon dialog box opens.



Enter the following information:

- **Login Name:** Enter your login name.
- **Password:** Enter your password.
- **Server Name:** Enter the name of the server. The format of the server name is `//<machine name>:<port number>`. Alternatively, you can specify the IP address or the hexadecimal format used by old versions of Tuxedo.  
**Note:** You cannot use quotation marks.
- **Client Name:** Enter the name of the client machine. If a Tuxedo server was previously monitored, its name is displayed in the Server Name box.
- **Browse:** Enables you to navigate to the `tpinit.ini` file of a recorded Tuxedo script.

**Note:** Logon information is located in the Logon section of the `tpinit.ini` file in the recorded script's directory. It is recommended that you use the Browse button and select the `tpinit.ini` file from a recorded script, rather than enter the values manually. You can also determine the client name from the `lrt_tpinitialize` statement in the recorded script.

In the following example of a **tpinit.ini** file, the Tuxedo monitor was configured for a server named psft1 using port 7000, and a client named bankapp. The logon user name was PS and the password was PS.

```
[Logon]
LogonServername=//psft1:7000
LogonUserName=PS
LogonCltName=bankapp
LogonGrpName=
LogonPasswd=PS
LogonData=
```

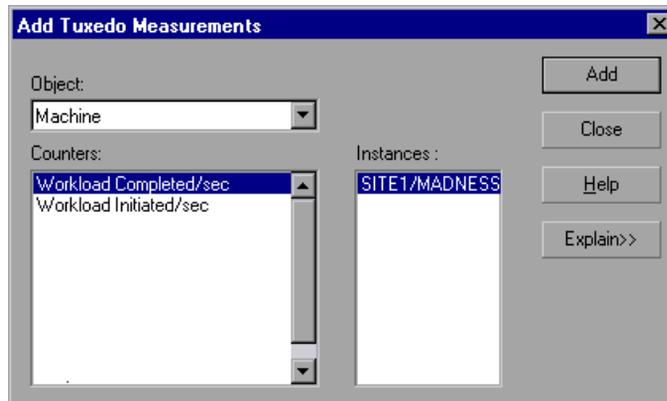
- To authenticate the Tuxedo monitor, click **Advanced**, and enter the authentication data as a hexadecimal string (beginning with "0x") in the data box. The authentication data value can be obtained from the **tpinit.ini** file of an existing Tuxedo script.

---

**Note:** If you are using Tuxedo 6.5 or below, the monitor can only connect to one application server during a scenario. Once it connects to an application server, the server is the only one used by the monitor until the Controller is closed. This applies even when all of the counters are deleted from the monitor.

---

- Click **OK**. The Add Tuxedo Measurements dialog box opens.



- 4 For each measurement, select an object, counter, and instance, and then click **Add**, as described in “Understanding the Add Tuxedo Measurements Dialog Box” on page 510.

For a description of the available measurements, see “Tuxedo Performance Counters” on page 511.

- 5 Add all the desired objects to the list, and click **Close**. The measurements that you selected appear in the **Resource Measurements on:** *<machine>* section of the Tuxedo dialog box.
- 6 Click **OK** in the Tuxedo dialog box to activate the monitor.

### **Understanding the Add Tuxedo Measurements Dialog Box**

The Add Tuxedo Measurements dialog box lets you select the resources to monitor on the Tuxedo client.

- **Object.** Select the object being monitored on the specified machine.
- **Counters.** Select a resource counter to monitor. Select multiple counters using the CTRL key. For an explanation of each counter, click **Explain**.
- **Instances.** If multiple instances of the selected counter are running, select one or more instances to monitor for the selected counter.
- **Explain.** Displays a description of the selected counter.

## Tuxedo Performance Counters

The following table lists the available Tuxedo monitor measurements. It is recommended to pay particular attention to the following measurements: % Busy Clients, Active Clients, Busy Clients, Idle Clients, and all the queue counters for relevant queues:

| Monitor        | Measurements                                                                                                                                                                       |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Machine</b> | <b>% Busy Clients</b> - The percent of active clients currently logged in to the Tuxedo application server that are waiting for a response from the application server.            |
|                | <b>Active Clients</b> - The total number of active clients currently logged in to the Tuxedo application server.                                                                   |
|                | <b>Busy Clients</b> - The total number of active clients currently logged in to the Tuxedo application server that are waiting for a response from the application server.         |
|                | <b>Current Accessers</b> - The number of clients and servers currently accessing the application either directly on this machine or through a workstation handler on this machine. |
|                | <b>Current Transactions</b> - The number of in-use transaction table entries on this machine.                                                                                      |
|                | <b>Idle Clients</b> - The total number of active clients currently logged in to the Tuxedo application server that are not waiting for a response from the application server.     |
|                | <b>Workload Completed/second</b> - The total workload on all the servers for the machine that was completed, per unit time.                                                        |
|                | <b>Workload Initiated/second</b> - The total workload on all the servers for the machine that was initiated, per unit time.                                                        |

| Monitor                   | Measurements                                                                                                                                                                                                 |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Queue                     | <b>% Busy Servers</b> - The percent of active servers currently handling Tuxedo requests.                                                                                                                    |
|                           | <b>Active Servers</b> - The total number of active servers either handling or waiting to handle Tuxedo requests.                                                                                             |
|                           | <b>Busy Servers</b> - The total number of active servers currently busy handling Tuxedo requests.                                                                                                            |
|                           | <b>Idle Servers</b> - The total number of active servers currently waiting to handle Tuxedo requests.                                                                                                        |
|                           | <b>Number Queued</b> - The total number of messages which have been placed on the queue.                                                                                                                     |
| Server                    | <b>Requests/second</b> -The number of server requests handled per second                                                                                                                                     |
|                           | <b>Workload/second</b> - Workload is a weighted measure of the server requests. Some requests could have a different weight than others. By default, the workload is always 50 times the number of requests. |
| Workstation Handler (WSH) | <b>Bytes Received/sec</b> - The total number of bytes received by the workstation handler, per second.                                                                                                       |
|                           | <b>Bytes Sent/sec</b> - The total number of bytes sent back to the clients by the workstation handler, per second.                                                                                           |
|                           | <b>Messages Received/sec</b> - The number of messages received by the workstation handler, per second.                                                                                                       |
|                           | <b>Messages Sent/sec</b> - The number of messages sent back to the clients by the workstation handler, per second.                                                                                           |
|                           | <b>Number of Queue Blocks/sec</b> - The number of times the queue for the workstation handler blocked, per second. This gives an idea of how often the workstation handler was overloaded.                   |

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## IBM WebSphere MQ Monitoring

The IBM WebSphere MQ monitor displays statistics about the resource usage on the IBM WebSphere MQ server during the scenario run.

To use the IBM WebSphere MQ monitor you must first install the IBM WebSphere MQ client on the Controller machine and configure the server environment to monitor events. The IBM WebSphere MQ monitor connects to the IBM WebSphere MQ server (via the MQ Client Connection installed on the Controller machine). In MQ Client environments, the client machine connects to an MQ Server instance, and uses the Server's resources as if they were local to the client machine.

You can then enable the MQ online monitor (from the Controller) and select the measurements you want to display, before running the scenario.

---

**Note:** The LoadRunner IBM WebSphere MQ monitor supports machines running the IBM MQ Server (version 5.2) on Windows platforms only. To monitor the IBM WebSphere MQ server, the Windows user must be part of the Administration Group of the IBM WebSphere MQ server.

---

### **This chapter includes:**

- ▶ Setting up the Monitoring Environment on page 514
- ▶ Adding a Machine to Monitor on page 517
- ▶ Configuring the IBM WebSphere MQ Monitor on page 518
- ▶ IBM WebSphere MQ Performance Counters on page 522

## Setting up the Monitoring Environment

Before you set up the monitor, perform the following:

- ▶ Ensure that an IBM WebSphere MQ Client Connection (version 5.21 only) is installed on the Controller machine.

For additional information on installing the IBM WebSphere MQ Server/Client, refer to the IBM Web site (<http://www.ibm.com/>).

- ▶ Configure the IBM WebSphere server to monitor events.

The LoadRunner MQ Monitor retrieves event messages from two standard MQSeries queues only:

- ▶ SYSTEM.ADMIN.PERFM.EVENT – performance events, such as “queue depth high”
- ▶ SYSTEM.ADMIN.CHANNEL.EVENT – channel events, such as “channel stopped”

Events must be enabled for the queue manager (and in many cases, on the applicable object, as well). Performance events are enabled by setting attributes for the queue on the MQ Server. Channel events are enabled by default, and cannot be disabled.

---

**Note:** The IBM WebSphere MQ monitor does not retrieve data from a queue manager after the queue manager has been restarted.

---

**To enable performance events for the Queue Manager:**

- 1 Use the following MQSC command: ALTER QMGR PERFMEV(ENABLED).
- 2 Set the following attributes for the queue:

| Measurement                     | Set Event Attributes                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Event - Queue Depth High</b> | <ul style="list-style-type: none"> <li>➤ QDEPTHHI(integer) – where integer is a value expressed as a percentage of maximum messages allowed, and is in the range of 0 to 100 inclusive.</li> <li>➤ QDPHIEV(action) – where action is the word “ENABLED” or “DISABLED”, enabling or disabling the generation of the event, respectively.</li> </ul>                                                                                            |
| <b>Event - Queue Depth Low</b>  | <p>To enable the event for a queue, the following attributes of the queue must be set:</p> <ul style="list-style-type: none"> <li>➤ QDEPTHLO(integer) – where integer is a value expressed as a percentage of maximum messages allowed, and is in the range of 0 to 100 inclusive.</li> <li>➤ QDPLOEV(action) – where action is the word “ENABLED” or “DISABLED”, enabling or disabling the generation of the event, respectively.</li> </ul> |
| <b>Event - Queue Full</b>       | <ul style="list-style-type: none"> <li>➤ QDEPTHHI(integer) – where integer is a value expressed as a percentage of maximum messages allowed, and is in the range of 0 to 100 inclusive.</li> <li>➤ QDPMAXEV(action) – where action is the word “ENABLED” or “DISABLED”, enabling or disabling the generation of the event, respectively.</li> </ul>                                                                                           |

| Measurement                         | Set Event Attributes                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Event - Queue Service Interval High | <ul style="list-style-type: none"> <li>▶ QSVCINT(integer) – where integer is a value expressed as milliseconds, in the range of 0 and 999,999,999, inclusive. Note: this value is shared with Queue Service Interval OK.</li> <li>▶ QSVCI EV(type) – where type is the word “HIGH”, “OK”, or “NONE”, enabling service interval high events, enabling service interval ok events, or disabling the generation of the event, respectively.</li> </ul>   |
| Event - Queue Service Interval OK   | <ul style="list-style-type: none"> <li>▶ QSVCINT(integer) – where integer is a value expressed as milliseconds, in the range of 0 and 999,999,999, inclusive. Note: this value is shared with Queue Service Interval High.</li> <li>▶ QSVCI EV(type) – where type is the word “HIGH”, “OK”, or “NONE”, enabling service interval high events, enabling service interval ok events, or disabling the generation of the event, respectively.</li> </ul> |

---

**Note:** If you encounter an MQ Server error message (starting with the characters MQRC\_), refer to the WebSphere MQ family support Web site (<http://www-306.ibm.com/software/integration/mqfamily/support/>).

---

After you have installed the MQ Client on the Controller, and configured the server environment to monitor events, you can specify which resources you want to measure.

## Adding a Machine to Monitor

In order to monitor the IBM WebSphere MQ resources of a particular machine from the Controller, you need to add the machine and the measurements that you want to monitor.

**To add a machine to the Controller:**

- 1** Click the IBM WebSphere MQ graph in the graph tree, and drag it into the right pane of the Run view.
- 2** Right-click the graph and select **Add Measurements**, or click anywhere on the graph and choose **Monitors > Add Measurements**. The IBM WebSphere MQ dialog box opens.

In the **Monitored Server Machines** section, click **Add**. The Add Machine dialog box opens.

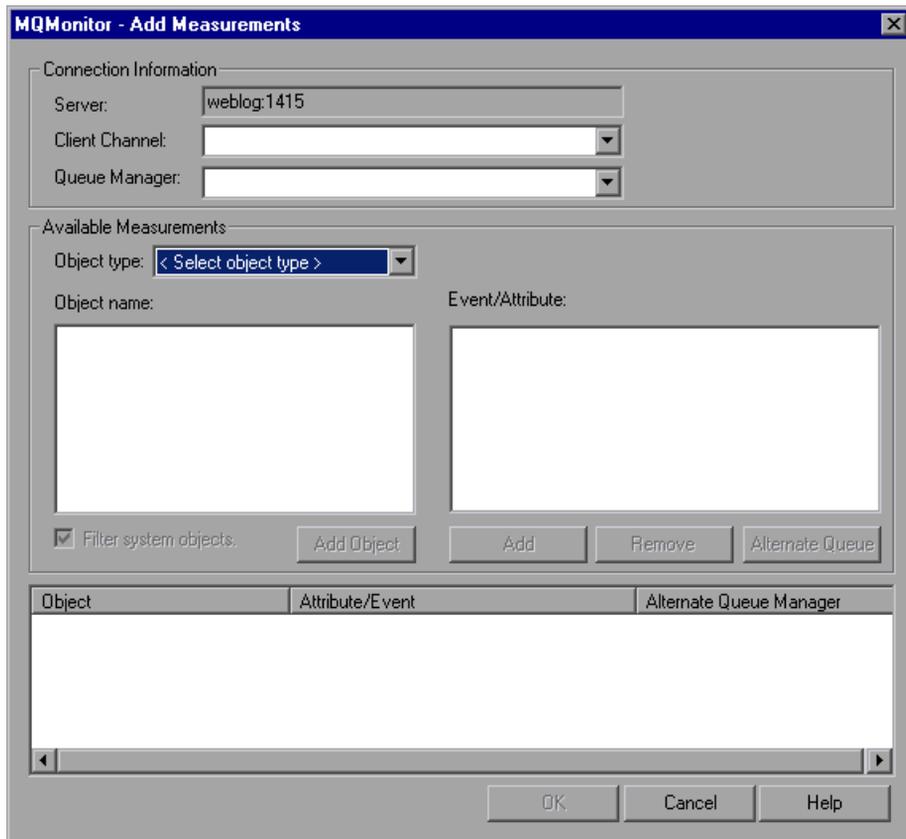
- 3** Enter the server name or IP address of the machine you want to monitor. The format of the server name is <machine name>:<port number>. Select the platform on which the machine runs, and click **OK**.
- 4** In the Resource Measurements section of the IBM WebSphere MQ dialog box, click **Add**.
- 5** Continue with “Configuring the IBM WebSphere MQ Monitor” on page 518.

## Configuring the IBM WebSphere MQ Monitor

After you have added the machine that you are monitoring, you configure the monitor by choosing which measurements to monitor on the machine.

To configure the IBM WebSphere MQ monitor:

- 1 When you click **Add** to add a measurement, the MQMonitor - Add Measurements dialog box opens.



In the **Connections Information** section, enter the name of the channel through which a client connection is made to an MQ Server, and the name of the queue manager to be monitored.

---

**Note:** A queue manager can only be accessed by one Controller or monitoring application at any one time.

User entries for any text box are limited to 48 characters.

---

- 2** In the **Available Measurements** section, select an object type.

A list of previously added objects of the selected object type appear in the **Object name** list. A list of attributes or events applicable to the selected object type appear in the **Events/Attributes** list.

The names of monitored objects, event/attribute selected, and alternate queue managers, are listed in the monitored objects pane.

- 3** By default, only user-defined objects are displayed in the Object name list. To show all objects, clear the **Filter System Objects** check box. You can modify the filter settings, in the `<LoadRunner_installation>\dat\monitors\mqseries.cfg` file.
- 4** Select an object or add a new object to the Object name list. To add a new object name, click **Add Object**. In the Add Object Name dialog box, enter the name of an object to be monitored and click **OK**. The dialog box closes and the name of the object appears in the **Object name** list.
- 5** Select the attributes or events to be measured from the **Attribute/Event** box. The list of attributes or events is applicable to the selected object type.  
  
For a description of the available measurements, see “IBM WebSphere MQ Performance Counters” on page 522.

---

**Note:** To enable the event for a queue, ensure that the attributes for the queue have been set. For more information, refer to “Setting up the Monitoring Environment” on page 514.

---

- 6 If the event configured for monitoring is from a remote queue manager (other than the one identified in the queue manager field of the IBM WebSphere MQ Add Measurements dialog box), click **Alternate Queue**. Enter the name of an alternate queue manager in the Alternate Queue dialog box, and click **OK**.

---

**Note:** When you add an alternate queue manager, this becomes the default queue manager for any events that you subsequently add. To return to the queue manager to which you are connected, enter that name in the Alternate Queue Manager dialog box.

---

- 7 To add the object measurements to the monitored objects list, click **Add**. The name of the object, its events and attributes, and any alternate queue managers, are listed in the monitored objects pane.
- 8 To remove a monitored object event or attribute, select the object measurement in the monitored objects pane, and click **Remove**. The entry is deleted from the monitored objects list.
- 9 Add all the desired counters to the monitored objects list, and click **OK**. The measurements that you selected appear in the **Resource Measurements on:** *<machine>* section of the IBM WebSphere MQ dialog box.
- 10 Click **OK** in the IBM WebSphere MQ dialog box to activate the monitor.

## Understanding the MQMonitor - Add Measurements Dialog Box

The MQMonitor - Add Measurements dialog box lets you select the items to monitor on the IBM WebSphere MQ server.

### Connection Information

- **Server.** The name of the server you are monitoring.
- **Client Channel.** Enter the name of the channel through which a client connection is made to an MQ Server.

---

**Note:** You can set up a specific channel on an MQ Server instance, or use the default “SYSTEM.DEF.SVRCONN” channel. If the client channel is undefined, the MQ Server will be inaccessible via client connections (the MQ Monitor will not work, as it will not be able to connect to the queue manager which it is supposed to monitor).

---

- **Queue Manager.** Enter the name of the queue manager to be monitored.

---

**Note:** The monitor is not restricted to monitoring only the queue manager to which it is connected. You can configure multiple queue managers to write to the event queue of a central queue manager for centralized monitoring (this applies to Events only, not polled object attributes). All events contain a queue manager attribute identifying their source.

---

### Available Measurements

- **Object Type.** Select an object type from either Channel or Queue.
- **Object Name.** Enter a name for object you want to monitor.
- **Event/Attribute.** Select the events and attributes you want to monitor.
- **Filter System Objects.** Select to enable the system objects filter.
- **Add Object.** Enables you to add a new object name to the Object name list.

- **Add.** Enables you to add an Event or Attribute to an object.
- **Remove.** Enables you to remove a monitored object event or attribute from the Object name list.
- **Alternate Queue.** Enter the name of an alternate queue manager if the event is from a remote queue manager.

### Monitored Object list

A list of monitored objects, including the object's name, events and attributes, and alternate queue manager.

## IBM WebSphere MQ Performance Counters

The following tables list the available IBM WebSphere MQ monitor measurements:

### Queue Performance Counters

The following table describes the Queue Performance counters:

| Measurement                                             | Description                                                                                               |
|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| Event - Queue Depth High (events per second)            | An event triggered when the queue depth reaches the configured maximum depth.                             |
| Event - Queue Depth Low (events per second)             | An event triggered when the queue depth reaches the configured minimum depth.                             |
| Event - Queue Full (events per second)                  | An event triggered when an attempt is made to put a message on a queue that is full.                      |
| Event - Queue Service Interval High (events per second) | An event triggered when no messages are put to or retrieved from a queue within the timeout threshold.    |
| Event - Queue Service Interval OK (events per second)   | An event triggered when a message has been put to or retrieved from a queue within the timeout threshold. |

| Measurement                       | Description                                                                                                               |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Status - Current Depth</b>     | Current count of messages on a local queue. This measurement applies only to local queues of the monitored queue manager. |
| <b>Status - Open Input Count</b>  | Current count of open input handles. Input handles are opened so that an application may "put" messages to a queue.       |
| <b>Status - Open Output Count</b> | Current count of open output handles. Output handles are opened so that an application may "get" messages from a queue.   |

### Channel Performance Counters

The following table describes the Channel Performance counters:

| Measurement                                                | Description                                                                                                                                                                                             |
|------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Event - Channel Activated (events per second)</b>       | Event generated when a channel, waiting to become active but inhibited from doing so due to a shortage of queue manager channel slots, becomes active due to the sudden availability of a channel slot. |
| <b>Event - Channel Not Activated (events per second)</b>   | Event generated when a channel, attempts to become active but inhibited from doing so due to a shortage of queue manager channel slots.                                                                 |
| <b>Event - Channel Started (events per second)</b>         | Event generated when a channel is started.                                                                                                                                                              |
| <b>Event - Channel Stopped (events per second)</b>         | Event generated when a channel is stopped, regardless of source of stoppage.                                                                                                                            |
| <b>Event - Channel Stopped by User (events per second)</b> | Event generated when a channel is stopped by a user.                                                                                                                                                    |
| <b>Status - Channel State</b>                              | The current state of a channel. Channels pass through several states from STOPPED (inactive state) to RUNNING (fully active state). Channel states range from 0 (STOPPED) to 6 (RUNNING).               |

| Measurement                          | Description                                                                                                                                                                                                                                                |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Status - Messages Transferred</b> | The count of messages that have been sent over the channel. If no traffic is occurring over the channel, this measurement will be zero. If the channel has not been started since the queue manager was started, no measurement will be available.         |
| <b>Status - Buffer Received</b>      | The count of buffers that have been received over the channel. If no traffic is occurring over the channel, this measurement will be zero. If the channel has not been started since the queue manager was started, no measurement will be available.      |
| <b>Status - Buffer Sent</b>          | The count of buffers that have been sent over the channel. If no traffic is occurring over the channel, this measurement will be zero. If the channel has not been started since the queue manager was started, no measurement will be available.          |
| <b>Status - Bytes Received</b>       | The count of bytes that have been received over the channel. If no traffic is occurring over the channel, this measurement will appear as zero. If the channel has not been started since the queue manager was started, no measurement will be available. |
| <b>Status - Bytes Sent</b>           | The count of bytes that have been sent over the channel. If no traffic is occurring over the channel, this measurement will appear as zero. If the channel has not been started since the queue manager was started, no measurement will be available.     |

# **Part XV**

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## **Infrastructure Resource Monitoring**



# 58

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## Infrastructure Resources Monitoring

Using LoadRunner's Network Client monitor, you can monitor network client resources for FTP, POP3, SMTP, IMAP, and DNS Vusers during a scenario run and isolate client performance bottlenecks.

**This chapter includes:**

- ▶ Configuring the Network Client Monitor on page 527
- ▶ Network Client Performance Counters on page 527

### Configuring the Network Client Monitor

You can view the Network Client online monitor graph by dragging it from the Infrastructure Resources Graph section in the graph tree into the right pane of the Run view. The graph appears in the graph view area.

### Network Client Performance Counters

The following table describes the Network Client measurements that are monitored:

| Measurement                 | Description                                 |
|-----------------------------|---------------------------------------------|
| Pings per sec               | Number of pings per second                  |
| Data transfer bytes per sec | Number of data bytes transferred per second |
| Data receive bytes per sec  | Number of data bytes received per second    |
| Connections per sec         | Number of connections per second            |

| Measurement                     | Description                                     |
|---------------------------------|-------------------------------------------------|
| Accept connections per sec      | Number of connections accepted per seconds      |
| SSL Connections per sec         | Number of SSL connections per second            |
| SSL Data transfer bytes per sec | Number of SSL data bytes transferred per second |
| SSL Data receive bytes per sec  | Number of SSL data bytes received per second    |
| SSL Accept connections per sec  | Number of SSL connections accepted per seconds  |

# **Part XVI**

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## **Appendixes**



# A

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## Troubleshooting Online Monitors

LoadRunner monitors allow you to view the performance of the scenario during execution.

The following sections describe several tips and known issues relating to the online monitors.

**This appendix includes:**

- ▶ Troubleshooting Server Resource Monitors on page 532
- ▶ Troubleshooting the Network Delay Monitor on page 535
- ▶ Network Considerations on page 537

## Troubleshooting Server Resource Monitors

To monitor resources on a server machine, you must be able to connect to that machine. If monitoring is unsuccessful and LoadRunner cannot locate the specified server, make sure that the specified server is available. Perform a “ping” operation by typing ping <server\_name> from the Controller machine command line.

Once you verify that the machine is accessible, check this table for additional tips on troubleshooting the monitor.

| Problem                                                                     | Solution                                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cannot monitor a Windows machine on a different domain, or “access denied.” | <p>To gain administrative privileges to the remote machine, perform the following from the command prompt:</p> <pre>%net use \\&lt;MachineName&gt;/ user:[&lt;Domain&gt;\&lt;RemoteMachineUsername&gt;]</pre> <p>At the password prompt, enter the password for the remote machine.</p> |

| Problem                                                                                                                              | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Cannot monitor an NT/Win 2000 machine (An error message is issued: “computer_name not found” or “Cannot connect to the host”)</p> | <p>The NT/Win 2000 machine you want to monitor only enables monitoring for users with administrator privileges. To allow monitoring for non-admin users, you must grant read permission to certain files and registry entries (Microsoft tech-note number Q158438.) The required steps are:</p> <ul style="list-style-type: none"> <li>a. Using Explorer or File Manager, give the user READ access to: <ul style="list-style-type: none"> <li>%windir%\system32\PERFCxxx.DAT</li> <li>%windir%\system32\PERFHxxx.DAT</li> </ul> <p>where xxx is the basic language ID for the system—for example, 009 for English. These files may be missing or corrupt. If you suspect this; expand these files off of the installation cd.</p> </li> <li>b. Using REGEDT32, give the user READ access to: <ul style="list-style-type: none"> <li>HKEY_LOCAL_MACHINE\Software\Microsoft\Windows NT\CurrentVersion\Perflib</li> </ul> <p>and all sub keys of that key.</p> </li> <li>c. Using REGEDT32, give the user at least READ access to: <ul style="list-style-type: none"> <li>HKEY_LOCAL_MACHINE\System\CurrentControlSet\Control\SecurePipeServers\winreg</li> </ul> </li> </ul> |
| <p>Some Win 2000 counters cannot be monitored from an NT machine.</p>                                                                | <p>Run the Controller on a Win 2000 machine.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <p>Some Windows default counters are generating errors</p>                                                                           | <p>Remove the problematic counters and add the appropriate ones using the “Add Measurement” dialog box.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

| Problem                                                                                               | Solution                                                                                                                                                                                                                                                                       |
|-------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>You cannot get performance counters for the SQL server (version 6.5) on the monitored machine.</p> | <p>There is a bug in SQL server version 6.5. As a workaround, give read permission to the following registry key at the monitored machine (use regedt32):</p> <p>HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\MSSQLServer\MSSQLServer</p> <p>(Microsoft tech-note number Q170394)</p> |
| <p>The selected measurements are not displayed in the graph.</p>                                      | <p>Ensure that the display file and online.exe are registered. To register the monitor dll's, without performing a full installation, run the <b>set_mon.bat</b> batch file located in <b>LoadRunner\bin</b>.</p>                                                              |
| <p>When monitoring a Windows machine, no measurements appear in the graph.</p>                        | <p>Check the built-in Windows Performance Monitor. If it is not functional, there may be a problem with the communication setup.</p>                                                                                                                                           |
| <p>When monitoring a UNIX machine, no measurements appear in the graph.</p>                           | <p>Ensure that an <b>rstatd</b> is running on the UNIX machine (Refer to Part IV, "System Resource Monitoring.")</p>                                                                                                                                                           |
| <p>Cannot monitor one of the following Web servers: MS IIS, MS ASP, or ColdFusion</p>                 | <p>Refer to problem above, "Cannot monitor a Windows machine."</p>                                                                                                                                                                                                             |
| <p>Cannot monitor the WebLogic (JMX) server</p>                                                       | <p>Open the &lt;LoadRunner root folder&gt;\dat\monitors\WebLogicMon.ini file, and search for:</p> <p>[WebLogicMonitor]<br/> JVM=javaw.exe</p> <p>Change javaw.exe to java.exe. A window containing trace information opens.</p>                                                |

## Troubleshooting the Network Delay Monitor

If monitoring is unsuccessful and LoadRunner cannot locate the source or destination machines, make sure that the specified machines are available to your machine. Perform a “ping” operation. At the command line prompt, type:

```
ping server_name
```

To check the entire network path, use the trace route utility to verify that the path is valid.

For Windows, type `tracert <server_name>`.

For UNIX, type `traceroute <server_name>`.

If the monitoring problem persists once you verify that the machines are accessible and that the network path is valid, perform the following procedures:

- 1 If you are using the TCP protocol, run **<LoadRunner root folder>\bin\webtrace.exe** from the source machine to determine whether the problem is related to the Controller, or the WebTrace technology on which the Network Delay monitor is based. If you are using the UDP or ICMP protocols, the problem must be related to the Controller and not WebTrace, since these protocols are not WebTrace technology-based.
- 2 If you receive results by running **webtrace.exe**, the problem is related to the Controller. Verify that the source machine is not a UNIX machine, and contact the Customer Support Web site with the following information:
  - the Controller log file, **drv\_log.txt**, located in the **temp** directory of the Controller machine.
  - the **traceroute\_server** log file, located on the source machine.

**Note:** In LoadRunner 7.02, this information is located in **<LR root folder>\dat\<the latest mdrv log>**. In LoadRunner 7.5, this information is located in **<LR root folder>\bin\traceroute\_server.log**.

- the debug information located in the **TRS\_debug.txt** and **WT\_debug.txt** files in the path directory. These files are generated by adding the following line to the [monitors\_server] section of the <LoadRunner root folder>\dat\mdrv.dat file, and rerunning the Network monitor:

ExtCmdLine=-tracert \_debug path

- 3 If you do not receive results by running **webtrace.exe**, the problem is related to the WebTrace technology, on which the Network Delay monitor is based. Perform the following procedures on the source machine:

- Verify that the **packet.sys** file (the Webtrace driver) exists in the **WINNT\system32\drivers** directory.
- Check whether a driver (such as “Cloud” or “Sniffer”) is installed on top of the network card driver. If so, remove it and run WebTrace again.
- Verify that there are administrator permissions on the machine.
- Using `ipconfig /all`, check that only one IP address is assigned to the network card. WebTrace does not know how to handle multiple IP addresses assigned to the same card (IP spoofing).
- Check the number of network cards installed. Run `webtrace -devlist` to receive a list of the available network cards.
- If there is more than one card on the list, run `webtrace -dev <dev_name> <destination>`, where <dev\_name> is one of the network card names shown in the list. If you discover that WebTrace is binding to the wrong card, you can use `webtrace set_device <dev_name>` to set a registry key that instructs WebTrace to use a specified card instead of the default one.
- Verify that the network card is of the Ethernet type.
- Contact the Customer Support Web site with the output of `webtrace.exe -debug` (for example, `webtrace.exe -debug www.merc-int.com`) and `ipconfig /all` on the machine.

## Network Considerations

If you notice extraordinary delays on the network, refer to one of the following sections to increase the performance:

- Network Bandwidth Utilization
- Ethernet-bus Based Networks
- Working on a WAN or Heavily Loaded LAN

### Network Bandwidth Utilization

In most load-testing scenario, the network card has little impact on scenario performance. Network cards are manufactured to handle the bandwidth of the physical network layer. Packets are transferred over an Ethernet at a rate that complies with IEEE 803.x standards. If the network becomes a bottleneck, the issue is not the brand of the network card, but rather the bandwidth limitations on the physical layer (--i.e. Ethernet, FDDI, ATM, Ethernet Token-ring, etc.).

That is, instead of load testing over a T10 line, upgrade your line to DS3 (45Mbps), or T100 (100Mbps).

Below are a few tips that will help qualify the need to upgrade the network:

- 1** Run the performance monitor on the Vuser load generators. As the number of Vusers increases, check the network byte transfer rate for saturation. If a saturation point has been reached, do not run any more Vusers without upgrading the network—otherwise performance of Vusers will degrade. Degradation is exponential in networking environments.
- 2** Run the performance monitor on the server machine. Run many Vusers on several load generator machines. Check the kernel usage and network transfer rate for saturation. If saturation is reached with less than the desired Vuser load, upgrade the network.
- 3** Every network has a different Maximum Transmission Unit or MTU, which is set by the network administrator. The MTU is the largest physical packet size (in bytes) that a network can transmit. If a message is larger than the MTU, it is divided into smaller packets before being sent.

If clients and servers are passing large data sets back and forth, instruct the network administrator to increase the MTU to yield better bandwidth utilization. Ideally, you want the MTU to be the same as the smallest MTU of all the networks between your machine and a message's final destination.

If you send a message that is larger than one of the MTUs, it will be broken up into fragments, slowing transmission speeds. If the MTU is too high, it may cause unintended degradation. Trial and error is the only sure way of finding the optimal MTU, but there are some guidelines that can help. For example, most Ethernet networks have an MTU of 1500.

If the desired MTU reduces performance, upgrade the network or reduce the MTU to improve performance.

### **Ethernet-bus Based Networks**

The following guidelines apply to Ethernet-bus based networks:

Networks with only 2 active machines communicating yield a maximum of 90% bandwidth utilization.

Networks with 3 active machines communicating yield a maximum of approximately 85% bandwidth utilization.

As the number of active machines on the network increases, the total bandwidth utilization decreases.

## Working on a WAN or Heavily Loaded LAN

When you work with LoadRunner on a WAN or heavy loaded LAN, you may notice some unusual LoadRunner behavior, which indicates network problems. The Output window may contain messages about retries, lost packets, or message mismatch. This is because some of the messages from the Controller may not be reaching the LoadRunner agent. To solve this problem, you should reduce the network traffic or improve the network bandwidth.

The following steps may help reduce network traffic:

- Click the **Run-Time Settings** button and select the **General: Log** node. Clear the **Enable logging** check box.
- Initialize all users before running them. Run them only after initialization is completed.



# B

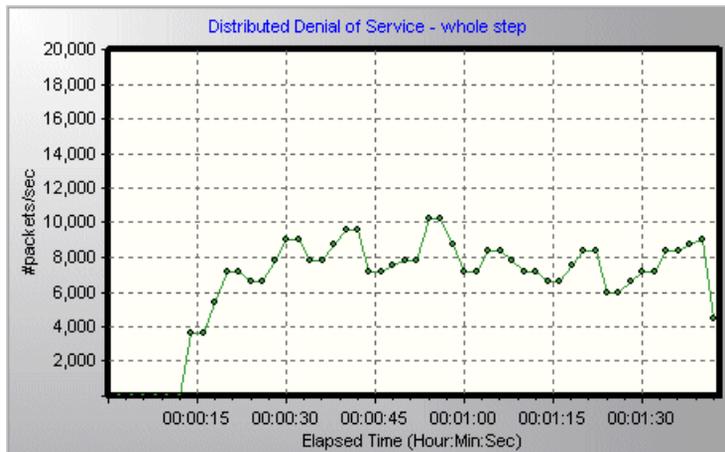
## Security Monitoring

When you run certain security scripts, you can use LoadRunner's security graphs to view information about the simulated attacks on the server.

### Distributed Denial of Service Graph

The Distributed Denial of Service graph displays the number of packets per second sent to the specified target to cause denial of service.

The x-axis represents the elapsed time. The y-axis represents the number of packets sent per second.



---

**Note:** To obtain data for this graph, you need to execute one of the following canned security scripts: SYN FLOOD DDOS Attack or UDP Echo DDOS Attack.

---

# C

---

## Working with Server Monitor Counters

When you configure the System Resource, Microsoft IIS, Microsoft ASP, ColdFusion, and SQL Server monitors, you are presented with a list of default counters that you can measure on the server you are monitoring. Using the procedure described below, you can create a new list of default counters by including additional counters, or deleting existing counters.

In addition, there are specific counters that are especially useful for determining server performance and isolating the cause of a bottleneck during an initial stress test on a server.

**This appendix includes:**

- Changing a Monitor's Default Counters on page 543
- Useful Counters for Stress Testing on page 544

### Changing a Monitor's Default Counters

You can change the default counters for the System Resource, Microsoft IIS, Microsoft ASP, or SQL Server monitors by editing the `res_mon.dft` file found in the `LoadRunner\dat` directory.

**To change the default counters:**

- 1** Open a new scenario and click the **Run** tab.
- 2** For each of the monitors, select the counters you want to measure.
- 3** Save the scenario and open the scenario `.lrs` file with an editor.

- 4 Copy the MonItemPlus section of the each counter you selected into the `res_mon.dft` file.
- 5 Count the number of new counters in the file and update the **ListCount** parameter with this number.

## Useful Counters for Stress Testing

Certain counters are especially useful for determining server performance and isolating the cause of a bottleneck during an initial stress test on a server.

The following is a list of counters that are useful for monitoring Web server performance:

| Object              | Counter                       |
|---------------------|-------------------------------|
| Web Service         | Maximum Connections           |
| Web Service         | Bytes Total/sec               |
| Web Service         | Current NonAnonymous Users    |
| Web Service         | Current Connections           |
| Web Service         | Not Found Errors              |
| Active Server Pages | Requests/sec                  |
| Active Server Pages | Errors/sec                    |
| Active Server Pages | Requests Rejected             |
| Active Server Pages | Request Not Found             |
| Active Server Pages | Memory Allocated              |
| Active Server Pages | Requests Queued               |
| Active Server Pages | Errors During Script Run Time |
| Memory              | Page Faults/sec               |
| Server              | Total Bytes/sec               |
| Process             | Private Bytes/Inetinfo        |

The following is a list of counters that are useful for monitoring SQL Server performance:

| Object          | Counter               |
|-----------------|-----------------------|
| SQLServer       | User Connections      |
| SQLServer       | Cache Hit Ratio       |
| SQLServer       | Net-Network Reads/sec |
| SQLServer       | I/O-Lazy Writes/sec   |
| SQLServer-Locks | Total Blocking Locks  |
| PhysicalDisk    | Disk Queue Length     |

The following is a list of counters that are useful for monitoring both Web and SQL server performance:

| Object       | Counter                |
|--------------|------------------------|
| Processor    | % Total Processor Time |
| PhysicalDisk | % Disk Time            |
| Memory       | Available Bytes        |
| Memory       | Pool Nonpaged Bytes    |
| Memory       | Pages/sec              |
| Memory       | Committed Bytes        |
| System       | Total Interrupts/sec   |
| Object       | Threads                |
| Process      | Private Bytes:_Total   |

---

**Note:** The % Disk Time counter requires that you run the `diskperf -y` utility at the command prompt and reboot your machine.

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