



HP ALM Performance Center

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User and Administrator Guide

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Part 1: Performance Testing Basics

Chapter 1: HP ALM Performance Center Introduction

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HP ALM Performance Center Overview

HP ALM Performance Center is a global cross-enterprise performance testing tool which enables you to manage multiple, concurrent performance testing projects across different geographic locations without any need to travel between the locations. Performance Center administers all your internal performance testing needs. With Performance Center, you manage all aspects of large-scale performance testing projects, including resource allocation and scheduling, from a centralized location accessible through the Web. Performance Center helps streamline the testing process, reduce resource costs, and increase operating efficiency.

Performance Center generates load on your Web server or application using HP's virtual user (Vuser) technology. Each Vuser follows a series of steps (for example, hyperlink steps, submit form steps, and so on) that you define in a Vuser script. You design Vuser scripts to emulate typical user activity in your application.

Vusers run on dedicated host machines. Each host machine runs many Vusers. When run concurrently, the Vusers create the same load as tens of thousands of individual human users. While Vusers run, Performance Center collects server response time data.

Performance Center analysis tools, which you access both during and after the performance test, provide you with a clear and concise picture of your application's performance under load.

Performance Center helps you pinpoint performance bottlenecks. It also allows you to determine the number of users your system can scale up to (this number is the "breaking point" after which your application's performance starts to degrade). This information gives clues as to what can be done to increase your application's load capacity.

In addition, the information provided by Performance Center helps you analyze how the load on your system affects the service level agreements (SLAs) or other performance thresholds that are important to your business.

Performance Center has the following system advantages:

- Performance Center's step-by-step process helps guide you through the performance testing procedure.
- Performance Center enables remote testing by anybody, from anywhere, at any time, eliminating the need to travel.
- Performance Center enables multiple concurrent tests, replacing serial testing with parallel testing.
- Performance Center enables remote management from anywhere through a Web server.
- Performance Center is a complete system for managing performance tests, scripts, and resources. Furthermore, Performance Center centralizes the testing environment, with no duplication of testing labs, keeping costs down and minimizing time.
- Performance Center enables you to take advantage of the power of the Web for supporting services such as remote consulting, online support, and so on.

For details on how to conduct a performance test, see ["How to Conduct a Performance Test"](#) below.

How to Conduct a Performance Test

This task describes how to conduct a performance test on your application.

Note: To view a movie that demonstrates how to conduct a performance test, select **Help > Movies** in the ALM main window.

To learn more about performance testing, see ["HP ALM Performance Center Overview"](#) on the [previous page](#).

1. Create and add test assets

For details, see ["How to Manage Testing Assets"](#) on page 39.

2. Reserve a timeslot for performance testing

For details, see ["How to Reserve Timeslots for Performance Testing"](#) on page 91.

3. Design a performance test

For details, see ["How to Design a Performance Test"](#) on page 111.

4. Run, monitor, and view results of the performance test

For details, see ["How to Manage a Performance Test Run"](#) on page 242.

Chapter 2: My Performance Center

This chapter includes:

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My Performance Center Overview

My Performance Center provides an interface specifically designed for facilitating execution of day-to-day performance testing activities. It enables you create and personalize views of performance testing features. Using My Performance Center, you can create and edit tests, manage test assets, as well as run and track test runs.

How to Start My Performance Center

This task describes how to launch My Performance Center on your machine from your Web browser.

1. Choose one of the following:

From Performance Center: Open your web browser and type the Performance Center Server URL

`http://<PCS server name>/loadtest.`

Note: If more than one Performance Center server is installed in your system together with a load balancer, you should access My Performance Center by entering the load balancer's URL. Alternatively, you can also enter the server's defined internal URL.

From ALM: Open your Web browser and type your ALM URL

`http://<ALM server name/IP address>[:port number]/qcbn.` The HP Application Lifecycle Management Options window opens. Click **My Performance Center**.

Note: Contact your system administrator if you do not have the correct URL.

2. The My Performance Center Login window opens.

Note: If Performance Center was configured for external authentication, the **Login Name** and **Password** fields do not appear in this window. For more details on external authentication, see the *HP ALM External Authentication Configuration Guide*.

3. In the **Login Name** box, type your user name.
4. In the **Password** box, type the password assigned to you by your site administrator.
5. Select the **Automatically log in to my last domain and project on this machine** check box if you want Performance Center to automatically log in to the last project in which you were working.
6. Click the **Authenticate** button. Performance Center verifies your user name and password and

determines which domains and projects you can access. If you specified automatic login, Performance Center opens.

- 7. If authentication fails, check that your user name and password are correct and try again.
- 8. In the **Domain** list, select a domain. By default, the last domain in which you were working is displayed.
- 9. In the **Project** list, select a project. By default, the last project in which you were working is displayed.

Note: The system administrator can control user access to Performance Center projects by defining user groups that can enter them, and by determining the types of tasks each user group performs according to permission levels. For more information, see the *HP Application Lifecycle Management Administrator Guide*.

- 10. Click the **Login** button. Performance Center opens.

My Performance Center User Interface

This section includes:






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My Performance Center Window

This section describes the My Performance Center window.

To access	See "How to Start My Performance Center" on page 21.
------------------	--

User interface elements are described below:

UI Elements	Description
Domain	Displays the selected domain name.
Project	Displays the selected project name.
	<p>Notifications. Opens the Notifications dialog box enabling you to receive and send notifications to other users.</p> <ul style="list-style-type: none"> • My Last Notifications. Enables you to view and send notifications. • Notifications Management. Contains a list of the available notifications.
	Community. Enables easy access to Performance Center RSS feeds, links to relevant groups and forums, and the product's Web site.
	Download Applications. Opens the Download Applications dialog box enabling you to download standalone applications needed for working with Performance Center. For more details, see "Download Applications Dialog Box" on page 27.
	Displays help for Performance Center. It also enables you to open additional online HP Application Lifecycle Management and Performance Center resources.
Hello <user name>	Displays the current user name.
Logout	Logs you out of your current project and returns you to the Performance Center Login window.
Module Navigation Toolbar	Enables you to navigate to a selected module. Includes the following options: Start, Test Management, Runs & Analysis, Resources, Reports, and Personalized Views.
	Returns to the last site visited module.
Start	Displays the starting page in Performance Center. For user interface details, see "Start Page" on the next page.

UI Elements	Description
Test Management > Test Plan	Displays the Test Plan tree . Enables you to create and manage tests. For user interface details, see "Test Plan Module" on page 116 .
Test Management > Test Lab	Enables you to ran and manage test sets. For user interface details, see "Test Lab Module" on page 249 .
Runs & Analysis > Runs	Enables you to view and manage test runs. For user interface details, see "Test Lab Module" on page 249 .
Runs & Analysis > Trending	Enables you to view performance trending information. For user interface details, see "Performance Trending Module" on page 312 .
Runs & Analysis > PAL	Enables you to view performance application lifecycle information. For user interface details, see "PAL Module" on page 344 .
Resources > Test Resources	This module enables create and manage monitor profiles and analysis templates. For user interface details, see "Test Resources Module" on page 67 .
Resources > Testing Hosts	Enables you to view and manage hosts. For user interface details, see "Testing Hosts Module" on page 29 .
Resources > Timeslots	Enables you to view and manage timeslots. For user interface details, see "Timeslots Module" on page 92 .
Resources > Topologies	Displays details about topologies defined in the system. For user interface details, see "Topologies Module" on page 57 .
Reports	Usage Reports. Provides you with an overall analysis of Performance Center. The analysis includes site users, resource usage, concurrent resource usage vs. license limitations, timeslot usage, resource usage by duration and runs, VUDS usage, protocol usage, and cloud utilization and operations. For more details on usage reports, see the <i>HP ALM Lab Management Guide</i> .
Personalized Views	Enables you create a personalized group of views to suit your specific testing needs. For user interface details, see "Personalized Views" on the next page .
	Auto Refresh On/Off. When enabled, automatically refreshes the views every 5 seconds so that it displays the most up-to-date task information.

Start Page

This section describes the Start page in My Performance Center. This page displays a dashboard of test runs. You can view your runs or all runs. The page also displays a list of your last modified entities, and the resources in use.

To access	See "How to Start My Performance Center" on page 21 . On the My Performance Center navigation bar, click Start .
------------------	---

User interface elements are described below:



UI Elements	Description
<Common UI elements>	For user interface details, see "My Performance Center Window" on page 23 .
Runs pane	Displays the test run activities. My Runs. Displays your test run activities. All Runs. Displays test run activities for all users of the project. Running. Displays the currently running tests in the system. Scheduled. Displays the tests that are scheduled to run. Finished. Displays the completed test runs.
Last Modified Entities pane	Enables you to keep track of changes to performance testing entities.
Resources	Enables you to keep track of the performance testing resources in use.

Personalized Views

You create a personalized group of views to suit your specific testing needs.

To access	On the My Performance Center navigation bar, select Personalized Views .
------------------	---

User interface elements are described below:

UI Elements	Description
Create New	Opens the Create New Perspective dialog box, enabling you to create a personalized view.
 	Displays the available views in the a pane.

Available Views

User interface elements are described below:

UI Elements (A - Z)	Description
Analysis Templates	Enables you to create an maintain analysis templates. For more information, see "Customizing Analysis Templates" on page 232 .

UI Elements (A - Z)	Description
Currently Running Tasks	Enables you to keep track of currently running tasks in the system.
Currently Running Tests	Enables you to keep track of currently running tests in the system.
Groups and Forums	Enables easy access to relevant groups and forums.
Last Modified Entities	Enables you to keep track of changes to performance testing entities.
Manage Production Data Sets	Enables you to import and monitor PAL data sets from the production system. For more information about PAL data sets, see "PAL Module" on page 344 .
Monitor Profiles	Enables you to create and manage existing monitor profiles. For more information about monitor profiles, see "Monitor Profiles" on page 64 .
PAL Reports	Enables you to manage PAL reports. It displays a list of available reports, and enables you to create new reports, and to delete or duplicate existing reports. For more information about PAL reports, see "PAL Module" on page 344 .
Performance Center Hosts	Enables you to view and manage Performance Center hosts. For more information about hosts, see the <i>HP ALM Lab Management Guide</i> .
Performance Center RSS	Enables easy access to Performance Center RSS feeds.
Performance Test Set	Enables you to view and edit selected tests within test sets. You can create, edit, rename, and remove tests. You can also run tests directly from this view. For more details on this view, see "Test Lab Module" on page 249 .
Performance Trending	Enables you to create trend reports in order to identify performance improvements and regressions. For more information about trending, see "Trending" on page 304 .
Reports	Enables you to generate various usage reports. You can export generate reports to a .pdf or an Excel file. For more information on usage reports, see the <i>HP ALM Lab Management Guide</i> .
Test Plan Tree	Enables you to manage your test plan tree. For more details, see "Test Plan Module" on page 116 .

UI Elements (A - Z)	Description
Test Run Results	Displays result information for a test run selected in the Test Runs view. For more details on this view, see "Test Lab Module" on page 249
Test Runs	Enables you to view and manage results for individual test runs. For more details on this view, see "Test Lab Module" on page 249 .
Test Sets Tree	Enables you to manage your test sets tree.
Timeslots	Enables you to view reserved timeslots for the project. For more information on timeslots, see "Timeslots Module" on page 92 .
Topologies Tree	Enables you to create and manage topologies. For more information on topologies, see "Topologies" on page 48 .
Topology Preview	Displays a preview of the topology defined for a performance test. For more information on topologies, see "Topologies" on page 48 .
VuGen Scripts	Enables you to view and upload VuGen scripts to ALM. For more information on managing scripts, see "VuGen Script Management" on page 40 .
Web Page	Enables easy access to the product's Web site.

Download Applications Dialog Box

This dialog box enables you to download various standalone applications for use with Performance Center.

To access	In the upper-right corner of the My Performance Center window, click  .
------------------	--

User interface elements are described below:

UI Elements	Description
Standalone VuGen	Enables you to create Vuser scripts for performance tests. Using VuGen, you record business processes into test scripts and customize the scripts according to defined user behavior.
Standalone Analysis	Enables you to analyze performance test data offline from any computer on which Analysis is installed. You use Analysis graphs and reports to organize and display performance test results and summarize system performance.





UI Elements	Description
Snapshot Viewer	Enables you to view snapshot on error pages captured from Web Vusers during performance test runs. The snapshot is a graphical representation of the Web page, displayed at the point at which the error occurred during the performance test run. This viewer displays snapshots from files with .SOE and .INF extensions. A Snapshot On Error (.SOE) file is a GNU-Zipped file containing one or more snapshots represented by .INF files.
Standalone Load Generator	Enables you to generate load by running virtual users (Vusers). The Controller dictates the manner in which they start and stop running. There can be any number of load generators for a given test.
Standalone Monitor Over Firewall	To enable monitoring of your servers from outside the firewall, you must install the Monitor Over Firewall component on designated machines inside the firewall. You first configure the Monitor Over Firewall agent to operate over a firewall. You then select the servers you want to monitor, and define the specific measurements that Performance Center collects for each monitored server.
Performance Validation SDK	Provides the tools to create a custom protocol for running performance tests on a previously unsupported application. For more information, see the <i>HP Performance Validation SDK Developer's Guide</i> .
PAL Data Set Creator	Enables you to create PAL production data sets using data from Microsoft IIS W3C Extended Log Format, Google Analytics, and Webtrends. For more details, see "PAL Data Set Creator Wizard" on page 369 .
Script Development Tools	Includes the following tools: <ul style="list-style-type: none"> • Agent for Citrix Server. Installs an optional component on the server machine which enhances VuGen's capabilities in identifying Citrix client objects. • Agent for Microsoft Terminal Server. Used for extended RDP protocol record-replay. This component runs on the server side, and is used to create and run enhanced RDP scripts. • MQ Tester. Installs a component on the VuGen machine to generate scripts that load IBM MQ Series. • WinPcap. Allows capturing network traffic into a file and analyzing it afterwards. It is used in the VuGen Web Services protocol server side recording feature. For more information about WinPcap, see http://www.winpcap.org.
Add-ins for Visual Studio IDE	Installs a component that enables you to create and run scripts written in your standard development environment, in the application's native language. Download the add-in that matches your version of Visual Studio, and run the add-in's executable file.






Testing Hosts Module


This module enables you to view and manage hosts used for test execution.

To access	On the My Performance Center navigation bar, select Resources > Testing Hosts .
Important information	You can provision hosts from the cloud for use in performance testing. For more information, see the <i>HP ALM Lab Management Guide</i> .
Relevant tasks	<ul style="list-style-type: none">• "How to Design a Performance Test" on page 111• <i>HP ALM Lab Management Guide</i>
See also	<ul style="list-style-type: none">• "My Performance Center Window" on page 23• <i>HP ALM Lab Management Guide</i>

User interface elements are described below (unlabeled elements are shown in angle brackets):

UI Elements	Description
<My Performance Center common UI elements>	For My PC menus and buttons, see "My Performance Center Window" on page 23 .
 Add Host	Opens the Add Host Dialog box, enabling you to create a testing host. For more information, see the <i>HP ALM Lab Management Guide</i> .
 Provision Hosts	Opens the Provision Cloud Hosts dialog box, enabling you to provision hosts. You can choose how many hosts to provision and where the hosts are provisioned, and you can select all necessary host configurations. For more information, see the <i>HP ALM Lab Management Guide</i> .
 Delete Host	Deletes the selected host.
 Check Host	Open the Check Host dialog box, enabling you to check connectivity between the selected host and other machines in the system.

UI Elements	Description
 Reboot Host	<p>Enables you to remotely reboot host machines.</p> <div> <p>Note:</p> <ul style="list-style-type: none"> • You cannot reboot Controller and Load generator hosts while they are in the Running state. You can only reboot these hosts when they are idle. • You cannot reboot a UNIX load generator host. • Available only for hosts with Performance purposes. </div>
 Data Processor Queue	<p>Opens the Data Processor Queue window, enabling you to view the pending data processing requests.</p>
 Change Status	<p>Opens the Change Host Status dialog box, enabling you to change the status of a selected host.</p> <p>The possible statuses are:</p> <ul style="list-style-type: none"> • Operational. The host is working. • Non-operational. The host is not working. • Unavailable. The host is not available.
 Reconfigure Host	<p>Resets the following on the selected host machine:</p> <ul style="list-style-type: none"> • Host license • System user (IUSR_METRO) • Communication Security passphrase <div> <p>Note: You can reconfigure only one host at a time.</p> </div>
 Provisioning Report	<p>Opens the provisioning report for the selected cloud host. For more information, see the <i>HP ALM Lab Management Guide</i>. This option is disabled if the selected host is not a cloud host.</p>

UI Elements	Description
<Cloud Hosts Summary Panel>	Displays a summary of cloud hosts by status/host state. Click on the number next to a status/host state to filter the Hosts grid by that status/host state.
<Quick Views> 	Lists predefined filters for the testing hosts grid. The following quick views are available: <ul style="list-style-type: none"> • All Performance Testing Hosts. • Cloud Load Generators. • Local Performance Testing Hosts. • Custom.
Add Filter	Enables you to filter the information being displayed in the testing hosts grid. Click the drop-down arrow to apply a filter.
Source	The testing host's source: <ul style="list-style-type: none"> • Local. The host exists in your testing lab. • Cloud. The host was provisioned from a cloud provider.
Name/IP	The name or IP address of the host.
Label	The logical name of the cloud host as specified during provisioning. Available in: All Performance Testing Hosts and Cloud Load Generators
Purpose	The testing tools available on the host. For example: Controller, Load generator, Data processor. <div> Note: <ul style="list-style-type: none"> • If the host machine is located over a firewall, or is a UNIX machine, it cannot function as a Controller or Data processor. • If you selected Windows Standalone LG or Unix Load Generator as the installation option, Load Generator is automatically selected as the purpose for the host and the other options are disabled. </div>

UI Elements	Description
Status	<p>The status of the host. The possible statuses are:</p> <ul style="list-style-type: none"> • Operational. The host machine is up and running. • Non-operational. The host machine is down. • Unavailable. There is no information available about the status of the host.
State	<p>The current activity on the host.</p> <p>Idle. Indicates that the host is not being used.</p> <p>Installing. Indicates that a patch is being installed on the host.</p> <p>Rebooting. Indicates that the host is rebooting.</p> <p><Run states>. Indicates the host state during a performance test run.</p> <p><Data processing states>. Indicates the state of the host during a data processing task.</p> <p><Provisioning states>. Indicates the provisioning status of a cloud host. Host State changes to idle once the host is provisioned.</p>
Location	The name of the host location.
Attributes	<p>The system attributes of the host.</p> <p>Example: Memory, strength, installed components.</p> <div> <p>Tip: You can customize the host attributes in Lab Management. For details, refer to the <i>HP Application Lifecycle Management Administrator Guide</i>.</p> </div>
Priority	<p>A rank assigned to the host. The higher the priority you give the host, the more likely the host will be allocated to a test. There are a number of criteria to consider when assigning priority. The main considerations are whether the host is a dedicated machine or a shared resource, and the type of hardware installed on the machine.</p> <p>Not Available in: Custom view</p>

UI Elements	Description
Privacy Type	<p>The privacy type of the host. You can modify all hosts in Lab Management, including private hosts. In ALM, you can only create and modify private hosts within the project's pool.</p> <p>Not Available in: Custom view</p>
Active Timeslot ID	<p>The ID of the timeslot for which this host is reserved, and which is now open.</p>
Cloud Host Identifier	<p>A unique ID for the host assigned by the cloud provider.</p> <p>Available in: Cloud Load Generators</p>
Cloud Request Id	<p>The cloud provider's ID for a single provision request. A provision request includes all requested batches of hosts. Each batch has its own Cloud Request Item ID.</p> <div> <p>Tip: You can filter by Cloud Request ID to see all hosts that were provisioned in a single provision request.</p> </div> <p>Available in: Cloud Load Generators</p>
Cloud Template	<p>The host template used to provision the host. Changing a host template does not affect existing hosts that were provisioned from the template.</p> <p>Available in: Cloud Load Generators</p>
Task	<p>Indicates the host status.</p> <p>Available in: Custom view</p>
MI Listener	<p>The IP address or name of the MI Listener that enables data collection. Relevant only for hosts located over a firewall.</p> <p>Available in: Custom view</p>
Cloud Account	<p>The name of the cloud account from which the host was provisioned.</p> <p>Available in: Custom view</p>
Cloud Image	<p>The machine image applied to the cloud host.</p> <p>Available in: Custom view</p>

UI Elements	Description
Cloud Instance Type	The hardware specs of the cloud host. Available in: Custom view
Cloud Region	The region from which a cloud host was provisioned. Available in: Custom view
Runtime State	Indicates the host state during a performance test run. Available in: Custom view
Active Timeslot ID	The ID of the timeslot for which this host is reserved, and which is now open. Available in: Custom view
Description tab	Describes the currently selected host.
Event Log tab	Displays detailed information about the tasks performed on the selected host, the action status, and a description of any errors.
Installed PC Components tab	Displays a list of the Performance Center components installed on the host machine, including versions and patches.
Installed Programs tab	Displays a list of all of the programs installed on the host machine. Details include the version, the publisher of the software, and the date it was installed in the host machine.
Processes tab	Displays detailed information about the processes and resource usage of the selected host. For more details, see the <i>HP ALM Lab Management Guide</i> .
Services tab	Displays the services running on the host machine. For more details, see the <i>HP ALM Lab Management Guide</i> .
Check Host Status tab	Displays the status of each step of the host checks. For more details, see the <i>HP ALM Lab Management Guide</i> .

Part 2: Performance Testing Assets

Chapter 3: Testing Assets - Introduction

This chapter includes:

How to Manage Testing Assets	39
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How to Manage Testing Assets

The following steps describe how to configure project settings and add testing assets.

Note: This task is part of a higher-level task. For details, see ["How to Conduct a Performance Test" on page 18](#).

Configure project settings

You can configure the monitors, runtime settings, timeout, general, and debug information options for all your Performance Center projects. For details, refer to the *HP ALM Lab Management Guide*.

Create projects that contain virtualized services - optional

You can create projects that contain virtualized services and integrate these services into your VuGen scripts. For details, see the *HP Service Virtualization User Guide*.

Upload VuGen scripts

After you create Vuser scripts using HP Virtual User Generator, you must upload them to Performance Center. For details, see ["How to Upload VuGen Scripts" on page 42](#).

Design topologies of your applications under test

You can design topologies of your applications under test using the Topologies feature. For details, see ["How to Design Topologies" on page 49](#).

Create monitor profiles to monitor your tests

To monitor server resources, you must configure the monitor settings for a test. These monitor settings can then be saved as monitor profiles that can be used by any performance test in your project. For details on creating monitor profiles, see ["How to Create and Configure Monitor Profiles" on page 65](#).

Chapter 4: VuGen Script Management

This chapter includes:

- Vuser Scripts 41
- Mapping VuGen Parameters to AUT Parameters 41
- How to Upload VuGen Scripts 42
- How to Convert NUnit, JUnit, or Selenium Tests to VuGen Scripts 43
- VuGen Script Management User Interface 44

Vuser Scripts

When you run a performance test, virtual users (Vusers) access your application concurrently in order to put load on your server. The actual steps that the Vusers perform when accessing your application are represented in a Vuser script. Each Vuser performs the actions recorded in one Vuser script.

You design Vuser scripts to emulate typical end-user activities on your application. For example, if you are testing performance on a Web site, the Vuser script emulates a real user accessing URLs, clicking links, submitting forms, and so on. When you create a performance test, you distribute your Vuser scripts among your Vusers.

For example, in the case of testing a Web site, you can specify that a portion of the Vusers run a Vuser script that emulates real users accessing your home page, a portion run a script that performs a search query, and a portion emulate the completion of an order form.

You obtain Vuser scripts by recording them using HP's Virtual User Generator (VuGen) and uploading them to Performance Center.

You can also obtain Vuser scripts by converting existing NUnit, JUnit, or Selenium tests and uploading them to Performance Center.

In addition to testing Web sites, Performance Center can be used to test performance of non-Web environments. For example, you can test WAP, Real, or Oracle NCA applications. For details of supported protocols, see the *HP Virtual User Generator User Guide*.

For details on how to upload VuGen scripts to Performance Center, see ["How to Upload VuGen Scripts" on the next page](#).

For details on how to convert NUnit, JUnit, or Selenium tests to VuGen scripts, see ["How to Convert NUnit, JUnit, or Selenium Tests to VuGen Scripts" on page 43](#).

Mapping VuGen Parameters to AUT Parameters

When setting VuGen parameters in a Vuser script, you can define AUT environment parameters. AUT Environments allows users to make test execution more dynamic by parameterizing the environment data used for testing. Instead of defining and running several different scripts that use the same logic but need different AUT environment parameters, you can simply provide a specific AUT environment configuration that ALM inserts into your script at run-time. ALM will then use the parameter values you defined in the AUT environment configuration when deploying the environment and executing the test.

For more details on working with AUT environments, refer to the *HP Application Lifecycle Management User Guide*.

How to Upload VuGen Scripts

This task describes how to upload VuGen scripts to Performance Center.

Note: This task is part of a higher-level task. For details, see ["How to Manage Testing Assets" on page 39](#).

This task includes the following steps:

- ["Prerequisites" below](#)
- ["Upload the VuGen scripts to Performance Center" below](#)

1. Prerequisites

Create scripts in VuGen. For details, see the *HP Virtual User Generator User Guide*.

Note: Service Virtualization:

- If your test requires the service to be running while you record your business process, open HP Service Virtualization simultaneously and deploy the virtualized service. Record the script as usual.
- Pointing calls to virtual services in the application under test covers two major scenarios:
 - Application components that use the service are embedded in the code or in a configuration file. In this case, update the code in the application under test or update the configuration file to point to the new URL.

Examples:

A .NET Desktop application uses a web service, and the url is set using a constant: `stringURL = http://hp.com`

A service or back end component uses the web service and the URL is configured in the app.config file.

- The service is consumed by accessing UDDI or some other registry component (Systinet) and the URL is retrieved at run-time. In this case, update the end point URL in UDDI/Systinet.

2. Upload the VuGen scripts to Performance Center

- a. Save the VuGen scripts locally. The scripts must be saved in ZIP format and must include all the files in the test scripts folder.

b. On the My Performance Center navigation bar, select **Test Management > Test Plan**.

c. Click the **Upload VuGen Scripts**  button.

Select a destination folder, scripts to upload, and upload options.

For user interface details, see ["Upload VuGen Scripts Dialog Box" on page 45](#).

For more details about uploading VuGen scripts from VuGen to ALM, see the section about saving VuGen scripts to ALM in the *HP Virtual User Generator User Guide*.

How to Convert NUnit, JUnit, or Selenium Tests to VuGen Scripts

This task describes how to convert NUnit, JUnit, or Selenium tests to VuGen Scripts.


1. Prerequisites

- Make sure to configure the load generator machine the same as the machine that is used to record or prepare the script or test.
- **NUnit tests:** Before converting a NUnit test to a VuGen script, make sure that **nunit.framework.dll** resides in the same directory as the NUnit test.
- **NUnit tests:** Make sure that the NUnit framework is installed on the load generator machine.
- **Java scripts and JUnit tests:** Verify that test dependencies are available on the load generator machine with the same paths defined in the classpath Run-Time settings.

2. Convert test to a VuGen script

- a. From a Performance Center host machine, select **Start > All Programs > HP Software > Performance Center Host > VuGen Script Convertor**. The VuGen Script Convertor dialog box opens. For user interface details, see ["VuGen Script Convertor" on page 46](#).
- b. Select the test and specify location for saving the converted script. Click **Convert**. The converted script is saved in ZIP format.

3. Upload converted VuGen scripts to Performance Center

- a. Save the converted VuGen scripts locally.
- b. On the My Performance Center navigation bar, select **Test Management > Test Plan**. Click the **Upload VuGen Scripts**  button.

For user interface details, see ["Upload VuGen Scripts Dialog Box" on page 45](#).


VuGen Script Management User Interface

This section includes:


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VuGen Script Convertor	46

Upload VuGen Scripts Dialog Box

This dialog box enables you to upload VuGen scripts to ALM.

To access	<ol style="list-style-type: none"> 1. In My Performance Center, on the navigation bar, select Test Management> Test Plan. 2. Click the Upload VuGen Scripts  button.
Important information	<ul style="list-style-type: none"> • The Upload VuGen Scripts dialog box is intended for uploading VuGen scripts only. The VuGen scripts must be saved locally, must be in ZIP format, and must include all the files in the test scripts folder. • You cannot upload QuickTest (UFT GUI Tests) or Service Test tests using the Upload VuGen Scripts dialog box. To upload QuickTest (UFT GUI Tests) or Service Test tests, see the relevant product's User Guide. • If the name of the folder to which you are uploading VuGen scripts contains a forward slash (/) you cannot upload the scripts using the Upload VuGen Scripts dialog box. Either rename the folder so that it does not contain a forward slash (/) or upload the scripts from VuGen.
Relevant tasks	"How to Upload VuGen Scripts" on page 42
See also	"Vuser Scripts" on page 41

User interface elements are described below:

UI Elements	Description
	Uploads the selected VuGen Scripts to the specified destination folder.
Select Folder	<p>The destination folder for the uploaded scripts.</p> <p>Note: The folder name must not contain a forward slash (/).</p>
Select Scripts	<p>Enables you to select up to five scripts.</p> <p>Note: The scripts must be saved locally, must be in ZIP format, and must include all the files in the test scripts folder.</p>
If Script Exists	<p>Action to take if the script already exists in the destination folder.</p> <ul style="list-style-type: none"> • Auto Rename Script. Automatically gives the script a different name. • Overwrite Existing Script. Overwrites the existing script.


UI Elements	Description
Upload Method	<p>The method to use for uploading the script:</p> <ul style="list-style-type: none"> • Upload All Files. Uploads all the files contained in the .zip file. With this option the upload takes a long time. • Upload runtime files only. Only the runtime files—that is the scripts, runtime settings, parameters, and so on—are uploaded.
Versioning > Keep checked out	<p>For version enabled projects, keeps the uploaded scripts checked out.</p> <p>Version Control: When you upload a script, it is available only for your own use until you check it in. After you check the script in, other users can access the script as well.</p>
Messages	Enables you to enter messages and comments about the script upload.

VuGen Script Converter

This dialog box enables you to transform NUnit, JUnit, or Selenium tests into VuGen scripts. You can then upload the VuGen scripts to Performance Center.

To access	Select Start > All Programs > HP Software > Performance Center Host > VuGen Script Converter .
Important information	Java and JUnit tests: Before running the converted VuGen scripts, make sure to update the Runtime Settings > Java Environment Settings > Classpath of the Vuser group, with the JUnit path and the dependent jars. For more details on runtime settings, "How to Configure Runtime Settings" on page 467 .
Relevant tasks	<ul style="list-style-type: none"> • "How to Convert NUnit, JUnit, or Selenium Tests to VuGen Scripts" on page 43 • "How to Upload VuGen Scripts" on page 42
See also	"Vuser Scripts" on page 41

User interface elements are described below:

UI Elements	Description
System or Unit Tests file	Enables you to browse to and select the test to be converted.
Output Directory	Enables you to specify where to store the converted file.
	Converts the test to a VuGen script.

Chapter 5: Topologies

This chapter includes:

- Topologies Overview 49
- How to Design Topologies 49
- How to Design Topologies - Use-Case Scenario 52
- Topologies User Interface 56

Topologies Overview

Performance Center can articulate the topology of your application under test (AUT) and use it as an interface for defining performance monitors by integrating with HP SiteScope.

Using topologies, you can:

- Manage an inventory of application under test (AUT) hosts which are grouped into AUT host pools, similar to Performance Center hosts and host pools
- Visually understand the tested environment
- Configure monitors using best practice monitor templates
- Configure monitors using templates from production environments
- Pinpoint runtime performance issues by highlighting a topology node's status based on the SiteScope monitor thresholds

The SiteScope user interface hosted in Performance Center enables leveraging SiteScope functionality in a use-case oriented approach, without requiring additional monitor configuration on the Performance Center side.

During runtime, the AUT schema with comprehensive SiteScope monitor data is displayed in different monitor graphs in the Performance Center run screen and measurement names can be identified and filtered.

For details on designing topologies, see ["How to Design Topologies" below](#).

How to Design Topologies

This section describes how to design a topology that graphically displays the logical components that make up your application under test (AUT) and the relationships between the components. This provides a useful method for managing your inventory of AUT hosts and enables topology-oriented monitoring and analysis.

Note:

- This task is part of a higher-level task. For details, see ["How to Manage Testing Assets" on page 39](#).
- Ensure that SiteScope is installed and configured to integrate with ALM Performance Center. For details, see the section about installing SiteScope in the *HP ALM Performance Center Installation Guide*.

- After you have designed a topology you can select it for a performance test when you design the test.



Tip: For a use-case scenario related to this task, see ["How to Design Topologies - Use-Case Scenario" on page 52.](#)

To learn more about topologies, see ["Topologies Overview" on the previous page.](#)

This task includes the following steps:

- ["Create an empty topology" below](#)
- ["Design the topology" below](#)
- ["Add the AUT hosts" on the next page](#)
- ["Configure the component properties" on the next page](#)
- ["Configure monitors on the components" on the next page](#)
- ["Results" on the next page](#)

1. Create an empty topology

- a. On the My Performance Center navigation bar, select **Resources > Topologies**.
- b. To create a topology folder, click the **New Folder**  button, and enter the folder name.
- c. Click the **New Topology**  button and enter the topology details. To add SiteScope monitors to the topology, specify the SiteScope server details.

2. Design the topology

Note: The Topology Designer window opens automatically when you create a new topology. If the Topology Designer window did not open, select a topology and click **Design Topology**.

In the Topology Designer window:

- a. From the palette on the left, select relevant nodes representing the components in your AUT and drag them onto the Topology canvas.
- b. To connect two components, click one component (ensure that it is not selected) and drag the cursor to the other component.

3. Add the AUT hosts

Define the machines that host the relevant components of the AUT.

On the Topology Designer window, click **AUT Hosts**. Click **Add New AUT Host**  to define the machines hosting your AUT.

Tip: If you have an Excel file listing your AUT hosts, you can import the list of AUT hosts into ALM. For details, refer to the *HP ALM Lab Management Guide*.

You can view the list of AUT hosts in the AUT Hosts tab on the left.

4. Configure the component properties

Select a component and, in the **Properties** pane in the top right corner of the Topology Designer, enter the relevant properties for that component. For successful integration with SiteScope, ensure that you select the relevant AUT host, and that all of the relevant properties are accurate.

Tip: When you click a property, a description is displayed in the lower area of the Properties pane.

Repeat this procedure for each of the relevant components.

5. Configure monitors on the components

You can configure groups of monitors for the components on AUT hosts. Ensure that the AUT host details are accurate for each relevant component.

- To deploy relevant monitors on specific components on your canvas, select the components, right-click the selection, and select **Deploy Monitor Templates**. Monitor groups are created in SiteScope for each selected component, and each group is automatically configured with relevant system-defined monitors.
- To configure monitors for a component manually in SiteScope, right-click the component and select **Configure Monitors**. For more details about configuring monitors in SiteScope, see the *HP SiteScope User Guide*.

Note: The AUT host defined in a component's properties is passed to SiteScope as a remote host and is inserted as the default monitored server for all monitors created for this component.

6. Results

After you save the topology, you can select the designed topology for your performance test. For details, see ["Performance Test Designer > Topology "](#) on page 62.

During a test run, you can view the SiteScope monitor activity on the relevant components in your AUT. For details, see ["Performance Test Run Page" on page 261](#).

How to Design Topologies - Use-Case Scenario

This use-case scenario describes how to design a topology that graphically displays the logical components that make up your application under test (AUT) and the relationships between the components.

Note: For a task related to this use-case scenario, see ["How to Design Topologies" on page 49](#).

This scenario includes the following steps:

- ["Background" below](#)
- ["Create the topology and design the outline" below](#)
- ["Add the AUT hosts" on page 54](#)
- ["Define the component properties" on page 55](#)
- ["Deploy the monitor templates" on page 55](#)
- ["Results" on page 56](#)

1. Background

John is a performance engineer working with HP Web Tours. He would like to design a performance test for the application.

As a first step, he would like to model the application in ALM Performance Center so that he can keep track of the topology of his application under test. Using this model, he can benefit from the monitoring and online view features that the topology feature offers.

2. Create the topology and design the outline

- a. On the Performance Center navigation bar, John selects **Resources > Topologies** to open the Topology module, and clicks the **New Topology** * button to create a new topology. He calls the topology **WebTours**, and enters the details of the SiteScope server with which the application will interact for monitoring purposes.

Add Topology ✕

*Topology Name:

SiteScope Server: SiteScope Port:

SiteScope SSL: Enable Mointors:

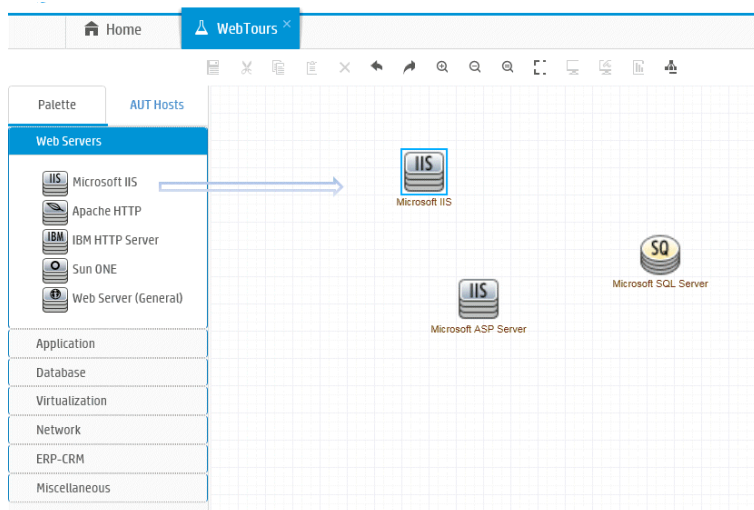
When John clicks **OK**, the Topology Designer window opens, displaying the Topology canvas which, at this stage, is empty.

- b. John's Web Tours application comprises the following components: A Web server, an application server, and a database server. The user accesses the application through a client workstation.

In the Topology Designer window, from the palette in the left, John drags the nodes representing these components onto the Topology canvas, and changes their captions to names that are relevant to the components they represent.

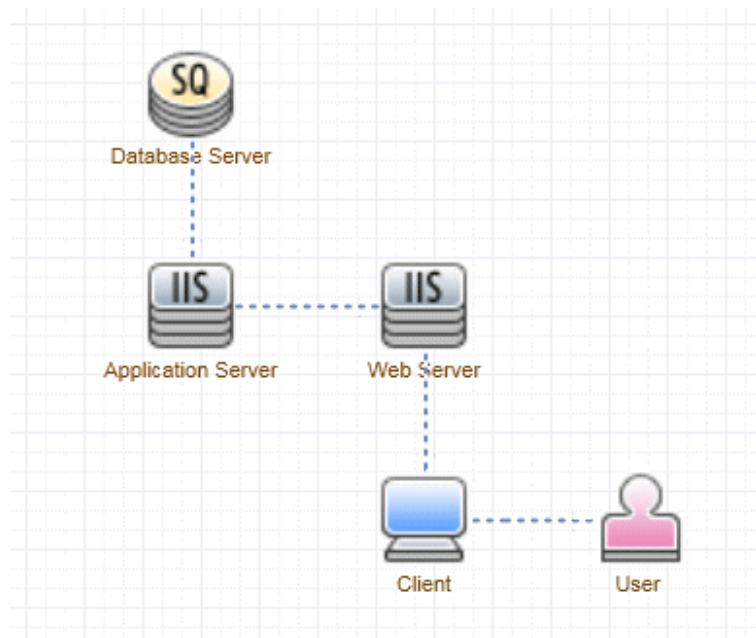
John drags the following nodes:

Palette Category	Component	New Caption
Web Servers	Microsoft IIS	Web Server
Application	Microsoft ASP Server	Application Server
Database	Microsoft SQL Server	Database Server
Miscellaneous	Workstation	Client
Miscellaneous	User	User




- c. John connects the application server to the Web server by clicking the application server (ensuring that it is not selected) and dragging the cursor over to the Web server.

Similarly, he connects the application server to the database server, the client workstation to the Web server, and the user to the client.



3. Add the AUT hosts

The AUT hosts are the physical machines that host the relevant components of the application under test.

On the Topology Designer window, John clicks **AUT Hosts**. He then clicks **Add New AUT Host** , and enters the name and details of the machine that hosts the database server:

The 'Add AUT Host' dialog box contains the following fields:

* Machine Name / IP:	Machine33	* Logical Name:	Machine33
* Platform:	Windows	* Protocols:	NetBIOS
* User:	User	* Password:	••••

Below the fields is a 'Messages' section.

John then adds the AUT host that hosts both the application and Web servers.

Tip:

- Alternatively, if John had an Excel file listing the AUT hosts in his system, he could have imported the list of AUT hosts to ALM. For details, refer to the *HP ALM Lab Management Guide*.
- John can view the list of AUT hosts in the **AUT Hosts** tab by clicking **AUT Hosts** next to the Palette tab.

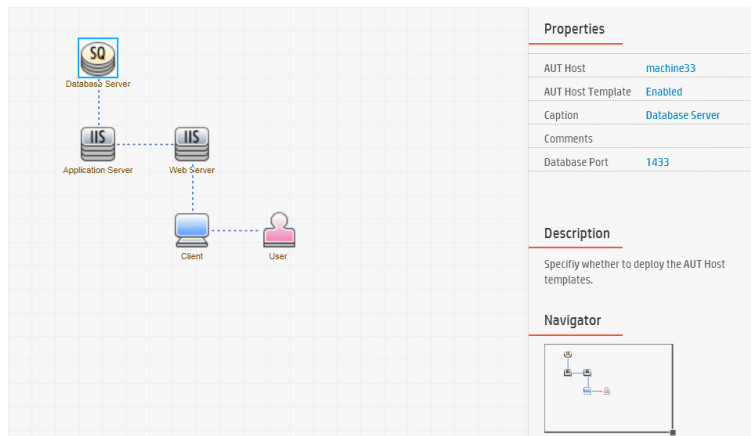
4. Define the component properties

For successful integration with SiteScope, John needs to ensure that the properties for each component are defined correctly.

John selects each component and, in the **Properties** pane in the top right corner of the Topology Designer window, he provides the relevant properties. The properties differ from one type of component to another.

Tip: A description for each property is displayed in the lower area of the Properties pane, and helps John to understand what information to provide for each property.

For example, for the database server, John selects **machine33** from the **AUT Host** drop-down list, and accepts the default values for all of the other properties. Then he provides the relevant details for the application and Web servers.



5. Deploy the monitor templates

John selects the three servers and clicks **Deploy Monitor Templates**. Performance Center creates a monitor group in SiteScope for each of the selected components, and deploys the relevant system-defined monitor templates for each component. Because the AUT Host Templates property is enabled, the templates for the actual AUT host are deployed as well.

Tip: If John wants to view or modify these monitors, he can do so by clicking **Configure Monitors** on the toolbar, which opens HP SiteScope and displays the monitor trees that were created for each component.

6. Results

John saves the topology and closes the Topology Designer window. He selects this topology when designing the performance test for the Web Tours application. When he runs the test, he can view the SiteScope monitor activity on the relevant components in the application in the Performance Test Run page.

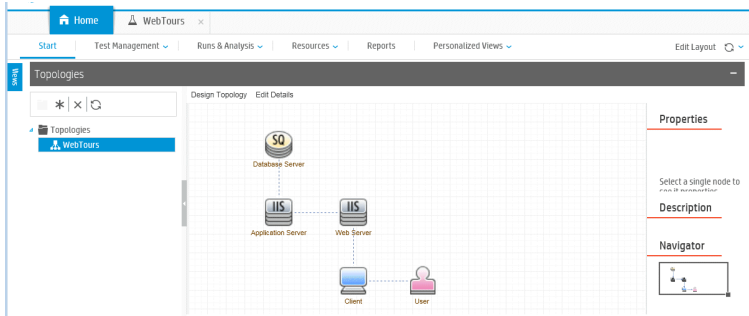
Topologies User Interface

This section includes:

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Topologies Module

This module enables you to create and manage topologies.



To access	On the My Performance Center navigation bar, select Resources >Topologies .
Important information	After you have designed a topology for your performance test, you must associate it with your test. For details about associating a topology with a test, see "Performance Test Designer > Topology " on page 62 .
Relevant tasks	"How to Design Topologies" on page 49
See also	"Topologies Overview" on page 49 "My Performance Center Window" on page 23

User interface elements are described below (unlabeled elements are shown in angle brackets>):

UI Elements	Description
	New Topology Folder. Enables you to create a topology folder.
	New Topology. Opens the Add Topology dialog box, enabling you to create a new topology. For details, see "Add / Update Topology Dialog Box " on the next page .
	Delete. Enables you to delete the selected topologies.
	Refresh All. Refreshes the page so that it displays the most up-to-date information.
Design Topology	Opens the Topology Designer window, enabling you to design topologies. For details, see "Topology Designer Window" on the next page .
Edit Details	Opens the Update Topology dialog box, enabling you to update the topology details. For details, see "Add / Update Topology Dialog Box " on the next page .
<Topologies tree>	Located on the left side of the window, organizes and displays your topologies hierarchically.

Add / Update Topology Dialog Box

To access	<ul style="list-style-type: none">• To add a topology: On the My Performance Center navigation bar, select Resources > Topologies. Click the New Topology * button.• To edit topology details: On the My Performance Center navigation bar, select Resources > Topologies. Select a topology and click Edit Details.
Relevant tasks	"How to Design Topologies" on page 49
See also	"Topologies Overview" on page 49

User interface elements are described below:













UI Elements	Description
Topology Name	The name of the topology.
SiteScope Server	The name of the SiteScope server.
SiteScope Port	The port defined for SiteScope during installation of SiteScope. Default value: <ul style="list-style-type: none">• Non-SSL: 8080• SSL: 8443
SiteScope SSL	Indicates whether SiteScope uses SSL.
Enable Monitors	Always enables SiteScope monitors, or enables them automatically during monitor configuration and performance test runs.
Description	The description of the topology.




Topology Designer Window

To access	On the navigation bar, select Resources >Topologies . Select a topology, and click Design Topology .
Important information	After you have designed a topology for your performance test, you must select it for your test. For more details, see "Performance Test Designer > Topology " on page 62.

Relevant tasks	"How to Design Topologies" on page 49
See also	"Topologies Overview" on page 49



User interface elements are described below:

UI Elements	Description
	Save Topology. Enables you to save your topology.
	Cut/Paste selected items. Enables you to cut and paste the selected topology from one topology folder to another.
	Copy selected items. Enables you to copy items selected on the canvas.
	Delete selected items. Enables you to delete items selected on the canvas.
	Undo/Redo. Enables you to undo or redo the previous action.
	Zoom in/Zoom out. Enables you to zoom in and out of the canvas.
	Actual size. Restores the whole topology design to its normal size. This button is enabled when the Zoom In and Zoom Out buttons are in use.
	Fit whole screen. Enables you to fit the entire topology design to the current screen size.
	<p>Configure Monitors. Opens the Configure Monitors dialog box, enabling you to manually configure SiteScope monitors on the selected node. For details about creating SiteScope monitors, see the <i>HP SiteScope User Guide</i>.</p> <p>Note: When configuring monitors for these components in SiteScope, the value for Monitor Run Settings > Frequency should be changed to a more suitable value, such as 5 - 15 seconds.</p>
	Deploy Monitor Templates. Opens the Deploy Monitor Templates Status dialog box, enabling you to configure SiteScope monitors on the selected node automatically by deploying a template monitor set.
	Deploy PAL Templates from Production. Opens the Deploy PAL Templates from Production dialog box, enabling you to import PAL templates from a production data set to the selected node. For more details, see "Deploy PAL Templates from Production Dialog Box" on page 61 .
	Export Topology. Enables you to export the whole area of the topology, or only the visible region of the topology to an image file.

UI Elements	Description
Palette tab	<p>Enables you to select components to add to the canvas.</p> <p>The palette includes various types of server categories, as well as a Miscellaneous category. This category includes nodes that are not necessarily AUT-specific but that complete the topology design, such as a user or a client workstation.</p>
AUT Hosts tab	<p>Enables you to manage all AUT hosts defined in the AUT host pool. Includes the following options:</p> <ul style="list-style-type: none">  Add New AUT Host. Opens the Add AUT Host dialog box, enabling you to add a new AUT host. For more details, see "Add / Update AUT Host Dialog Box" below. <p>Tip: If you have a list of AUT hosts set up in an Excel file, you can import this list instead of adding the hosts one by one. For details, refer to the <i>HP ALM Lab Management Guide</i>.</p>  Update AUT Host. Opens the Update AUT Host dialog box, enabling you to modify AUT host details. For more details, see "Add / Update AUT Host Dialog Box" below.  Delete AUT Host. Deletes selected AUT host.
Topology canvas	Provides a canvas where you can lay out the topology by dragging components/server nodes and linking them to each other.
Properties	<p>Enables you to define properties for the node selected on the canvas.</p> <p>The lower section of the Properties pane displays a description of the selected property.</p>
Navigator	Enables you to drag the topology's structure to a new position on the canvas.

Add / Update AUT Host Dialog Box

This dialog box enables you to create a new AUT host.

To access	<ul style="list-style-type: none"> To add an AUT Host: On the My Performance Center navigation bar, select Resources > Topologies. Click Design Topology. Click AUT Hosts. Click Add New AUT Host . To edit topology details: On the My Performance Center navigation bar, select Resources > Topologies. Click Design Topology. Click AUT Hosts. Select an AUT host and click Update AUT Host .
------------------	--


Important information	<p>When creating an AUT host in ALM, the AUT host is automatically added to the AUT Pool of the project.</p> <p>Tip: You can import a list of AUT hosts from an Excel file. For details, refer to the <i>HP ALM Lab Management Guide</i>.</p>
See also	<ul style="list-style-type: none"> • "Topologies Overview" on page 49 • <i>HP ALM Lab Management Guide</i>.

User interface elements are described below:

UI Elements	Description
Machine Name/IP	The name or IP of the AUT host machine.
Logical Name	The logical name given to the AUT host.
Platform	The base operating system of the AUT host machine: Window or UNIX.
Protocols	<p>The network protocol used for communication with the AUT host (for monitoring purposes).</p> <p>Default value: NetBIOS, WMI,SSH.</p>
User	The user name for logging in to the AUT host machine.
Password	The password for logging in to the AUT host machine.

Deploy PAL Templates from Production Dialog Box

This dialog box enables you to import PAL templates from a production data set to a selected topology node.

To access	On the navigation bar, select Resources >Topologies . Select a topology, and click Design Topology . Click the Deploy PAL Templates from Production  button.
Relevant tasks	<p>"How to Design Topologies" on page 49</p> <p>"How to Work with PAL" on page 339</p>
See also	<p>"Topologies Overview" on page 49</p> <p>"PAL Overview" on page 337</p>

User interface elements are described below:

UI Elements	Description
Name	The name of the selected node.






UI Elements	Description
AUT Host	The name of the AUT Host associated with the selected node.
Select a production data set	Click the down arrow to select a data set file. The data set file is stored as a .zip file.
Templates	Lists the available templates. Select a relevant template.
Settings	Defines the parameters of a selected template.





Performance Test Designer > Topology

This view enables you to select a topology for a performance test.

To access	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Test Management > Test Plan. 2. Select a performance test in the test plan tree and select Edit Test. 3. In the Performance Test Designer window, click Topology.
Important information	You design topologies in the Topologies module. After you have designed topologies, you can select one of them for a performance test.
Relevant tasks	<ul style="list-style-type: none"> • "How to Design a Performance Test" on page 111 • "How to Design Topologies" on page 49
See also	"Topologies Overview" on page 49

User interface elements are described below:

UI Elements	Description
 Select Topology	Opens the Topologies tree in the right pane, enabling you to select a topology for the test.
 Remove Topology	Enables you to remove the selected topology.
 Zoom in	Zoom in. Enables you to zoom into the displayed topology.
 Zoom out	Zoom out. Enables you to zoom out of the displayed topology.
 Fit to panel	Fit to panel. Enables you to fit the topology to the size of the Topology pane.

UI Elements	Description
Topologies tree	<p>Opens when you click Select Topology, enabling you to select a topology for the test.</p> <p>Expand the Topologies tree, select a topology, and click  to move it to the Topology pane on the left.</p> <p>To refresh the tree, click .</p>
Topology pane	Displays the selected topology.
	Saves the topology to the selected test and opens the Run Test dialog box. For more details, see "Run Test Dialog Box" on page 270 .
	Save the topology to the selected test.

Chapter 6: Monitor Profiles

This chapter includes:

- Monitor Profiles Overview65
- How to Create and Configure Monitor Profiles65
- Monitor Profiles User Interface 66

Monitor Profiles Overview

You monitor performance test execution using the Performance Center online monitors. To monitor server resources, you must configure the monitor settings for a performance test. You select the type of monitors to run, the servers whose resources you want to monitor, and add the measurements to monitor for each server. These monitor settings can then be saved as a monitor profile that can be used by any performance test in your project.

For details about creating monitor profiles, see ["How to Create and Configure Monitor Profiles" below](#).

How to Create and Configure Monitor Profiles

This task describes how to create and configure a monitor profile.

Note: This task is part of a higher-level task. For details, see ["How to Manage Testing Assets" on page 39](#).

To learn more about monitor profiles, see ["Monitor Profiles Overview" above](#).



This task includes the following steps:

- ["Prerequisites" below](#)
- ["How to Create and Configure Monitor Profiles" above](#)
- ["Create a monitor profile" on the next page](#)

1. Prerequisites

To use the following monitors, you must first install or configure monitoring components on the server machine. For task details about configuring the monitoring components, see the specific monitoring sections listed below.

- **Citrix.** For task details, see ["How to Set up the Citrix Monitoring Environment" on page 445](#).
- **J2EE & .NET.** For task details, see ["How to Enable and Configure J2EE/.NET Diagnostics" on page 205](#).
- **Network Delay.** For task details, see ["How to Set Up the Network Monitoring Environment" on page 408](#).
- **Oracle.** For task details, see ["How to Set Up the Oracle Monitoring Environment" on page 421](#).
- **UNIX.** For task details, see ["How to Set up the UNIX Monitoring Environment" on page 400](#).

2. Create a monitor profile
- a. On the My Performance Center navigation bar, select **Resources > Test Resources**.
 - b. Click **New Monitor Profile** . The Create New Monitor Profile dialog box, enabling you to add a new monitor profile.
 - c. In the Monitor Profile page, click the **Add Monitor** button . In the Add New Monitor page that opens, select the monitor that you want to run.
 - d. In the Edit Monitor dialog box, enter the required information and select the counters that you want to monitor. The Edit Monitor page varies depending on which monitor type you select:
 - o For user interface details for Windows Resources, UNIX, Apache, MS IIS, MS ASP, Citrix, SQL, or Oracle, see ["Edit Monitor Dialog Box" on page 71](#).
 - o For SNMP monitor user interface details, see ["Edit Monitor \(SNMP\) Dialog Box " on page 73](#).
 - o For SiteScope monitor user interface details, see ["Edit Monitor \(SiteScope\) Dialog Box" on page 74](#).
 - o For Network Delay Time monitor user interface details, see ["Edit Monitor \(Network Delay Time\) Dialog Box" on page 75](#).

Monitor Profiles User Interface

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Edit Monitor Dialog Box	71
Edit Monitor (SNMP) Dialog Box	73
Edit Monitor (SiteScope) Dialog Box	74
Edit Monitor (Network Delay Time) Dialog Box	75
Performance Test Designer > Monitors	77







Test Resources Module

This module enables create and manage monitor profiles and analysis templates.

To access	On the My Performance Center navigation bar, select Resources > Test Resources .
Relevant tasks	<ul style="list-style-type: none">• "How to Create and Configure Monitor Profiles" on page 65• "How to Customize Analysis Templates" on page 233
See also	<ul style="list-style-type: none">• "Monitor Profiles Overview" on page 65• "Analysis Templates Overview"• "My Performance Center Window" on page 23

Test Resources Tree





User interface elements are described below:

UI Elements	Description
	New Folder. Enables you to create a new resource folder.
	New Monitor Profile. Opens the Create New Monitor Profile dialog box, enabling you to add a new monitor profile.
	New Monitor Over Firewall. Opens the Create New Monitor Over Firewall dialog box, enabling you to create a monitor-over-firewall agent.
	New Analysis Template. Opens the Create New Analysis Template dialog box, enabling you to create a new analysis template in Performance Center. For more details, see
	Delete. Deletes selected resource.
	Refresh All. Refreshes the tree so that it displays the most up-to-date information.

Monitor Profile Pane

This pane enables you to view and manage a selected monitor profile.




User interface elements are described below:

UI Elements	Description
	Add Monitor. Opens the Add New Monitor dialog box, enabling you to select a monitor.
	Edit Monitor. Opens the Edit Monitor dialog box, enabling you to add and manage a monitor type for the selected monitor profile. For more details, see "Edit Monitor Dialog Box" on page 71 .
	Delete Selected Item. Deletes the selected monitor profile from the Monitor Profile grid.
	Refresh Monitor List. Refreshes the monitor list so that it displays the most up-to-date information.
Monitor	The name of the monitor.
Server	The server whose resources are being monitored.
Counters	The counters that are being monitored.

Analysis Templates Pane

This pane enables you to create, view, upload and download analysis templates.

User interface elements are described below:





UI Elements	Description
	Upload New Analysis Template Content. Opens the Upload Analysis Template dialog box, enabling you to upload analysis templates to Performance Center. For more details, see "Upload Analysis Template Dialog Box" on page 235 .
	Download Analysis Template Content. Downloads the selected analysis template zip file to your machine.
	Refresh Content. Refreshes the pane so that it displays the most up-to-date information.
Name	The name for the analysis template.
Uploaded By	The user who uploaded the analysis template zip file.
Template File	The name of the analysis template zip file.
Uploaded Date	The date the analysis template zip file was uploaded .

Monitor Profile Page

This page enables you to add and edit monitors that are part of a monitor profile.



To access	Use one of the following: <ul style="list-style-type: none">• In the Test Resources module, select a monitor profile in the test resource tree.• In the Performance Test Designer, click the Monitors tab, and then click View Selected.
Relevant tasks	<ul style="list-style-type: none">• "How to Create and Configure Monitor Profiles" on page 65.• "How to Manage a Performance Test Run" on page 242.

User interface elements are described below:

UI Elements	Description
	Add Monitor. Opens the Add New Monitor dialog box, enabling you to select which monitors to run in the monitor profile.
	Edit Monitor. Opens the Monitor Profile page, enabling you to add and manage a monitor type for the selected monitor profile. For more details, see "Edit Monitor Dialog Box" on page 71.
	Delete Selected Item. Deletes the selected monitor profile from the monitor profile.
	Refresh Monitor List. Refreshes the monitor list so that it displays the most up-to-date information.
Counters	The counters that are being monitored.
Monitor	The name of the monitor.
Server	The server whose resources are being monitored.

Add New Monitors Page

This page enables you to select the monitor type to add to a monitor profile.

To access	<p>Use one of the following:</p> <ul style="list-style-type: none"> • In the Test Resources module, select a monitor profile in the test resource tree and click the Add Monitor button . • In the Run-Time Monitors dialog box, click the Add Monitor button . For more information, see "Monitor Profile Content Dialog Box" on page 276.
Relevant tasks	<ul style="list-style-type: none"> • "How to Create and Configure Monitor Profiles" on page 65 • "How to Manage a Performance Test Run" on page 242


User interface elements are described below:

UI Elements	Description
<ul style="list-style-type: none"> • Windows Resources • Unix Resources • Apache • MS IIS • MS Active Server Pages • Citrix Server • SQL Server • Oracle • TUXEDO • PeopleSoft (Tuxedo) • SAPGUI 	<p>Enables you to select the specific counters for this monitor type. For more information, see "Edit Monitor Dialog Box" on the next page.</p>
SNMP	<p>Opens the Edit Monitors Page, which enables you to select the specific counters that you want to monitor for this monitor type. For more information, see "Edit Monitor (SNMP) Dialog Box " on page 73.</p>

UI Elements	Description
SiteScope	Opens the Edit Monitors Page, which enables you to select the specific counters that you want to monitor for this monitor type. For more information, see "Edit Monitor (SiteScope) Dialog Box" on page 74 .
Network Delay Time	Opens the Edit Monitors Page, which enables you to select the specific counters that you want to monitor for this monitor type. For more information, see "Edit Monitor (Network Delay Time) Dialog Box" on page 75 .


Edit Monitor Dialog Box

This dialog box enables you to define the server whose resources you want to monitor, and to select the counters to monitor.

To access	<ol style="list-style-type: none">1. On the My Performance Center navigation bar, select Resources > Test Resources.2. Select a monitor profile in the test resource tree.3. In the Monitor Profile page, select one of the following: Windows Resources, UNIX Resources, Apache, MS IIS, MS ASP, Citrix, SQL, Oracle.4. Click Edit Monitor .
Important information	This dialog box contains information relevant for the following monitor types: Windows Resources, UNIX Resources, Apache, MS IIS, MS Active Server Pages, Citrix, SQL, Oracle
Relevant tasks	"How to Create and Configure Monitor Profiles" on page 65


User interface elements are described below:

UI Elements	Description
Server	The name or IP address of the server whose resources you want to monitor.
User Name	The monitored server's user name, if relevant.
Password	The monitored server's password, if relevant.


UI Elements	Description
URL (Apache only)	<p>The Server statistics information URL. To verify the statistics information URL, try to view it through the browser using the following format: http://<server_name/IP address>:<port_number>/server-status?auto For example: http://stimpv:80/server-status?auto.</p> <p>Format: Enter the server statistics information URL, without the server name.</p> <p>Default value:/server-status?auto</p> <div> <p>Note: The default port number and URL can vary from one server to another. Consult your Web server administrator.</p> </div> <p>Available for: Apache</p>
Port	<p>The port number of the Apache server.</p> <div> <p>Note: To monitor an Apache server through a firewall, use the Web server port (by default, port 80).</p> </div> <p>Available for: Apache</p>
Client	<p>The SAPGUI client.</p> <p>Available for: SAPGUI</p>
SAP Server	<p>The SAP Server.</p> <p>Available for: SAPGUI</p>
	Click to display a list of available counters.
Available Counters	A list of available counters for the selected monitor.
Selected Counters	A list of selected counters for the monitor.

Edit Monitor (SNMP) Dialog Box

This dialog box enables you to define the SNMP server whose resources you want to monitor, and to select the counters to monitor.


To access	<ol style="list-style-type: none">1. On the My Performance Center navigation bar, select Resources > Test Resources.2. Select a monitor profile in the test resource tree.3. In the Monitor Profile page, select SNMP.4. Click Edit Monitor .
Relevant tasks	"How to Create and Configure Monitor Profiles" on page 65

User interface elements are described below (unlabeled elements are shown in angle brackets):


UI Elements	Description
Server	<p>Enter the name or IP address of the server to monitor.</p> <div>Note: Performance Center connects to default SNMP port 161. To use a different port number, specify the machine name in the following format:</div> <p><server name>:<port number></p>
Concatenate SNMP Levels	For SNMP object nodes with ten or more levels, select to display the sub-levels as a single string, separated by periods (.).
	Click to display a list of available counters.
<choose counters area>	<p>Displays a list of available counters.</p> <p>Default: Displays all nodes of the SNMP objects in a tree-level hierarchy.</p>

Edit Monitor (SiteScope) Dialog Box

This dialog box enables you to define the SiteScope server whose resources you want to monitor, and to select the counters to monitor.


To access	<ol style="list-style-type: none">1. On the My Performance Center navigation bar, select Resources > Test Resources.2. Select a monitor profile in the test resource tree.3. In the Monitor Profile page, select SiteScope.4. Click Edit Monitor .
Relevant tasks	"How to Create and Configure Monitor Profiles" on page 65

User interface elements are described below:

UI Elements	Description
Server	The SiteScope server name.
Port	The SiteScope port. Default: 8888
Use HTTPS	Specify if you are using a secure HTTP connection.
Use Account	Select when SiteScope is working in secure mode, which requires authentication. Enter the SiteScope account name, user name and password in the corresponding fields.
User Name	When Use Account is selected, enter the relevant user name.
Password	When Use Account is selected, enter the relevant password.
	Click to display a list of available counters.

Edit Monitor (Network Delay Time) Dialog Box

This dialog box enables you to define the Network Delay Time server whose resources you want to monitor, and to select the counters to monitor.

To access	<ol style="list-style-type: none">1. On the My Performance Center navigation bar, select Resources > Test Resources.2. Select a monitor profile in the test resource tree.3. In the Monitor Profile page, select Network Delay Time.4. Click Edit Monitor  .
Relevant tasks	"How to Create and Configure Monitor Profiles" on page 65

User interface elements are described below:

UI Elements	Description
Source Machine	<p>The name of the source machine from which you want the network path monitoring to begin.</p> <div>Note: To run the Network Delay Monitor when there are firewalls between the Performance Center Host machine and the source machine, type the server name or IP address of the source machine according to the format:<p><MI Listener machine>:<source machine local key></p><p>Where <code>source machine local key</code> is the unique key that you chose when configuring the Performance Center agent on the source machine.</p><div>Example</div><p>12.12.12.3:vds</p><p>For more information about working with firewalls in Performance Center, see the section about firewalls in the <i>HP ALM Performance Center Installation Guide</i>.</p></div>
Platform	The platform on which the machine runs.






UI Elements	Description
Destination Machine	<p>The name of the machine at the final destination of the path you want to monitor.</p> <p>Note: If the destination machine is localhost, type the local machine's name and not localhost.</p>
Monitor Settings	<ul style="list-style-type: none"> • Send Request Using X protocol. Select the relevant protocol. It is recommended that you keep the default protocol. In Windows, the default is TCP, and in UNIX, the default is UDP. • Send request to port X. Enter the port number being used by the network path. • Enable display of network nodes by DNS names. Select to view the DNS name of each node along the network path, in addition to its IP address. Note that selecting this option decreases the speed of the Network monitor.
Monitor Frequency	<p>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. If you have a long, steady load test, you can increase the interval by several seconds.</p> <p>Default: 3000 milliseconds</p>
Monitoring Packet Retries	<ul style="list-style-type: none"> • Wait Xseconds 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. <p>Default: 3 seconds. If your network is very large and loaded (an internet connection with a low capacity), increase the value by several seconds. If you have a small network (such as a LAN), decrease the value.</p> <ul style="list-style-type: none"> • Number of retries. Select the number of times the Network monitor should try resending a packet to a node if the packet is not initially returned. <p>Default: 0</p>
Use Defaults	Uses the default values.

Performance Test Designer > Monitors

This view enables you to select monitor profiles and monitor-over-firewall agents to use in your performance test.

To access	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Test Management > Test Plan. 2. Select a performance test in the test plan tree and select Edit Test. 3. In the Performance Test Designer window, click Monitors.
Important information	You must have monitor profiles defined before you can select them for the test.
Relevant tasks	<ul style="list-style-type: none"> • "How to Design a Performance Test" on page 111 • "How to Create and Configure Monitor Profiles" on page 65
See also	"Monitor Profiles Overview" on page 65

User interface elements are described below:

UI Elements	Description
 Add Monitor Profile	Opens the Monitor Profiles tree in the right pane, enabling you to select a monitor profile for the test.
 Add Monitor OFW	Opens the Monitors Over Firewall tree in the right pane, enabling you to select a monitor-over-firewall agent for the test.
 View Selected	Opens a window that displays all of the measurements of the selected monitor profile.
 Remove Selected	Removes the selected monitor profile or monitor-over-firewall agent from the test.
Associated Monitors grid	Displays the monitors and monitor-over-firewall agents selected for the test.
Monitor Profile Tree / Monitor Over Firewall Tree	<p>Enables you to select a monitor profile or monitor-over-firewall agent for the test.</p> <p>Expand the Resources tree, select a monitor profile or monitor-over-firewall agent, and click  to move it to the Associated Monitors grid on the left.</p>

Part 3: Performance Testing Timeslots

Chapter 7: Timeslots

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- How to Reserve Timeslots for Performance Testing91
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Performance Testing Timeslots Overview

When running tests, or performing maintenance on host machines (administrators only), the resources needed for these tasks must be available, and must fall within the project and license limits. Performance Center’s timeslots feature enables you to reserve resources in advance to ensure that the required resources are available when you are ready to perform these tasks. Performance Center itself also reserves resources needed for data processing tasks.

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Types of Timeslot Reservations

Timeslots can be reserved for immediate use or they can be reserved in advance for future use. This section describes these two types of timeslot reservations.

Immediate Timeslot Reservations

Scheduling an immediate timeslot reserves resources for a task at hand.

- **Administration:** If you want to perform administrative tasks on particular hosts, such as installing patches, when you start the task—and provided that the hosts are currently available—Performance Center automatically reserves the requested hosts in a maintenance timeslot so that the hosts cannot be used for any other purpose for the duration of your task.
- **Performance Testing:** When you start running a performance test, before the test starts to run, you specify the time and resources you need for the test. Performance Center checks if the required hosts and Vusers are currently available for that amount of time, and that the license and project limits are not exceeded, in which case, you can reserve the hosts and Vusers for that timeslot. If the hosts and Vusers are not available, or license/project limits have been exceeded, you cannot run the test at that time and need to try again at a later time.
- **Data Processing:** When working with Performance Center projects, tasks such as test result analysis, SLA status publication, and trending are performed on a data processor host. Performance Center estimates how long a data processor host is needed for the task at hand. As soon as a data processor becomes available for this task, an immediate timeslot reservation is automatically made.

Advance Timeslot Reservations

If you know which testing resources you need for running a test, or you know the hosts on which you need to perform maintenance, you can reserve the resources for your test in advance for a specified amount of time.

When reserving resources for a testing timeslot, there are two types of timeslot reservations:

- **Performance Test.** Enables you to reserve the resources needed for running a single instance of a performance test.
- **Build Verification Suite.** Enables you to reserve the resources needed for running several functional test sets together with a single instance of a performance test with the purpose of checking the overall status of your build. The tests in the test set are executed consecutively, followed by the single performance test. This type of timeslot reservation enables you to integrate your system with HP Continuous Delivery Automation (CDA) for provisioning, deployment, and so on. For more information, see the *HP Application Lifecycle Management User Guide*.

When reserving a testing timeslot, you can request either specific hosts or automatch hosts. That is, you can specify the exact hosts which will run your test or test set, and if those hosts are available, Performance Center reserves them for you. Alternatively, you can request automatch hosts, which

allows Performance Center to allocate any available host with properties that match your selected criteria.

When you add a test instance to a test set, Performance Center automatically allocates automatch hosts to the test instance based on the test type. You can change the allocation as part of the timeslot reservation.

For performance test timeslots, you must select at least one Controller and one load generator. For more details, see the ["Load Generator Distribution Overview" on page 161](#).

A timeslot can be reserved successfully only if all of the requested resources are available.

Tip: All users in your project can use the timeslot that you have reserved.

It is important to note that many conditions and changes in the system can affect host allocation, and can cause a shuffling around of the hosts. For more details about host allocation and examples of resource shuffling, see ["Host Allocation" on page 85](#).

Automatic Timeslots

Some tests might require a lot of time and many resources. The **Timeslot** feature enables you to reserve these resources when resources are more readily available, and/or when you might not be available to run the test manually. This allows for maximum resource usage because your resources can then be used around the clock.

Example

Suppose a project has a total of eight hosts for allocation and the employees assigned to the project work a standard 09:00-17:00 day. The hours between 09:00 and 17:00 are peak hours for host usage, during which time all the hosts are usually reserved for testing, data processing, and maintenance tasks. Because of this, there may be periods during the day that employees cannot perform tasks because there are no available hosts. In contrast, the non-standard work hours pass with very little host resource usage.

To extend host resource usage, employees might come in early or stay late to run tests, but this only extends the peak usage by one or two hours at the beginning and end of the day.

Reserving timeslots during non-standard work hours and setting the tests to run during these timeslots allows for maximum resource usage.

Best Practices for Reserving Automatic Timeslots

This section describes some best practices to follow when reserving an automatic timeslot:

- Where possible, run the test manually first to get an indication as to how long it takes for the test to run. This information can assist you when selecting the timeslot duration.
- The following suggestions apply to running automatic Performance tests:

Note: When a performance test is added to a Build Verification Suite timeslot, the performance test runs only after all included functional tests have completed running.

- Always ensure that the Scheduler is set to stop as soon as all the Vusers have stopped running. This allows more time for post-run actions during the duration of the timeslot. For details on setting test options, refer to the ["Test Options Dialog Box" on page 146](#).
- If you want to analyze the test results straight after the run, take into account that the analysis process can take a long time, so be sure to reserve enough time for this operation.
- If you want to perform auto-collate and analyze operations at the end of the run, you should take the time required for these operations into account when reserving the timeslot.

Note: To prevent loss of run data, it is recommended, whenever possible, to collate the results immediately after the run finishes. If your timeslot ends before result collation is completed, collation continues as it does not require reserved resources.

- 15 minutes before the end of a timeslot, Performance Center automatically stops the test run. Five minutes before the end of the timeslot, even if all the Vusers have not yet finished running, Performance Center aborts the run. To ensure that the test ends properly as designed, make sure that you reserve more time than defined in the test schedule.

Extending Timeslot Reservations

There may be times when you do not allocate enough time for a test set to finish. For example, when running a test set for the first time, you may be unsure how long the tests will take to complete. You can extend timeslots to allow your tests to finish running.

To extend a timeslot, all necessary testing resources must be available during the extension time. If any of the testing resources are reserved for a different timeslot immediately following yours, you cannot extend the timeslot and tests stop without completing properly.

A performance test is extended manually while the test is running. If you see that a performance test will reach the end of its timeslot before it completes, you can enter a number of minutes to extend the timeslot. For more information, see the ["Timeslot Duration Dialog Box" on page 274](#).

Note: If the Vusers are in the process of stopping gradually, the system will prolong the timeslot automatically for 15 minutes, provided the resources are still available.

Understanding Timeslot Failure

Timeslots can be reserved successfully only when all the requested resources are available for the requested duration of time.

Many factors render a timeslot invalid. Such factors include:

- Changes to the ALM licenses (This does not affect maintenance timeslots)
- Resources become unavailable
- A test linked to a timeslot becomes invalid

In some cases, such as where there is a conflict between hosts, the system can perform a reshuffle of hosts to try to rectify the situation and revalidate the timeslot. For more information, see "[Host Allocation](#)" below. Other factors, such as test invalidation, can be corrected manually.

Tip: You can configure the system to alert you by email when a timeslot becomes invalid. The alert provides details about the cause of the failure. For details on configuring timeslot alerts, refer to the *HP ALM Lab Management Guide*.

Host Allocation

When reserving a timeslot, the system calculates the availability of all the requested hosts and, in the case of a Performance Test timeslot, Vusers. A timeslot can be reserved successfully only if all of the requested hosts can be allocated, and in the case of a Performance Test timeslot, if all the requested Vusers are available.

Note: Performance Testing. You must request at least one Controller and one Load Generator. If you have linked a test to the timeslot, the hosts and Vusers defined in the test are automatically requested for the timeslot.

Hosts are allocated as follows:

- A **specific host** defined in the Testing Host grid can be allocated for testing as long as it is available and operational. A **specific host** can be allocated for maintenance even if it is non-operational.

Note: You can make specific hosts available only to specific users. For details, see the *HP ALM Lab Management Guide*.

- An **Automatch** host is matched up with a specific host that has the requested properties. A host is allocated after the following criteria have been checked:
 - Lab Management and PC create a list of all the hosts in the host pool of the project that are operational and available, and that match the requested properties of the automatch host.

- From this list of candidate hosts, the system allocates the host that best fits the requested properties, taking into account the host priority, the number of pools the host belongs to, the purposes assigned to the host, and the host's attributes. The hosts are then allocated in such a way that other hosts with similar but also additional properties may still be available for allocation to other test executions.

Note: You can block hosts from being included in the automatch selection. For details, see the *HP ALM Lab Management Guide*.

It is important to note that many conditions and changes in the system can occur that can affect host allocation. At such times, the system attempts to optimize the overall resource usage by reshuffling the hosts that are available among the timeslots.

It is not always possible to shuffle the hosts appropriately. When this happens, a timeslot might become **partially allocated**, and thus invalid. As soon as the requested host becomes available again or another host can be allocated instead, the timeslot becomes valid again.

Example

- If an allocated host becomes non-operational, then the system will try to find another host to replace the non-operational host.
- In a version-enabled project, if a test is linked to an automatic timeslot and is checked out, modified, and checked in again before the timeslot starts, the timeslot recalculates the availability of the updated resources.

To view an example of how hosts are allocated, and how they are reshuffled when necessary, see ["Example of Allocating and Reshuffling Hosts" below](#).

Example of Allocating and Reshuffling Hosts

There are many factors that can affect the allocation of hosts among timeslots. Consider the following scenarios which illustrate how hosts are allocated among performance timeslots and how changes in the available testing hosts can affect the host allocation. You will see that Lab Management attempts to optimize the overall resource usage by reshuffling the hosts that are available among the timeslots.

Assume the following hosts belong to the host pool of the project:

Host	Properties
Host1	Controller
Host2	Controller + Load Generator
Host3	Load Generator with the following property: <ul style="list-style-type: none">• Priority = 1_Lowest

Host	Properties
Host4	Load Generator with the following properties: <ul style="list-style-type: none"> • Citrix. The host can run scripts based on Citrix protocols. • Priority = 9_Highest

At 07:00 am, John reserves the following timeslot:

Timeslot	Reserved at	Reserved for	Requested Resources, Properties
TS1	07:00	08:00am - 10:00am	1 Controller, Any 1 Load Generator, Any

John submits the request. The system allocates Host1 as the Controller, leaving Host2 available to serve as either load generator or Controller in other timeslots. Additionally, the system allocates Host4 as the load generator, since it has higher priority than both Host2 and Host3. The following hosts are allocated successfully:

Requested Hosts	Allocated Hosts
1 Controller, Any	Host1
1 Load Generator, Any	Host4



At 07:30 am, Sue submits the following timeslot reservation:

Timeslot	Reserved at	Reserved for	Requested Resources, Properties
TS2	07:30	09:00am - 11:00am Autostart	1 Controller, Any 1 Load Generator, Citrix

Because Host4 is the only Citrix load generator, the system checks if it can allocate a different load generator to John's timeslot so that Host4 can be allocated to Sue's timeslot instead.

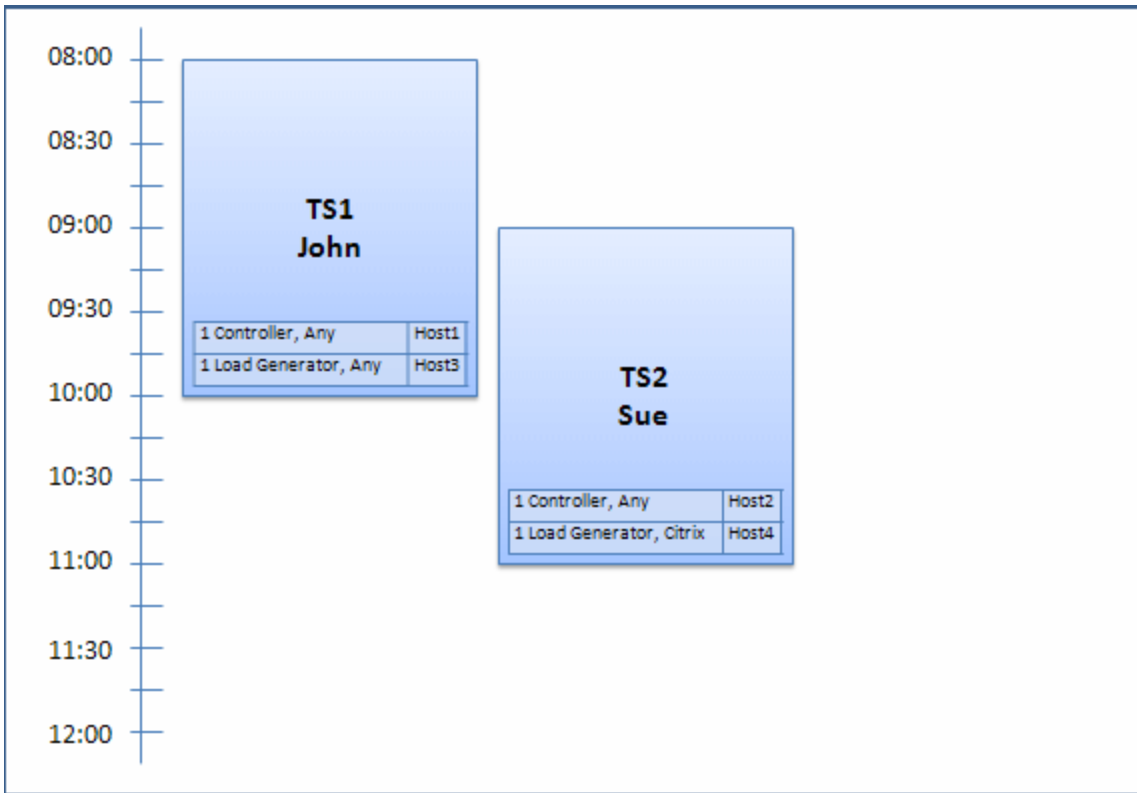
The necessary hosts are available, so the following reshuffle occurs:

- Host3 is allocated to John; Host4 is allocated to Sue
- John's Controller, Host1 remains allocated to John; Host2, also a Controller, (not yet allocated), is allocated to Sue

Sue successfully submits the request. The new host allocation looks as follows:

Timeslot	Requested Hosts	Allocated Hosts
TS1	1 Controller, Any 1 Load Generator, Any	Host1 Host3 (replaced Host4)

Timeslot	Requested Hosts	Allocated Hosts
TS2	1 Controller, Any 1 Load Generator, Citrix	Host2 Host4



Note: Host allocation works on a "first-come, first-served" basis. Since John reserved Host4 first, if there had been no other host to allocate to his timeslot, Host4 would have remained allocated to John, and Sue would not have been able to reserve her timeslot successfully.

At 07:45am, Peter reserves the following timeslot:

Timeslot	Reserved at	Reserved for	Requested Resources, Properties
TS3	07:45	10:00am - 12:00pm	1 Controller, Host2 1 Load Generator, Any

Peter is specifically requesting Host2 for his Controller, and any load generator. The system checks if the requested hosts can be allocated, taking into consideration requests and timing of the other timeslots:

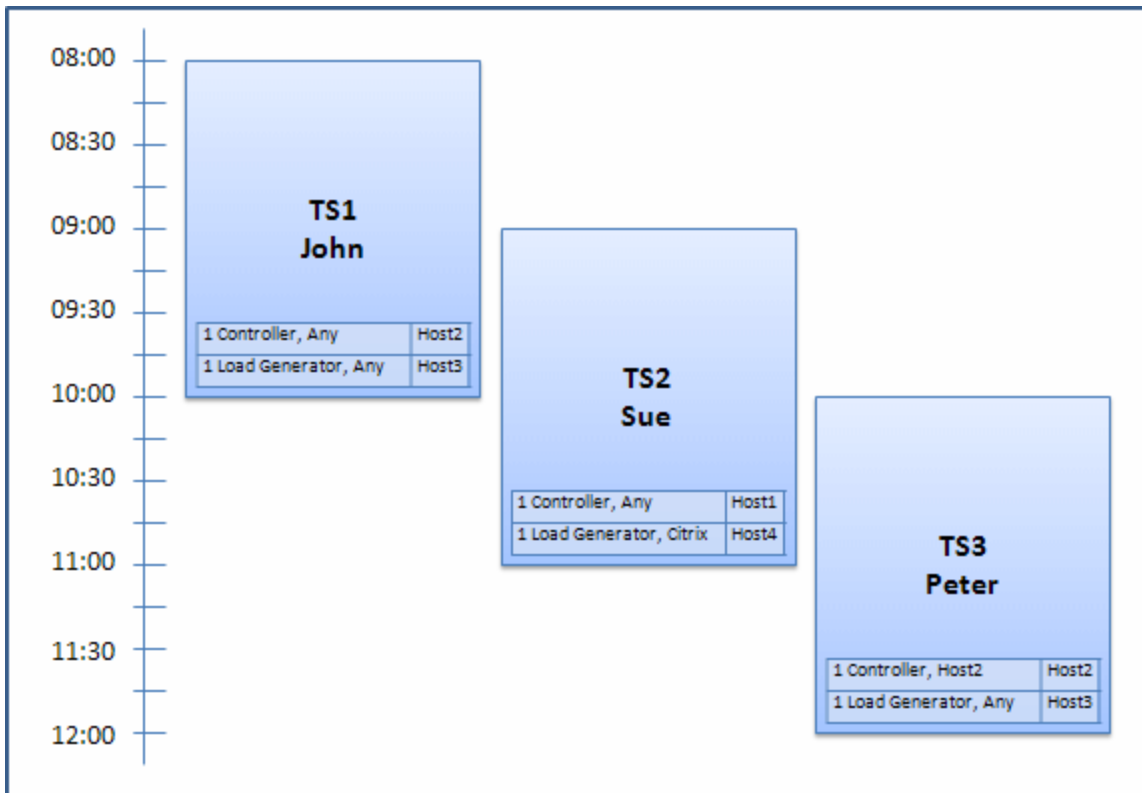
- To allocate Host2 to Peter's timeslot, it must be available by 10:00.
- Sue is willing to have any Controller.
- John's timeslot will end at 10:00 and free resources.

The following reshuffle occurs so that all the timeslots can be accommodated:

- Sue's timeslot gives up Host2, and is allocated Host1 instead; Host4 (Citrix) remains allocated to Sue's timeslot
- Host2 is allocated to John's timeslot; Host3 remains allocated to John's timeslot
- Host2 and Host3 can then be allocated to Peter's timeslot because John's timeslot will be finished by 10:00 when Peter's starts.

Peter successfully submits his request. The new host allocation looks as follows:

Timeslot	Requested Hosts	Allocated Hosts
TS1	1 Controller, Any	Host2
	1 Load Generator, Any	Host3
TS2	1 Controller, Any	Host1
	1 Load Generator, Citrix	Host4
TS3	1 Controller, Host2	Host2
	1 Load Generator, Any	Host3



Note: If John and Peter's timeslots had overlapped, Host2 would not have been available for part of Peter's timeslot. In this case, the reshuffle would not have been possible and Peter would not have been able to reserve his timeslot successfully.

Now let's say at 07:55 Host2 becomes non-operational. As a result, TS1 takes back Host1, and starts at 08:00. It follows from the information above, that TS2 and TS3 both become invalid as their resources have become partially allocated.

Then, at 09:05, Host2 becomes operational again. It is allocated to TS2, and TS2 starts, though five minutes late, but still during the specified retries period. (For details about configuring retries, refer to the *HP ALM Lab Management Guide*.)

At 11:00, TS3 remains invalid (partially allocated) and is unable to start because Host2 is still being used by TS2.

How to Reserve Timeslots for Performance Testing

This section describes how to reserve timeslots.


Note: This task is part of a higher-level task. For details, see ["How to Conduct a Performance Test" on page 18](#).

To learn more about topologies, see ["Performance Testing Timeslots Overview" on page 81](#).

1. Prerequisites

- Ensure that there is a host pool defined and allocated to the project. For information about managing host pools in Lab Management, see the *HP ALM Lab Management Guide*.
- If you want to run a particular test during the timeslot, ensure that an instance of that test is included in a test set.
- Make sure that at least one of the hosts in the host pool can be designated as a Controller, and that Host, Vuser, and Concurrent Run limits are defined in the project settings.

2. Create a timeslot

- a. On the My Performance Center navigation bar, select **Resources > Timeslots**.
- b. On the Timeslots module, click **Create Timeslot** .
- c. Enter the details of the timeslot and select resources. For user interface details, see "[Add New Timeslot / Edit Timeslot Dialog Box](#)" on page 98.

3. Verify availability of requested resources

Do one of the following:

- (Recommended) Click **Calculate Availability**. The system checks the availability of the requested resources. The results of this calculation are displayed in the Timeslot Status tab and graphically on the resource availability timeline.

If the timeslot cannot be reserved, consider the reasons displayed in the **Timeslot Status** tab when reselecting your resources. If the timeslot can be reserved, you can click Submit to save the timeslot.

- Click **Submit**. The system calculates the availability of the requested resources during the selected timeslot. If all of the resources are available, the Add New Timeslot dialog box closes and the timeslot is reserved and displayed in the Timeslots page. If the timeslot cannot be reserved, the reasons are displayed in the Timeslot Status tab.

Timeslots Module

This module enables you to reserve timeslots for running Performance tests. The module contains the following views: Calendar View, Grid View.









To access	On the My Performance Center navigation bar, select Resources > Timeslots .
Relevant tasks	<ul style="list-style-type: none">• "How to Reserve Timeslots for Performance Testing" on the previous page• <i>HP ALM Lab Management Guide</i>






See also	<ul style="list-style-type: none"> • "Performance Testing Timeslots Overview" on page 81 • <i>HP Application Lifecycle Management User Guide.</i>
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Calendar View

This view enables you to view the timeslots in a calendar view. The Calendar view is time-oriented. It allows you to view your timeslots scheduled for the same day, and to get a visual indication of overlapping timeslots.

User interface elements are described below (unlabeled elements are shown in angle brackets):

UI Elements (A-Z)	Description
	Create Timeslot. Opens the Add New Timeslot dialog box, enabling you to reserve timeslots for running performance tests. For more details, see " Add New Timeslot / Edit Timeslot Dialog Box " on page 98.
	Edit Timeslot. Opens the Edit Timeslot dialog box, enabling you to edit a selected timeslot for running performance tests. For more details, see " Add New Timeslot / Edit Timeslot Dialog Box " on page 98.
	Delete Timeslot. Deletes the selected timeslot.
	Abort Timeslot. Aborts the selected timeslot.
 Grid view	Enables you to view timeslots in a flat, non-hierarchical view. Each line in the grid displays a separate timeslot. This view is useful for filtering the timeslots and for viewing the details of multiple timeslots simultaneously.
Today	Displays the current day only on the calendar.
 Day	Displays the date selected in the date selector.
 Work Week	Displays the 5-day work week around the date selected in the date selector.
 Week	Displays the full week around the date selected in the date selector.
<Date navigator>	Enables you to select the day/week to display in the main calendar grid.
My Timeslots for Today	Displays open and future timeslots that you reserved for the current day in the current project.

UI Elements (A-Z)	Description
<Calendar>	<p>Displays the reserved timeslots in your projects in calendar form.</p> <p>The timeslots in the calendar view are color-coded as follows:</p> <ul style="list-style-type: none"> Performance timeslots Maintenance timeslots Data processing timeslots (Performance Center projects only) Build Verification Suite timeslots Read only timeslots, reserved in other projects






UI Elements (A-Z)	Description
Summary tab	<p>Displays a summary of the timeslot selected in the calendar.</p> <ul style="list-style-type: none"> • AUT env. configuration. The set of environment parameters allocated to the timeslot, or Not Connected indication. • Build Verification Suite. The name of the build verification suite associated with the timeslot, or Not Connected indication. Available for: Build Verification Suite timeslots only. • Created by. The user who created the timeslot. • Description. Displays a description of the timeslot. • Duration. The duration of the timeslot (in minutes). • End time. The end time of the timeslot. • Hosts. The number of hosts requested for the timeslot. • Last modified by. The user who last modified the timeslot. • Maintenance state. The state of the maintenance timeslot. Available for: Maintenance timeslots only. • Name. The name of the timeslot. • Performance Test. The name of the performance test linked to the timeslot. • Post-run action. The post-run action specified for the linked performance test. • Priority modified. The date and time that the priority of the timeslot was modified. • Processing state. The state of the data processing timeslot. Available for: Data processing timeslots only. • Project. The project in which the timeslot was created. • Realized environment name. After linking to CDA, the name of the actual environment for the timeslot. Available for: Build Verification Suite timeslots only. • Start. How the timeslot is started: <ul style="list-style-type: none"> ■ Manually. The timeslot reservation reserves testing resources only. ■ Automatically. The linked tests or test sets automatically start running at

UI Elements (A-Z)	Description
	<p>the start of the timeslot, without any manual intervention.</p> <ul style="list-style-type: none"> • Timeslot ID. The timeslot ID. • Topology action. Topological deployment, provisioning and deprovisioning actions defined for the timeslot. Available for: Build Verification Suite timeslots only. • Validity. The validity of the timeslot: <ul style="list-style-type: none"> ■ Valid. The timeslot is valid. ■ Failed. The timeslot failed (Because resources unexpectedly became unavailable; Because of a change in license definitions; Because of changes in project settings; In the case of a testing timeslot, due to changes such as the validity of a test, a test set, an AUT environment configuration, or a build verification suite. • Vusers. The number of Vusers requested for the timeslot.
Host Allocation tab	<p>Displays the allocation of hosts for the selected timeslot. For future timeslots, the host allocation is a temporary allocation.</p> <ul style="list-style-type: none"> • Requested. Displays the requested hosts, including the requested properties. • Actual. Displays the specific hosts allocated for the timeslot. May display the following in place of specific host names: <ul style="list-style-type: none"> ■ Not Allocated. Requested host(s) could not be allocated. ■ Allocated (Deleted). The allocated host was deleted after the timeslot start time. ■ From another pool. The host belongs to a host pool in another project to which you do not have access. <p>Note: If an allocated host becomes unavailable, the system attempts to replace the allocated host with another host with similar properties. If no host is available, the timeslot becomes partially allocated and is rendered invalid.</p>

Grid View

Enables you to view timeslots in a flat, non-hierarchical view. Each line in the grid displays a separate timeslot. This view is useful for filtering the timeslots and for viewing the details of multiple timeslots simultaneously.



User interface elements are described below (unlabeled elements are shown in angle brackets):

UI Elements	Description
 Calendar View	Enables you to view the timeslots in a calendar view. The Calendar view is time-oriented. It allows you to view your timeslots scheduled for the same day, and to get a visual indication of overlapping timeslots.
 Create Timeslot	Opens the Add New Timeslot dialog box, enabling you to reserve timeslots for running performance tests. For more details, see " Add New Timeslot / Edit Timeslot Dialog Box " on the next page.
 Edit Timeslot	Opens the Edit Timeslot dialog box, enabling you to edit a selected timeslot for running performance tests. For more details, see " Add New Timeslot / Edit Timeslot Dialog Box " on the next page.
 Abort Timeslot	Aborts the selected timeslot.
 Delete Timeslot	Deletes the selected timeslot.
Add Filter	Enables you to filter the information being displayed in the timeslots grid. Click the drop-down arrow to apply a filter.
ID	A unique numeric ID for the timeslot, assigned automatically by ALM. This is a read-only field.
Valid	indicates whether the timeslot is valid .
Created By	The user who reserved the timeslot.
Start Time	The date and time that the timeslot is due to start or started.
Duration	The duration of the timeslot.
Hosts	The number of hosts (including Controller) requested for the timeslot.
Vusers	The number of Vusers reserved for the timeslot.
Test	The name of the test.
Run	A unique numeric ID for the run, assigned automatically by ALM. This is a read-only field.
End Time	The date and time that the timeslot ends.
Event Log	Displays a log of events related to the currently selected timeslot. For details, refer to the <i>HP ALM Lab Management Guide</i> .

UI Elements	Description
Host Allocation tab	<p>Displays the allocation of hosts for the selected timeslot. For future timeslots, the host allocation is a temporary allocation.</p> <ul style="list-style-type: none"> • Requested. Displays the requested hosts, including the requested properties. • Actual. Displays the specific hosts allocated for the timeslot. May display the following in place of specific host names: <ul style="list-style-type: none"> ■ Not Allocated. Requested host(s) could not be allocated. ■ Allocated (Deleted). The allocated host was deleted after the timeslot start time. ■ From another pool. The host belongs to a host pool in another project to which you do not have access. <p>Note: If an allocated host becomes unavailable, the system attempts to replace the allocated host with another host with similar properties. If no host is available, the timeslot becomes partially allocated and is rendered invalid.</p>

Add New Timeslot / Edit Timeslot Dialog Box





This dialog box enables you to reserve and manage timeslots for running performance tests.

To access	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Resources > Timeslots. 2. To add a new timeslot, click New Timeslot . To edit a timeslot, select the timeslot and click  Edit Timeslot.
Relevant tasks	"How to Reserve Timeslots for Performance Testing" on page 91
See also	"Performance Testing Timeslots Overview" on page 81

User interface elements are described below (unlabeled elements are shown in angle brackets):

UI Elements	Description
Start	<p>Choose the method for executing linked tests or test sets:</p> <ul style="list-style-type: none"> • Manually. The timeslot reservation reserves testing resources only. You manually execute the linked test or test sets. • Automatically. The linked tests or test sets automatically start running at the start of the timeslot, without any manual intervention. Setting the test to start automatically enables autostart for the timeslot. <div> <p>Note: To set autostart retry settings, refer to "Timeslot Settings Page" in <i>HP ALM Lab Management Guide</i>.</p> </div> <p>Version Control: The last checked-in version of a test always runs, even if you have the test checked out at the start of the timeslot. In version-enabled projects, if a test scheduled to autostart contains scripts that are checked out, the autostart fails.</p>
Name	A descriptive name for the timeslot.
Test instance	<p>Enables you to link a performance test instance to the timeslot.</p> <p>By default, there is no linked test, and the selection is empty.</p> <p>You do not have to link a test to the timeslot. However, linking a test gives you the option of running the test automatically without your manual intervention.</p> <div> <p>Note: If you make changes to the linked test (in the Performance Test Designer), the timeslot is updated automatically, and you do not need to relink the test manually. Bear in mind that changing a linked test might affect the validity of the timeslot.</p> </div> <p>Version Control: You cannot link a test that is checked out.</p>

UI Elements	Description
<Select a test set>	<p>Enables you to link a test set to the timeslot.</p> <p>By default, there is no linked test set, and the selection is empty.</p> <p>You do not have to link a test set to the timeslot. However, linking a test set gives you the option of running the test set automatically without your manual intervention.</p> <p>Note: If you make changes to the linked test set, the timeslot is updated automatically, and you do not need to relink the test set manually. Bear in mind that changing a linked test set might affect the validity of the timeslot.</p>
Vusers	<p>Displays the number of Vusers that are defined in the linked test.</p> <p>Note: The sum of all Vusers reserved for the requested timeslot and other timeslots must not exceed the limits specified in the project settings (Lab Settings > Project Settings), and must not exceed the number of Vusers specified in the license.</p> <p>Available: Only when a performance test has been linked to the timeslot.</p>
VUDs	<p>Displays the number of VUDs that are defined in the linked test.</p> <p>Note: The sum of all VUDs reserved for the requested timeslot and other timeslots must not exceed the limits specified in the project settings (Lab Settings > Project Settings), and must not exceed the number of VUDs specified in the license.</p> <p>For more information about VUDs, refer to the <i>HP ALM Lab Management Guide</i>.</p> <p>Available: Only when a performance test has been linked to the timeslot.</p>
Duration	<p>The duration of the timeslot, in hours and minutes.</p> <p>Note: A timeslot can be reserved for a minimum of 15 minutes and maximum of 480 hours (20 days).</p>
Start Time	The date and time (in hours and minutes) that the timeslot starts.
End Time	The date and time (in hours and minutes) that the timeslot ends.





UI Elements	Description
 Add Automatch LG	<p>Opens the Add Automatch Load Generators dialog box, enabling you to select automatch load generators with specific properties for the timeslot.</p> <p>Note: Performance Test timeslots must include at least one load generator (automatch or specific).</p>
 Add Specific LG	<p>Opens the Add Specific Load Generator dialog box, enabling you to select specific load generators for the timeslot.</p> <p>Note: Performance Test timeslots must include at least one load generator (automatch or specific).</p>
 Edit	<p>Enables you to edit the selected request.</p> <ul style="list-style-type: none">• Selecting an automatch load generator opens the Add Automatch Load Generators dialog box.• Selecting a specific load generator opens the Add Specific Load Generator dialog box.• Selecting a controller opens the Select Controller dialog box.
 Remove	<p>Removes selected load generators.</p> <p>Note: You can change the selected Controller, but you cannot delete it.</p>

UI Elements	Description
Post Run	<p>Enables you to define the action to be taken when the performance test run is complete:</p> <ul style="list-style-type: none"> • Collate. When the run has finished, the run results are collected from all the load generators. <div> <p>Note: To prevent loss of or inaccessibility to run data, select this option so that the results are collected immediately upon completion of the test run.</p> </div> <ul style="list-style-type: none"> • Collate and Analyze. When the run has finished, the run results are collected and analyzed. Data analysis requires some time, depending on the size of the results file. If there is no timeslot available to include the data analysis, then select the Collate option instead, and run late Analysis when a data processor becomes available. You run late Analysis from the Results tab. • None. Frees the machines immediately after the performance test ends. When the run has finished, the run results are left on the load generators. You can analyze the results at a later stage from the Results tab.
AUT Env. Configuration	<p>Enables you to select an AUT environment configuration for the timeslot.</p> <p>By default, there is no configuration selected, and the selection appears as none.</p> <p>To link an AUT Environment Configuration, click the [none] link. A window displaying the AUT Environments tree opens. Navigate to the AUT environment configuration to add and click OK.</p> <p>For more information regarding AUT Environments, see the <i>HP Application Lifecycle Management User Guide</i>.</p>

UI Elements	Description
Deployment	<p>When your system is integrated with HP Continuous Delivery Automation (CDA), these options enable you to select deployment actions for the application under test. For more information on the integration between AUT environment configuration and CDA, see the <i>HP Application Lifecycle Management User Guide</i>.</p> <p>The following options are available:</p> <ul style="list-style-type: none"> • Provision and deploy. Allocates machines on which to deploy the application under test, and prepares the required image so that the application can be installed. That is, the operating system, database server and all required software are installed based on CDA parameters. Following provisioning, the application under test itself is installed. • Redeploy. Deploys and runs the application under test environment on machines that have already been provisioned. • Use deployed environment. Uses an existing installation to run the test. <p>When you select an option, the environment name appears in blue. Click the name to change the selection.</p> <div> <p>Note:</p> <ul style="list-style-type: none"> • When deciding which option to select, bear in mind that the provisioning and deployment actions can be very time consuming. For routine testing, it is advisable to select Use Deployed. • You can arrange for an environment to be deployed and available for your run. Schedule a build verification suite or test set to run for the entire day, and select the environment you want to use. </div>
Calculate Availability	Calculates the availability of the requested resources for the selected timeslot. The results are displayed graphically on the resource availability chart, and a message is displayed in the Timeslot Status tab.
Timeslot Status tab	<p>Displays the status of the timeslot reservation.</p> <p>For details about timeslot failure, see the <i>HP Application Lifecycle Management User Guide</i>.</p>
Pool and Project tab	Displays pool details and project limits related to the timeslot.

Add Automatch Load Generator Dialog Box

This dialog box enables you to reserve and define properties for automatch load generators.

To access	<p>To add an automatch load generator:</p> <ol style="list-style-type: none">1. On the My Performance Center navigation bar, select Resources > Timeslots.2. Click New Timeslot .3. Click  Add Automatch LG. <p>To edit an automatch load generator:</p> <ol style="list-style-type: none">1. On the My Performance Center navigation bar, select Resources > Timeslots.2. Click .3. In the Edit Timeslot dialog box, select the automatch load generator and click  Edit.
Relevant tasks	"How to Reserve Timeslots for Performance Testing" on page 91
See also	"Performance Testing Timeslots Overview" on page 81





User interface elements are described below:

UI Elements	Description
Reserve x Load Generators	The number of automatch load generators to reserve for the timeslot.
Location	Select a load generator location for the reserved load generators.

UI Elements	Description
Host Attributes	<p>Select attributes for the selected load generators.</p> <p>Tip: The list of attributes can be customized. For details, see "Load Generator Distribution Overview" on page 161.</p> <p>Example:</p> <p>You want a Vuser group to use a load generator that is located in London and has medium strength and memory. Under Location, select London, and in the Host Attributes list, select Host memory: Medium and Host strength: Medium. At runtime, the system tries to assign a specific load generator with these properties to the Vuser group.</p>

Add Specific Load Generator Dialog Box

This dialog box enables you to add specific load generators for a selected timeslot.



To access	<p>To add a specific generator:</p> <ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Resources > Timeslots. 2. Click New Timeslot . 3. Click  Add Specific LG. <p>To edit a specific load generator:</p> <ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Resources > Timeslots. 2. Click . 3. In the Edit Timeslot dialog box, select the specific load generator and click  Edit.
Relevant tasks	"How to Reserve Timeslots for Performance Testing" on page 91
See also	"Performance Testing Timeslots Overview" on page 81

User interface elements are described below:

UI Elements	Description
ID	The load generator ID.
Name/IP	The name or IP address of the load generator.
Purpose	The purpose of the load generator, that is, Controller , Load Generator , Data Processor , or a combination of these.
Location	The location of the load generator.
Status	The current state of the load generator: Operational , Non- Operational , or Unavailable .
Installation	The installation type of the host. The following types are available: Unix Load Generator. Indicates that this Unix host is used as a Load Generator for performance tests. Windows Host. Indicates that this Windows host can be used for performance purposes (Controller, Load Generator, or Data Processor). Windows Standalone LG. Indicates that this Windows host is used as a standalone Load Generator for performance tests.
Attributes	The attributes for the load generator.

Select Controller Dialog Box

This dialog box enables you to select a controller for a selected timeslot.

To access	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Resources > Timeslots. 2. Click New Timeslot . 3. Select a controller and click  Edit.
Important information	If you select a Controller host that has multiple purposes (Controller+Load Generator+Data Processor), it is recommended to dedicate the host for Controller functionality, and not to select it for other functionality as well, to avoid performance issues during runtime.
Relevant tasks	"How to Reserve Timeslots for Performance Testing" on page 91
See also	"Performance Testing Timeslots Overview" on page 81

User interface elements are described below:

UI Elements	Description
Select a Controller for the timeslot	<ul style="list-style-type: none"> • Automatch. Enables the system to allocate an available Controller for the timeslot. • Specific. Enables you to select a specific controller for the timeslot.
<Controller grid>	<p>Lists all the specific controller hosts.</p> <p>Note: Enabled when Specific is selected.</p>
ID	The controller ID.
Name/IP	The name or IP address of the controller.
Purpose	The purpose of the controller host, that is, Controller, Load Generator, Data Processor , or a combination of these.
Location	The location of the controller.
Reserve as C + LG	<p>Allows the selected host to serve both as a controller and as a load generator.</p> <p>Note: This option is not recommended. The Controller host should be dedicated for Controller functionality, and it is recommended not to run Vusers on this host.</p> <p>Note: Enabled when Specific is selected.</p>

Part 4: Performance Test Design

Chapter 8: Performance Test Design - Introduction

This chapter includes:

Performance Test Design Overview	111
How to Design a Performance Test	111
Performance Test Design User Interface	115

Performance Test Design Overview

When you design a performance test you create the test, define a workload for the test and, if desired, associate a topology and monitor profiles which provide a diagram of the application under test.

You can also enable a diagnostics module to collect diagnostics data during the test run.

Service Virtualization: Your test can run simulated, virtualized services instead of actual services, for example, if the actual services involve additional costs or if the services are inaccessible at the time you run the performance test.

Performance Test Design Best Practices

Before you start with designing a performance test, it is recommended to:

- Create scripts for your test in the relevant application (VuGen scripts, QuickTest tests, Service Test tests), and upload them to ALM. For details, see the relevant User Guide.
- Design topologies of your application under test. For details, see ["Topologies" on page 48](#).
- Configure the monitor machines or monitor-over-firewall agents that you want to use to monitor the test run, and define monitor profiles for these monitors. For details, see ["Monitor Profiles" on page 64](#).
- To enable diagnostic modules to collect diagnostics data from the test run, you must set up the relevant diagnostics components (server/mediators). For details, refer to the *HP ALM Lab Management Guide*.
- To use simulated services during your test run instead of loading actual services, create your virtualized services in HP Service Virtualization Designer. For details on creating projects that contain virtualized services, see the *HP Service Virtualization User Guide*.

How to Design a Performance Test

This task describes how to design a performance test.

Note: This task is part of a higher-level task. For details, see ["How to Conduct a Performance Test" on page 18](#).

To learn more about performance test design, see ["Performance Test Design Overview" above](#).


This task includes the following steps:

- ["Prerequisites" below](#)
- ["Create a new performance test" below](#)
- ["Design a workload for the test" on the next page](#)
- ["Integrate virtualized services - Optional" on the next page](#)
- ["Select a topology for the test - Optional" on the next page](#)
- ["Select monitor profiles to monitor the test - Optional" on the next page](#)
- ["Enable and configure diagnostics - Optional" on page 114](#)
- ["Define service level agreements for the test - Optional" on page 114](#)
- ["Results" on page 114](#)

1. Prerequisites

- Make sure the relevant scripts/tests have been uploaded/saved to Performance Center. You can use VuGen scripts for performance testing, as well as QuickTest (UFT GUI Tests) and Service Test tests.
 - VuGen scripts: For details on uploading VuGen scripts, see ["Upload VuGen Scripts Dialog Box" on page 45](#).
 - QuickTest tests: For details on saving QuickTest tests (UFT GUI Tests), see the *HP Unified Functional Testing User Guide*.
 - Service Test tests: For details on saving Service Test tests (API Tests), see the *HP Service Test User Guide* or the information about API testing in the *HP Unified Functional Testing User Guide*.
- Under **Lab Resources**, select **Testing Hosts** and make sure that there is at least one Controller, one load generator, and one data processor in the host pool of your project. If not, contact your administrator to add them.
- For optional pre-design best practices, see ["Performance Test Design Best Practices" on the previous page](#).

2. Create a new performance test

- a. On the My Performance Center navigation bar, select **Test Management > Test Plan**.
- b. In the Test Plan Tree, select the **Subject** root folder, click **New Folder** . Type folder name and click **OK**.

- c. Select the folder from the tree.
- d. Click **New Test** . Fill in the fields in the Create New Performance Test dialog box. For more details, see ["Test Plan Module" on page 116](#).

Tip: To simplify the process of creating, designing, and running performance tests, you can use Test Express Designer. This tool guides you through each step, including selecting scripts for a test, scheduling how many Vusers to run in each script and for how long to run them, and selecting a post-run action. During test run, you can view the performance test initialization steps performed by Performance Center and the status for each step. If each step is completed successfully, the performance test continues running and the Performance Test Run page opens. For user interface details, see ["Test Express Designer" on page 253](#).

3. Design a workload for the test

Designing a workload involves creating Vuser groups, distributing Vusers among the Vuser groups, assigning hosts to the Vuser groups, and defining a run schedule for the test. For task details, see ["How to Define a Performance Test Workload" on page 128](#).

Note: Non-English national characters are not supported in group names.

4. Integrate virtualized services - Optional

Configure and integrate virtualized services into the performance test. For task details, see ["How to Add Virtualized Services to Performance Tests" on page 152](#).

You can start adding projects that contain virtualization services to your performance test from the Performance Test Designer at any point in the design process, but we recommend adding projects after you have added relevant scripts to the test.

5. Select a topology for the test - Optional

Note: Before you can select a topology for a test, you must design the topology. To design topologies, see ["How to Design Topologies" on page 49](#).

In the Performance Center Designer's **Topology** tab, click **Select Topology** and select a topology for the test. For user interface details, see ["Performance Test Designer > Topology" on page 62](#).

6. Select monitor profiles to monitor the test - Optional

Note: Before you can select monitors for a test, you must configure monitor machines and

create monitor profiles. For details, see ["How to Create and Configure Monitor Profiles" on page 65](#).

Similarly, you must define monitor-over-firewall agents in the system before you can select them to monitor a test.

In the Performance Center Designer's **Monitors** tab, click **Add Monitor Profile** or **Add Monitor OFW**. The respective tree opens on the right. Select a monitor, and drag and drop it into the left pane.

For user interface details, see ["Performance Test Designer > Monitors " on page 77](#).

7. Enable and configure diagnostics - Optional

Enable and configure diagnostic modules to collect diagnostics data from the test run.

- For ERP/CRM diagnostics, see ["How to Enable and Configure ERP/CRM Diagnostics" on page 205](#).
- For J2EE/.NET diagnostics, see ["How to Enable and Configure J2EE/.NET Diagnostics" on page 205](#).

8. Define service level agreements for the test - Optional

Define service level agreements to measure performance metrics against performance goals. For details, see ["How to Define Service Level Agreements" on page 190](#).

9. Results

When you save the test, it goes through a validation process. The test is valid only if it contains no errors. The result of the validation is stated at the bottom of the Test Designer window.



Click the link to open the Test Validation Results dialog box and view the details of the validation results. For user interface details, see ["Test Validation Results Dialog Box" on page 125](#).

Note: If you make changes to the test, and the test is linked to a timeslot, the timeslot is updated with these changes automatically.

Performance Test Design User Interface

This section includes:






- Test Plan Module 116
- Performance Test Designer > Summary View / Preview Tab117
- Performance Test Designer > Test Runs Trend View / Test Runs Trend Tab121
- Performance Test Designer Window 122
- Create New Performance Test Dialog Box124
- Test Validation Results Dialog Box 125

Test Plan Module

This module enables you to create and manage Performance Center tests in the test plan tree.

To access	On the My Performance Center navigation bar, select Test Management > Test Plan .
Relevant tasks	"How to Design a Performance Test" on page 111
See also	"Performance Test Design Overview" on page 111

User interface elements are described below:

UI Elements	Description
<My Performance Center common UI elements>	For My PC menus and buttons, see "My Performance Center Window" on page 23 .
	New Folder. Opens the Create New Test Folder dialog box, enabling you to add a test subject under a selected folder. Syntax exceptions: A folder name cannot include the following characters: \ ^ *
	New Test. Opens the Create New Performance Test dialog box, enabling you to add a test under a selected folder. For more details, see "Create New Performance Test Dialog Box" on page 124 .
	Upload Script. Opens the Upload VuGen Scripts dialog box, enabling you to upload VuGen scripts to Performance Center. For more details, see "Upload VuGen Scripts Dialog Box" on page 45 .
	Delete. Deletes the selected test or folder in the test plan tree. When deleting a folder, the selected folder is deleted and all related tests are moved to the Unattached folder. You cannot delete the root Subject folder. When deleting a test, the selected test is deleted permanently. In addition, all test runs associated with the deleted test are deleted from the project and removed from any associated test sets. Note: Deleting a performance test that is linked to a timeslot will affect the timeslot.
	Refresh. Refreshes the test plan tree so that it displays the most upto- date information.
Copy/Paste	Right-click a folder/test to copy it within the same tree.

Preview Tab

This tab displays test details and enables you to edit and run your test. For more details, see ["Performance Test Designer > Summary View / Preview Tab "](#) below.

Test Runs Tab

This tab enables you to manage results and related actions for test runs. For more details, see ["Test Lab Module" on page 249](#).

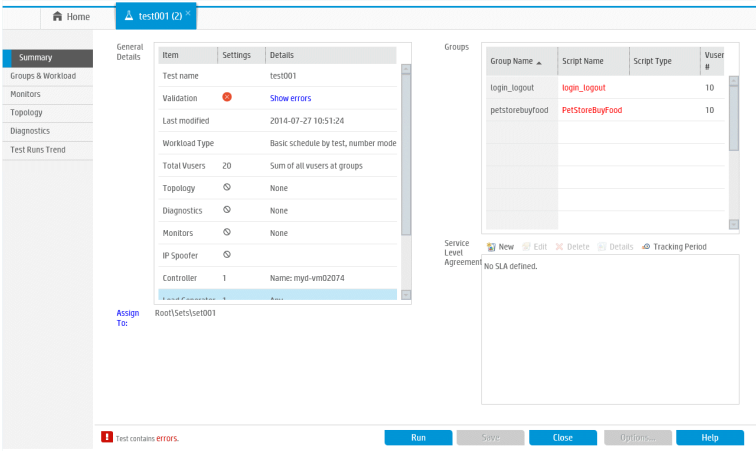
Test Runs Trend Tab

This tab enables you to monitor the test runs of a selected test over time. For more details, see ["Performance Test Designer > Test Runs Trend View / Test Runs Trend Tab "](#) on page 121.

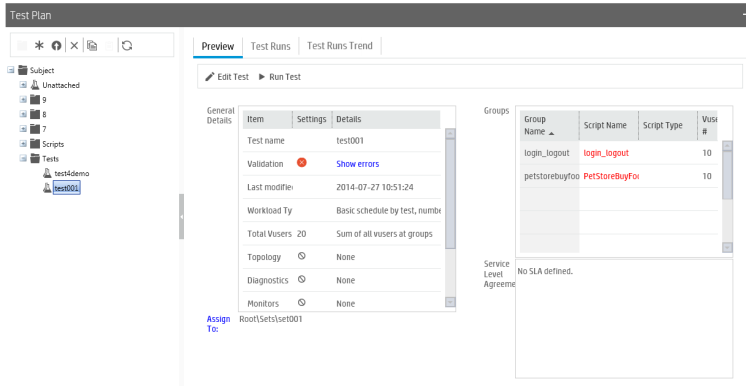
Performance Test Designer > Summary View / Preview Tab

This view displays a detailed summary of a selected performance test.

Summary View




Preview Tab



<p>To access</p>	<p>Summary View:</p> <ol style="list-style-type: none"> On the My Performance Center navigation bar, select Test Management > Test Plan. Select a performance test in the test plan tree and click Edit Test. In the Performance Test Designer window, click Summary. <p>Preview tab:</p> <ol style="list-style-type: none"> On the My Performance Center navigation bar, select Test Management > Test Plan. Click a performance test in the test plan tree.
<p>See also</p>	<ul style="list-style-type: none"> "Performance Test Designer Window" on page 122 "Test Plan Module" on page 116

User interface elements are described below:





UI Elements	Description
 Edit Test	<p>Opens the Performance Test Designer window where you design performance tests. For details, see "Performance Test Designer Window" on page 122.</p> <p>Available in: Preview tab</p>

UI Elements	Description
► Run Test	<ul style="list-style-type: none"> If the selected test is assigned to a single test set, then the Run Test dialog box opens. For more details, see "Run Test Dialog Box" on page 270. If the selected test is assigned to more than one test set, or if the selected test is not assigned to a test set, then the Assign and Select Test Set dialog box opens. Select a test set and click Run. The Run Test dialog box opens. For more details, see "Run Test Dialog Box" on page 270. <p>Available in: Preview tab</p>

General Details Pane

This pane displays general summary information about the test.

User interface elements are described below (unlabeled elements are shown in angle brackets>):

UI Elements	Description
<Settings column icons>	<ul style="list-style-type: none">  Indicates that there is an error in the test design.  Indicates that the test is valid and can run.   Indicates whether: <ul style="list-style-type: none"> A topology is selected for the test Monitors are selected for the test Diagnostics are enabled for the test IP Spoofing is enabled for the test
Test name	The name of the test.
Validation	<p>Indicates whether the test is valid.</p> <p>If the test is not valid or there are notifications about the test, the Details column displays a link to the Test Validation Results dialog box which lists errors and messages related to the test. For details, see "Test Validation Results Dialog Box" on page 125.</p>
Workload Type	The workload type selected for the test.
Total Vusers	The number of Vusers defined in the test.

UI Elements	Description
Topology	Indicates whether a topology is associated with the test, and if so, displays the relevant details.
Diagnostics	Indicates whether diagnostics are enabled for the test, and if so, displays the relevant details.
Monitors	Indicates whether monitor profiles are defined for the test, and if so, displays the relevant details.
IP Spoofer	Indicates whether IP spoofing is enabled for the test. For details, see "Test Options Dialog Box" on page 146 .
Services Virtualization	Indicates whether service virtualization is on or off.
Controller/Load Generator	Displays the number of hosts selected for the test, and their properties.
Assign To	Opens the Assign and Select dialog box, enabling you assign the selected test to a test set, and then run it from the Run Test dialog box. For details on the Run Test dialog box, see "Run Test Dialog Box" on page 270 .

Groups Pane

This pane displays details about the Vuser groups defined in the test.

User interface elements are described below:

UI Elements	Description
Group Name	The name of the Vuser group.
Script Name	The name of the Vuser script associated with the Vuser group.
Script Type	The Vuser script type.
Vusers #/%	The number/percentage of Vusers distributed to the Vuser group.

Service Level Agreement Pane

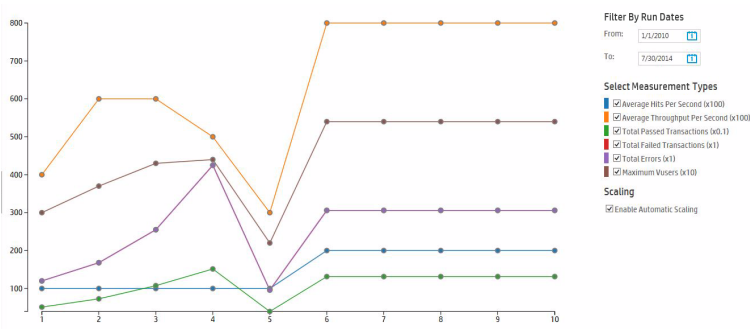
This pane displays service level agreements (SLAs) that are defined for the test.

Important information	<ul style="list-style-type: none">You create, modify, and delete SLAs in the Summary tab.In the Test Design tab you can only view a list of defined SLAs.In the Preview tab you can only view a list of defined SLAs.
Relevant tasks	"How to Define Service Level Agreements" on page 190
See also	"Service Level Agreements Overview" on page 189

For user interface details, see ["Service Level Agreement Pane" on page 195](#).

Performance Test Designer > Test Runs Trend View / Test Runs Trend Tab

Displays a trend graph which monitors the test runs of a selected test over time.



To access	<p>Test Runs Trend View:</p> <ol style="list-style-type: none">On the My Performance Center navigation bar, select Test Management > Test Plan.Select a performance test in the test plan tree and click Edit Test.In the Performance Test Designer window, click Test Runs Trend. <p>Test Runs Trend tab:</p> <ol style="list-style-type: none">On the My Performance Center navigation bar, select Test Management > Test Plan.Click a performance test in the test plan tree.
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See also	<ul style="list-style-type: none">• "Performance Test Designer Window" below• "Test Plan Module" on page 116
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User interface elements are described below:

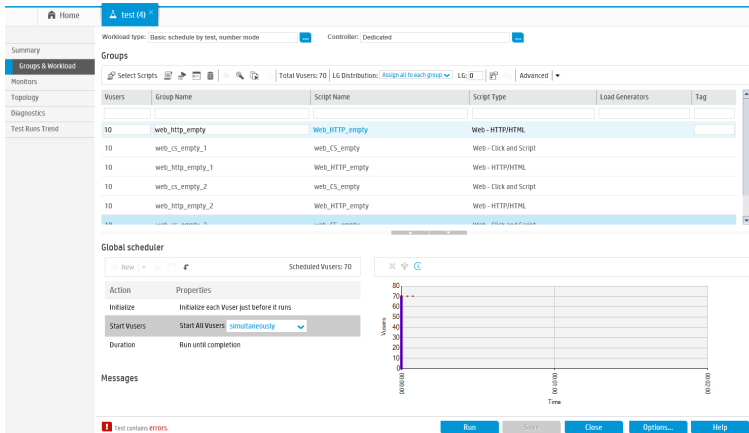
UI Elements	Description
Measurement Value	The value of the measurement being trended.
Run	The number of test runs.
Filter By Run Dates	Select the desired trended time frame for the graph.
Select Measurement Types	Select the desired measurement types: <ul style="list-style-type: none">• Average Hits Per Second. Measures the average number of hits per second within the trended time range.• Average Throughput Per Second. The amount of throughput per second within the trended time range.• Total Passed Transactions. The total number of passed transactions run within the trended time range.• Total Failed Transactions. The total number of failed transactions run within the trended time range.• Total Errors. The total number of errors within the trended time range.• Maximum Vusers. The maximum number of running Vusers during a test run within the trended time range.
Enable Automatic Scaling	Automatically scales the measurements by calculating the best ratio for displaying the graph. The scaling factor is specified next to each measurement.

Performance Test Designer Window

This window enables you to define a performance test. Defining a performance test includes selecting scripts for the test, scheduling how many Vusers to run in each script and for how long to run them, choosing topologies and monitor profiles for the test, and enabling collection of diagnostics data for the test run.

Version Control: If your project is version-enabled:



- To edit a test, you must check it out.
- When you check out a test, only you can edit the test.
- If the test is checked out by another user, you cannot check the test out as well. You can view the last checked in version in read-only mode.



To access	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Test Management > Test Plan. 2. Select a performance test in the test plan tree and click Edit Test.
Relevant tasks	"How to Design a Performance Test" on page 111
See also	<ul style="list-style-type: none"> • "Enabling and Configuring ERP/CRM and J2EE/.NET Diagnostics " on page 204 • "Monitor Profiles" on page 64 • "Topologies" on page 48

User interface elements are described below (unlabeled elements are shown in angle brackets>):

UI Elements	Description
Summary	Displays a summary of the test. For details, see "Performance Test Designer > Summary View / Preview Tab" on page 117 .
Groups & Workload	Enables you to design a workload for the test. For details, see "Performance Test Designer > Groups & Workload" on page 134 .

UI Elements	Description
Monitors	Enables you to select monitors to monitor the test. For details, see "Performance Test Designer > Monitors " on page 77.
Topology	Enables you to associate a topology with the test. For details, see "Performance Test Designer > Topology " on page 62.
Diagnostics	Enables you to select a diagnostics module to collect diagnostics data from the test. For details, see "Performance Test Designer > Diagnostics" on page 207.
Test Runs Trend	Enables you to monitor the test runs of a selected test over time. For details, see "Performance Test Designer > Test Runs Trend View / Test Runs Trend Tab " on page 121.
<Validation message>	<p>When you save the test, this message displays the test validation result. If there are errors or messages, a link to the test validation results is displayed.</p> <p> Test contains errors.</p> <p>For details, see "Test Validation Results Dialog Box" on the next page.</p>
	Opens the Test Options dialog box, enabling you to set general Scheduler and testing options. For details, see "Test Options Dialog Box" on page 146.

Create New Performance Test Dialog Box

This dialog box enables you to create a performance test.

To access	<p>Use one of the following options:</p> <ul style="list-style-type: none"> On the My Performance Center navigation bar, select Test Management > Test Plan. In the test tree, click New Test. On the My Performance Center navigation bar, select Test Management > Test Lab. In the test tree, click Create New Test.
Relevant tasks	"How to Design a Performance Test" on page 111
See also	"Performance Test Design Overview" on page 111

User interface elements are described below:



UI Elements	Description
Test name	The name of the performance test.
Test Plan folder	The folder in the test plan tree in which the test resides. Available in: Test Lab module
Assign to Test Set	The test set in which the test resides.

Test Validation Results Dialog Box

This dialog box displays the validation results of your performance test.

To access	<ol style="list-style-type: none">1. On the My Performance Center navigation bar, select Test Management > Test Plan. Select a performance test in the test plan tree and click Edit Test.2. Use one of the following:<ul style="list-style-type: none">■ Click the validation link at the bottom of the Performance Test Designer window.■ In the Summary view, click the validation link. <div>Note: The validation link appears only if the test is invalid or there are messages about the test. If the test is valid and there are no messages, no validation link is displayed.</div>
Important information	A performance test that is not valid cannot run.
Relevant tasks	"How to Design a Performance Test" on page 111
See also	"Performance Test Designer > Summary View / Preview Tab " on page 117

User interface elements are described below:

UI Elements	Description
Level	The type of message:  Error or  Warning .
Details	Describes the error or warning.

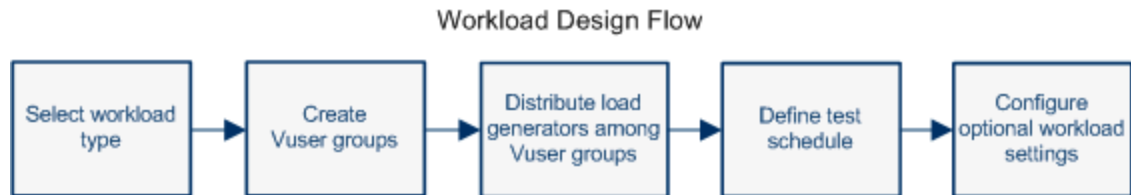
Chapter 9: Defining Performance Test Workloads

This chapter includes:

Performance Test Workload Overview	127
How to Define a Performance Test Workload	128
How to Distribute Vusers Among Vuser Groups	131
Defining Performance Test Workloads User Interface	133

Performance Test Workload Overview

When you create a performance test you need to define a workload for the test. Defining a workload involves selecting a type of workload for the test, creating Vuser groups that emulate groups of users running on the application, and configuring how they should behave during the test.



You select a workload depending on the type of schedule and schedule run mode you want to use to run your test, and depending on how you want to distribute the Vusers among the Vuser groups in your test.

For details on defining a workload for your performance test, see ["How to Define a Performance Test Workload" on the next page](#).

This section also includes ["Rendezvous Points" below](#).

Rendezvous Points

During a test run, you can instruct multiple Vusers to perform tasks simultaneously by using rendezvous points. A rendezvous point creates intense user load on the server, enabling you to measure server performance under load.

Suppose you want to measure the performance of an application when 10 Vusers perform a given task simultaneously. To make sure that multiple Vusers act simultaneously, you create a **rendezvous point** in the Vuser script. When Vusers arrive at a rendezvous point, they are held there by the Controller. The Controller releases the Vusers from the rendezvous either when the required number of Vusers arrives, or when a specified amount of time has passed.

For example, to test an online bank, you could create a test that contains two rendezvous points. The first rendezvous ensures that one thousand Vusers simultaneously deposit cash. The second rendezvous ensures that another thousand Vusers simultaneously withdraw cash. To measure how the server performs when only 500 Vusers deposit cash, you can set the release policy so that the Vusers are released when 500 Vusers arrive at the rendezvous.

You can configure rendezvous policies when defining the test workload. For task details, see ["How to Define a Performance Test Workload" on the next page](#).

You can manually release Vusers waiting at a rendezvous point during a run. For task details, see ["How to Manage a Performance Test Run" on page 242](#).

How to Define a Performance Test Workload

This task describes how to define a performance test workload.

Note: This task is part of a higher-level task. For details, see ["How to Design a Performance Test" on page 111](#).

To learn more about performance testing, see ["Performance Test Workload Overview" on the previous page](#).

This task includes the following steps:

- ["Prerequisite" below](#)
- ["Select a workload" below](#)
- ["Select a Controller" below](#)
- ["Create Vuser groups and distribute Vusers to the groups" on the next page](#)
- ["Distribute load generators among the Vuser groups " on the next page](#)
- ["Define a schedule for the performance test" on the next page](#)
- ["Configure test settings - Optional" on the next page](#)
- ["Define topology, monitoring, and diagnostics options" on page 131](#)

1. Prerequisite


Create a performance test. For details, see ["How to Design a Performance Test" on page 111](#).

2. Select a workload

- a. On the My Performance Center navigation bar, select **Test Management > Test Plan**. Select a performance test in the test plan tree and click **Edit Test**.
- b. In the Performance Test Designer window, click **Groups & Workload**.
- c. Click the **Select Workload Type** button adjacent to the **Workload type** box, and select a type of workload for the test. The type of workload you choose determines the type of schedule by which the test will run, and how the Vusers will be distributed at runtime. For user interface details about the Workload Types dialog box, see ["Workload Types Dialog Box" on page 141](#).

3. Select a Controller

Click the **Select Controller** button adjacent to the **Controller** box, and select a host to act as the Controller for the test. For user interface details about the Select Controller dialog box, see ["Select Controller Dialog Box" on page 142](#).

4. Create Vuser groups and distribute Vusers to the groups
 - a. In the Groups pane, select scripts from the Scripts Tree pane on the right to run in the test. If the Scripts Tree pane is not open, click the **Select Scripts**  button.

Tip: You can select complete folders of scripts, or select multiple scripts while holding down the CTRL key on your keyboard.

- b. (Optional) For each selected script, a Vuser group is created in the Groups grid and is given, by default, the same name as the selected script. You can change the group name if desired.
 - c. Distribute Vusers among the Vuser groups according to the Vuser distribution method you selected in the workload type. For details, see ["How to Distribute Vusers Among Vuser Groups" on page 131](#).

Note: Non-English national characters are not supported in group names.

5. Distribute load generators among the Vuser groups

Select a method by which to distribute the load generators among the Vuser groups, and specify which load generators to distribute to which groups.





For details, see ["How to Distribute Load Generators Among Vuser Groups" on page 162](#).

6. Define a schedule for the performance test

Schedule how the Vuser groups are to run in the test. For details, see ["How to Define a Schedule for the Performance Test" on page 177](#).

7. Configure test settings - Optional

You can configure the following optional settings for your test:

Optional Test Setting	Description
Command line arguments	<p>Sending command line arguments enables you to configure test settings without the need to manually define them in the UI.</p> <p>In the Groups pane, click the Edit Command Line  button. For details, see Edit Command Line in the "Performance Test Designer > Groups & Workload" on page 134.</p>
Rendezvous Points	<p>When you add Vuser groups to the test, their associated scripts are scanned for rendezvous points.</p> <p>To view and manage the rendezvous points, click the View Rendezvous  button. For user interface details, see "Rendezvous Dialog Box" on page 144.</p>
Runtime Settings Configuration	<p>You can configure the runtime settings of uploaded Vuser scripts. Runtime settings are applied to Vusers when the script runs.</p> <p>To open the Runtime Settings dialog box, in the Groups pane toolbar, click the Edit Runtime Settings  button. For more details, see "How to Configure Runtime Settings" on page 467.</p>
Runtime Settings Duplication	<p>You can copy runtime settings from one script in the test to other scripts of the same script type. In the Groups pane toolbar, click the Duplicate Runtime Settings  button.</p> <p>For details, see Duplicate Runtime Settings in the "Performance Test Designer > Groups & Workload" on page 134.</p>
Network Virtualization	<p>Network Virtualization enables you to emulate probable network effects over your network, thereby creating a more realistic performance test.</p> <p>To open the Network Virtualization Settings dialog box, in the Groups pane toolbar, select Advanced > Newtwork Virtualization Settings. For user interface details, see "Network Virtualization Settings Dialog Box" on page 300.</p>

Optional Test Setting	Description
Services Virtualization	<p>Instead of loading actual services, Service Virtualization enables you to use simulated services in your test run.</p> <p>To open HP Services Virtualization dialog box, in the Groups pane toolbar, select Advanced > Services Virtualization. For user interface details, see "HP Service Virtualization Dialog Box" on page 154.</p>
PAL Reports	<p>Enables you open a PAL production report. To open the Select PAL Report dialog box, select Advanced > Open PAL Report. For more details on PAL, see "How to Work with PAL" on page 339.</p>
Analysis Template	<p>Enables you to select a customized template for the analysis report of your performance test. To open the Analysis Template Options dialog box, select Advanced > Analysis Template Options. For user interface details, see "Analysis Template Options Dialog Box" on page 236.</p>
Terminal Services	<p>When using manual load generator distribution, you can open terminal services sessions on the load generators, enabling you to run multiple GUI Vusers simultaneously on the same application. For details, see "Terminal Services Dialog Box" on page 224.</p>

8. Define topology, monitoring, and diagnostics options

For task details, see ["How to Design a Performance Test" on page 111](#).

How to Distribute Vusers Among Vuser Groups

This task describes how to distribute Vusers in a performance test among the Vuser groups. You distribute Vusers according to the Vuser distribution method you selected for the workload.

You can distribute the Vusers by number, by percentage (manually), or by percentage using the relative distribution method.

Note:

- In workloads with group schedules, you can distribute Vusers by number only.
- This task is part of a higher-level task. For details, see ["How to Define a Performance Test Workload" on page 128](#).

This task describes how to:

- ["Distribute Vusers by number" below](#)
- ["Distribute Vusers by percentage" below](#)
- ["Distribute Vusers by percentage using relative distribution" below](#)

Distribute Vusers by number

Note: This procedure assumes that you selected **By number** when you selected the workload for the test. For user interface details, see ["Workload Types Dialog Box" on page 141](#).

- **Basic schedule:** In the Performance Test Designer window, in the Groups grid, select a group, and in the **Vusers** column, enter the number of Vusers to allocate to that group.
- **Real-world schedule:** You define the number of Vusers when you define the test schedule. For details, see ["How to Define a Schedule for the Performance Test" on page 177](#).

For both run modes, the total number of the Vusers assigned to all the Vuser Groups is displayed in the Groups pane toolbar.

Distribute Vusers by percentage


Note: This procedure assumes that you selected **By percentage** when you selected the workload for the test. For user interface details, see ["Workload Types Dialog Box" on page 141](#).

1. In the Performance Test Designer window, in the Groups grid, in the **Vusers-100%** column for each group, enter the percentage of the total number of Vusers to allocate to the group.

Note: The total of all the groups' percentages must be exactly 100% for the test to be valid.

2. Allocate a total number of Vusers to run in the test:
 - **Basic mode:** In the Groups pane, enter the number of Vusers in the **Total Vusers** box.
 - **Real-world mode:** You define the number of Vusers when you define the test schedule. For details, see ["How to Define a Schedule for the Performance Test" on page 177](#).

Distribute Vusers by percentage using relative distribution

In the Performance Test Designer window, in the Groups grid, click the **Relative Distribution**  button to define a ratio by which to distribute the Vusers from each group. For user interface details, see **Relative Distribution** in the ["Performance Test Designer > Groups & Workload" on page 134](#).

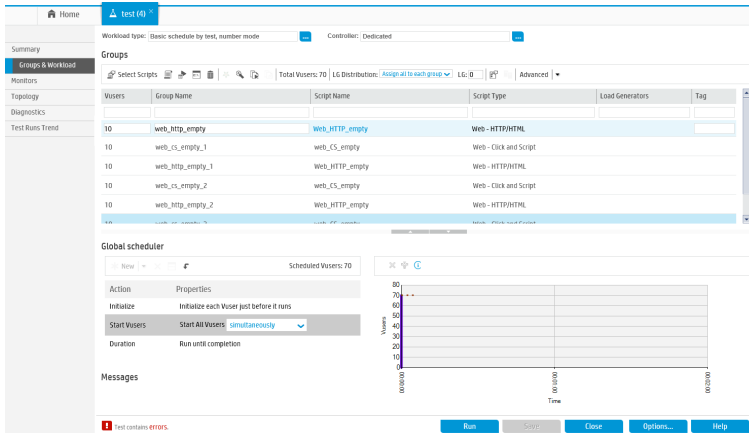
Defining Performance Test Workloads User Interface

This section includes:

- Performance Test Designer > Groups & Workload 134
- Workload Types Dialog Box 141
- Select Controller Dialog Box 142
- Relative Distribution Dialog Box 143
- Rendezvous Dialog Box 144
- Test Options Dialog Box 146

Performance Test Designer > Groups & Workload



This view enables you to define a workload for the test. You select a Controller for the test, scripts to run in the test, and load generators on which to run the Vusers. You also define a run schedule for the test.



<p>To access</p>	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Test Management > Test Plan. 2. Select a performance test in the test plan tree and click Edit Test. 3. In the Performance Test Designer window, click Groups & Workload.
<p>Relevant tasks</p>	<p>"How to Define a Performance Test Workload" on page 128</p>
<p>See also</p>	<p>See "Groups Pane" on the next page for details about:</p> <ul style="list-style-type: none"> • View Script dialog box • Edit Command dialog box • Relative Distribution dialog box • Duplicate Runtime Settings dialog box • Duplicate Scheduler Settings dialog box • Analysis Template Options dialog box



Workload Tab Common Area





User interface elements are described below:





UI Elements	Description
Workload Type	Displays the workload type for the test. Click  to open the Workload Types dialog box and select a type of workload for the test. For details, see "Workload Types Dialog Box" on page 141 .
Controller	Displays the Controller selected for the test. Click  to open the Select Controller dialog box and select a Controller for the test. For details, see "Select Controller Dialog Box" on page 142 .


Groups Pane

User interface elements are described below (unlabeled elements are shown in angle brackets>):




UI Elements	Description
 Select Scripts	Select Scripts. Opens the Scripts Tree pane, enabling you to select scripts to run in your test. For details, see "Scripts Tree pane" on page 140 .
	<p>View Script. Opens the script selected in the Groups grid in a read-only window.</p> <p>Versioning:</p> <ul style="list-style-type: none"> As long as a script is checked in, the same version is displayed for all users. If you have checked out the script, the script displayed is your own private copy of the script. If you make changes to the script, other users will not be able to see your changes until you check the script back in. Similarly, if other users check in changes to this script, you will not be able to see them as long as you have the script checked out. If another user checks out the script, you will still see the latest checked-in version.

UI Elements	Description
	<p>Edit Runtime Settings. Opens the Runtime Settings dialog box for the selected script, enabling you to configure its runtime settings.</p> <p>To use the default settings, click Use Defaults. Vuser scripts have individual runtime setting defaults for VuGen and the Controller, to support the debugging environment of VuGen and the performance testing environment of the Controller.</p> <p>For more information, see "Runtime Settings Configuration" on page 464.</p>
	<p>Edit Command Line. Opens the Command Line dialog box, enabling you to pass arguments to instruct the Controller how to behave. By passing arguments in the command line, you configure test settings without the need to manually define them in the user interface.</p> <ul style="list-style-type: none"> • Command line. Type the name and value of the parameter you want to send using the format, <Parameter_Name> <value>. <div style="background-color: #f0f0f0; padding: 10px; margin: 10px 0;"> <p>Note: For information about the command line parsing functions, or for details about including arguments on a command line, see the <i>HP LoadRunner Online Function Reference</i>, provided with HP Virtual User Generator.</p> </div> <ul style="list-style-type: none"> • <Command line options>. Select whether to: <ul style="list-style-type: none"> ■ Apply the command line to the current script only ■ Apply the command line to all the scripts in the test ■ Add the command line to all the scripts in the test <div style="background-color: #f0f0f0; padding: 10px; margin: 10px 0;"> <p>Note: You cannot pass arguments to Service Test tests.</p> </div>
	<p>Delete Group. Deletes the selected Vuser group.</p>
	<p>Relative Distribution. Opens the Relative Distribution dialog box, enabling you to provide a ratio by which Performance Center calculates the percentage of Vusers to distribute to each Vuser group. For details, see "Relative Distribution Dialog Box" on page 143.</p> <div style="background-color: #f0f0f0; padding: 10px; margin: 10px 0;"> <p>Note: Enabled in percentage mode only.</p> </div>

UI Elements	Description
	<p>View Rendezvous. Opens the Rendezvous dialog box, enabling you to enable or disable rendezvous points, and set policies for how to treat Vusers when they arrive at a rendezvous point. For details, see "Rendezvous Dialog Box" on page 144.</p>
	<p>Duplicate Runtime Settings. Opens the Duplicate Runtime Settings dialog box, enabling you to select a source script, and copy its runtime settings to one or more scripts of the same type.</p> <p>Note: The source and destination scripts must be of the same script type.</p>
	<p>Duplicate Scheduler Settings. Opens the Duplicate Scheduler Settings dialog box, enabling you to select a source Vuser group, and copy its schedule settings to one or more Vuser group in the test.</p> <p>For details, see the instructions on how to copy group schedules in "How to Define a Schedule for the Performance Test" on page 177.</p> <p>Available for: Schedules by group only.</p>
Total Vusers	<p>Displays the total number of Vusers distributed to all of the Vuser groups participating in the test. For details, see "How to Distribute Vusers Among Vuser Groups" on page 131.</p>
LG Distribution	<p>Enables you to select a method for assigning load generators to the Vuser groups in the test.</p> <ul style="list-style-type: none"> • Assign all to each group. All of the automatch load generators are distributed to all of the participating Vuser groups. • Assign manually. Load generators are distributed manually. <p>For details, see "Load Generator Distribution Overview" on page 161.</p>
LG	<p>Displays the number of automatch load generators selected for the test.</p> <p>Note: Available only if Assign all to each group is selected in the LG Distribution box.</p>
	<p>Automatch Load Generator Properties. Opens the Automatch Load Generator Properties dialog box, enabling you to specify properties for automatch load generators. For details, see "Automatch Load Generators Properties Dialog Box" on page 171.</p>

UI Elements	Description
	<p>Assign Load Generators to Multiple Groups. Opens the Assign Load Generators to Multiple Groups dialog box, enabling you to assign one or more load generators—automatch or specific—to multiple Vuser groups at once. You can also use this dialog box to remove one or more load generators from multiple Vuser groups at once. For details, see "Assign Load Generators to Multiple Groups Dialog Box" on page 165.</p> <p>Available for: The Assign manually load generator distribution method. See "LG Distribution" on the previous page.</p>
Advanced > Network Virtualization Settings	<p>Opens the Network Virtualization Settings dialog box, enabling you to emulate probable Network Virtualization effects over your network, thereby creating a more realistic performance test.</p> <p>For details, see "Network Virtualization Settings Dialog Box" on page 300.</p>
Advanced > Services Virtualization	<p>Opens the Configure Service Virtualization dialog box, enabling you to integrate virtualized services into your performance test. For user interface details, see "HP Service Virtualization Dialog Box" on page 154.</p> <p>For details on creating projects that contain virtualized services, see the <i>HP Service Virtualization User Guide</i>.</p> <p>For task details on using virtualized services in performance tests, see "How to Add Virtualized Services to Performance Tests" on page 152.</p>
Advanced > Open PAL Report	<p>Opens the Select PAL Report dialog box, enabling you to select a PAL production report. For more details on PAL, see "How to Work with PAL" on page 339.</p>
Advanced > Analysis Template Options	<p>Opens the Analysis Template Options dialog box, enabling you to select a customized template for the analysis report of your performance test.</p> <p>For task details on using customized analysis templates, see "How to Customize Analysis Templates" on page 233.</p>
<grid filters>	<p>Located under each column name. Displays the filter that is currently applied to a column. If the filter box is empty, no filter is currently applied to the column.</p> <p>Type directly into the box and press ENTER to apply the filter.</p>

UI Elements	Description
Groups grid	<p>Displays the Vuser groups participating in the test.</p> <ul style="list-style-type: none"> • Vusers. (By Number mode) The number of Vusers distributed to the Vuser group. Default: 10 Vusers • Group Name. The name of the Vuser group. • Script Name. The name of the Vuser script associated with the Vuser group. When the group is selected, the script name turns into a link. To select a different script, click the script name and select a script. • Load Generators. The load generators assigned to the Vuser group. • Script Type. The Vuser script type. • Tag. A tag for the Vuser group. Tagging enables categorization and easy identification of Vuser groups. <div> <p>Examples:</p> <ul style="list-style-type: none"> ■ If you have finished configuring runtime and Scheduler settings for the group, you could tag the group Done. For a group that is not yet done, you could tag TODO. ■ Groups running against the Defects or Requirements modules, could be tagged DEF or REQ. </div>

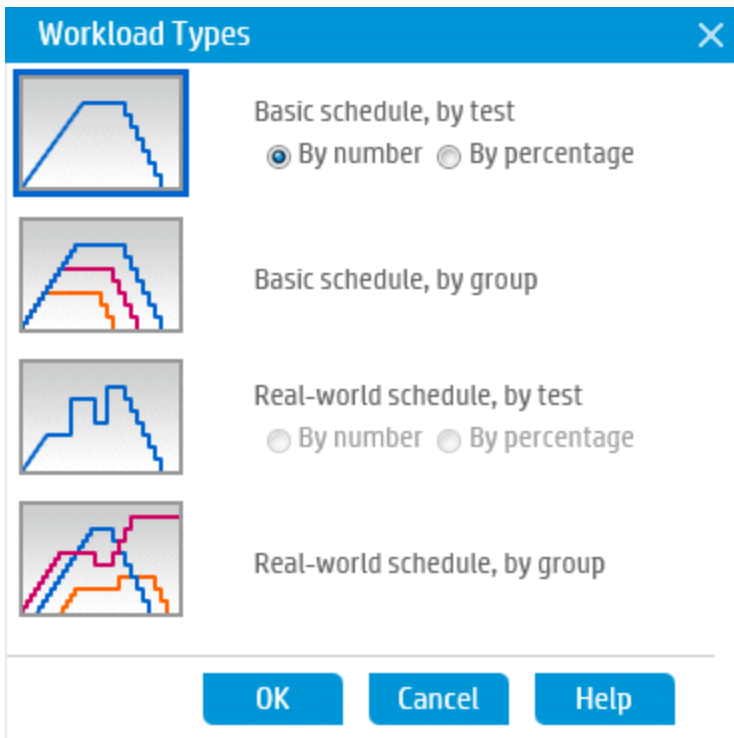
UI Elements	Description
Scripts Tree pane	<p>Opens on the right when you click  Select Scripts . Lists all the VuGen scripts, UFT GUI tests, and UFT API tests that have been uploaded to the project.</p> <p>Note: HP Unified Functional Testing (UFT) comprises the product formerly known as HP QuickTest Professional and the product known as HP Service Test.</p> <ul style="list-style-type: none">• Functionality provided by QuickTest is now known as GUI testing in UFT.• Functionality provided by Service Test is also known as API testing in UFT. <p>Drag and drop one or more scripts from the tree into the Groups pane or select the scripts and click  .</p> <p>Tip: You can select whole folders of scripts, or select multiple scripts while holding down the CTRL key on your keyboard.</p> <p>To keep the Scripts Tree open, click the Dock  button .</p>


Global Scheduler Pane

The Global Scheduler pane enables you to define a run schedule for your test. For details, see ["Global Scheduler Pane" on page 182](#).

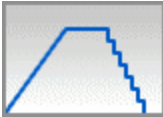
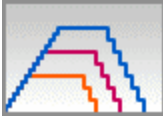

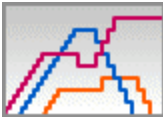
Workload Types Dialog Box

This dialog box enables you to select a type of workload for the performance test. The type of workload you choose determines the type of schedule by which the test will run, and how the Vusers will be distributed at runtime.




To access	<ol style="list-style-type: none">1. In the Performance Test Designer window, click Groups & Workload.2. Next to the Workload type box, click Select Workload Type .
Important information	If you change the workload, Scheduler settings are lost.
Relevant tasks	"How to Define a Performance Test Workload" on page 128
See also	<ul style="list-style-type: none">• "Performance Test Workload Overview" on page 127• "Scheduling Performance Tests Overview" on page 175

User interface elements are described below:

UI Elements	Description
	<p>Basic schedule, by test. Select this workload type to configure all the Vuser groups to run together on the same test schedule, in the basic run mode.</p> <p>Vusers can be distributed:</p> <ul style="list-style-type: none"> • By number. The Vusers are distributed by number. • By percentage. The Vusers are distributed by percentage.
	<p>Basic schedule by group. Select this workload type to configure each Vuser group to run on its own test schedule, in the basic run mode.</p> <p>In group schedules, Vusers are always distributed by number.</p>
	<p>Real-world schedule, by test. Select this workload type to configure all the Vuser groups to run together on the same test schedule, in the real-world run mode.</p> <p>Vusers can be distributed:</p> <ul style="list-style-type: none"> • By number. The Vusers are distributed by number. • By percentage. The Vusers are distributed by percentage.
	<p>Real-world schedule, by group. Select this workload type to configure each Vuser group to run on its own test schedule, in the real-world run mode.</p> <p>In group schedules, Vusers are always distributed by number.</p>

Select Controller Dialog Box

This dialog box enables you to select a Controller for the performance test.


To access	<ol style="list-style-type: none"> 1. In the Performance Test Designer window, click Groups & Workload. 2. Next to the Controller box, click .
Important information	<ul style="list-style-type: none"> • You select only one Controller for a performance test. • Due to possible heavy load on the Controller and load generator hosts during a performance test, if you select a C+LG host for Controller functionality, it is best practice not to assign it as a load generator as well.
Relevant tasks	"How to Define a Performance Test Workload" on page 128
See also	"Performance Test Workload Overview" on page 127

User interface elements are described below:

UI Elements	Description
Automatch: Dedicated Controller	<p>At runtime, an available Controller host in the host pool of the project is allocated for the test run, and is dedicated for Controller functionality. Because it is a dedicated Controller, it cannot be allocated as a load generator as well.</p> <p>For details about host allocation, see "Host Allocation" on page 85.</p>
Specific	<p>Select this option if you want a specific Controller host. The grid lists the specific Controller hosts available in the project's host pool.</p> <div><p>Note: If a host is marked with a red asterisk (*), it is already assigned to a Vuser group as a load generator. Due to possible heavy load on the Controller and load generator hosts during a performance test, if a host is assigned to a Vuser group, it is best practice not to select it as a Controller as well.</p></div>

Relative Distribution Dialog Box

This dialog box enables you to provide a ratio by which Performance Center calculates the percentage of Vusers to distribute to each Vuser group.



To access	In the Groups & Workload view, click Relative Distribution  .
Important information	Enabled in percentage mode only.
Relevant tasks	<ul style="list-style-type: none">• "How to Distribute Vusers Among Vuser Groups" on page 131• "How to Define a Performance Test Workload" on page 128.
See also	"Performance Test Designer > Groups & Workload" on page 134

User interface elements are described below (unlabeled elements are shown in angle brackets>):

UI Elements	Description								
Ratio	<p>The part of total number of Vusers to distribute to the corresponding Vuser group.</p> <p>Example:</p> <p>To distribute 200 Vusers among the groups at a ratio of 1:1:3, type 1 for group1, 1 for group2, and 3 for group3.</p> <p>20% of the Vusers are assigned to group1, 20% to group2, and 60% to group3. That is, 40 Vusers are assigned to group1, 40 Vusers to group2, and 120 Vusers to group3.</p> <table border="1"> <thead> <tr> <th>Ratio</th><th>Group Name</th></tr> </thead> <tbody> <tr> <td>1</td><td>group1</td></tr> <tr> <td>1</td><td>group2</td></tr> <tr> <td>3</td><td>group3</td></tr> </tbody> </table>	Ratio	Group Name	1	group1	1	group2	3	group3
Ratio	Group Name								
1	group1								
1	group2								
3	group3								
Group Name	The name of the Vuser group.								







Rendezvous Dialog Box

This dialog box enables you to enable/disable rendezvous points defined in the Vuser scripts and to set rendezvous policies that determine how the Controller handles Vusers at a rendezvous point.

To access	<ul style="list-style-type: none"> • During the test design phase: In the Groups & Workload view, click View Rendezvous . • During the test run: On the Performance Test Run page, click Rendezvous .
Important information	<p>Rendezvous points are inserted in the Vuser script when creating the script in VuGen. For information, see the <i>HP Virtual User Generator User Guide</i>.</p> <p>Rendezvous points cause multiple Vusers to perform tasks at exactly the same time, thereby creating intense user load on the server. Enabling rendezvous points enables you to check your system's response under specific load.</p> <p>For each rendezvous point, you can set Policy attributes. During the test run, you can manipulate the Vuser behavior at the rendezvous points.</p>

Relevant tasks	<ul style="list-style-type: none"> • "How to Define a Performance Test Workload" on page 128. • "How to Manage a Performance Test Run" on page 242
See also	"Rendezvous Points" on page 127


User interface elements are described below (unlabeled elements are shown in angle brackets):

UI Elements	Description
	Select all. Selects all the rendezvous points in the grid.
	Select none. Clears all the selected rendezvous points in the grid.
	<p>Switch between selected/non selected. Inverts the current selection of rendezvous points.</p> <p>That is, the non-selected rendezvous points are selected, and the selected rendezvous points are cleared.</p>
 	Enables/Disables the selected rendezvous point. Enabling or disabling a rendezvous point influences the level of server load.
	<p>Releases the Vusers at the selected rendezvous points.</p> <p>Available from: Performance Test Run page only</p>
<Rendezvous grid>	<p>Displays the details about the rendezvous points in the scripts:</p> <ul style="list-style-type: none"> • Name. The name of the rendezvous point as given in the VuGen script. • Status. The status of the rendezvous point: Enabled or Disabled. • Contained in Scripts. The names of the scripts in which the rendezvous point was defined. <p>You select a rendezvous point by clicking it.</p>

UI Elements	Description
Policy	<p>Enables you to determine how the Controller handles Vusers at a rendezvous point. You set the following policy attributes for each rendezvous:</p> <ul style="list-style-type: none"> • Release when. Sets how many Vusers are released from a rendezvous point at a time. <ul style="list-style-type: none"> ■ X% of all Vusers arrive at the rendezvous. Releases the Vusers only when the specified percentage of all Vusers have arrived at the rendezvous point. <div style="border: 1px solid #ccc; background-color: #f0f0f0; padding: 10px; margin: 10px 0;"> <p>Note: This option interferes with the scheduling of the test. If you select this option, your test will not run as scheduled.</p> </div> ■ X% of all running Vusers arrive at the rendezvous. Releases the Vusers only when the specified percentage of all Vusers running in the test have arrived at the rendezvous point. ■ X Vusers arrive at the rendezvous. Releases the Vusers only when the specified number of Vusers have arrived at the rendezvous point. • Timeout between Vusers. The timeout value (in seconds). After each Vuser arrives at the rendezvous point, the Controller waits up to the maximum timeout period specified for the next Vuser to arrive. If the next Vuser does not arrive within the timeout period, the Controller releases all the waiting Vusers from the rendezvous. Each time a new Vuser arrives, the timer is reset to zero. You set a timeout for each rendezvous point.

Test Options Dialog Box

This dialog box enables you to set general Scheduler and testing options.

To access	<ol style="list-style-type: none"> 1. In the Performance Test Designer window, click Groups & Workload. 2. In the lower-right area of the Performance Test Designer window, click .
Important information	This is accessible only when the Groups & Workload view is displayed.
Relevant tasks	<ul style="list-style-type: none"> • "How to Define a Schedule for the Performance Test" on page 177 • "How to Enable IP Spoofing in ALM" on page 227
See also	"Performance Test Workload Overview" on page 127

User interface elements are described below:

UI Elements	Description
Enable Scheduler	<p>Enables the Scheduler so that you can run the test according to a user-defined schedule. To define a schedule, this option must be selected.</p> <ul style="list-style-type: none"> • Stop test when Scheduler ends and Vusers are inactive. Automatically stops the test when the test schedule has stopped and all the Vusers are in any of the following inactive states: Down, Pass, Fail, Error, or Stop. • Start the Scheduler after a delay of HH:MM:SS. Enables you to specify when, after the Run Test command has been issued, the Scheduler should start running the schedule. If this option is not selected, the schedule starts to run as soon as the test starts running. • Wait for all groups to initialize. Instructs the Scheduler to wait until all the Vusers in all the Vuser groups have finished initializing before starting to run any of the groups. <p>Note: If you select this option, if any of the Vuser groups' Initialize action is Initialize each Vuser just before it runs, the Scheduler automatically changes this setting to Initialize all Vusers simultaneously.</p> <ul style="list-style-type: none"> • Pause Scheduler at test start. Pauses the Scheduler at the start of a test run, enabling you make changes to the test design just before the test is about to run. You can then restart the Scheduler manually.
Enable IP Spoofer	<p>After you define multiple IP addresses, and before you run the test, select this option to enable IP spoofing.</p> <p>Note: You must enable IP spoofing before running a test.</p> <p>For details about multiple IP addressing, see "Multiple IP Addresses" on page 226.</p>
Set maximum number of concurrent Vusers	<p>The maximum number of concurrent Vusers allowed for this test.</p>

Chapter 10: Integrating Virtualized Services

This chapter includes:

Integrating Virtualized Services Overview	149
How to Add Virtualized Services to Performance Tests	152
Integrating Virtualized Services User Interface	153

Integrating Virtualized Services Overview

As part of your performance test, you may want to test applications that depend on other services which are a part of your business scenario. Instead of loading actual services, you can use simulated services in your test run. The virtualized services are a simulation of actual services.

To facilitate performance testing business processes that contain services that are not available, Performance Center integrates with HP Service Virtualization.

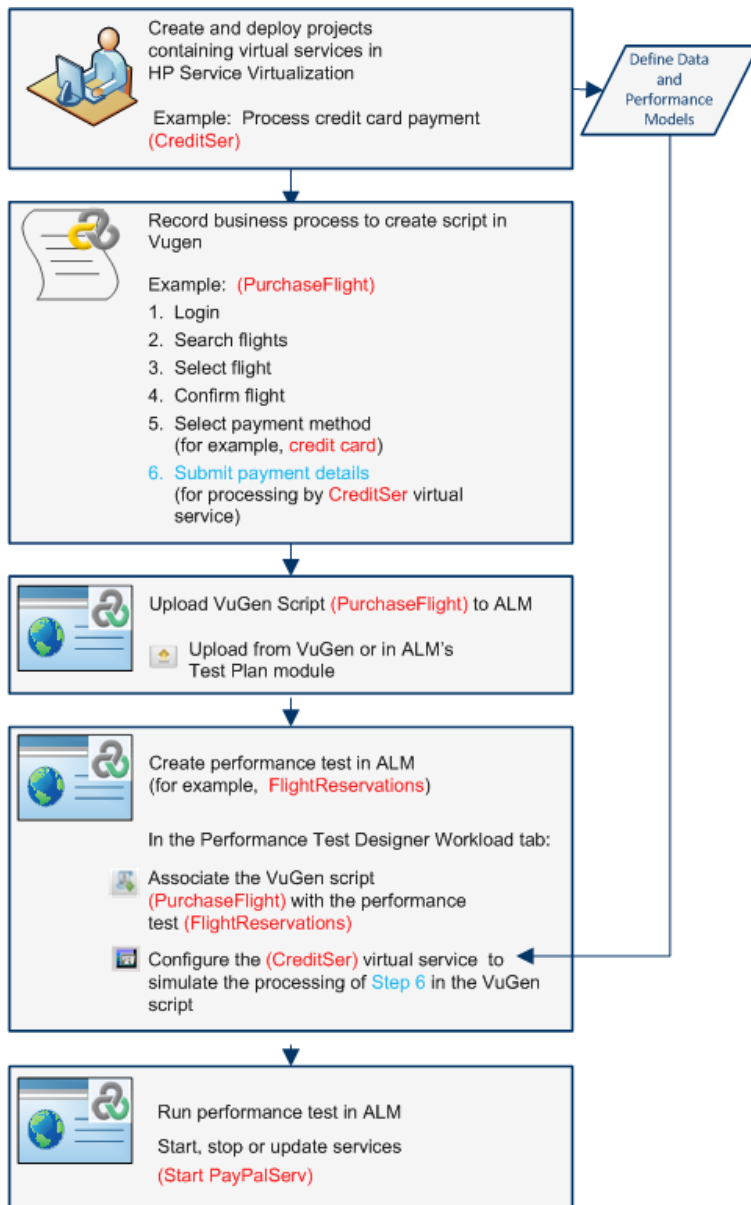
Using simulated services in your test is helpful if using actual services involves an additional cost or requires the service of an application that is under development or inaccessible at the time when you run your performance test.

Example

Your business process might include a service that is in development or incurs a cost, such as processing a credit card through a third-party vendor. By using a virtual service, you can replace actual services with simulated services that mirror both the data model and the performance model.

For details on creating projects that contain virtualized services, see the *HP Service Virtualization User Guide*.

The workflow below explains how HP Service Virtualization integrates with Performance Center processes:



For task details, see ["How to Add Virtualized Services to Performance Tests"](#) on page 152.

This section includes:

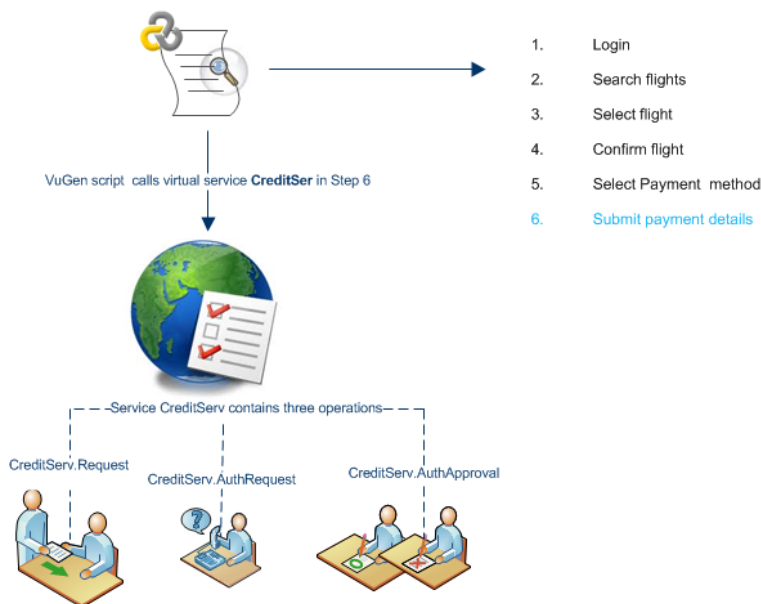
- ["Service Virtualization Monitoring"](#) on the next page
- ["Service Virtualization Locking"](#) on page 152

Service Virtualization Monitoring

The HP Service Virtualization monitors enable you to analyze the status and performance of the simulated services during the performance test run. For example, you may integrate a payment process service containing the following operations into your script:

Type	Example Name	Example Description
Service	CreditServ	Process online credit card payments
Operation	CreditServ.PurchaseRequest	Cardholder requests product/service
Operation	CreditServ.AuthorizationRequest	Merchant request authorization for payment
Operation	CreditServ.AuthorizationApproval	Credit card company authorizes or denies payment

The online monitors measure the overall behavior of the service and each operation. The flowchart illustrates using a service and operations for credit card payment.



In addition to the Run-Time monitor graphs available in Performance Center, the following graph(s) are useful for working with and analyzing service virtualization integration.

You can view the following Run-Time monitor graphs during a test run:

- ["Operations Graph" on page 386](#)
- ["Services Graph" on page 387](#)

Service Virtualization Locking

When your performance test contains virtualized services, those services are automatically locked and cannot be used by other users while the test is running. Virtualized services may be locked by you or other users for editing, simulation, deployment.

- If your test includes a service that has been locked by another user, start run will fail and an error message will appear in the ALM Test Runs module's event log for the specific run.
- If your test is running and you update the test to include a service that has been locked by another user, the test will continue running, however an error message will appear in the Online Screen's Messages tab as an error. There will also be an error notification in the Summary.

How to Add Virtualized Services to Performance Tests

The task describes how to configure virtual services to run when designing a performance test.

This task includes the following steps:

- ["Prerequisites " below](#)
- ["Configure service virtualization" below](#)
- ["Add projects and services" on the next page](#)
- ["Select the services to simulate" on the next page](#)
- ["Check service deployment" on the next page](#)
- ["Enter credentials for monitoring the SV server" on the next page](#)

1. Prerequisites

- Create your virtualized services in HP Service Virtualization Designer. For details on creating projects that contain virtualized services, see the *HP Service Virtualization User Guide*.
- In VuGen, create or record a script. Upload the script either from VuGen or from within Performance Center. For details on uploading VuGen scripts to Performance Center, see ["How to Upload VuGen Scripts" on page 42](#).

2. Configure service virtualization


Open Performance Test Designer. In the **Groups & Workload** view, select **Advanced > Service Virtualization**. The HP Service Virtualization dialog box opens.

This dialog box enables you to add projects, remove projects, and check the deployment of services. For user interface details, see ["HP Service Virtualization Dialog Box" on page 154](#).

3. Add projects and services

To add projects and their corresponding services, click **Add Project** and search and select for the relevant project containing the simulated services you want to run with your performance test. For user interface details, see ["Add Project Dialog Box" on page 156](#).


4. Select the services to simulate

Expand  a project. Check the **Simulate** checkbox of each virtualized service you want to run, and provide the relevant data model and performance model information.

5. Check service deployment

Click the **Check Deployment** button to determine if the services are deployed correctly on the SV server specified in the URL. Under Messages, click **More Details**. The Deployment Check Results dialog box opens. For user interface details, see ["Deployment Check Results Dialog Box" on page 157](#).

 indicates that the service is deployed on the specified server.

 indicates that the service is not deployed on the specified server.

Note: The virtualized service must be deployed on the simulation server to be able to configure the service and run it as part of your performance test in Performance Center.

6. Enter credentials for monitoring the SV server

Click the **Server Credentials** button to enter the credentials for monitoring the SV server in the Server Credentials dialog box. For user interface details, see ["Server Credentials Dialog Box" on page 158](#).

Integrating Virtualized Services User Interface

This section includes:

HP Service Virtualization Dialog Box	154
Add Project Dialog Box	156
Deployment Check Results Dialog Box	157
Server Credentials Dialog Box	158




HP Service Virtualization Dialog Box




This dialog box provides integration with HP Service Virtualization designer. This integration allows you to test services with virtualized services instead of real-time services.

To access	Open Performance Test Designer. In the Groups & Workload view, select Advanced > Service Virtualization .
Important information	<p>If you make changes to the services virtualization configuration during run time, both the original and modified configurations are saved in the wlrun.log file on the Load Testing Server (LTS) machine.</p> <p>For developers: Pointing calls to virtual services in the application under test cover two major scenarios:</p> <ol style="list-style-type: none">1. Application components that use the service are embedded in the code or in a configuration file. In this case, you will need to update the code in the application under test or update the configuration file to point to the new URL. <div><p>Examples</p><p>.NET Desktop application uses a web service, and the url is set using a constant: <code>stringURL = http://hp.com</code></p><p>Service or back end component uses the web service and the URL is configured in the app.config file.</p></div> <ol style="list-style-type: none">2. Service is consumed by accessing UDDI or some other registry component (Systinet) and the URL is retrieved at run-time. In this case, you will need to update the end point URL in UDDI/Systinet.
Relevant tasks	"How to Add Virtualized Services to Performance Tests" on page 152

User interface elements are described below (unlabeled elements are shown in angle brackets):

UI Element	Description
Add Project	Opens the Add Project dialog box, allowing you to specify or browse for a HP Service Virtualization project. Project files have a .zip or .vproj extension. For user interface details, see "Add Project Dialog Box" on page 156 .

Delete Project	<p>Removes the selected project and its services from the list.</p> <p>Note: Performance tests that are currently running the virtualized services in the deleted project keep running the virtualized services; Deleting the project unlocks the corresponding services so others can edit them.</p>
Check Deployment	<p>Checks if the virtual service was deployed (started) on the virtualization server specified in Server URL. For user interface details, see "Deployment Check Results Dialog Box" on page 157.</p>
Server Credentials	<p>Opens the Server Credentials dialog box, which enables you to configure SV server credentials used for monitoring the SV servers and virtual services deployed on them. Credentials include server login and password. For user interface details, see "Server Credentials Dialog Box" on page 158.</p>
Project Name	<p>The name of the HP Service Virtualization project containing the virtual service.</p>
Simulation Server	<p>The address of the SV server on which the selected service is deployed.</p> <p>Formats:</p> <p>http:<server>:6080/management - for standalone SV servers</p> <p>http:<server>:7080/management - for embedded SV servers (available only if the SV Designer is open)</p>
Deployed	<p>An indicator showing the deployment status of the project:</p> <ul style="list-style-type: none"> •  . Click the Check Deployment button to check the status. •  . Successfully deployed. •  . Unsuccessfully deployed.

<virtualized services>	<p>A list of the virtualized services showing the following information:</p> <ul style="list-style-type: none"> • Simulate. When checked, includes the virtual service when executing the performance test. When cleared, the service switches to pass-through mode by the test. • Service Name. The name of the virtual service to use during performance test execution. • Data Model. The data model to associate with the virtual service. • Performance Model. The performance model to associate with the virtual service. • Deployed. An indicator showing the deployment status of the virtual service: <ul style="list-style-type: none"> ■  . Click the Deploy Check button to check the status. ■  . Successfully deployed. ■  . Unsuccessfully deployed.
Messages	<p>Displays messages about the virtual services, such as:</p> <p>Last Deployment Check. Date on which the last deployment check occurred.</p> <p>More details. Opens the Deployment Check Results dialog box, enabling you to determine if the services are deployed correctly on the SV server specified in the URL. For user interface details, see "Deployment Check Results Dialog Box" on the next page.</p>

Add Project Dialog Box

This dialog box enables you to add projects that contain virtualized services to your performance test.

To access	In the Services Virtualization dialog box, click Add Project .
Relevant tasks	"How to Add Virtualized Services to Performance Tests" on page 152
See also	<ul style="list-style-type: none"> • "Integrating Virtualized Services Overview" on page 149 • "HP Service Virtualization Dialog Box" on page 154

User interface elements are described below:

UI Element	Description
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Select Project File	Name of the project file. Project files have a .zip or a .vproj extension.
Select	Enables you to browse for, and select, a project. Note: If the project file is password protected, enter password in the Password Required dialog box.
Remove	Removes a selected a project file.
Messages	Displays messages about the project file, such as error messages.

Deployment Check Results Dialog Box

This dialog box enables you to check if the projects and their virtualized services are deployed on the server at the specified URL address.

To access	In the HP Services Virtualization dialog box, click Check Deployment . Under Messages, click More details .
Important information	The deployment check verifies that a service with the same ID exists on the specified server.
Relevant tasks	"How to Add Virtualized Services to Performance Tests" on page 152
See also	<ul style="list-style-type: none"> • "Integrating Virtualized Services Overview" on page 149 • "HP Service Virtualization Dialog Box" on page 154

User interface elements are described below:

UI Element	Description
Deployed	<p>Indicates whether the virtualization service is deployed correctly on the specified server.</p> <ul style="list-style-type: none"> •  Status is unknown. Click Deploy Check to check the status. •  Successfully deployed. •  Unsuccessfully deployed.
Project Name	Displays the name of the project containing the virtualization service.
Service name	Displays the name of the virtualization service.

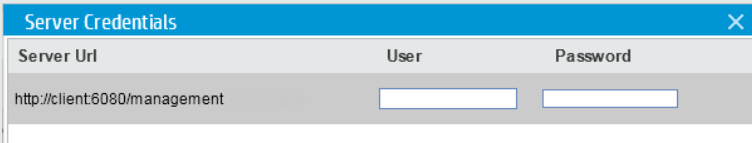
Check details	Displays the results of the check.
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Server Credentials Dialog Box

This dialog box enables you to configure login information for the SV server.

To access	In the HP Services Virtualization dialog box, click the Server Credentials button .
Important information	This dialog box only lists the servers that are defined in the HP Services Virtualization dialog box's Simulation Server column.
Relevant tasks	"How to Add Virtualized Services to Performance Tests" on page 152
See also	<ul style="list-style-type: none">• "Integrating Virtualized Services Overview" on page 149• "HP Service Virtualization Dialog Box" on page 154

User interface elements are described below:

UI Element	Description
Server Url	Displays the URL for the server.
User	Displays the user name for the server. To edit, click the URL to display the User and Password text boxes. <div>Example </div>
Password	Displays the password for the server. To edit, click the server URL to display the User and Password text boxes.

Chapter 11: Load Generator Distribution

This chapter includes:

Load Generator Distribution Overview	161
How to Distribute Load Generators Among Vuser Groups	162
Load Generators User Interface	164

Load Generator Distribution Overview

Load generators are Performance Center hosts on which Vusers run during a test run.

This section includes:

- ["Load Generator Types" below](#)
- ["Load Generator Distribution Methods" below](#)
- ["Load Generator Attribute Customization" on the next page](#)

Load Generator Types

There are two types of load generators:

Type	Description
Specific load generator	An actual load generator. For example, machine host1 , located in London.
Automatch load generator	A load generator placeholder, for example LG1 . When you assign an automatch load generator to a Vuser group, you are not assigning a specific load generator to the group, but rather a placeholder for a load generator with specific properties. At runtime, specific load generators in the host pool of the project that have the same properties as the automatch load generators, are allocated in place of the automatch load generators.

Load Generator Distribution Methods

When you design a performance test, you specify how to distribute load generators among the Vuser groups participating in the test. You can automatically assign all load generators to each Vuser group, or you can manually select which load generators to assign to which group.

Use the following methods to distribute load generators:

Method	Description
Automatic load generator distribution	<p>When you select the automatic load generator distribution method, during the test design phase all of the automatch load generators in the test are distributed to all of the participating Vuser groups.</p> <p>At runtime, specific load generators in the project's host pool that have the same properties as the automatch load generators, are allocated in place of the automatch load generators.</p>

Method	Description
Manual Load Generator Distribution	<p>Using the manual distribution method, you can assign specific load generators to Vuser groups.</p> <p>If you are not particular about which load generators should be used for the test, you can assign automatch load generators to the groups. At the initialization stage of the test run, the automatch load generators are automatically replaced with specific load generators from the project's host pool that match the automatch load generators' properties.</p> <p>Manual distribution enables you to distribute your load generators among Vuser groups, without overloading any one load generator.</p>

Load Generator Attribute Customization

You can customize load generator attributes. For details about how to customize host attributes, see the *HP Application Lifecycle Management Administrator Guide*.

When customizing load generator attributes, consider the following:

- Create attributes that represent properties about your hosts that will help tell one host apart from another host when using them for performance testing.
- Because you can select multiple attributes for your host, you can define an unlimited number of host attributes. They do not need to be related.
- Host attributes can refer to anything. For example, **Host Memory - High**, **Spanish environment**, **Very slow machine**.

How to Distribute Load Generators Among Vuser Groups

This task describes how to distribute load generators automatically and manually among Vuser groups participating in the performance test.

Note: This task is part of a higher-level task. For details, see ["How to Define a Performance Test Workload" on page 128](#).

To learn more about load generator distribution, see ["Load Generator Distribution Overview" on the previous page](#).

This task includes the following steps:

- ["Prerequisites" on the next page](#)
- ["Select a load generator distribution method" on the next page](#)

- ["Specify the load generators to use in the test" below](#)
- ["Select properties for the automatch load generators - optional" below](#)

1. Prerequisites

Add Vuser groups to participate in the test. For details, see ["How to Define a Performance Test Workload" on page 128](#) on ["How to Define a Performance Test Workload" on page 128](#).

2. Select a load generator distribution method

In the Performance Test Designer window, click **Groups & Workload**. On the Groups pane toolbar, in the **LG Distribution** box, select one of the following options:


- **Assign all to each group.** Assigns all the load generators automatically to each Vuser group.
- **Assign manually.** Enables you to assign load generators manually to the Vuser groups.

3. Specify the load generators to use in the test

- If you selected **Assign all to each group** above, the **LG** box is displayed to the right of the **LG Distribution** box.

Type the number of load generators to use in the test and press ENTER. The automatch load generators are distributed to each of the Vuser groups and are displayed in the **Load Generators** column.

- If you selected **Assign manually** above:
 - To select the same load generators for multiple groups at once, click the **Assign Load**

Generators to Multiple Groups  button. In the dialog box that opens, select automatch and/or specific load generators to multiple groups

Similarly, you can remove load generators that have been assigned to the groups.

For user interface details, see ["Assign Load Generators to Multiple Groups Dialog Box" on page 165](#).

- To select load generators for a specific group only, you can use the link that appears in the **Load Generators** column of a selected group. Click the link and select automatch and/or specific load generators to assign to the group.


For user interface details, see ["Select Load Generators Dialog Box " on page 168](#).

4. Select properties for the automatch load generators - optional

You can select properties for the automatch load generators that are assigned to Vuser groups in your test. Properties include a location and other attributes. At runtime, each automatch load

generator is matched up with an available specific load generator (in the host pool of the project) with the same properties.

To select properties for automatch load generators, click the **Configure Automatch Load**

Generator Properties  button, select one or more automatch load generators, and enter a location and/or attributes.

For user interface details, see "[Automatch Load Generators Properties Dialog Box](#)" on page 171.

Note: If no properties are specified, the automatch load generator is matched up with any load generator in the project's host pool.


Load Generators User Interface

This section includes:




Assign Load Generators to Multiple Groups Dialog Box	165
Select Load Generators Dialog Box	168
Automatch Load Generators Properties Dialog Box	171

Assign Load Generators to Multiple Groups Dialog Box

This dialog box enables you to assign one or more load generators—automatch or specific—to multiple Vuser groups at once. You can also use this dialog box to remove one or more load generators from multiple Vuser groups at once.

To access	<ol style="list-style-type: none">1. In the Performance Test Designer window, click Groups & Workload.2. From the LG Distribution drop-down list, select Assign manually.3. Click Assign Load Generators to Multiple Groups .
Important information	This dialog box is available only when using the manual load generator distribution method.
Relevant tasks	<ul style="list-style-type: none">• "How to Define a Performance Test Workload" on page 128• "How to Distribute Load Generators Among Vuser Groups" on page 162

User interface elements are described below (unlabeled elements are shown in angle brackets>):

UI Elements	Description
	Enables you to add more automatch load generators for the test. Enter the number of load generators in the adjacent box and click Add LGs .
	Assigns the selected load generators to the selected Vuser groups.
	Removes the selected load generators from the selected Vuser groups.

UI Elements	Description
Automatch tab	<p>Enables you to select automatch load generators to assign to Vuser groups in the test, or to remove assigned automatch load generators from the Vuser groups.</p> <ul style="list-style-type: none">• Name. The name of the automatch load generator. By default, these are named LG1, LG2, and so on.• Properties. The properties by which the automatch load generator is matched up with a specific load generator in the host pool of the project at runtime. <p>Any is displayed by default. This means that the automatch load generator can be matched up with any load generator in the project's host pool at runtime.</p> <p>To specify properties for an automatch load generator, click the corresponding link in this column to open the Automatch Load Generator Properties dialog box. For details, see "Automatch Load Generators Properties Dialog Box" on page 171.</p> <p>Tip: To select all the load generators in the list, select the check box in the check box column heading.</p>

UI Elements	Description
Specific tab	<p>Enables you to select load generators from the project's host pool to assign to the Vuser groups in the test, or to remove them from the Vuser groups.</p> <ul style="list-style-type: none"> • <filter>. Enables you to filter the information being displayed in grid. • Name. The name of the load generator. • State. The state of the load generator: Operational; Non-operational; Unavailable <p>Note: Assigned load generators must be operational during runtime.</p> <ul style="list-style-type: none"> • Location. The location of the load generator. • Purpose. The purpose of the load generator. Controller, Load Generator, Data Processor, or a combination of these. <ul style="list-style-type: none"> ■ Only the hosts in the pool with at least a Load Generator purpose are displayed. ■ QuickTest tests (UFT GUI Tests) cannot run on a load generator that has been selected as the Controller of the performance test. ■ If a load generator is marked with an asterisk (*), this indicates that the load generator host has been selected as the Controller. It is recommended not to use a Controller host as a load generator as well. <p>Tip: To select all the load generators in the list, select the check box in the check box column heading.</p>
<Select Load Generators pane>	<p>Enables you to select load generators to assign to the Vuser groups in the test, or to remove them from the Vuser groups.</p> <ul style="list-style-type: none"> • Click the Automatch tab to select automatch load generators. • Click the Specific tab to select specific load generators.

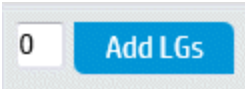
UI Elements	Description
Select Groups pane	<p>Enables you to select the Vuser groups to which the selected load generators are to be assigned, or from which they are to be removed.</p> <ul style="list-style-type: none"> • Name. The name of the Vuser group. • Assigned Load Generators. The load generators currently assigned to the Vuser group. <p>Tip: To select all the Vuser groups, select the check box in the check box column heading.</p>


Select Load Generators Dialog Box

This dialog box enables you to assign one or more load generators—automatch or specific—to a Vuser group.

To access	<ol style="list-style-type: none"> 1. In the Performance Test Designer window, click Groups & Workload. 2. From the LG Distribution drop-down list, select Assign manually. 3. Select a Vuser group in the Groups pane and click the link in the Load Generators column.
Important information	This dialog box is available only when using the manual load generator distribution method.
Relevant tasks	<ul style="list-style-type: none"> • "How to Define a Performance Test Workload" on page 128 • "How to Distribute Load Generators Among Vuser Groups" on page 162 • "How to Create a Terminal Session" on page 219
See also	"Load Generator Distribution Overview" on page 161

User interface elements are described below:


UI Elements	Description
	<p>Enables you to add more automatch load generators for the test. Enter the number of load generators in the adjacent box and click Add LGs.</p> <p>Available from: Automatch tab only</p>

UI Elements	Description
	<p>Terminal Services. Enables you to configure terminal services sessions on the selected load generator. For details, see "Configuring Terminal Sessions" on page 218.</p> <p>Available: For load generators</p>
<p>Automatch tab</p>	<p>Enables you to select automatch load generators to assign to the selected Vuser group.</p> <ul style="list-style-type: none"> • Name. The name of the automatch load generator. By default, these are named LG1, LG2, and so on. • Properties. The properties by which the automatch load generator is matched up with a specific load generator at runtime. Any is displayed by default. This means that the automatch load generator can be matched up with any load generator at runtime. To specify properties for a particular automatch load generator, click the corresponding Any link in the Properties column to open the Automatch Load Generator Properties dialog box. For details, see "Automatch Load Generators Properties Dialog Box" on page 171. • Virtual Locations. The name of the virtual location. Click the Select virtual location link to open the Select Virtual Location dialog box. <p>Tip: To select all the load generators in the list, select the check box in the check box column heading.</p>



UI Elements	Description
Specific tab	<p>Enables you to assign load generators from the host pool of the project to the selected Vuser group.</p> <ul style="list-style-type: none"> • <filter>. Enables you to filter the information being displayed in grid. • Name. The name of the load generator. • State. The state of the load generator: Operational, Non-operational, Unavailable. <p>Note: Assigned load generators must be operational during runtime.</p> <ul style="list-style-type: none"> • Location. The location of the load generator. • Virtual Locations. The name of the virtual location. Click the Select virtual location link to open the Select Virtual Location dialog box. • Purpose. The purpose of the load generator, that is, Controller, Load Generator, Data Processor, or a combination of these. <ul style="list-style-type: none"> ■ Only the hosts in the pool with at least a Load Generator purpose are displayed. ■ You can run QuickTest tests (UFT GUI Tests) only on load generators that are not also assigned as the Controller for the performance test. ■ If a load generator is marked with an asterisk (*), this indicates that the load generator host has been selected as the Controller. It is recommended not to use a Controller host as a load generator as well. <p>Tip: To select all the load generators in the list, select the check box in the check box column heading.</p>

Automatch Load Generators Properties Dialog Box

This dialog box enables you to define properties for an automatch load generator. Properties include a location, and other host attributes. At runtime, a specific load generator in the host pool of the project matching these properties is assigned to the Vuser group.

To access	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Test Management > Test Plan. 2. Select a performance test in the test plan tree and click Edit Test. 3. In the Performance Test Designer window, click Groups & Workload. 4. On the Groups pane tool bar, click Configure Automatch Load Generators Properties .
Relevant tasks	<ul style="list-style-type: none"> • "How to Distribute Load Generators Among Vuser Groups" on page 162 • "How to Create a Terminal Session" on page 219

User interface elements are described below:

UI Elements	Description
	<p>Enables you to add additional automatch load generators for the test.</p> <p>Available: When the Assign Manually load generator distribution method is selected.</p>
	<p>Enables you to configure terminal services sessions on the selected load generator. For details, see "Configuring Terminal Sessions" on page 218.</p> <p>Available: When the Assign Manually load generator distribution method is selected.</p>
Load Generators pane	Lists the available automatch load generators.
Location	Select a load generator location for the selected load generators.

UI Elements	Description
Host Attributes	<p>Select attributes for the selected load generators.</p> <p>Tip: The list of attributes can be customized. For details, see "Load Generator Distribution Overview" on page 161.</p> <p>Example:</p> <p>You want a Vuser group to use a load generator that is located in London and has medium strength and memory. Under Location, select London, and in the Host Attributes list, select Host memory: Medium and Host strength: Medium. At runtime, the system tries to assign a specific load generator with these properties to the Vuser group.</p>
Virtual Location	<p>Select a load generator virtual location for the selected load generators.</p> <p>Available: When working with HP Network Virtualization and using the Assign All to Each Group load generator distribution method.</p> <p>For more details on working with HP Network Virtualization, see "How to Integrate Network Virtualization into a Performance Test" on page 292.</p>

Chapter 12: Scheduling Performance Tests

This chapter includes:

Scheduling Performance Tests Overview	175
How to Define a Schedule for the Performance Test	177
How to Add Actions to a Test Schedule	179
How to Edit Scheduler Actions	181
Scheduling Performance Tests User Interface	181

Scheduling Performance Tests Overview

You use the Scheduler to create a schedule that distributes load in a performance test in a controlled manner.

Using the Scheduler, you can:

- Set the time at which the test should begin running, and specify how long the Scheduler should wait after the Run Test command is issued, and before running Vusers.
- Stipulate:
 - How to initialize the Vusers in the test
 - How many Vusers to start/stop within a given time period
 - How often to start running the Vusers—simultaneously or gradually

For details, see ["Global Scheduler Actions" on page 184](#).

- Limit the run duration of the Vusers or Vuser groups within the test by specifying the amount of time the Vusers or Vuser groups should be in the running state.
- Set a test to run according to the runtime settings defined for the enabled Vuser groups, or set the Vuser groups to run over and over again until the schedule settings instruct them to stop running.

To define a performance test schedule, see ["How to Define a Schedule for the Performance Test" on page 177](#).

This section also includes:

- ["Types of Test Schedules" below](#)
- ["Schedule Run Modes" on the next page](#)

Types of Test Schedules

When you design a performance test, you can define a schedule according to which the participating Vuser groups should run in the test.

You can schedule all the groups to run together on one schedule, or you can define a separate schedule for each Vuser group.

Scheduling By Test

When you schedule **by test**, all the Vuser groups participate in the test run simultaneously. That is, the schedule is applied to all the Vuser groups concurrently, and each action is applied proportionally to all

the Vusers groups.

For example, take a test that includes three participating Vuser groups as follows:

Group Name	Number of Vusers
Group1	10
Group2	20
Group3	30
Total	60

When scheduling by test, if the scheduler instructs 30 Vusers to start running when it starts the test run, a proportional number of Vusers starts running from each group as follows:

Group Name	Number of Vusers
Group1	5
Group2	10
Group3	15
Total	30

Note: The same principle applies when the test is in percentage mode.

Scheduling By Vuser Group

Note: For tests in Vuser group (number) mode only.

When you schedule **by Vuser group**, each Vuser group participating in the test runs on its own separate schedule. That is, for each Vuser group, you can specify when to start running the Vuser group, how many Vusers in the group to start and stop running within specified time intervals, and how long the group should continue running.

Group schedules can run separately, or all at the same time.

Schedule Run Modes

You can schedule a test to run according to the run-time settings defined for the Vuser groups, or you can let the groups run over and over again until the test schedule instructs them to stop running.

You can schedule a test to run in one of the following run modes:

- **Real-world run mode.** The test runs according to a user-defined group of actions that simulate a real-world schedule of events. Vuser groups run according to the iterations defined in their run-time settings, but you can define how many Vusers to run at a time, how long Vusers should continue to run, and how many Vusers to stop running at a time.
- **Basic run mode.** All enabled Vuser groups run together on one schedule, each according to its own run-time settings. You can schedule how many Vusers to start running at a time, and how long they should run before stopping.

The following table illustrates how the given schedule types run in real-world versus basic run mode:

Schedule by	Run Mode - Real World	Run Mode - Basic
Test	All participating Vuser groups run together on one schedule. The test runs according to a user-defined group of actions that emulates a true-to-life schedule of events. You can schedule Vusers to start and stop running numerous times during the test, and specify how long to keep them in their running or stopped state.	All participating Vuser groups run together on one schedule, each according to its own run-time settings. You schedule when to start running all the Vusers, specify how long they should run, and then specify how to stop running all the Vusers.
Group (Not applicable when the test is in Percentage mode)	Each participating Vuser group runs according to its own defined schedule that emulates a true-to-life schedule of events for that Vuser group. You can schedule Vusers in the groups to start and stop running numerous times during the test, and specify how long to keep them in their running or stopped state.	Each participating Vuser group runs according to its own schedule, each according to its own run-time settings. For each Vuser group, you schedule when to start running the Vuser group, how to start running all the Vusers in the group, specify how long the Vusers should run, and then specify how to stop running all the Vusers in the group.

How to Define a Schedule for the Performance Test

This task describes how to define a schedule for a performance test.

Note: This task is part of a higher-level task. For details, see ["How to Define a Performance Test Workload" on page 128](#).

This task includes the following steps:

- ["Prerequisites" below](#)
- ["Define a set of scheduler actions" below](#)
- ["Group schedules only: Copy a Vuser group's scheduler settings to other groups - optional" below](#)
- ["Schedule a start time for the test - optional" on the next page](#)

1. Prerequisites

- Open **Performance Test Designer > Groups & Workload**, under the **Groups** section, make sure the test contains scripts.
- The Scheduler must be enabled. Click the **Options** button located at the bottom of the Groups & Workload view. In the Test Options dialog box, ensure that **Enable Scheduler** is selected. For user interface details, see ["Test Options Dialog Box" on page 146](#).

2. Define a set of scheduler actions

The Global Schedule grid displays the default scheduler actions that correspond to the workload type selected in the **Workload type** box.

In real-world schedules, you can add more scheduler actions, and edit or delete existing actions.

In basic schedules, you can edit the existing scheduler actions.

- For details about the scheduler actions, see ["Global Scheduler Actions" on page 184](#).
- For details about how to add actions (real-world schedules only), see ["How to Add Actions to a Test Schedule" on the next page](#).
- For details about how to edit actions, see ["How to Edit Scheduler Actions" on page 181](#).

3. Group schedules only: Copy a Vuser group's scheduler settings to other groups - optional

When scheduling **by Vuser group**, you can copy a Vuser group's scheduler settings to other Vuser groups.

Note:

- Scheduler settings copied include the scheduler run mode (basic or real-world) and the set of defined scheduler actions.
- This option is disabled for global schedules.

- a. On the Groups grid toolbar, click the **Duplicate Scheduler Settings** button.
 - b. Select the source group whose settings you want to copy, and select one or more target groups.
 - c. Click **Apply**. The source group's scheduler settings are copied to the target groups.
4. Schedule a start time for the test - optional
Click the **Options** button located at the bottom of the Groups & Workload view. Select **Start the Scheduler after a Delay of**, and enter the amount of time after which to start running the test.

How to Add Actions to a Test Schedule

This task describes how to add actions to a real-world test schedule.

Note: You can add actions to a **real-world schedule** only.

This task includes the following steps:

- ["Add an action to the schedule from the Global Scheduler grid" below](#)
- ["Add an action by splitting one action into two actions" on the next page](#)

Add an action to the schedule from the Global Scheduler grid

Note: A new action is always added **after** the action selected in the Global scheduler grid.


1. In the Global scheduler grid, select an action after which to insert the new action, and click the **New scheduler action** button's down arrow.
2. Select the type of action to add.

Note: You can add a **Start Vusers**, **Stop Vusers**, or **Duration** action. For details about each type of action, see ["Global Scheduler Actions" on page 184](#).

3. In the **Properties** column, specify the action's properties.
 - If you are adding a Start Vusers or Stop Vusers action, enter the number of Vusers to start/stop running, and select how to start/stop running the Vusers: **simultaneously** or **gradually**.

If you selected **gradually**, enter the number of Vusers to start/stop at a time, and a time interval.

- If you are adding a Duration action, select how long to run the action.

Click **Apply change**  to save the action settings.

4. When you have finished adding actions to the schedule, click **Save** at the bottom of the Workload tab.

Note: If you navigate away from the Performance Test Designer window without clicking **Save**, changes applied to the schedule are not saved.


Add an action by splitting one action into two actions

You can add **Start Vusers**, **Duration**, and **Stop Vusers** actions from the Global Scheduler grid or from the graph by splitting an action into two halves of the original action.

To split an action in two:

1. Select the action in the grid, or the line in the graph that represents the action that you want to split.

Tip: Selecting the action in the Global Scheduler grid highlights the corresponding line in the graph.

2. Click the **Split selected action** button . The selected action/line splits in two. In the Global scheduler grid, the original action splits into two equivalent actions, each representing half of the original action.

Example


- Splitting a Duration action of 5 minutes results in two Duration actions of 2.5 minutes each.
- Splitting a Start Vusers action that starts 20 Vusers results in two Start Vusers actions, each starting 10 Vusers.

3. (Optional) Edit each of the actions. For details, see ["How to Edit Scheduler Actions" on the next page](#).

How to Edit Scheduler Actions

This task describes how to edit scheduler actions. You can edit all types of actions. For details about each action type, see ["Global Scheduler Actions" on page 184](#).

To edit a scheduler action:

- 1. In the Actions grid, select the action that you want to edit. The **Properties** column becomes editable.
- 2. Modify the action settings and click **Apply change**  .
- 3. When you have finished editing the actions, click **Save**.

Note: If you navigate away from the Performance Test Designer window without clicking **Save**, changes applied to the schedule are not saved.

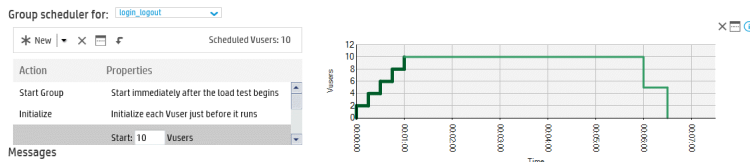
Scheduling Performance Tests User Interface

This section includes:

Global Scheduler Pane	182
Global Scheduler Actions	184

Global Scheduler Pane


This pane enables you to define a schedule for running your performance test.



To access	In the Performance Test Designer window, click Groups & Workload .
Important information	If scripts in your test contain rendezvous points, the test will not run as scheduled because the rendezvous points interfere with the schedule. For details, see "Rendezvous Points" on page 127 .
Relevant tasks	"How to Define a Schedule for the Performance Test" on page 177
See also	<ul style="list-style-type: none"> "Scheduling Performance Tests Overview" on page 175 "Global Scheduler Actions" on page 184

User interface elements are described below (unlabeled elements are shown in angle brackets>):

UI Elements	Description
	<p>New scheduler action. Enables you to add an action to the test schedule. The new action is added after the action selected in the grid.</p> <p>You can add Start Vuser, Duration, and Stop Vuser actions only. For details, see "Global Scheduler Actions" on page 184.</p> <p>Available from: Real-world schedule only</p>
	<p>Delete selected action. Deletes the selected action.</p>
	<p>Split selected action. Splits the selected action into two identical halves of the original action.</p>
	<p>Apply change. Enables you to apply modifications made to the actions in the schedule graph.</p>

UI Elements	Description
	<p>Hide/Show Legend. Hides/Shows the graph legend.</p> <p>Note for group schedules only: When the legend is showing, the group selected in the grid's title bar is read-only in the legend.</p> <p>To view/hide one or more of the other Vuser groups, select/clear the check boxes next to the Vuser groups respectively.</p>
Scheduled Vusers	<p>Displays a total of the Vusers scheduled to run in the test.</p> <div> <p>Note:</p> <ul style="list-style-type: none"> When the test is in number mode and you are defining a basic schedule, the number of scheduled Vusers is updated when you modify the number of Vusers in the Vuser groups. You can change the number of Vusers in a selected group: <ul style="list-style-type: none"> In the Groups grid: Select the group and change the number of Vusers In the Global Scheduler grid: Select the group in the grid's title bar and change the number of Vusers in the Start Vusers action. In real-world schedules, the total number of Vusers is the sum of all the Vusers defined in the Start Vusers actions. </div>
<Global Scheduler grid>	<p>Lists the scheduled actions. Initially the grid displays default actions that correspond to the schedule type you selected for your workload. For details, see "Workload Types Dialog Box" on page 141.</p> <p>For all schedules, some of the actions can be modified.</p> <p>In real-world schedules, you can also add and delete actions, enabling you to simulate a more true-to-life schedule by which to run your test.</p>
<Schedule graph>	<p>Provides a graphical representation of the actions listed in the Global Scheduler grid.</p> <p>In real-world schedules, you can add new actions from the graph by splitting an action into two identical halves.</p>
<Title bar>	<p>Displays the type of schedule and the number of scheduled Vusers, depending in the type of workload is selected for the test:</p> <ul style="list-style-type: none"> Global Schedule. Displayed when the schedule is a schedule by test. Group Schedule for <group>. Displayed for group schedules. Displays the name of the group whose schedule is displayed in the Global Scheduler grid.
Messages	Displays alert messages.

Global Scheduler Actions

A performance test schedule contains a sequence of actions that instruct the test when to start running a Vuser group, how to initialize Vusers, when to start and stop running Vusers, and how long to run an action.

The following sections describe the available scheduler actions.

- ["Start Group" below](#)
- ["Initialize " on the next page](#)
- ["Start Vusers" on the next page](#)
- ["Duration" on page 186](#)
- ["Stop Vusers" on page 187](#)

Start Group

The Start Group action defines when to start running a Vuser group. By default, the **Start Group** action appears as the first action in the Global Scheduler grid when you select a workload of type: **by group**.

Options	Description
Start immediately	The Scheduler starts running the selected Vuser group as soon as the test starts running. Resulting action: Start immediately after the test begins.
Start with delay	After the test starts running, the Scheduler waits the specified time (in hours, minutes, and seconds) before it starts running the selected Vuser group. Resulting action: Start (HH:MM:SS) after the test begins.
Start when group	The Scheduler starts running the selected Vuser group immediately after the Vuser group specified in this option has finished running. Resulting action: Start when group <group name> finishes.

Note:

- The **Start Group** action is available for group schedules only.
- The **Start Group** action is always followed by the **Initialize** action.
- The **Start Group** action cannot be deleted.

Initialize

The **Initialize** action instructs the Scheduler to prepare the Vusers so that they are in the **Ready** state and can run. By default, the **Initialize** action appears in the Global Scheduler grid for all types of schedules.

Options	Description
Initialize all Vusers simultaneously	<p>The Scheduler initializes all the Vusers in the test or selected Vuser group together, and waits the specified amount of time before running them.</p> <p>Resulting action: Initialize all Vusers simultaneously Wait for <00:00:00> (HH:MM:SS) after initialization</p>
Initialize gradually	<p>The Scheduler initializes the specified number of Vusers gradually, according to the specified time interval (in hours, minutes, and seconds), and waits the specified amount of time before running them.</p> <p>Resulting action: Initialize <X> Vusers every (HH:MM:SS) Wait for (HH:MM:SS) after initialization.</p>
Initialize each Vuser just before it runs	<p>The Scheduler initializes each Vuser in the test or selected Vuser group just before it starts running.</p> <p>Resulting action: Initialize each Vuser just before it runs.</p> <p>Note: This option is not available for Group schedules when Wait for all groups to initialize is selected. See "Wait for all groups to initialize" on "Test Options Dialog Box" on page 146.</p>

Note: The **Initialize** action cannot be deleted.

Start Vusers

The Start Vusers action instructs the Scheduler to start running the Vusers.

Options	Description
Start All Vusers: Simultaneously	The Scheduler runs all the Vusers in the test simultaneously.
Start X Vusers: gradually Y Vusers: every <hh:mm:ss> (HH:MM:SS)	<p>The Scheduler runs the specified number of Vusers (X) gradually. That is, the Scheduler runs Y Vusers, and waits the specified time (in hours, minutes, and seconds) before running another Y Vusers.</p> <p>Resulting action: Start X Vusers: Y Vusers every <hh:mm:ss> (HH:MM:SS)</p>

Note:

- The Scheduler starts running Vusers only when they have reached the **Ready** state.
- In a basic schedule, the Scheduler always runs **all** the Vusers, whether simultaneously or gradually. In a real-world schedule, you can select how many Vusers to start running at a time.
- While a test is running, you can add Vuser groups/scripts to the test and enable them. When starting the Vusers gradually, if you add a Vuser group after all the Vusers in the test have started running, the new group will start running immediately.

Duration

The Duration action instructs the Scheduler to continue running the test in the current state, for the specified amount of time.

Options	Description
Run until complete	The test runs until all the Vusers have finished running. Resulting action: Run until completion
Run for	The test runs in its current state for the specified amount of time (in days, hours, minutes, and seconds) before continuing with the next action. Default: 5 minutes Maximum definable duration period: 99.23:59:59 dd.HH:MM:SS. Resulting action: Run for <dd.hh:mm:ss> (dd.HH:MM:SS)
Run indefinitely	The test runs indefinitely. Resulting action: Run indefinitely Available for: Basic schedule only

Note:

- In a real-world schedule, if a Duration action is not followed by another action, the test continues to run indefinitely.
- In a real-world schedule, to avoid unexpected behavior during the test run, add a Duration action between consecutive Start Vusers and Stop Vusers actions.
- In a basic schedule, a **Run for** Duration action is always followed by a Stop Vuser action.

Stop Vusers

The Stop Vusers action instructs the Scheduler to stop the running Vusers.

Options	Description
Stop All Vusers: Simultaneously	The Scheduler stops all the running Vusers at once.
Stop All/X Vuser: gradually	<p>The Scheduler stops the specified number of Vusers (All or X) gradually. That is, the Scheduler stops Y Vusers, and waits the specified time (in hours, minutes, and seconds) before stopping another Y Vusers.</p> <p>Resulting action: Stop <X> Vuser: <Y> Vusers every <hh:mm:ss> (HH:MM:SS)</p>

Note:

- A basic schedule that has a **Run for** Duration action, is always followed by a Stop Vuser action that stops all the Vusers, simultaneously or gradually.
- In a real-world schedule, to avoid unexpected behavior during the test run, add a Duration action between consecutive Start Vusers and Stop Vusers actions.
- In a real-world schedule, if no action is specified after a **Run for** Duration action, the Vusers continue to run indefinitely—that is, the schedule continues to run indefinitely.
- When scheduling by group, if Group A is scheduled to run indefinitely, and Group B is scheduled to run after Group A, then Group A must be stopped manually before Group B can start running.

Chapter 13: Service Level Agreements

This chapter includes:

- Service Level Agreements Overview 189
- How to Define Service Level Agreements 190
- How to Define Service Level Agreements - Use-Case Scenario 191
- Service Level Agreement User Interface 194

Service Level Agreements Overview

Service level agreements (SLAs) are specific goals that you define for your performance test. After a test run, HP LoadRunner Analysis compares these goals against performance related data that was gathered and stored during the course of the run, and determines whether the SLA passed or failed.

Depending on the measurements that you are evaluating for your goal, ALM determines the SLA status in one of the following ways:

SLA Type	Description
SLA status determined at time intervals over a timeline	<p>Analysis displays SLA statuses at set time intervals over a timeline within the test run. At each time interval in the timeline—for example, every 10 seconds—Analysis checks to see if the measurement's performance deviated from the threshold defined in the SLA.</p> <p>Measurements that can be evaluated in this way:</p> <ul style="list-style-type: none">• Average Transaction Response Time• Errors per Second
SLA status determined over the whole run	<p>Analysis displays a single SLA status for the whole test run.</p> <p>Measurements that can be evaluated in this way:</p> <ul style="list-style-type: none">• Transaction Response Time - Percentile• Total Hits per run• Average Hits (hits/second) per run• Total Throughput (bytes) per run• Average Throughput (bytes/second) per run

Note:

- You can define and edit SLAs in ALM or in HP LoadRunner Analysis.
- For details about viewing post-run SLA statuses in ALM Performance Center, see ["SLA Report" on page 285](#).
- For details about viewing post-run SLA statuses in Analysis reports, see the *HP LoadRunner Analysis User Guide*.

Tracking Period

When you define service level agreements (SLAs) for measurements that are evaluated over a timeline, Analysis determines SLA statuses at specified time intervals within that timeline. The frequency of the time intervals is called the **tracking period**.

An internally-calculated tracking period is defined by default. You can change this tracking period by defining a value which Analysis plugs into a built-in algorithm to calculate the tracking period. For details, see ["Tracking Period Dialog Box" on page 203](#).

How to Define Service Level Agreements

This task describes how to define service level agreements (SLAs).

You can define service level agreements (SLAs) which measure performance test goals over time intervals during a test run, or over a whole performance test run. To learn more, see ["Service Level Agreements Overview" on the previous page](#) and the *HP LoadRunner Analysis User Guide*.

Note: This task is part of a higher-level task. For details, see ["How to Design a Performance Test" on page 111](#).

Tip: For a use-case scenario related to this task, see ["How to Define Service Level Agreements - Use-Case Scenario" on the next page](#).

This task includes the following steps:

- ["Prerequisites" below](#)
- ["Run through the SLA wizard" on the next page](#)
- ["Define a tracking period - optional" on the next page](#)
- ["Results" on the next page](#)

1. Prerequisites

Create a performance test. For details, see ["How to Design a Performance Test" on page 111](#).

Note: To define Average Transaction Response Time or Transaction Response Time Percentile SLAs, your performance test must include a script that contains at least one transaction.

2. Run through the SLA wizard

In the Performance Test Designer, click **Summary**. In the **Service Level Agreement** pane, click **New** to open the Service Level Agreement wizard. For user interface details, see ["Service Level Agreement Wizard" on page 196](#).

- a. Select a measurement for the SLA.
- b. If you are defining an SLA for Transaction Response Time (Average/ Percentile), select the transactions to include in your goal.
- c. (Optional) When evaluating SLA statuses over a timeline, select a load criterion to take into account and define appropriate load value ranges for the load criterion.
- d. Set thresholds for the measurements.
 - o If the values of **Transaction Response Time (Average/Percentile)** or **Errors per Second** exceed the defined thresholds, Analysis will produce a **Failed** SLA status.
 - o If the values of **Total Hits**, **Average Hits per Second**, **Total Throughput**, or **Average Throughput** are lower than the defined threshold, Analysis will produce a **Failed** SLA status.

3. Define a tracking period - optional

For measurements whose SLA statuses are determined over time intervals, you need to define the frequency of the time intervals, known as the **tracking period**. For details, see ["Tracking Period" on the previous page](#).

For user interface details, see ["Tracking Period Dialog Box" on page 203](#).

4. Results

During post test run analysis, HP LoadRunner Analysis compares the data collected from the test run against the settings defined in the SLAs, and determines SLA statuses which are included in the default Summary Report and the SLA Report.

See also the *HP LoadRunner Analysis User Guide*.

How to Define Service Level Agreements - Use-Case Scenario

This use-case scenario describes how to define a service level agreement (SLA) for Average Transaction Response Time.

Note: For a task related to this scenario, see ["How to Define Service Level Agreements" on the](#)

[previous page.](#)

This use-case scenario includes the following steps:

- ["Background" below](#)
- ["Start the SLA wizard" below](#)
- ["Select the measurement for the SLA" below](#)
- ["Select the transactions to evaluate in your goal" below](#)
- ["Select a load criterion and define appropriate ranges of load - optional" below](#)
- ["Set thresholds" on the next page](#)
- ["Define a tracking period - optional" on the next page](#)
- ["Results" on page 194](#)

1. Background

The administrator of HP Web Tours would like to know when the average transaction response time for booking a flight and searching for a flight exceeds a certain value. Assume that your performance test includes a script that includes the following transactions: **book_flight** and **search_flight**.

2. Start the SLA wizard

In the Service Level Agreement pane, click **New** to start the Service Level Agreement wizard. Click **Next**.

3. Select the measurement for the SLA

On the Measurement page, select **Transaction Response Time**, and from the drop-down list, select **Average**.

4. Select the transactions to evaluate in your goal

On the Transactions page, select the transactions to be evaluated: **book_flight** and **search_flight**.

5. Select a load criterion and define appropriate ranges of load - optional

On the Load criteria page, select the load criterion to take into account when evaluating the average transaction response time.

In this case, to see the effect that various quantities of Vusers running on the system has on the average transaction response time of each transaction, in the **Load Criterion** box, select **Running Vusers**.

Then set the value ranges for the running Vusers:

Consider less than 20 Vusers to be a light load, 20 – 50 Vusers an average load, and 50 Vusers or more a heavy load. Enter these values in the Load Values boxes.

Note:

- You can set up to three in-between ranges.
- Valid load value ranges are consecutive—there are no gaps in the range—and span all values from zero to infinity.

6. Set thresholds

On the Thresholds page, you define the acceptable average transaction response times for the transactions, taking into account the defined load criterion.

In this case, define the same threshold values for both transactions as follows: for a light load, a reasonable average response time can be up to 5 seconds, for an average load, up to 10 seconds, and for a heavy load, up to 15 seconds.

Tip: To define the same thresholds for all the transactions, enter the values in the **Apply to all transactions** boxes above the table, and click the **Apply to all** button.

7. Define a tracking period - optional

When SLA statuses for a measurement are determined at time intervals over a timeline, the frequency of the time intervals is determined by the **tracking period**.

This step is optional because an internally-calculated tracking period of at least 5 seconds is defined by default. You can change the tracking period in the Tracking Period dialog box:

- a. In the Service Level Agreement pane, click the **Tracking Period** button.
- b. Select **Tracking period of at least X seconds**, and select a tracking period. The time intervals are calculated by Analysis according to a built-in algorithm and as a function of the value you enter here.

Example:

If you select a tracking period of 10, and the aggregation granularity for the performance

test (defined in Analysis) is 6, then the tracking period is set to the nearest multiple of 6 that is greater than or equal to 10, that is, Tracking Period = 12.

For details, see ["Tracking Period" on page 190](#).

For user interface details, see ["Tracking Period Dialog Box" on page 203](#).

8. Results

When analyzing your test run, Analysis applies your SLA settings to the default Summary Report and the report is updated to include all the relevant SLA information.

For example, it displays the worst performing transactions in terms of defined SLAs, how specific transactions performed over set time intervals, and overall SLA statuses.

For more information, see the *HP LoadRunner Analysis User Guide*.

Service Level Agreement User Interface

This section includes:






Service Level Agreement Pane	195
Service Level Agreement Wizard	196
Tracking Period Dialog Box	203

Service Level Agreement Pane

This pane lists all the service level agreements (SLAs) defined for the performance test.


To access	In the Performance Test Designer window, click Summary .
Relevant Tasks	<ul style="list-style-type: none">• "How to Design a Performance Test" on page 111• "How to Define Service Level Agreements" on page 190
See also	"Service Level Agreements Overview" on page 189

User interface elements are described below:

UI Elements	Description
 New	Starts the Service Level Agreement wizard where you can define new goals for the performance test.
 Edit	Opens the Service Level Agreement wizard where you can modify the goals defined in the SLA.
 Delete	Deletes the selected SLA.
 Details	Opens the SLA Details dialog box which displays a summary of the details of the selected SLA.
 Tracking Period	Opens the Tracking Period dialog box where you can adjust the tracking period for measurements that are evaluated per time interval over a timeline. For conceptual information, see "Tracking Period" on page 190 . For user interface details, see "Tracking Period Dialog Box" on page 203 .
Service Level Agreement list	Lists the SLAs defined for the performance test.

Service Level Agreement Wizard

This wizard enables you to define service level agreements (SLAs). SLAs enable you to define performance targets or goals for your performance test. During a test run, ALM measures performance and collects data. This data is compared against thresholds defined in the SLAs.

To access	<p>To view a list of defined SLAs:</p> <p>On the My Performance Center navigation bar, select Test Management > Test Plan. Select a test in the tree. The Service Level Agreement pane lists the defined SLAs</p> <p>To define SLAs:</p> <ol style="list-style-type: none"> 1. Select a test in the tree, and click Edit Test. 2. In the Performance Test Designer window, click Summary. 3. In the Service Level Agreement pane, click  New.
Important information	You can define SLAs in the Performance Test Designer only.
Relevant tasks	"How to Define Service Level Agreements" on page 190
Wizard map	<p>This wizard contains:</p> <p>Introduction > "Measurement Page" on the next page > "Transactions Page" on page 198 > "Load Criteria Page" on page 199 > "Thresholds Page" on page 200 > "Summary Page" on page 202</p>
See also	"Service Level Agreements Overview" on page 189

User interface elements are described below:

UI Elements	Description
Skip this page next time	<p>When this option is selected, the SLA wizard starts on the Measurements page. For details, see "Measurement Page" on the next page.</p> <p>To view the Introduction page again, on the Measurement page click Back and clear the Skip this page next time option.</p>

Measurement Page

This wizard page enables you to select a measurement for the SLA. Some measurements are measured at time intervals over a timeline, and others are measured over the whole test run.

Important information	General information about this wizard is available here: "Service Level Agreement Wizard" on the previous page .
Wizard map	The "Service Level Agreement Wizard" on the previous page contains: Introduction > "Measurement Page" above > "Transactions Page" on the next page > "Load Criteria Page" on page 199 > "Thresholds Page" on page 200 > "Summary Page" on page 202
See also	"Service Level Agreements Overview" on page 189

User interface elements are described below:

UI Elements	Description
Transaction Response Time	<ul style="list-style-type: none">• Percentile. Measures the percentage of transactions whose transaction response time falls below a specific threshold. The SLA is measured over the whole run.• Average. Measures whether the average transaction response time of the transactions over a specified time interval exceeds the defined threshold. <div>Note: Transaction Response Time SLAs can be defined only when at least one of the scripts participating in the test includes a transaction.</div>
Errors per Second	Measures whether the errors per second over a specified time interval exceed the defined threshold.
Total Hits	Measures whether the total number of hits over the whole test run reach the defined threshold.
Average Hits per Second	Measures whether the average hits per seconds over the whole test run reach the defined threshold.
Total Throughput	Measures whether the total throughput over the whole test run reaches the defined threshold.
Average Throughput	Measures whether the average throughput over the whole test run reaches the defined threshold.

Transactions Page

This wizard page enables you to include transactions critical to your test in the evaluation.

Important information	<ul style="list-style-type: none">• General information about this wizard is available here: "Service Level Agreement Wizard" on page 196.• The Transaction page is displayed only when at least one of the scripts participating in the test includes a transaction.
Wizard map	The "Service Level Agreement Wizard" on page 196 contains: Introduction > "Measurement Page" on the previous page > "Transactions Page" above > "Load Criteria Page" on the next page > "Thresholds Page " on page 200 > "Summary Page" on page 202
See also	"Service Level Agreements Overview" on page 189

User interface elements are described below:

UI Elements	Description
Available Transactions	<p>Lists the transactions in the scripts participating in the test.</p> <p>To move a script to the Selected Transaction list, double-click it.</p> <div>Note: You must select at least one transaction for evaluation.</div>
Selected Transactions	<p>Lists the transactions in the scripts that have been selected for the SLA.</p> <p>To remove a script from this list, double-click it.</p> <div>Note: At least one transaction must be listed.</div>

Load Criteria Page

This wizard page enables you to select a load criterion for your goal and define appropriate load value ranges. For example, you can define the SLA to show the behavior of errors per second when there are less than 5 running Vusers, when there are between 5 and 10 running Vusers, and when there are 10 or more running Vusers.

Important information	<ul style="list-style-type: none"> General information about this wizard is available here: "Service Level Agreement Wizard" on page 196. This page is available only when defining the Average Transaction Response Time or Errors per Second SLAs. In the next wizard step (Thresholds page), you will set different thresholds for each of these load value ranges.
Wizard map	<p>The "Service Level Agreement Wizard" on page 196 contains:</p> <p>Introduction > "Measurement Page" on page 197 > "Transactions Page" on the previous page > Load Criteria Page > "Thresholds Page " on the next page > "Summary Page" on page 202</p>
See also	"Service Level Agreements Overview" on page 189

User interface elements are described below:

UI Elements	Description
Measurement	The measurement selected for the SLA.
Load Criterion	<p>The load criterion to consider when evaluating the goal.</p> <ul style="list-style-type: none"> None. Does not consider any load criterion. Running Vusers. Considers the impact of the running Vusers. Throughput. Considers the impact of throughput. Hits per Second. Considers the impact of the hits per second. <p>For Average Transaction Response Time, you can also select:</p> <ul style="list-style-type: none"> Transactions per second. Considers the impact of the transactions per second. Transactions per second (passed). Considers the impact of the transactions per second that passed the evaluation.

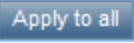
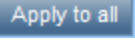
UI Elements	Description
Load Values	<p>Values of load to consider when evaluating the goal.</p> <p>Value ranges must be consecutive, spanning all values from zero to infinity.</p> <ul style="list-style-type: none"> • Less than. The lower range is always from 0 up to, but not including, the value entered here. <p>Example:</p> <p>If you enter 5, the lower range is between 0 and 5, but does not include 5.</p> <ul style="list-style-type: none"> • Between. The in-between ranges include the lower value of the range, but not the upper value. <p>Example:</p> <p>If you enter 5 and 10, the range is from 5 and up to, but not including, 10.</p> <p>Note: You can set up to three in-between ranges.</p> <ul style="list-style-type: none"> • Greater than. The upper range is from the value entered here, and higher. <p>Example:</p> <p>If you enter 10, the upper range is from 10 and up.</p>

Thresholds Page

This wizard page enables you to define thresholds for the selected measurement.

Important information	General information about this wizard is available here: "Service Level Agreement Wizard" on page 196 .
Wizard map	The "Service Level Agreement Wizard" on page 196 contains: Introduction > "Measurement Page" on page 197 > "Transactions Page" on page 198 > "Load Criteria Page" on the previous page > "Thresholds Page" above > "Summary Page" on page 202
See also	"Service Level Agreements Overview" on page 189

User interface elements are described below (unlabeled elements are shown in angle brackets>):

UI Elements	Description
Measurement	The measurement selected for the SLA.
Percentile	Percentage of transactions to measure against the configured threshold. Available for the following measurement: Transaction Response Time Percentile
Apply to all transactions	Enables you to define a threshold or a set of thresholds for all of the listed transactions. Click  to apply the thresholds to all of the listed transactions simultaneously. Note: Threshold values for the transactions do not have to be the same. You can assign different values for each transaction. Available for the following measurement: Average Transaction Response Time
Provide a threshold value for all transactions	Enables you to define one threshold for all of the listed transactions. Click  to apply the value to all of the listed transactions simultaneously. Note: The threshold values for the transactions do not have to be the same. You can assign different values for each transaction. Available for the following measurements: Transaction Response Time Percentile

UI Elements	Description
Threshold/<Threshold table>	<p>The minimum/maximum threshold value for the selected measurement.</p> <ul style="list-style-type: none"> • Transaction Response Time Percentile: If the resulting value over the whole run exceeds the defined threshold values, the SLA produces a Failed status. • Average Transaction Response Time and Errors per Second: If the resulting value over the specified time interval exceeds the threshold values, the SLA produces a Failed status for that time interval. • Average/Total Throughput and Average Hits per Second/Total Hits: If the resulting value over the whole run is lower than the threshold value, the SLA produces a Failed status. <p>Note:</p> <ul style="list-style-type: none"> • Transaction Response Time Percentile and Average Transaction Response Time: When more than one transaction is selected, all of the transactions are listed in a table enabling you to define thresholds for each transaction separately. • Average Transaction Response Time and Errors per Second: When a load criterion is selected, the table displays the load value ranges, enabling you to define thresholds per range of load values. For details, see "Load Criteria Page" on page 199.

Summary Page

This wizard page displays a summary of the SLA you defined and enables you to define more SLAs.

Important information	General information about this wizard is available here: "Service Level Agreement Wizard" on page 196 .
Wizard map	<p>The "Service Level Agreement Wizard" on page 196 contains:</p> <p>Introduction > "Measurement Page" on page 197 > "Transactions Page" on page 198 > "Load Criteria Page" on page 199 > "Thresholds Page" on page 200 > "Summary Page" above</p>
See also	"Service Level Agreements Overview" on page 189

User interface elements are described below:

UI Elements	Description
Define another service level agreement	Enables you to define another SLA while still in the SLA wizard. If this option is selected, clicking Finish takes you directly to the page where you can select a measurement for another SLA.

Tracking Period Dialog Box

This dialog box enables you to set a tracking period for service level agreements.

To access	<ol style="list-style-type: none">1. In the Performance Test Designer, click the Summary tab.2. In the Service Level Agreement pane, click the Tracking Period button.
Important information	For measurements evaluated over a timeline, Analysis determines SLA statuses at specified time intervals within that timeline. These time intervals are known as the tracking period.
Relevant tasks	"How to Define Service Level Agreements" on page 190
See also	"Service Level Agreements Overview" on page 189

User interface elements are described below:

UI Elements	Description
Internally calculated tracking period	Analysis automatically sets a tracking period over which SLA statuses are determined. Minimum tracking period: 5 seconds
Tracking period of at least <xx> seconds	Analysis sets the tracking period as close as possible to the value specified here. Minimum tracking period: 5 seconds Example: Assume that you select a tracking period of X=10, and assume that the aggregation granularity for the performance test is 6. The tracking period is set to the nearest multiple of 6 that is greater than or equal to 10. That is, Tracking Period = 12. For this option, Analysis uses the following formula: Tracking Period = Max(5 seconds, m(Aggregation Granularity)) where m is a multiple of the performance test's aggregation granularity such that m (Aggregation Granularity) is greater than or equal to X.

Chapter 14: Enabling and Configuring ERP/CRM and J2EE/.NET Diagnostics

This chapter includes:

How to Enable and Configure ERP/CRM Diagnostics	205
How to Enable and Configure J2EE/.NET Diagnostics	205
How to View Diagnostics Results	206
Diagnostics User Interface	206

How to Enable and Configure ERP/CRM Diagnostics

This task describes how to configure the ERP/CRM Diagnostics modules to communicate with the Mediator, and how to define the servers that you want to monitor in order to generate diagnostics data.

To learn more about ERP/CRM diagnostics, refer to the *HP ALM Lab Management Guide*.

Note: This task is part of a higher-level task. For details, see ["How to Design a Performance Test" on page 111](#).

1. Prerequisites

- Make sure that the ERP/CRM Mediator is installed and configured. If this is not the case, consult the administrator for help.
- Make sure that the performance test is not already running.

2. Manually define transactions in the Vuser script

To ensure that valid diagnostics data are generated, manually define the transactions in the Vuser script rather than using automatic transactions. Make sure to disable the following options in the Run-Time Settings' **General > Miscellaneous** node: **Define each action as a transaction** and **Define each step as a transaction**.

3. Enable the diagnostics module

On the My Performance Center navigation bar, select **Test Management > Test Plan**. Select a performance test in the test plan tree and click **Edit Test**. Click **Diagnostics**.

For user interface details, see ["Performance Test Designer > Diagnostics" on page 207](#).

How to Enable and Configure J2EE/.NET Diagnostics

This step describes how to capture J2EE/.NET diagnostics metrics in a performance test, and how to select the probes that are included in the test.

To learn more about J2EE/.NET diagnostics, refer to the *HP ALM Lab Management Guide*.

Note: This task is part of a higher-level task. For details, see ["How to Design a Performance Test" on page 111](#).

Enable J2EE/.NET diagnostics from the Diagnostics Tab

On the My Performance Center navigation bar, select **Test Management > Test Plan**. Select a performance test in the test plan tree and click **Edit Test**. Click **Diagnostics**.

For user interface details, see ["Performance Test Designer > Diagnostics" on the next page](#).

How to View Diagnostics Results

You view results for ERP/CRM as well as J2EE/.NET diagnostics in HP LoadRunner Analysis.

1. Open Analysis
 - a. Navigate to **<HP Performance Center Host directory> Applications > Analysis**.
 - b. Open the desired results file from the following location:

<LTS installation>\orchidtmp\Results\<Domain Name+Project Name>\Run_<Run number>\res<Run number>\res<Run number>.lrr

2. View results in the Analysis diagnostics graphs

You can use the Analysis diagnostics graphs and reports to view the performance data and drill down to pinpoint problem areas in any layer of the application.

For information about specific diagnostics graphs, see the *HP LoadRunner Analysis User Guide*.

Diagnostics User Interface

This section includes:


Performance Test Designer > Diagnostics	207
J2EE/.NET Configuration Dialog Box	208
Oracle 11i Configuration Dialog Box	209
Oracle 11i Server Configuration Dialog Box	210
SAP Configuration Dialog Box	211
Siebel Configuration Dialog Box	212
Siebel DB Configuration Dialog Box	213
Siebel DB Server Configuration Dialog Box	214
Siebel Server Configuration Dialog Box	215

Performance Test Designer > Diagnostics

This view enables you to enable and define the ERP/CRM and J2EE/.NET diagnostics modules for a performance test.


To access	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Test Management > Test Plan. 2. Select a performance test in the test plan tree and click Edit Test. 3. In the Performance Test Designer window, click Diagnostics.
Important information	<ul style="list-style-type: none"> • The contents of the tab are disabled while the performance test is running. You must enable and configure the diagnostics modules before running the test. • The settings that you configure are per performance test. All scripts in the performance test run under the same diagnostics configuration.
Relevant tasks	<ul style="list-style-type: none"> • "How to Enable and Configure ERP/CRM Diagnostics" on page 205 • "How to Enable and Configure J2EE/.NET Diagnostics" on page 205

User interface elements are described below:

UI Elements	Description
Enable the following Diagnostics for X% of all relevant Vusers in the test	<p>Specify the percentage of Vusers for which you want to collect diagnostics data. This value determines how many of the transactions on the application server are reported to the Controller. Reducing this percentage will reduce the overhead on the application server for Web Page, Oracle 11i, and J2EE & .NET Diagnostics.</p> <p>Example: If you enter a sampling value of 25% and run 12 Vusers in group1, 8 Vusers in group2, and 1 Vuser in group3, diagnostics data will be collected for 3 Vusers in group1, 2 Vusers in group2, and 1 Vuser in group3.</p> <p>Note: The minimum percentage of Vuser sampling allowed is 1%, or 1 Vuser per group, whichever is more.</p> <p>The maximum percentage allowed is the lowest of the Max. Vuser Sampling values of all the selected diagnostics types.</p>
Configure	Click the  button to configure each diagnostics type.
Max Vuser Sampling	The maximum percentage of the amount of Vusers specified in the Enable the following Diagnostics for X% ... that can be collected.

J2EE/.NET Configuration Dialog Box

This dialog box enables you to set up the J2EE/.NET diagnostics module.

To access	<ol style="list-style-type: none">1. On the My Performance Center navigation bar, select Test Management > Test Plan.2. Select a performance test in the test plan tree and click Edit Test.3. In the Performance Test Designer window, click Diagnostics.4. Select Enable the following diagnostics for X% of all relevant Vusers in the test.5. Select Enable by J2EE/.NET Application Diagnostics, then click the Configure button .
Important information	The dialog box is read only while the performance test is running.
Relevant tasks	"How to Enable and Configure J2EE/.NET Diagnostics" on page 205
See also	J2EE & .NET Diagnostics Graphs in the <i>HP LoadRunner Analysis User Guide</i> .


User interface elements are described below:

UI Elements	Description
Monitor server requests	<p>Select to capture a percentage of server requests which occur outside the context of any Vuser transaction. For more information, see <i>HP ALM Lab Management Guide</i>.</p> <div><p>Note:</p><ul style="list-style-type: none">• The server requests will be captured at the same percentage that was selected for the percentage of Vusers in the Diagnostics Distribution dialog box.• Enabling this option imposes an additional overhead on the probe.</div>

UI Elements	Description
Select Probes Table	<ul style="list-style-type: none"> <input type="checkbox"/>. Selects a probe for monitoring. At least one probe must be selected. Name. The name of the probe. Group. The probe group. Host Name. The host the probe is running on (or the application server on which the probe is installed). Status. The probe's status. Either Available or Not Available. <p>Note: If you upgraded your Diagnostics installation, probes from existing performance tests may appear with a red status. Clear any probes that appear in red.</p>
There is a firewall between the Mediator and the Controller. Use the MI Listener for collating results.	<p>Select if the Diagnostics server (or a Diagnostics server in Mediator mode in a distributed environment) is located behind a firewall.</p> <p>Note: If there is a firewall between the Controller and the Diagnostics Server involved in a load test, you must configure the Controller and the Diagnostics Server to use the MI Listener to enable the transfer of the offline analysis file. For more information, refer to the <i>HP Diagnostics Installation and Configuration Guide</i>.</p>
Troubleshoot diagnostics for J2EE/.NET connectivity	<p>Click to open the HP Diagnostics System Health Monitor to enable you to investigate any connectivity issues between the Diagnostics components.</p>

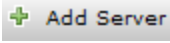


Oracle 11i Configuration Dialog Box

This dialog box enables you to set up the Oracle 11i Diagnostics module to communicate with the Mediator.

To access	<ol style="list-style-type: none"> On the My Performance Center navigation bar, select Test Management > Test Plan. Select Test Design > Edit Test > Diagnostics. Select Enable the following diagnostics for X% of all relevant Vusers in the test. Select Enable by Oracle 11i Diagnostics, then click the Configure button  .
------------------	--

Relevant tasks	"How to Enable and Configure ERP/CRM Diagnostics" on page 205
See also	<ul style="list-style-type: none"> • "Oracle 11i Server Configuration Dialog Box" below • Oracle 11i Diagnostics Graphs in the <i>HP LoadRunner Analysis User Guide</i>

User interface elements are described below:

UI Elements	Description
	Opens the Oracle 11i Server Configuration dialog box where you can add Oracle 11i servers and enter server information. For more information, see "Oracle 11i Server Configuration Dialog Box" below .
	Tests the connections between the Oracle 11i Diagnostics module and the Mediator. Note: This does not check the connections to the Oracle servers.
	Enables you to edit the server details.
Name	The name of the Mediator used to collect and process the Oracle 11i diagnostics data. Only one Mediator is supported for each diagnostics module.
Servers Table	<ul style="list-style-type: none"> • Server. The name of the Oracle server. • Platform. The platform of the Oracle server. • Log Directory. The directory where the Oracle trace files (*.trc) are written.

Oracle 11i Server Configuration Dialog Box

This dialog box enables you to add Oracle 11i servers and to add server information.

To access	In the Oracle 11i Configuration dialog box, click Add Server .
Relevant tasks	"How to Enable and Configure ERP/CRM Diagnostics" on page 205
See also	"Oracle 11i Configuration Dialog Box" on the previous page


User interface elements are described below:

UI Elements	Description
Domain	The Oracle server domain.

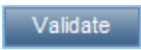
UI Elements	Description
Log Directory	A location where the Oracle application saves the trace files. The trace files can be saved in a shared directory on the Oracle server or in a separate folder.
Password/Passphrase	The user password or passphrase.
Platform	The Oracle server platform.
Private Key File	The name of the file where the Private Key is stored. This can be found on the Mediator. If you specify the file name only (without a path), the configuration automatically looks for the file in the Mediator's <Mediator Root>\bin directory.
Server	The name of the Oracle server.
Use Secure Shell	Select if you are working with a Secure Shell connection.
User Name	The user name of the server where trace files are stored. Note: For Windows platforms, the user should have administrator privileges.

SAP Configuration Dialog Box

This dialog box enables you to add SAP servers and to add server information.


To access	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Test Management > Test Plan, then select the desired test. 2. Select Test Design > Edit Test > Diagnostics. 3. Select Enable the following diagnostics for X% of all relevant Vusers in the test. 4. Select Enable by SAP Diagnostics, then click the Configure button .
Relevant tasks	"How to Enable and Configure ERP/CRM Diagnostics" on page 205
See also	SAP Diagnostics Graphs in the <i>HP LoadRunner Analysis User Guide</i>

User interface elements are described below:

UI Elements	Description
	Validates the connection to the SAP server. When you click Validate , the Controller produces a report of all the servers that are available for diagnostics through the Server Host.
Client Number	The client number of the selected user.
Name	The name of the Mediator used to collect and process the SAP diagnostics data. Only one Mediator is supported for each diagnostics module. Note: If you are using a Mediator that is over a firewall, enter the local machine key of the Mediator instead of the Mediator machine name.
Server Host Name	The name of the SAP server.
System Router string	Optional. Enter the system router string of the SAP server.
System number	The system number of the SAP server.
User Name	The user's unique name for logging onto the SAP server.
User Password	The user's password for logging onto the SAP server.




Siebel Configuration Dialog Box

This dialog box enables you to set up the Siebel Diagnostics module to communicate with the Mediator.

To access	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Test Management > Test Plan, then select the desired test. 2. Select Test Design > Edit Test > Diagnostics. 3. Select Enable the following diagnostics for X% of all relevant Vusers in the test. 4. Select Enable by Siebel Application Diagnostics, then click the Configure button .
------------------	--


Relevant tasks	"How to Enable and Configure ERP/CRM Diagnostics" on page 205
See also	<ul style="list-style-type: none"> • "Siebel DB Server Configuration Dialog Box" on the next page • Siebel Diagnostics Graphs in the <i>HP LoadRunner Analysis User Guide</i> • Siebel DB Diagnostics Graphs in the <i>HP LoadRunner Analysis User Guide</i>

User interface elements are described below:

UI Elements	Description
	Opens the Siebel Server Configuration dialog box where you can add Siebel servers and enter server information. For more information, see "Siebel Server Configuration Dialog Box" on page 215 .
	Tests the connections between the Siebel Diagnostics module and the Mediator. Note: This does not check the connections to the Siebel servers.
	Enables you to edit the server details.
Name	The name of the Mediator used to collect and process the Siebel diagnostics data. Only one Mediator is supported for each diagnostics module.
Servers Table	<ul style="list-style-type: none"> • Server Name. The name of the Siebel server. • Platform. The platform of the Siebel server. • Log Directory. The Siebel server directory where Siebel log files (*.SARM) are written.

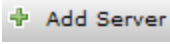

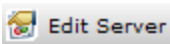
Siebel DB Configuration Dialog Box

This dialog box enables you to add Siebel DB servers and to add server information.

To access	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Test Management > Test Plan, then select the desired test. 2. Select Test Design > Edit Test > Diagnostics. 3. Select Enable the following diagnostics for X% of all relevant Vusers in the test. 4. Select Enable by Siebel Application Diagnostics, then click the Configure button .
------------------	--

Relevant tasks	"How to Enable and Configure ERP/CRM Diagnostics" on page 205
See also	<ul style="list-style-type: none"> • "Siebel DB Server Configuration Dialog Box" below • Siebel DB Diagnostics Graphs in the <i>HP LoadRunner Analysis User Guide</i>

User interface elements are described below:

UI Elements	Description
	Opens the Siebel DB Server Configuration dialog box where you can add Siebel DB servers and enter server information. For more information, see "Siebel DB Server Configuration Dialog Box" below .
	Tests the connections between the Siebel DB Diagnostics module and the Mediator. Note: This does not check the connections to the Siebel servers.
	Enables you to edit the server details.
Name	The name of the Mediator used to collect and process the Siebel diagnostics data. Only one Mediator is supported for each diagnostics module.
Servers Table	<ul style="list-style-type: none"> • Server Name. The name of the Siebel server. • Platform. The platform of the Siebel server. • Log Directory. The Siebel server directory where Siebel log files (*.SARM) are written.

Siebel DB Server Configuration Dialog Box

This dialog box enables you to add Siebel DB servers and add server information.

To access	In the Siebel DB Configuration dialog box, click Add Server .
Relevant tasks	"How to Enable and Configure ERP/CRM Diagnostics" on page 205
See also	"Siebel DB Configuration Dialog Box" on the previous page

User interface elements are described below:

UI Elements (A-Z)	Description
Domain	The Siebel server domain.

UI Elements (A-Z)	Description
Log Directory	A location where the Siebel application saves the trace files. The trace files can be saved in a shared directory on the Siebel server or in a separate folder.
Password/Passphrase	The user password or passphrase.
Platform	The Siebel server platform.
Private Key File	The name of the file where the Private Key is stored. This can be found on the Mediator. If you specify the file name only (without a path), the configuration automatically looks for the file in the Mediator's <Mediator Root>\bin directory.
Server Name	The name of the Siebel server.
Use Secure Shell	Select if you are working with a Secure Shell connection.
User Name	The user name of the server where trace files are stored. Note: For Windows platforms, the user should have administrator privileges.

Siebel Server Configuration Dialog Box

This dialog box enables you to add Siebel servers and enter server information.

To access	In the Siebel Configuration dialog box, click Add Server .
Relevant tasks	"How to Enable and Configure ERP/CRM Diagnostics" on page 205
See also	"Siebel Configuration Dialog Box" on page 212

User interface elements are described below:

UI Elements	Description
Domain	The Siebel server domain.
Log Directory	A location where the Siebel application saves the trace files. The trace files can be saved in a shared directory on the Siebel server or in a separate folder.
Password/Passphrase	The user password or passphrase.
Platform	The Siebel server platform.

UI Elements	Description
Private Key File	The name of the file where the Private Key is stored. This can be found on the Mediator. If you specify the file name only (without a path), the configuration automatically looks for the file in the Mediator's <Mediator Root>\bin directory.
Server ID	The Siebel server ID.
Server Name	The name of the Siebel server.
Server Type	The Siebel server type.
Use Secure Shell	Select if you are working with a Secure Shell connection.
User Name	The user name of the server where trace files are stored. Note: For Windows platforms, the user should have administrator privileges.

Chapter 15: Configuring Terminal Sessions

This section includes:

Terminal Sessions Overview	219
How to Create a Terminal Session	219
How to Connect to a Terminal Session	220
How to Configure a Terminal Session over a Firewall	222
Terminal Sessions User Interface	223

Terminal Sessions Overview

Using Performance Center's terminal sessions, you can run multiple load generators simultaneously in your performance test on a terminal server. Performance Center allows you to create a new terminal session, or connect to an existing session.

Using terminal sessions enables you to overcome the limitation of being able to run only a single GUI Vuser on a Windows-based load generator. GUI Vusers, which operate graphical user interface (GUI) applications, are defined in a GUI Vuser script. You create GUI Vuser scripts using HP's QuickTest Professional (HP Unified Functional Testing). By opening a terminal server session for each GUI Vuser, you can run multiple GUI Vusers on the same application.

You select the number of terminals to be used in your performance test (provided that you have sufficient terminal sessions running), and the maximum number of Vusers that can be run per terminal. The maximum number of Vusers depends on the Vuser type used in the script. For GUI Vusers, the maximum is one Vuser for each terminal session. Performance Center then evenly distributes the number of Vusers among the client sessions.

For details on how to create or connect to a terminal session, see ["How to Create a Terminal Session" below](#).

How to Create a Terminal Session

This task describes how to create a new terminal session.

To learn about terminal sessions, see ["Terminal Sessions Overview" above](#).

Note:

- You can enable terminal sessions when configuring performance tests with manual load generator distribution only.
- The Terminal Services Manager does not support terminal sessions connected over a firewall. To configure terminal sessions over a firewall, see ["How to Configure a Terminal Session over a Firewall" on page 222](#).

1. Prerequisites

- Ensure that a load generator host is installed on the terminal server machine.

Note: You cannot use terminal sessions on Linux load generators.

- Ensure that the Remote Desktop Connection client software is installed on the Controller

machine.

2. Configure the Performance Center agent on the load generator machine
 - a. Select **Start > All Programs > HP Performance Center Host > Advanced Settings > Performance Center Agent Configuration**. The Agent Configuration dialog box opens.
 - b. Select **Enable Terminal Services** and click **OK**.
 - c. When prompted to restart the agent, click **OK**.

3. Check the Terminal Services logon settings

Ensure that the correct terminal services settings are selected for the Remote Desktop Connection client.

To configure the correct Terminal Server logon settings:

- a. On the load generator machine, select **Start > Programs > Administrative Tools > Terminal Services Configuration**. The Terminal Services Configuration dialog box opens. Right-click **RDP-TCP**, and select **Properties** to open the RDP-TCP Properties dialog box.
 - b. Click the **Logon Settings** tab.
 - c. Make sure that **Use client-provided logon settings** is selected and that **Always prompt for password** is not selected.
4. Add the load generator to the system

Use the New Host dialog box to add the load generator the system. For user interface details, refer to the *HP ALM Lab Management Guide*.
5. Configure the terminal session

You configure the terminal session from the Terminal Services dialog box. For user interface details, see ["Terminal Services Dialog Box" on page 224](#).

How to Connect to a Terminal Session

This task describes how to connect to an existing terminal session.

To learn about terminal sessions, see ["Terminal Sessions Overview" on the previous page](#).

Note:

- You can enable terminal sessions when configuring performance tests with manual load generator distribution only.
- The Terminal Services Manager does not support terminal sessions over a firewall. To configure terminal sessions over a firewall, see ["How to Configure a Terminal Session over a Firewall" on the next page](#).

1. Prerequisites

- Ensure that a load generator host is installed on the terminal server machine.

Note: You cannot use terminal sessions on Linux load generators.

- Ensure that the Remote Desktop Connection client software is installed on the Controller machine.

2. Run the Performance Center agent as a process

- a. On the load generator machine, run **<Performance Center Host installation>\launch_service\bin\Magentconfig.exe**. The Agent Runtime Settings dialog box opens.
- b. Select **Manual log in to this machine**.

Note: You must run the Performance Center agent as a process for each terminal session that you are running.

3. Configure the Performance Center agent on the load generator

- a. Select **Start > All Programs > Performance Center Host > Advanced Settings > Performance Center Agent Configuration**. The Agent Configuration dialog box opens.
- b. Select **Enable Terminal Services** and click **OK**.
- c. When prompted to restart the agent, click **OK**.

4. Add the load generator to the system

Use the New Host dialog box to add the load generator to the system. For user interface details, refer to the *HP ALM Lab Management Guide*.

5. Launch a terminal session from the Controller

Note: You must open a terminal session for each terminal that you want to run Vusers on during the performance test.

- a. Select **Start > All Programs > Accessories > Communication > Remote Desktop Connection**, or select **Start > Run** and run the **mstsc** command. The Remote Desktop Connection dialog box opens.
 - b. Click **Options**.
 - c. In the **General** tab, enter the name or IP address of a terminal server, or select a terminal server from the list of available servers.
 - d. Enter your user name, password, and domain name (if required) for login onto the terminal server.
 - e. Click **Connect** to open a Terminal Client window.
6. Configure the terminal session

You configure the terminal session from the Terminal Services dialog box. For user interface details, see ["Terminal Services Dialog Box" on page 224](#).

How to Configure a Terminal Session over a Firewall

This task describes how to configure a terminal session on a load generator that is located over a firewall.

1. Open the load generator machine console.
2. If the Performance Center Agent is not running as a process, run **<load generator host installation>\launch_service\bin\magentproc.exe**.
3. Configure the Performance Center Agent on the console:
 - a. Select **Enable Firewall Agent**, click **Settings**. In the **Local Machine Key** field, enter a virtual load generator name, for example, `machine_ofw`.
 - b. Select **Enable Terminal Services**, and click **OK**.
4. Create one or more terminal sessions on the load generator console machine.

Consider the following:

- For each terminal session, run the agent configuration as above. For each session, specify a different Local Machine Key name, for example, `machine_ofw_1`, `machine_ofw_2`, etc.
- If you stop the agent on a terminal session, you must reconfigure the settings for that particular

session before restarting the agent.

- When selecting the load generator for the scenario in the Controller, select the local machine key for each individual virtual load generator used.



Terminal Sessions User Interface

This section includes:

Terminal Services Dialog Box	224
Performance Center Agent Runtime Settings Dialog Box	225

Terminal Services Dialog Box

This dialog box enables you to configure terminal sessions.

To access	<p>Use one of the following:</p> <ul style="list-style-type: none"> In the Select Load Generators dialog box, select a load generator and click the Terminal Services button . For more information, see "Select Load Generators Dialog Box" on page 168. In the Automatch Load Generators Properties dialog box, select a load generator then click Terminal Services. For more information, see "Automatch Load Generators Properties Dialog Box" on page 171. During Runtime, on the Performance Test Run page, click the Load Generators  button. Then click Terminal Sessions Settings.
Important information	During runtime, you can set or change terminal services settings only when the load generator is non-operational.
Relevant tasks	"How to Create a Terminal Session" on page 219

User interface elements are described below:

UI Elements	Description
Enable Terminal Services	Applies the settings to the load generator running on the terminal server.
Number of Terminal Services to open on Load Generator	<p>Enter the number of terminals in your performance test.</p> <p>Note: You must open a terminal session for each terminal on which you want to run Vusers during the performance test.</p>
Maximum number of Vusers to run in a Terminal Service	<p>Enter the maximum number of Vusers that you want to run in a terminal session.</p> <p>Note: The maximum number of Vusers depends on the Vuser type used in the script. For GUI Vusers, the maximum is one Vuser for each terminal session.</p>
Create new Terminal Services sessions	Enables the Controller to launch terminal sessions automatically using the Remote Desktop Connection.

UI Elements	Description
Connect to existing Terminal Services session	Enables a connection to an existing terminal session.

Performance Center Agent Runtime Settings Dialog Box

This dialog box enables you to run the Performance Center Agent as a service, or as a process.

User interface elements are described below:

UI Elements	Description
Allow virtual users to run on this machine without user login	Select to run the Performance Center Agent as a service. You must enter your user credentials. Note: This is the default selection.
Manual log in to this machine	Select to run the Performance Center Agent as a process. This enables you to run multiple GUI Vusers on the same load generator.

Chapter 16: Multiple IP Addresses

This chapter includes:

Multiple IP Addresses Overview	227
How to Enable IP Spoofing in ALM	227
How to Configure Multiple IP Addresses on Linux	229
IP Wizard	229

Multiple IP Addresses Overview

Application servers and network devices use IP addresses to identify clients. The application server often caches information about clients coming from the same machine. Network routers try to cache source and destination information to optimize throughput. If many users have the same IP address, both the server and the routers try to optimize. Since Vusers on the same load generator have the same IP address, server and router optimizations do not reflect real-world situations.

The Multiple IP Addresses feature enables Vusers running on a single load generator to be identified by many IP addresses. The server and router recognize the Vusers as coming from different load generators and as a result, the testing environment is more realistic.

This feature can be implemented on Windows and Linux platforms with the following protocols:

DNS, IMAP, Oracle NCA, Oracle Web Applications 11i, POP3, RTE, SAP-Web, Siebel-Web, SMTP, Web (HTTP/HTML), Web Services, and Windows Sockets.

How to Enable IP Spoofing in ALM

The following steps describe how to add IP addresses to a load generator to enable IP Spoofing.

This task includes the following steps:

- ["Create multiple IP addresses on the load generator." below](#)
- ["Update the server's routing table with the new addresses." below.](#)
- ["Enable the Multiple IP Addresses feature from Performance Center" on the next page](#)

1. Create multiple IP addresses on the load generator.

- **Windows:** Run the IP Wizard to create multiple IP addresses. For details on running the IP Wizard, see ["IP Wizard" on page 229](#).

The new IP addresses are added to the load generator once and are used for all performance tests. After running the wizard, restart the load generator machine.

- **Linux:** Manually configure the new IP addresses for Linux load generators. For details, see ["How to Configure Multiple IP Addresses on Linux" on page 229](#).

2. Update the server's routing table with the new addresses.

Once the client machine has new IP addresses, the server needs the addresses in its routing table, so that it can recognize the route back to the client. If the server and client share the same netmask, IP class, and network, the server's routing table does not require modification.

Note: If there is a router between the client and server machines, the server needs to recognize the path via the router. Make sure to add the following to the server routing table:

- A route from the Web server to the router,
- Routes from the router to all of the IP addresses on the load generator.

Update the Web server routing table as follows:

- a. Edit the batch file that appears in the IP Wizard Summary page. An example **.bat** file is shown below.

```
REM This is a bat file to add IP addresses to the routing table of a
server
REM Replace [CLIENT_IP] with the IP of this machine that the server
already recognizes
REM This script should be executed on the server machine

route ADD 192.168.1.50 MASK 255.255.255.255 [CLIENT_IP] METRIC 1
route ADD 192.168.1.51 MASK 255.255.255.255 [CLIENT_IP] METRIC 1
route ADD 192.168.1.52 MASK 255.255.255.255 [CLIENT_IP] METRIC 1
route ADD 192.168.1.53 MASK 255.255.255.255 [CLIENT_IP] METRIC 1
route ADD 192.168.1.54 MASK 255.255.255.255 [CLIENT_IP] METRIC 1
```

- b. For each occurrence of **[CLIENT_IP]**, insert your IP address instead.
 - c. Run the batch file on the server machine.

3. Enable the Multiple IP Addresses feature from Performance Center

After you define multiple IP addresses, you set an option to tell the Controller to use this feature.

- a. On the My Performance Center navigation bar, select **Test Management > Test Plan**. Select a performance test in the test plan tree and click **Edit Test**. In the Performance Test Designer window, click **Groups & Workload** and click the **Options** button at the bottom of the window. Select **Enable IP Spoofer**.

Note: You must select this option before running a performance test.

- b. Specify how the Controller should allocate the IP addresses: per process or per thread. For details, see the Controller's general run option settings described in *HP ALM Lab Management Guide*.

How to Configure Multiple IP Addresses on Linux

The following section describe how to manually configure multiple IP addresses on the Linux load generator.

1. To define multiple IP addresses for a single Ethernet card, you need IP Aliasing compiled into the kernel. To do this, use the **ifconfig** command: `/sbin/ifconfig eth0:0 x.x.x.x netmask 255.255.x.x up`
2. Substitute the new IP address for x.x.x.x, and insert the correct information for subnet mask. Place this command in the **rc.local** file so that it executes upon boot.

IP Wizard

This wizard enables you to create and save new IP addresses on Windows machines.

To access	Use one of the following: <ul style="list-style-type: none">• Start > Program Files > Performance Center Host > Tools > IP Wizard• From the Performance Center Host's \bin directory, run ipwizard.exe.
Important information	<ul style="list-style-type: none">• The IP wizard resides on each load generator.• The new addresses can be a range of addresses defined by the Internet Assignment Numbers Authority. They are for internal use only, and cannot connect to the Internet. This range of addresses is the default used by the IP Wizard.• The IP Wizard only works on machines with a fixed IP, not on machines with a DHCP.• Before any of the changes made can take effect, you must restart the machine after you run the wizard, and the Web server's routing table may need to be updated.
Relevant tasks	"How to Enable IP Spoofing in ALM" on page 227

IP Wizard Welcome - Step 1 of 3

User interface elements are described below:

UI Elements	Description
Create new settings	Enables you to define new IP settings on the load generator.
Load previous settings from file	Enables you to use an existing file with IP address settings.
Restore Original Settings	Restores original settings.


IP Wizard - Step 2 of 3 - Optional

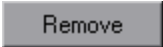
User interface elements are described below (unlabeled elements are shown in angle brackets):

UI Elements	Description
<Web Server Address box>	<p>If you have more than one network card, enables you to choose the card to use for IP addresses.</p> <p>This step enables the IP Wizard to check the server's routing table to see if it requires updating after new IP addresses are added to the load generator.</p> <p>For details, see "How to Enable IP Spoofing in ALM" on page 227.</p>

IP Wizard - Step 3 of 3 - Optional

User interface elements are described below:

UI Elements	Description
	<p>Opens the Add dialog box, enabling you to add a new IP address.</p> <ul style="list-style-type: none"> • Private Address Spaces. The class that represents the correct submask for the machine's IP addresses. • From IP. Adds IP addresses starting with this number. • Submask. IP addresses include two components, a netid and hostid. The submask determines where the netid portion of the address stops and where the hostid begins. • Number to add. The number of IP addresses to add. • Verify that new IP addresses are not already in use. Instructs the IP Wizard to check the new addresses. The IP Wizard adds only the addresses that are not already in use.

UI Elements	Description
	Removes a selected IP Address.
IP Address	The IP addresses on the load generator machine.
Subnet Mask	The submasks of the IP addresses on the load generator machine.
Number of IPs added	The number of IP addresses added to the load generator machine.

IP Wizard - Summary

User interface elements are described below (unlabeled elements are shown in angle brackets):

UI Elements	Description
<Summary area>	Displays a summary of the operations performed by the IP Wizard. Take note of the location of the batch file (.bat). This is used to update the routing table if necessary. See "How to Enable IP Spoofing in ALM" on page 227 .
Reboot now to update routing tables	If you updated the routing table, rebooting initializes the Windows device drivers with the new addresses.

Chapter 17: Customizing Analysis Templates

This chapter includes:

- Analysis Templates Overview233
- How to Customize Analysis Templates 233
- Analysis Template User Interface234

Analysis Templates Overview

You can customize your analysis reports using templates. In HP LoadRunner Analysis, you create the customized templates. You then import the templates to ALM and access the specific template you want for each test in Performance Center.

How to Customize Analysis Templates

This task describes how to customize analysis templates.

You can customize analysis templates to display your performance test run reports in a format that is suitable to your needs. To learn more, see ["Analysis Templates Overview"](#) above and the *HP LoadRunner Analysis User Guide*.

Note: This task is part of a higher-level task. For details, see ["How to Design a Performance Test" on page 111](#).

This task includes the following steps:

- ["Create a customized analysis template"](#) below
- ["Create a zip file with the customized analysis template"](#) below
- ["Upload the file to My Performance Center"](#) below
- ["Apply the customized analysis template to the report of your performance test"](#) below

1. Create a customized analysis template

In LoadRunner, create a customized analysis template. For user interface details, see the *HP LoadRunner Analysis User Guide*.

2. Create a zip file with the customized analysis template

After creating a local copy of the customized analysis template, zip the folder containing the customized analysis template. Make sure the folder contains a .tem file.

3. Upload the file to My Performance Center

Upload the customized analysis template zip file to the Test Resources module.

For more information, see ["Upload Analysis Template Dialog Box" on page 235](#).

4. Apply the customized analysis template to the report of your performance test

Apply the customized analysis template to the analysis report of your performance test.

For more information, see ["Analysis Template Options Dialog Box" on page 236](#).

Note:

- During the test run, the analysis template is logically bound to the run entity by its ID.
- Editing a test after it has run and changing to another analysis template only impacts future runs. Prior runs still use the previous analysis template.
- If the customized analysis template is not found, the default analysis template is used.


Analysis Template User Interface

This section includes:

Create New Analysis Template Dialog Box	235
Upload Analysis Template Dialog Box	235
Analysis Template Options Dialog Box	236

Create New Analysis Template Dialog Box

This dialog box enables you to create a new analysis template..


To access	<ol style="list-style-type: none">1. On the My Performance Center navigation bar, select Resources > Test Resources.2. Click the New Analysis Template  button.
Relevant tasks	"How to Customize Analysis Templates" on page 233
See also	"Test Resources Module" on page 67

User interface elements are described below:


UI Elements	Description
Name	The name of the new analysis template.
Analysis Template Folder	The folder of the new analysis template. Note: The folder name must not contain a forward slash (/).
Description	Enables you to enter a description of the new analysis template.
Messages	Enables you to enter messages and comments about the new analysis template.

Upload Analysis Template Dialog Box

This dialog box enables you to upload analysis template files to ALM.

To access	<ol style="list-style-type: none">1. On the My Performance Center navigation bar, select Resources > Test Resources.2. Select an existing, or create a new, Analysis Template resource.3. Click the Upload Analysis Template Content  button.
Important information	The template file must be saved locally, must be in ZIP format, and must include at least one .tem file.
Relevant tasks	"How to Customize Analysis Templates" on page 233
See also	"Test Resources Module" on page 67

User interface elements are described below:

UI Elements	Description
	Uploads the selected analysis template zip file to the specified Analysis Template resource.
Select	The analysis template zip file.
Clear	Clears the selected analysis template zip file.
Messages	Enables you to enter messages and comments about the analysis template upload.

Analysis Template Options Dialog Box

This dialog box enables you to apply an analysis template to a selected performance test run report.

To access	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Test Management > Test Plan. 2. Select a performance test in the test plan tree and click Edit Test. 3. In the Performance Test Designer window, click Groups & Workload. 4. From the Advanced menu, select Analysis Template Options.
Relevant tasks	"How to Define a Performance Test Workload" on page 128 "How to Customize Analysis Templates" on page 233
See also	"Performance Test Designer > Groups & Workload" on page 134 "Test Resources Module" on page 67

User interface elements are described below:

UI Elements	Description
Use default Analysis Template	Selecting this option uses the default analysis template for the selected performance test report.
Use Analysis Template resource	Select this option to select a customized analysis template for the selected performance test report.

Part 5: Performance Testing Execution

Chapter 18: Performance Test Execution Introduction

This chapter includes:

- Running Performance Tests Overview 241
- How to Manage a Performance Test Run 242
- How to Manage Vusers During a Test Run 245
- How to Manage Virtualized Services During a Test Run 246
- How to Manage Monitoring and Load Generator Information During a Test Run 247
- Performance Test Execution User Interface 248

Running Performance Tests Overview

After planning, designing and scheduling your performance test, you run it to create load on your application and to test its performance.

This section includes:

- ["Performance Test Execution Flow" below](#)
- ["Monitoring Performance Test Execution" below](#)
- ["Analyzing Performance Test Results" on the next page](#)

Performance Test Execution Flow

The following table explains the various stages of the test run flow.

Run stage	Description
Start of run	At the start of the run, the Controller checks the test configuration information, invokes the applications that were selected to run with the test, and then distributes each Vuser script to its designated load generator. When the Vusers are ready, they start running their scripts.
During run	<p>During the run, you can see a synopsis of the test and can also drill down to see which Vuser actions are causing the application problems.</p> <p>Service Virtualization: During the run, specified virtualized services run instead of the actual services. You can update services during the test run.</p> <p>The online graphs display performance data collected by the monitors. You use this information to isolate potential problem areas in your system.</p>
End of run	The test run ends when all the Vusers have completed their scripts, when the duration runs out, or when you terminate it.

Monitoring Performance Test Execution

Online monitors enable you to monitor performance test execution. During a test run, you can view graphs that display information about the load that Vusers generate on your Web server and other applications. ALM Performance Center displays this data in real-time during test execution.

At the conclusion of the performance test, you can use HP LoadRunner Analysis to view a summary and graphs of the data collected from these monitors during the test run. For detailed information on the available graphs, see the *HP LoadRunner Analysis User Guide*.

For a list of supported monitor types, see ["Monitor Types" on page 380](#).

Analyzing Performance Test Results

HP LoadRunner Analysis lets you analyze performance test data off-line, from any computer on which Analysis is installed. You use Analysis to generate various graph views, merge graphs, drill down within graphs, change zoom level and granularity, and so forth.

Analysis integrates with ALM Performance Center to let you analyze data collected during a performance test run. You can download raw results and sessions for analysis on a local machine. After analyzing the data, you can upload the analysis data (HTML and Rich reports) to Performance Center to share the results with other users.

For Analysis to access an ALM project, your version of Analysis must be properly configured, and be connected to ALM Performance Center.

For information about how to work with ALM Performance Center from within Analysis, see the *HP LoadRunner Analysis User Guide*.

For details about running performance tests, see ["How to Manage a Performance Test Run" below](#).

How to Manage a Performance Test Run

This task describes the workflow for running a performance test, and the available options for managing the test run.

Version Control: If your project is version-enabled: If you have checked out your test or related scripts, the checked-out versions are used. If another user has checked out the test or scripts and you want to run the test or script, the last checked-in version is used.

To learn more about running performance tests, see ["Running Performance Tests Overview" on the previous page](#).

This task includes the following steps:

- ["Prerequisite" on the next page](#)
- ["Begin test execution" on the next page](#)
- ["Manage Vusers during the test run - Optional" on the next page](#)
- ["Manage virtualized services during the test run - Optional" on the next page](#)
- ["Manage runtime monitors, monitor over firewall machines, and load generators during the test run" on page 244](#)
- ["Manually stop the test run and collate run results - Optional" on page 244](#)
- ["View test results and manage result files" on page 244](#)

- ["Analyze test run results" on the next page](#)
- ["View performance improvements and regressions" on the next page](#)

1. Prerequisite

Make sure that the performance test you want to run is valid. For more information, see ["How to Design a Performance Test" on page 111](#).

Tip: To simplify the process of creating, designing, and running performance tests, you can use Test Express Designer. This tool guides you through each step, including selecting scripts for a test, scheduling how many Vusers to run in each script and for how long to run them, and selecting a post-run action. During test run, you can view the performance test initialization steps performed by Performance Center and the status for each step. If each step is completed successfully, the performance test continues running and the Performance Test Run page opens. For user interface details, see ["Test Express Designer" on page 253](#).

2. Begin test execution

- a. On the My Performance Center navigation bar, select **Test Management > Test Lab**. In the Test Lab module, create a test set that includes an instance of the performance test you want to run. For user interface details, see the ["Test Lab Module" on page 249](#).
- b. In the Performance Test Set pane, select a performance test and click **RunTest**. The Run Test dialog box opens, enabling you to reserve a timeslot for the test run. For user interface details, see ["Run Test Dialog Box" on page 270](#).
- c. Select an available timeslot and click **Run**. The Initializing Run page opens. The Initializing Run page displays the performance test initialization steps performed by ALM Performance Center, and the status for each step. If each step is completed successfully, the performance test starts running and the Performance Test Run page opens.
 - For Initializing Run page user interface details, see ["Initializing Run Page" on page 259](#).
 - For Performance Test Run page user interface details, see ["Performance Test Run Page" on page 261](#).

3. Manage Vusers during the test run - Optional

You can override the defined schedules and manually control the behavior of Vusers during a performance test run.

For task details, see ["How to Manage Vusers During a Test Run" on page 245](#).

4. Manage virtualized services during the test run - Optional

You can stop, start, update, and load virtualized services during your performance test run.

For task details, see ["How to Manage Virtualized Services During a Test Run" on page 246](#).

5. Manage runtime monitors, monitor over firewall machines, and load generators during the test run


You can perform actions related to the status and management of runtime monitors, monitor over firewall machines, and load generators during a performance test run.


For task details, see ["How to Manage Monitoring and Load Generator Information During a Test Run" on page 247](#).

6. Manually stop the test run and collate run results - Optional

You can manually stop a test run, for example, if you want to delay data collection and analysis until a more convenient time.

- **To stop the test run gradually.** On the Performance Test Run page, click the **Stop Run**

button . The Stop Run dialog box opens, which prompts you to select a post-run collation option. Select an option, then click **Stop**. All Vusers in the test move to the **Gradual Exiting** state. For user interface details, see ["Stop Run Dialog Box" on page 275](#).

- **To stop the test run immediately.** After clicking the **Stop** button in the Stop Run dialog box, the **Stop Run** button on the Performance Test Run page changes to **Stop Now** . Click the button to stop all Vusers immediately.

7. View test results and manage result files

You view and manage result files generated by the test run in the Test Lab module's Test Runs view. For user interface details, see ["Test Lab Module" on page 249](#).

8. Analyze test run results

You use HP LoadRunner Analysis to analyze test run data off-line, from any computer on which Analysis is installed. For information on how to access your ALM Project from Analysis, see the *HP LoadRunner Analysis User Guide*.

If there are SLAs defined for the performance test, you can calculate SLA results, and view these results in the Analysis Summary report and SLA report which can be accessed from the Test Run's Result tab. For user interface details, see ["Test Lab Module" on page 249](#).

9. View performance improvements and regressions

You can use the Trend Reports feature to view improvements or regressions in performance across several test runs. For more information, see ["Trending" on page 304](#).

How to Manage Vusers During a Test Run

The following steps describe runtime options for managing the behavior of Vusers during a performance test run.


Note: This task is part of a higher level task. For more information, see ["How to Manage a Performance Test Run" on page 242](#).

This task includes the following steps:

- ["View details of individual Vusers" below](#)
- ["Run Vusers" below](#)
- ["Add/Edit Vuser groups" below](#)
- ["View Vuser scripts" on the next page](#)
- ["Manually release Vusers from a Rendezvous" on the next page](#)


1. View details of individual Vusers

You can view status details of individual Vusers, and run/stop a single Vuser currently in the **down/run** state, irrespective of its defined schedules.

On the Performance Test Run page, click the **Vusers Details** button . The Vusers dialog box opens, enabling you to run or stop individual Vusers. For user interface details, see ["Vusers Dialog Box" on page 280](#).

2. Run Vusers


You can initialize, run, or stop any number of Vusers irrespective of their defined schedules. In addition, you can add new Vusers to the performance test.

On the Performance Test Run page, click the **Run Vusers** button . The Run Vusers dialog box opens, enabling you to run additional Vusers. For user interface details, see ["Run Vusers Dialog Box" on page 281](#).

3. Add/Edit Vuser groups

You can add Vuser groups, or you can modify existing groups during the test run.

To open the **Add/Edit Vuser Group** dialog box:

- **To add a group.** On the Performance Test Run page, click the **Design Groups and Scheduler** button . Then select **Add Groups**. The Add/Edit Vuser Group dialog box opens, enabling you to add a Vuser group.
- **To edit a group.** On the Performance Test Run page, on the Groups pane, place the mouse cursor over the name of the group you want to edit. Click the down arrow that appears adjacent to the name, and select **Edit Group**. The Edit Group dialog box opens, enabling you to edit the group's details.


For user interface details, see ["Add Group Dialog Box" on page 283](#).

4. View Vuser scripts

On the Performance Test Run page, on the Groups pane, place the mouse cursor over a group name. Click the down arrow that appears adjacent to the name, and select **View Script**. The View Script dialog box opens up, enabling you to view the code for each action in the script.

5. Manually release Vusers from a Rendezvous


You can manually release Vusers from a rendezvous before the Controller releases them.

On the Performance Test Run page, click the **View Rendezvous** button . The Rendezvous Policy dialog box opens. For user interface details, see ["Rendezvous Dialog Box" on page 144](#).

How to Manage Virtualized Services During a Test Run

The following task describes runtime options for managing the behavior of virtualized services during a performance test run.

Note: This task is part of a higher level task. For more information, see ["How to Manage a Performance Test Run" on page 242](#).

1. Open Performance Test Run Page. In the **Groups & Workload** view, select **Advanced > Services Virtualization**  to open the Service Simulation dialog box.
2. In the **Service Simulation** dialog box, click the **Simulate** checkbox of the service you want to stop, start, or update (for example, change its data model).
3. Click **Add Project** to load the additional project containing the virtualized services to run with your performance test.

Tip: You can also click **Remove Project** to remove the project.

How to Manage Monitoring and Load Generator Information During a Test Run

The following steps describe runtime options for managing monitor profile, monitor-over-firewall, and load generator information during a performance test run.


Note: This task is part of a higher level task. For more information, see ["How to Manage a Performance Test Run" on page 242](#).

This task includes the following steps:

- ["Manage Runtime Monitors" below](#)
- ["Edit Monitor Over Firewall Information" below](#)
- ["Manage Load Generators" below](#)


Manage Runtime Monitors

You can add, edit, or remove currently running monitors during a performance test run.

On the Performance Test Run page, click the **Monitors** button  , and select **Runtime Monitors**. The Monitor Profile content dialog box opens. For user interface details, see ["Monitor Profile Content Dialog Box" on page 276](#).

Edit Monitor Over Firewall Information

You can change the status of a monitor over firewall machine during a performance test run.

On the Performance Test Run page, click the **Monitors** button  , and select **Monitors Over Firewall**. The Monitors Over Firewall dialog box opens. For user interface details, see ["Monitor Over Firewall Dialog Box" on page 279](#).

Manage Load Generators

You can perform the following actions with load generators during a performance test run: View status and machine utilization, connect and disconnect load generators, add load generators to the test, and configure terminal sessions.

On the Performance Test Run page, click the **Load Generators** button  . The Load Generators dialog box opens. For user interface details, see ["Load Generators Dialog Box" on page 277](#).

Performance Test Execution User Interface

This section includes:


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Test Express Designer	253
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Add Group Dialog Box	283
View Script Dialog Box	284
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Calculate Service Level Agreement Dialog Box	286

Test Lab Module

This module enables you to create and manage test sets.

To access	On the My Performance Center navigation bar, select Test Management > Test Lab .
Relevant tasks	"How to Manage a Performance Test Run" on page 242
See also	"My Performance Center Window" on page 23


User interface elements are described below:







UI Elements	Description
<My Performance Center common UI elements>	For My PC menus and buttons, see "My Performance Center Window" on page 23 .
Filter By Test Set	Enables you to filter by a selected test set.
Test	Enables you to filter by a selected test.
 Manage Test Sets	Opens the Create New Test Set dialog box, enabling you to create test sets.
Performance Test Set view	Enables you to design tests, assign tests to test sets, and run tests.
Test Runs view	Enables you to manage results and related actions for test runs.

Performance Test Set View

This pane enables you to design tests, create test sets, assign tests to test sets, and run tests.

User interface elements are described below (unlabeled elements are shown in angle brackets):


UI Elements	Description
<My Performance Center common UI elements>	For My PC menus and buttons, see "My Performance Center Window" on page 23 .
 Test Express	Opens the Test Express view, which enables you to design and run the performance test. For more details, see "Test Express Designer" on page 253 .










UI Elements	Description
 Run Test	Opens the Run dialog box, which enables you to run the performance test. For more details, see "Run Test Dialog Box" on page 270 .
 Create New Test	Opens the Create New Performance Test dialog box, enabling you to define a performance test. For more details, see "Create New Performance Test Dialog Box" on page 124 .
 Edit Test	Opens the Performance Center Test Designer window, enabling you to define a performance test. Defining a performance test includes selecting scripts for the test, scheduling how many Vusers to run in each script and for how long, choosing topologies and monitor profiles for the test, and enabling collection of diagnostics data for the test run. For more details, see "Performance Test Designer Window" on page 122 .
 Assign Test	Opens the Assign Test to Test Set dialog box, enabling you to add a test instance of a selected test to a specified test set.
 Rename	Enables you to rename the test.
 Remove	Enables you to remove the test.
ID	The ID number of the test.
VS	The version status of the test.
Test Name	The name of the test.
Status	The run status of the test.
Responsible	The user responsible for the test.
Last Modified	The date on which the test was last modified.
Version	The version number of the test.
Checkout By	The user responsible for checking out the test.


Test Runs View

This pane enables you to manage results and related actions for test runs.

User interface elements are described below:


UI Elements	Description
Result Management > Collate	<p>Collates results of test runs that have not yet been collated.</p> <p>Note:</p> <ul style="list-style-type: none"> • If a test is running on the Controller that will perform the collating, ALM Performance Center issues an alert. Click OK to proceed with collating the results, or Cancel to defer the action until later. • Should the Collate Results process encounter an error, the Collate Errors dialog box appears, displaying details of the error. To analyze the partially collated results, select Analyze partially collated results. Note that analyzing partially collated results is an irreversible operation.
Result Management > Analyze	<p>Analyzes results for the selected test run. ALM Performance Center generates analysis data and deletes the temporary results from the load generators and the Controller.</p> <p>Note: Only enabled when the test run state is Before Creating Analysis Data.</p>
Result Management > Recover Results	<p>Enables you to recover and collate the results of a failed test run.</p> <p>Note:</p> <ul style="list-style-type: none"> • Only enabled when the test run is in the failed state. • Enables you to collate results only up to the point where the test failed.
 HTML Report	<p>Opens an HTML version of the Analysis Summary report, which analyzes the data collected during the performance test run. The report provides general information about the performance test, lists statistics about the test run, and provides links to graphs containing test run data.</p> <p>For more details regarding the summary report, see the <i>HP LoadRunner Analysis User Guide</i>.</p>

UI Elements	Description
 SLA Report	<p>Opens the SLA Report for the selected test run. For details, see "SLA Report" on page 285.</p> <p>Note: This feature is available only if SLAs were defined during the performance test design phase. For more information about SLAs, see "Service Level Agreements" on page 188.</p>
 Recalculate SLA	<p>Opens the Calculate SLA dialog box. For details, see "Calculate Service Level Agreement Dialog Box" on page 286.</p> <p>Note: This feature is available only if SLAs were defined during the performance test design phase. For more information about SLAs, see "Service Level Agreements" on page 188.</p>
 Rename Run	Enables you to rename a selected test run name.
 Delete	Deletes selected test run.
 View Hosts	Opens the Timeslot Hosts dialog box, which displays the requested and actual hosts.
 Export PAL Data	Opens the Export PAL Data dialog box.
Add Filter	Enables you to filter the information being displayed in the Test Runs grid. Click the drop-down arrow to apply a filter.
Last Modified	Enables you to filter the information being displayed in the Test Runs grid by the last modified date. Click the drop-down arrow to apply a filter.
Run ID	The test run ID.
Run Name	The name of test run.
Test	The name of the test.
State	Displays the current state of the selected test runs.
SLA Status	<p> . Indicates a failed SLA status.</p> <p> . Indicates a passed SLA status.</p> <p> . Indicates that there is no data about the SLA status.</p>

UI Elements	Description
Exec Date	The date and time of the test run.
Duration	The time, in minutes, that the test took to run.
Tester	The name of the user running the test.
Timeslot	The ID of the test run timeslot.
Results tab	<p>Displays result information for the selected test run.</p>  <ul style="list-style-type: none"> • Download... Enables you to download a selected result file. • ID. The result file ID. • Type. The type of result file. • Name. The name of the result file. • Modified by. The user who last modified the result file. • Last Modified. The date the result file was last modified.
Event Log tab	<p>Displays a list of events generated for the selected test run.</p> <ul style="list-style-type: none"> • ID. The event ID. • Type. An indication of the event's severity. From most to least severe: error, warning, or info. • Time. The date and time the event was logged. • Event. The name of the event. • Description. A description of the event. • Responsible. The user, or automated system process responsible for the event.

Test Express Designer



This window simplifies the process of creating, designing, and running performance tests. It guides you through each step, including selecting scripts for a test, scheduling how many Vusers to run in each script and for how long to run them, and selecting a post-run action. During test run, you can view the performance test initialization steps performed by Performance Center and the status for each step. If each step is completed successfully, the performance test continues running and the Performance Test Run page opens.

To access	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Test Management > Test Lab. 2. Click  Test Express .
Important Information	You can refine and adjust your performance test using the Performance Test Designer window. For more details, see "Performance Test Designer Window" on page 122 .
Relevant tasks	<ul style="list-style-type: none"> • "How to Design a Performance Test" on page 111 • "How to Manage a Performance Test Run" on page 242
See also	<ul style="list-style-type: none"> • "Performance Test Design - Introduction" on page 110 • "Performance Test Execution Introduction" on page 240 • "Performance Test Run Page" on page 261

Step 1 Scripts Pane

This pane enables you to select VuGen scripts to run in the performance test.

User interface elements are described below:

UI Elements	Description
	<p>Adds the selected VuGen script to the Step 2 - Design pane.</p> <p>Tip: You can also add a script by dragging it from the tree to the Groups table in the Design pane.</p>
	Refreshes the resources tree.
<resources tree>	Displays the available VuGen scripts.

Step 2 - Design

This pane enables you to define a performance test. Defining a performance test includes setting a test run duration, and selecting load generators on which to run the Vuser groups.

User interface elements are described below:

UI Elements	Description
Test Name	The name of the test.
Test Folder	The test plan folder name.
Groups	<p>Name. The name of the Vuser group.</p> <p>Script. The name of the Vuser script.</p> <p>Vusers. The number of Vusers assigned to the group.</p> <p>Load Generators. The load generator on which the group is running. Click the down arrow to select a load generator.</p> <p>Command Line. Opens the Script Command Line dialog box, enabling you to type the name and value of the parameter you want to send using the format, <Parameter_Name> <value>. For information about the command line parsing functions, or for details about including arguments on a command line, see the <i>HP LoadRunner Online Function Reference</i>, provided with HP Virtual User Generator.</p>
Start/End Vusers	<p>You can start all Vusers simultaneously or start a specific number of Vusers gradually.</p> <ul style="list-style-type: none"> • To start all Vusers simultaneously: Move the slider all the way to right. • To start a specific number of Vusers gradually: Move the slider to the appropriate predefined settings. The Scheduler will run X Vusers and then wait the predefined time before running another X Vusers.
Duration	<p>The duration of the test run in hours and minutes.</p> <p>Note: This indicates the test run duration once the gradual initialization and stopping of all Vusers is done.</p>
Scheduler Preview	Displays a preview graph by Vuser groups. For more details, click the Scheduler Preview tooltip icon ⓘ.

Step 3 - Run

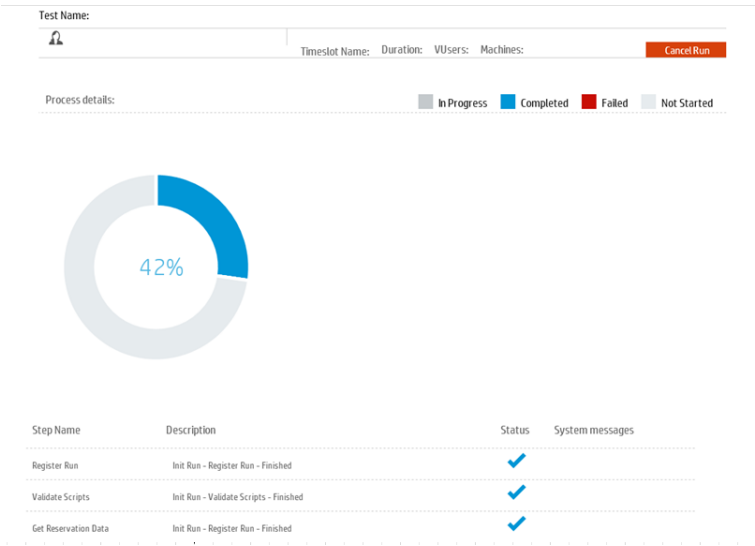
This pane enables you to run the performance test and determine the action to be taken when the test run is complete.

User interface elements are described below:

UI Elements	Description
Post-Run Actions	<p>Indicates the action to be taken when the test run is complete.</p> <ul style="list-style-type: none"> • Do not collate results. Frees the machines immediately after the performance test ends. When the run has finished, the run results are left on the load generators. You can analyze the results at a later stage from the Results. • Collate results. When the run has finished, the run results are collected from all the load generators. This is recommended because collation of results takes only a few minutes, and can prevent loss of or inaccessibility to results in case any of your load generators becomes unavailable. • Collate and analyze results. When the run has finished, the run results are collected and analyzed. Data analysis requires some time, depending on the size of the results file. If there is no timeslot available to include the data analysis, select the Collate option instead, and run late Analysis when a data processor becomes available. You run late Analysis from the Results tab. For user interface details, see "Test Lab Module" on page 249.
Test Validation	<p>Displays the validation results of your performance test</p> <ul style="list-style-type: none"> • Level. The type of message: Error or Warning. • Details. Describes the error or warning.
Save and Run	<p>Saves and runs the performance test.</p> <p>The Process Details page opens, displaying the performance test initialization steps performed by Performance Center and the status for each step. For user interface details, see "Process Details Page" below.</p> <p>If each step is completed successfully, the performance test starts running and the Performance Test Run page opens. For user interface details, see "Performance Test Run Page" on page 261.</p>
Save	Saves the performance test.

Process Details Page

This page displays the performance test initialization steps performed by Performance Center and the status for each step.



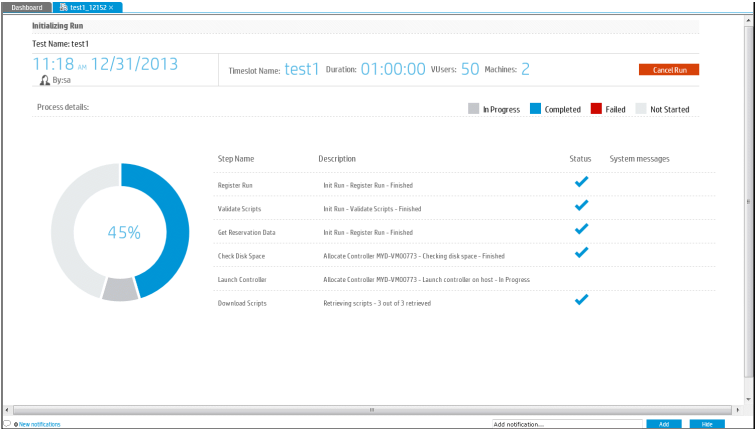
User interface elements are described below (unlabeled elements are shown in angle brackets):

UI Elements	Description
<progress chart>	Displays test initialization steps progress in percentage.

UI Elements	Description
Step Name	<p>Displays the following steps:</p> <ul style="list-style-type: none"> • RegisterRun. Performance Center initializes the run process. • ValidateScripts. Performance Center checks that the selected scripts' Run Logic runtime settings are in sync with the scripts' state. • GetReservationData. Performance Center checks the required resource information from the selected timeslot. • CheckDiskSpace. Performance Center checks that there is enough disk space on the Controller. • LaunchController. Performance Center initializes the Controller so that other testing entities, such as load generators and scripts can connect to it. If there is a problem launching the Controller, Performance Center automatically attempts to find an alternative Controller. This attempt appears as an additional initialization step. If no alternative Controller is available, the step fails. • ConnectToLGs. Performance Center checks that the required load generators are valid and connects them to the Controller. If this step fails, Performance Center attempts to find alternative load generators automatically. If this step still fails, check the test definitions and select different load generators for the test. • DownloadScripts. Performance Center downloads the required Vuser scripts. • StartControllerServices. Performance Center initializes the Controller's configuration settings in preparation to run the performance test. • MapVirtualHosts. Performance Center maps virtual hosts to actual hosts. • LoadLTOMToController. Performance Center creates the performance test and adds the Vuser scripts to the Controller. • StartRun. Performance Center starts the performance test run.
Description	A detailed description of the current status of the step.
Status	Displays whether the step passed or failed.
System Messages	Displays error messages generated when a step fails. These error messages can also be viewed from the Event Log. For details about the event log, refer to the <i>HP ALM Lab Management Guide</i> .

Initializing Run Page

The Initializing Run page displays the performance test initialization steps performed by ALM Performance Center and the status for each step.



To access	In the Run Performance Center dialog box, click Run . For details, see "Run Test Dialog Box" on page 270.
Relevant tasks	"How to Manage a Performance Test Run" on page 242

User interface elements are described below:

UI Elements	Description
Test Name	The name of the test.
<Run Date and Time>	The date and time of the test run.
By	The user responsible for running the test.
Timeslot Name	The name of the test run timeslot.
Duration	The time that the test takes to run.
Vusers	The number of Vusers reserved for the timeslot.
Machines	The number of hosts requested for this test.
<Progress Chart>	Displays test initialization steps progress in percentage.

UI Elements	Description
Step Name	Displays the step name. For explanations about the action ALMPerformance Center performs for each step, see Initialization Steps below.
Description	A detailed description of the current status of the step.
Status	Displays whether the step passed or failed.
System Messages	Displays error messages generated when a step fails. These error messages can also be viewed from the Event Log. For details about the event log, refer to the <i>HP ALM Lab Management Guide</i> .

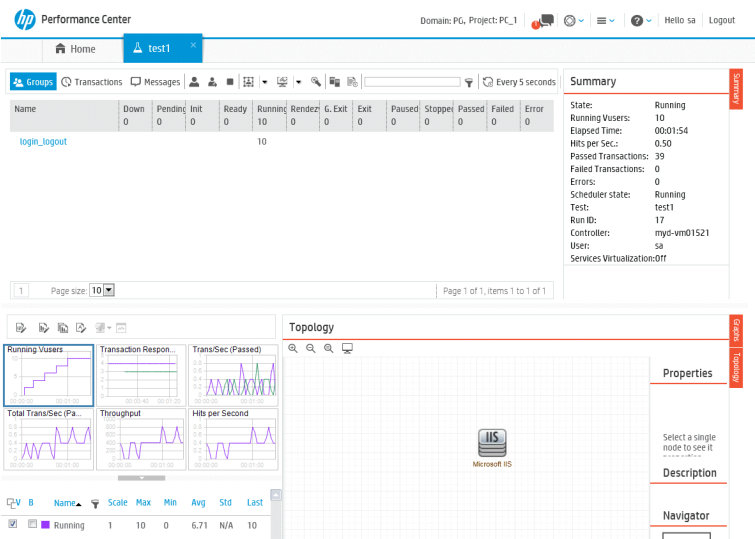
Initialization Steps

The Initialization steps are described below:

Step	Description
RegisterRun	Performance Center initializes the run process.
ValidateScripts	Performance Center checks that the selected scripts' Run Logic runtime settings are in sync with the scripts' state.
GetReservationData	Performance Center checks the required resource information from the selected timeslot.
CheckDiskSpace	Performance Center checks that there is enough disk space on the Controller.
LaunchController	<p>Performance Center initializes the Controller so that other testing entities, such as load generators and scripts can connect to it.</p> <p>If there is a problem launching the Controller, Performance Center automatically attempts to find an alternative Controller. This attempt appears as an additional initialization step.</p> <p>If no alternative Controller is available, the step fails.</p>
DownloadScripts	Performance Center downloads the required Vuser scripts.

Performance Test Run Page

The Performance Test Run page displays a detailed overview of the running performance test, and enables you to perform all runtime test run actions.




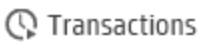
To access	The Performance Test Run page opens as a tab in My Performance Center automatically when a performance test starts, or when you join a running test from My Performance Center.
Relevant tasks	"How to Manage a Performance Test Run" on page 242







Performance Test Details Pane - Toolbar Buttons








The Performance Test Details pane displays details on the running test.

To access	The pane is located in the upper area of the Performance Test Details page.
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User interface elements are described below:

UI Elements	Description
	Displays the Performance Test Run page Details pane Groups view. For more information, see "Performance Test Details Pane - Groups View" on page 263 .
	Displays the Performance Test Run page Details pane Transactions view. For more information, see "Performance Test Details Pane - Transactions View" on page 264 .

UI Elements	Description
 Messages	Displays the Performance Test Run page Details pane Messages view. For more information, see "Performance Test Details Pane - Messages View" on page 265 .
	Vusers Details. Displays specific details for each Vuser in the performance test, and enables you to run or stop individual Vusers irrespective of their defined schedules. For user interface details, see "Vusers Dialog Box" on page 280 .
	Run Vusers. Enables you to run additional Vusers during the course of a performance test. That is, you can run Vusers that are not included in the test's original defined schedule. For user interface details, see "Run Vusers Dialog Box" on page 281 .
	<p>Stop Run/Stop Run Now. Enables you to stop a running performance test.</p> <ul style="list-style-type: none"> • Stop Run. Stops the test gradually by moving all running Vusers to the Gradual Exiting state. For user interface details, see "Stop Run Dialog Box" on page 275. • Stop Run Now. Enabled only after you click the Stop Run button. Enables you to stop the Vusers immediately.
	<p>Design Groups and Scheduler. Click the arrow adjacent to the button for the following options:</p> <ul style="list-style-type: none"> • Add Group. Enables you to add a Vuser group to a running performance test, or to edit Vuser group settings during a test run. For user interface details, see "Add Group Dialog Box" on page 283. • Edit Scheduler. Enables you to edit the scheduler during a test run. For user interface details, see "Performance Test Schedule Dialog Box" on page 276.
	<p>Monitors. Click the arrow adjacent to the button for the following options:</p> <ul style="list-style-type: none"> • Runtime Monitors. Displays a list of monitors which are currently running during a performance test, and enables you to add, edit, and remove monitors during the run. For user interface details, see "Monitor Profile Content Dialog Box" on page 276. • Monitor Over Firewall. Enables you to change the status of a monitor over firewall machine. For user interface details, see "Monitor Over Firewall Dialog Box" on page 279.

UI Elements	Description
	View Rendezvous. Enables you to enable/disable rendezvous points defined in the Vuser scripts and to set rendezvous policies that determine how the Controller handles Vusers at a rendezvous point. For user interface details, see "Rendezvous Dialog Box" on page 144.
	Load Generators. Enables you to manage the load generator in the performance test. For user interface details, see "Load Generators Dialog Box" on page 277.
	Timeslot Duration. Enables you to extend or shorten the duration of the performance test. For user interface details, see "Timeslot Duration Dialog Box" on page 274.
	Filter Items. Enables you to filter the information being displayed.
 Every 5 seconds ▾	Refresh Frequency. Enables you set the refresh frequency of the page.
	Service Virtualization. Opens the Configure Service Virtualization Dialog Box. For user interface details, see "HP Service Virtualization Dialog Box" on page 154.
 Add to PAL	Add to PAL. Opens the Select PAL Report dialog box, enabling you to add the test run data to a selected PAL report. The test run data is displayed in the Data Sources Tab. For more details, see "Data Sources Tab" on page 352.

Performance Test Details Pane - Groups View

The Groups view of the Details pane displays the statuses of the Vusers in the performance test.

To access	In the Performance Test Run page, in the Details pane, click Groups .
	Note: Displayed by default.

User interface elements are described below:

UI Elements (A - Z)	Description
Down	The number of Vusers that are down.
Error	The number of Vusers for which a problem occurred.

UI Elements (A - Z)	Description
Exiting (displayed as Exit)	The number of Vusers that have finished running, or have been stopped, and are exiting now.
Failed	The number of Vusers that have finished running. The script failed.
Gradual Exiting (displayed as G. Exit)	The number of Vusers that are finishing their current iteration before exiting.
Init	The number of Vusers that are being initialized on the host machine.
Name	The Vuser group name.
Passed	The number of Vusers that have finished running. The script passed.
Paused	The number of Vusers that have been paused.
Pending	The number of Vusers that are ready to be initialized and are waiting for an available load generator, or are transferring files to the load generator. The Vusers run when the conditions set in their scheduling attributes are met.
Ready	The number of Vusers that have already performed the init section of the script and are ready to run.
Rendezvous	The number of Vusers that have arrived at the rendezvous and are waiting to be released.
Running	The number of Vusers that are running. The Vuser script is being executed on a host machine.
Stopped	The number of Vusers that have been stopped manually.

Performance Test Details Pane - Transactions View

The Transactions view of the Details pane displays how many transactions have been executed successfully or unsuccessfully.

To access	In the Performance Test Run page, in the Details pane, click Transactions .
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User interface elements are described below:

UI Elements	Description
Failed	The number of times the transaction failed.

UI Elements	Description
Name	The transaction name.
Pass	The number of times the transaction passed.
Stopped	The number of times the transaction stopped.
Success Rate %	The transactions success rate percentage.
TPS	The number of times per second the transaction has run.

Performance Test Details Pane - Messages View

The Messages view of the Details pane displays error, warning, debug, and output messages that are sent to the Controller by the Vusers and load generators during a test run.

To access	In the Performance Test Run page, in the Details pane, click Messages .
Important information	To view details of specific messages, click the number for the message type to open the Output Details dialog box.

User interface elements are described below:

UI Elements	Description
Script Name	The name of the script that generated the message.
Total Debug	Sent only if the debugging feature is enabled in the Controller. To enable the feature, select Tools > Performance Center Controller Options > Debug Information .
Total Errors	The total number of error messages received. Error messages usually indicate that the script failed.
Total Messages	The total number of messages received.
Total Output	The total number of output messages received from the Vuser script.
Total Warnings	The total number of warning messages received. Warning messages indicate that the Vuser encountered a problem, but the test continued to run.

Summary Pane

The Summary pane displays a synopsis of the running performance test.

To access	Displayed in the upper left corner of the Performance Test Run page.
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User interface elements are described below:


UI Elements	Description
Controller	The Controller being used in the test.
Elapsed Time	The amount of time since the test began running.
Errors	The number of Vuser errors that occurred during the test run.
Failed Transactions	The number of completed, unsuccessful transactions performed during the test run.
Hits per Sec	How many hits (HTTP requests) there have been to the Web server by Vusers during each second of the test run.
Passed Transactions	The number of completed, successful transactions performed during the test run.
Run ID	The run ID.
Running Vusers	The number of Vusers currently running in the test.
Scheduler State	The current state of the scheduler.
State	The current run state.
Test	The name of the test.
User	The name of the user who is running the test.
Services Virtualization	Whether services virtualization is on or off.




Online Graphs Pane


The online monitor graphs are used to display performance measurements for those resources being monitored in a performance test.

To access	Displayed in the lower section of the Performance Test Run page.
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User interface elements are described below:

UI Elements	Description
	# Graphs. Enables you to select the number of graphs being displayed.

UI Elements	Description
	<p>Graph Configuration. Opens the Graph Configuration dialog box which enables you to configure the graphs display. The following options are available:</p> <ul style="list-style-type: none"> • Granularity. The interval of the test displayed in the graph. • Time Display. The time displayed on the x-axis. <ul style="list-style-type: none"> ■ Relative to Load Test start. Displays the amount of time that has elapsed since the beginning of the test (in hours, minutes, and seconds). ■ Controller clock. Displays the time on the Controller clock. ■ None. No clock or time is displayed. • Scale. Select the desired scale: <ul style="list-style-type: none"> ■ Automatic. Each measurement in the graph is displayed in the scale that best suits it. ■ None. Each measurement's true values are displayed in the graph. • Line Style. Select the desired line style: <ul style="list-style-type: none"> ■ With markers. Lines in the graph are marked with dots. ■ Without markers. Lines in the graph are smooth. • Apply to all visible graphs. Applies the changes to all displayed graphs.
	<p>Duplicate Graph. Enables you to duplicate a graph.</p>
	<p>Rename Graph. Enables you to rename a graph.</p>

UI Elements	Description
	<p>Diagnostics Transaction Breakdown. Opens HP Diagnostics, displaying the Transactions view, which displays performance metrics and drilldown options for the relevant transaction. For more information about interpreting data in the Diagnostics Transactions view, see the section that describes the transaction views in the <i>HP Diagnostics User Guide</i>.</p> <p>Note:</p> <ul style="list-style-type: none"> • Only enabled if your system is configured to work with HP Diagnostics. • To ensure that you can view Diagnostics data during a performance test run, in the Java Settings' Java Control Panel, click the Network Settings button and select Direct Connection.
<graph legend>	<p>Displays details about graph. The following information is displayed.</p> <ul style="list-style-type: none"> • V. Selects the measurement to be displayed on the graph. • B. Displays the measurement in bold. • <color>. Enables you to select in which color the measurement appears in the graph. • Name. The measurement name. • Scale. The graph scale. • Max. The measurement's maximum value. • Min. The measurement's minimum value. • Avg. The measurement's average value. • Std. The measurement's standard deviation. • Last. The measurement's last value.
Graphs	Displays a tree which lists all the configured online monitors graphs.

Graph Selection Tab

This tab displays a tree which lists all the configured online monitors graphs, and enables you to select which graphs to display in the Online Graphs pane.

To access	Click the Graphs tab, on the right of the Online Graphs pane.
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User interface elements are described below:




UI Elements	Description
<Online graphs tree>	Displays a list of the configured online monitors. Select a monitor to display its graph in the Online Graphs pane.





Topology Tab

This tab displays the topology selected for the performance test, enabling you to track the SiteScope monitor status on each component of your AUT.

To access	Click the Topology tab, on the right of the Online Graphs pane.
Important information	<ul style="list-style-type: none">• To ensure that SiteScope monitoring data can be displayed for the topology, ensure that the relevant SiteScope server is up and running and that connectivity has been established.• After the test run, a snapshot of the topology is included among the run result files. For details, see "Test Lab Module" on page 249.
See also	"Topologies Overview" on page 49

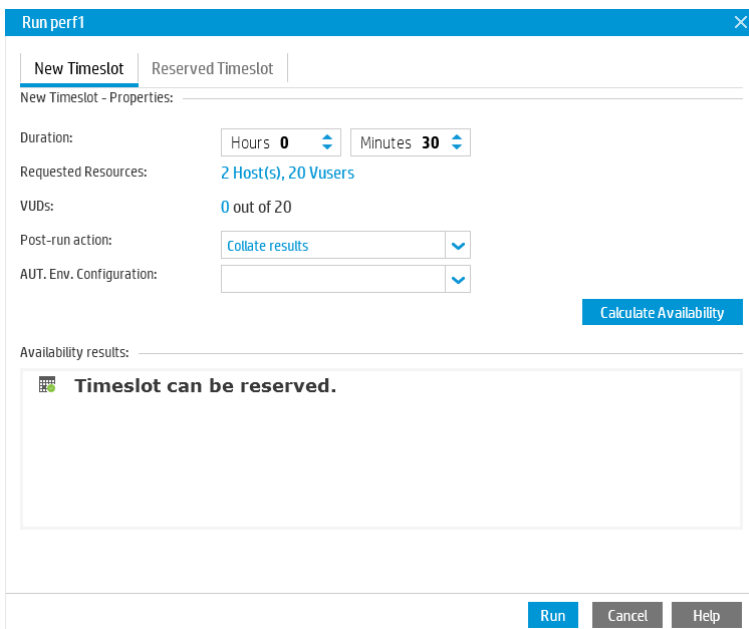
User interface elements are described below:

UI Elements	Description
	Zoom in/out. Enables you to zoom in and out of the topology tab.
	Fit to panel. Enables you to fit the entire topology design to the current pane size.
	Edit monitor. Opens HP SiteScope, enabling you to edit the monitors defined on the component selected in the Topology tab. Note: During a test run, you can only edit monitors that were defined on the components when designing the topology. You cannot add new monitors during the test run.

UI Elements	Description
<Topology display area>	<p>Displays the topology selected for the test.</p> <p>If monitors are defined on a component in the topology, the following icons may appear:</p> <ul style="list-style-type: none">  Indicates that all of the monitors on the component are working successfully.  Indicates that there is an error with at least one of the monitors on the component.  Indicates that at least one of the monitors on the component is not working or not receiving data.  Indicates a warning on at least one of the monitors on the component.

Run Test Dialog Box

This dialog box enables you to run performance tests.



The screenshot shows the 'Run perf1' dialog box. It has two tabs: 'New Timeslot' (selected) and 'Reserved Timeslot'. Under 'New Timeslot - Properties:', there are fields for 'Duration' (Hours: 0, Minutes: 30), 'Requested Resources' (2 Host(s), 20 Vusers), 'VUDs' (0 out of 20), 'Post-run action' (Collate results), and 'AUT. Env. Configuration'. A 'Calculate Availability' button is on the right. Below, the 'Availability results:' section shows a green icon and the text 'Timeslot can be reserved.'. At the bottom are 'Run', 'Cancel', and 'Help' buttons.

To access	<p>Use one of the following:</p> <ul style="list-style-type: none"> On the My Performance Center navigation bar, select Test Management > Test Plan. Click a performance test in the test plan tree. In the Preview, click Run Test. On the My Performance Center navigation bar, select Test Management > Test Lab. In the Performance Test Set pane, select a performance test and click Run Test.
Relevant tasks	<ul style="list-style-type: none"> "How to Manage a Performance Test Run" on page 242 "How to Work with PAL" on page 339

New Timeslot Tab

Enables you to create a new timeslot. If the current resources are insufficient for the selected test, you will be unable to reserve a timeslot to run the test.

User interface elements are described below:

UI Element	Description
Duration	The amount of time, in hours and minutes, that you need the resources reserved.
Requested Resources	The resources being requested for this test.
VUDs	Requests VUDs Vusers for the test rather than regular Vusers. For details about VUDs, refer to the <i>HP ALM Lab Management Guide</i> .
Post Run Action	<p>The action to be taken when the test run is complete.</p> <ul style="list-style-type: none"> Do not collate results. Frees the machines immediately after the performance test ends. When the run has finished, the run results are left on the load generators. You can analyze the results at a later stage from the Results. Collate results. When the run has finished, the run results are collected from all the load generators. This is recommended because collation of results takes only a few minutes, and can prevent loss of or inaccessibility to results in case any of your load generators becomes unavailable. Collate and analyze results. When the run has finished, the run results are collected and analyzed. Data analysis requires some time, depending on the size of the results file. If there is no timeslot available to include the data analysis, select the Collate option instead, and run late Analysis when a data processor becomes available. You run late Analysis from the Results tab. For user interface details, see "Test Lab Module" on page 249.
AUT Env. Configuration	You can only use a deployed environment. For details, refer to the <i>HP Application Lifecycle Management User Guide</i> .

UI Element	Description
Calculate Availability	Calculates the availability of the resources required for running the test and checks whether a new timeslot can be created.
Availability results	Displays the results of the availability verification. If your timeslot cannot be reserved, the reason will be displayed.
Run	Uses the hosts reserved by the selected timeslot and runs the test. The Performance Center Dashboard opens displaying the Performance Test Run page. For details, see "Performance Test Run Page" on page 261 .

Reserved Tab

Enables you to run a test in a reserved manual timeslot that has been assigned to your test or has not been assigned to any test. If there are no timeslots available, you will be unable to schedule your test.

User interface elements are described below:


UI Element	Description
ID	The ID of the run created in the context of the timeslot.
Created By	The user who reserved the timeslot.
Start Time	The date and time that the timeslot is due to start or started.
Duration	The duration of the timeslot.
Vusers	The number of Vusers reserved for the timeslot.
Hosts	The number of hosts (including Controller) requested for the timeslot.

UI Element	Description
Remark	<p>Indicates a timeslot remark. Includes the following values:</p> <ul style="list-style-type: none"> • New. Indicates a new timeslot that can be created especially for this run. • Recommended. Displayed when the test you are about to run is linked (without Autostart) to the timeslot. When the timeslot was reserved, all the resources needed for this test were reserved. It is therefore recommended to use this timeslot rather than creating a new one. • Update Required. Indicates that the timeslot can offer some of the resources needed for the test but you need to update the timeslot to include all the other required resources too. The resource requiring the update is marked with an asterisk (*). <p>Note: Even if you reserved a timeslot in the Timeslots module, it may not appear in the grid. Some possible reasons include:</p> <ul style="list-style-type: none"> • The timeslot is not open yet. • The timeslot is running (it was configured to start automatically instead of manually). • The timeslot does not have the required resources, and due to concurrent timeslots, it cannot be updated with more resources. • The timeslot was not configured with a duration long enough to run the selected test entity, and it cannot be prolonged. • The timeslot was linked to another test by mistake.
Name	The name of the timeslot.
Duration	The amount of time, in hours and minutes, that you need the resources reserved.
Requested Resources	The resources being requested for this test.
VUDs	Requests VUDs Vusers for the test rather than regular Vusers. For details about VUDs, refer to the <i>HP ALM Lab Management Guide</i> .


UI Element	Description
Post Run Action	<p>The action to be taken when the test run is complete.</p> <ul style="list-style-type: none"> • Do not collate results. Frees the machines immediately after the performance test ends. When the run has finished, the run results are left on the load generators. You can analyze the results at a later stage from the Results. • Collate results. When the run has finished, the run results are collected from all the load generators. This is recommended because collation of results takes only a few minutes, and can prevent loss of or inaccessibility to results in case any of your load generators becomes unavailable. • Collate and analyze results. When the run has finished, the run results are collected and analyzed. Data analysis requires some time, depending on the size of the results file. If there is no timeslot available to include the data analysis, select the Collate option instead, and run late Analysis when a data processor becomes available. You run late Analysis from the Results tab. For user interface details, see "Test Lab Module" on page 249.
AUT Env. Configuration	You can only use a deployed environment. For details, refer to the <i>HP Application Lifecycle Management User Guide</i> .

Timeslot Duration Dialog Box

This page enables you to extend or shorten the current timeslot.


To access	During runtime, on the Performance Test Run page, click the Timeslot Duration button  .
Relevant tasks	"How to Manage a Performance Test Run" on page 242

User interface elements are described below:


UI Elements	Description
	Refreshes the Timeslot Remaining Time information.
Prolong Timeslot by X minutes	Prolongs the timeslot duration by the selected number of minutes.
Shorten Timeslot by X minutes	Shortens the timeslot duration by the selected number of minutes.

Stop Run Dialog Box

This page enables you to stop a running performance test and to select a post-run collation option.


To access	During a test run, on the Performance Center Dashboard's Performance Test Run page, click the Stop Run button  .
Relevant tasks	"How to Manage a Performance Test Run" on page 242

User interface elements are described below:




UI Elements (A-Z)	Description
	Moves all running Vusers to the Gradual Exiting state.
Collate and analyze results	ALM Performance Center collates the run data from the load generators and generates analysis data. After data is collated, Performance Center automatically deletes the temporary results from the load generators and controllers. You can display the results using analysis tools such as graphs and reports, or download the results for analysis on a local machine. This option takes the most time.
Collate results	ALM Performance Center collates the run data from the load generators. After data is collated, Performance Center automatically deletes the temporary results from the load generators. You can download the raw results from the Results tab, or manually analyze results at a later point from the Results tab. Note: This is the default setting.
Do not collate results	Frees the machines immediately after the test ends. You can collate and analyze results at a later point from the Results tab.
Free current timeslot	Frees the current timeslot once the test has stopped.

Performance Test Schedule Dialog Box

This dialog box enables you to edit scheduler settings during a performance test run.

To access	On the Performance Test Run page, click the Design Groups and Scheduler button  . Then select Edit Scheduler .
Relevant tasks	"How to Manage a Performance Test Run" on page 242


User interface elements are described below (unlabeled elements are shown in angle brackets>):

UI Elements	Description
 Stop Scheduler	Stops the scheduler and enables it for editing.
 Pause Scheduler	Pauses the scheduler.
 Start Scheduler	Restarts the scheduler after editing.
<edit scheduler section>	Enables you to edit a defined schedule. For more information, see "Global Scheduler Actions" on page 184 .
Global/Groups Schedule	Displays whether the current schedule has been defined by test or by group . <ul style="list-style-type: none"> • Start Time. Enter a delay time for the scheduler to restart after editing. To restart the scheduler immediately, leave this setting blank. • Wait. (Groups schedule only) Select to initialize all Vuser groups together. • Group. (Groups schedule only) Select individual groups to display and edit their schedules.
Schedule Graph	Provides a graphical representation of the defined schedule actions.
State	Displays the current scheduler status.





Monitor Profile Content Dialog Box

This dialog box displays a list of monitors which are currently running during a performance test, and enables you to add, edit, and remove monitors during the run.

The monitors that are displayed are a combination of the monitors from all the monitor profiles that were associated to the test, as well as a set of 'host' monitors which are added automatically to every test for each host which is used in the test.


To access	On the Performance Test Run page, click the Monitors button  , and select Runtime Monitors .
Important information	<ul style="list-style-type: none"> Monitors which are defined as part of a monitor profile but fail to run do not appear in the list of monitors. Default host monitors cannot be modified during runtime.
Relevant tasks	"How to Manage a Performance Test Run" on page 242.

User interface elements are described below:



UI Elements	Description
	Add Monitor. Click to add a monitor to the performance test. For more information about monitors, see "Add New Monitors Page" on page 69.
	Edit Monitor. Click to edit the selected monitor. The relevant monitor type page opens, enabling you to edit the monitor information.
	Delete Selected Item. Deletes the selected monitor.
	Refresh Monitors List. Refreshes the monitors list.







Load Generators Dialog Box

This dialog box enables you to view load generator status and machine utilization, connect and disconnect load generators, add load generators to the test, and to configure terminal sessions.

To access	On the Performance Test Run page, click the Load Generators  button.
Relevant tasks	"How to Manage a Performance Test Run" on page 242


User interface elements are described below:

UI Elements	Description
	Select All. Selects all displayed load generators.
	Deselect All. Deselects all displayed load generators.

UI Elements	Description
	Invert Selection. Inverts the current selection of load generators. That is, the non-selected load generators are selected, and the selected load generators are cleared.
 Disconnect	Disconnects the selected load generator for the performance test.
 Connect	Connects the selected load generator for the performance test.
	Add Load Generators. Opens the Add Load Generators dialog box, which enables you to add load generators to the test. For user interface details, see "Add Load Generators Dialog Box " below.
	Terminal Session Settings. Opens the Terminal Services dialog box, which enables you to configure terminal sessions for the load generator. For user interface details, see "Terminal Services Dialog Box" on page 224 .
	Refresh. Refreshes the information displayed in the Load Generators dialog box.
Name	The load generator name.
Details	Load generator details.
Platform	The platform on which the load generator is running.
Status	<p>The current status of the load generator. The possible statuses are:</p> <ul style="list-style-type: none"> • Active. The load generator is connected. • Busy. The load generator is running Vusers. • Disconnecting. The load generator is disconnecting. • Down. The load generator is not connected. • Failed. A connection with the load generator could not be established. • Ready. The load generator is connected.

Add Load Generators Dialog Box

This dialog box enables you to add load generators to a running performance test.


To access	In the Load Generators dialog box, click the Add Load Generators button  .
Relevant tasks	"How to Manage a Performance Test Run" on page 242
See also	"Load Generator Distribution " on page 160

User interface elements are described below:




UI Elements	Description
Add X Automatch Load Generators	Enables you to add a specified number of automatch load generators.
Add Specific Load Generators	<p>Enables you to add specific load generators. The load generator table lists the specific load generators which are available, displaying the following information for each load generator:</p> <ul style="list-style-type: none"> • Name. The load generator name. • State. The current state of the load generator: Operational, Non-Operational, or Unavailable. • Purpose. The purpose of the load generator, that is, Controller, Load Generator, Data Processor, or a combination of these. • Location. The location of the load generator. • Host Attributes. Select attributes for the load generator.




Monitor Over Firewall Dialog Box

This dialog box enables you to change the status of a monitor over firewall machine during a test run.

To access	On the Performance Test Run page, click the Monitors button  , and select Monitor Over Firewall .
Relevant tasks	"How to Manage a Performance Test Run" on page 242


User interface elements are described below:

UI Elements	Description
	Select All. Selects all displayed monitor over firewall machines.
	Deselect All. Deselects all displayed monitor over firewall machines.
	<p>Invert Selection. Inverts the current selection of monitor over firewall machines.</p> <p>That is, the non-selected machines are selected, and the selected machines are cleared.</p>









UI Elements	Description
 Disconnect	Disconnects the selected monitor over firewall machine for the performance test.
 Connect	Connects the selected monitor over firewall machine for the performance test.
	Refresh. Refreshes the information displayed in the monitor over firewall agent dialog box.



Vusers Dialog Box

This dialog box displays specific details for each Vuser in the performance test, and enables you to run or stop individual Vusers irrespective of their defined schedules.

To access	During Runtime, on the Performance Center Dashboard's Performance Test Run page, click the Vusers Details button  .
Relevant tasks	"How to Manage a Performance Test Run" on page 242


User interface elements are described below:

UI Elements	Description
	Select All. Selects all displayed Vusers.
	Deselect All. Deselects all selected Vusers.
	Invert Selection. Inverts the current selection of Vusers. That is, the non-selected Vusers are selected, and the selected Vusers are cleared.
	Run Selected Vusers. Runs the selected Vusers.
	Pause Selected Vusers. Pauses the selected Vusers.
	Stop Selected Vusers Gradually. Stops the selected Vusers gradually. The Vusers complete the current iteration before stopping.
	Stop Selected Vusers Immediately. Stops the selected Vusers immediately.
	Reset Selected Vusers. Resets the selected Vusers to the Down state.








UI Elements	Description
	<p>Show Selected Vusers Log. Opens the Vuser Activity Log, which displays runtime information for the selected Vuser. The log displays the following information:</p> <ul style="list-style-type: none"> • Activity log for Vuser. The selected Vuser. • Refresh. Refreshes the information displayed in the log. • Download log. Enables you to download the log. • Close. Closes the log. • Log Message. Displays the logged Vuser messages. • Show snapshot. Generates a snapshot of the point where an error occurred in a test run. Before using this feature, you must install the snapshot viewer on your desktop, and enable the Snapshot on Error option in the Runtime Settings for the Vuser script. For more information on configuring the runtime settings, see "Script Runtime Settings" on page 466.
	Refresh. Refreshes the information displayed in the dialog box.
Elapsed Time	The amount of time the Vuser has been running.
Group	Filters displayed Vusers by Vuser group.
ID	The Vuser's ID.
Load Generator	Filters displayed Vusers by load generators.
Status	Filters displayed Vusers by their current status.

Run Vusers Dialog Box

This dialog box enables you to initialize, run, or stop any number of Vusers irrespective of their defined schedules. In addition, you can add new Vusers or VUDs to the performance test.

To access	On the Performance Test Run page, click the Vuser Details button  .
Relevant tasks	"How to Manage a Performance Test Run" on page 242


User interface elements are described below:

UI Elements	Description
Distribution Mode: 	by Vusers. The Vusers being given an instruction are distributed according to Vuser groups.
Distribution Mode: 	by Load Generator. The Vusers being given an instruction are distributed according to load generators.
Vuser By: 	by Number. Enables you to give an instruction to a specific number of Vusers per Vuser group/load generator.
Vuser By: 	<p>by Percentage. Enables you to give an instruction to a specific number of Vusers, which are then distributed among the Vuser groups/load generators according to a percentage which you define.</p> <p>Example: If you choose to run an additional 200 Vusers, among three Vuser groups, A, B, and C, and you define the percentage distribution as A = 75%, B = 20%, and C = 5%, then the Vusers would be distributed as follows:</p> <p>A. 150 Vusers B. 40 Vusers C. 10 Vusers</p> <p>Note: When selecting this method, you enter the number of Vusers to run in the box adjacent to the by Percentage button.</p>
	Enter the number of Vusers per Vuser group/load generator.
	Enter the percentage distribution per Vuser group/load generator.
	Performs the selected instruction.
Group	Lists the Vuser groups in the test.
Load Generator	Lists the load generators in the test.

UI Elements	Description
Perform the following Action	<p>Give the desired instruction to the defined number of Vusers. The possible actions are:</p> <ul style="list-style-type: none"> • Add new Vusers to Down state. Add the desired number of Vusers to the Down state. • Add new VUDs to Down state. Add the desired number of VUDs to the Down state. • Initialize Vusers from Down. Initializes the desired number of Vusers currently in the Down state. • Run Vusers from Down. Runs the desired number of Vusers currently in the Down state. • Run Vusers from Ready. Runs the desired number of Vusers currently in the Ready state. • Stop Vusers. Moves the desired number of Vusers from the Run state to the Gradual Exiting state. • Reset Vusers. Moves the desired number of Vusers from the Stopped state to the Down state. <p>Note: You cannot perform an action on more Vusers than are currently in a particular state. For example, if you define 10 Vusers and select Initialize Vusers from Down, but there are only five Vusers in the Down state, <i>only</i> those five Vusers are initialized.</p>



Add Group Dialog Box

This dialog box enables you to add a Vuser group to a running performance test, or to edit Vuser group settings during a test run.

To access	<ul style="list-style-type: none"> • When adding a Vuser group. On Performance Test Run page, click the Design Groups and Scheduler button  . Then select Add Groups. • When editing a Vuser group. On the Performance Test Run page, on the Groups pane, place the mouse cursor over the name of the group you want to edit. Click the downward arrow that appears adjacent to the name, and select Edit Group.
Important information	To edit a Vuser group, all Vusers must be in the inactive state.

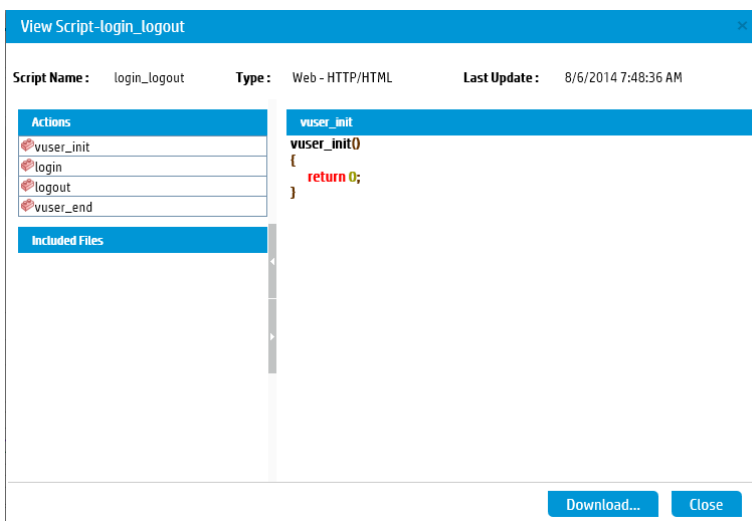
Relevant tasks	"How to Manage a Performance Test Run" on page 242
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User interface elements are described below:

UI Elements (A-Z)	Description
 Run Time Settings	Enables you to view and change the runtime settings for the Vuser script. For more details, see "How to Configure Runtime Settings" on page 467 .
 View Script	Opens the script in VuGen.
Command Line	Type the name and value of the parameter you want to send using the format, <Parameter_Name> <value> . For information about the command line parsing functions, or for details about including arguments on a command line, see the <i>HP LoadRunner Online Function Reference</i> , provided with HP Virtual User Generator.
Group Name	The name of the Vuser group.
Load Generators	The load generators on which the group is running.
Protocol	The Vuser script's protocol.
Script	The name of the Vuser script.
Vusers	The number of Vusers assigned to the group.


View Script Dialog Box

This dialog box enables you view the code for each action in a running Vuser script.



To access	On the Performance Test Run page, on the Groups pane, place the mouse cursor over the name of a group. Click the downward arrow that appears adjacent to the name, and select View Script .
Relevant tasks	"How to Manage a Performance Test Run" on page 242

User interface elements are described below:








UI Elements	Description
	Enables you to download the script.
Script Name	The script's name.
Type	The script type.
Last Update	The last updated date and time.
Actions	Lists the actions included in the script. Click on an action to view its code in the right pane.
Included files	Displays files included in the script.

SLA Report

This report displays the post-run SLA statuses of the SLA goals defined for the performance test.

To access	Use one of the following: <ul style="list-style-type: none">On the My Performance Center navigation bar, select Test Management > Test Plan. Click a performance test in the test plan tree. In the Test Run tab, click SLA Report button.On the My Performance Center navigation bar, select Test Management > Test Lab or select Runs & Analysis > Runs. In the Test Runs view, click SLA Report button.
Important information	The SLA report is available only if SLAs were defined prior to running the performance test.
Relevant tasks	"Running Performance Tests Overview" on page 241
See also	"Service Level Agreements Overview" on page 189

User interface elements are described below (unlabeled elements are shown in angle brackets):

UI Elements	Description
	Export to Excel. Enables you to export the selected section of the SLA report to an Excel file.
	Export to PDF. Enables you to export the selected section of the SLA report to a .pdf file.
	Export to CSV. Enables you to export the selected section of the SLA report to a .csv file.
	Export to Word. Enables you to export the selected section of the SLA report to a Word file.
<Test run details>	The details of the performance test run to which the SLA report data relates are displayed at the top of the report.
<SLA grids>	The results for each SLA are displayed in separate grids. Tip: Each set of results can be exported to Excel, Word, PDF, and CSV format.
<SLA status indicators>	 . Indicates a failed SLA status.  . Indicates a passed SLA status.  . Indicates that there is no data about the SLA status.

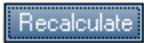
Calculate Service Level Agreement Dialog Box

This dialog box enables you to change the test time range included in the Service Level Agreement (SLA).

To access	Use one of the following: <ul style="list-style-type: none"> On the My Performance Center navigation bar, select Test Management >Test Plan. Click a performance test in the test plan tree. Click the Test Run tab. Click the Recalculate SLA Report button. On the My Performance Center navigation bar, select Test Management >Test Lab or select Runs & Analysis > Runs. Click the Recalculate SLA Report button.
Important information	The Recalculate SLA button is available only if SLAs were defined for the performance test.

Relevant tasks	"Running Performance Tests Overview" on page 241
See also	"Service Level Agreements Overview" on page 189

User interface elements are described below:

UI Elements	Description
	Recalculates the SLA according to the defined information.
Calculate SLA for whole run duration	Calculates the SLA over the whole test run.
Calculate SLA for part of run duration	Calculates the SLA over part of the test run. Enter the desired Start Time and End Time over which to calculate the SLA.

Chapter 19: Network Virtualization

This chapter includes:

- Network Virtualization Overview289
- How to Integrate Network Virtualization into a Performance Test292
- Network Virtualization Graphs295
- Network Virtualization User Interface299
- Limitations for Network Virtualization302

Network Virtualization Overview

HP ALM Performance Center integrates with HP Network Virtualization to help you test point-to-point performance of network-deployed products under production conditions. By installing HP Network Virtualization, you can introduce highly probable network effects such as latency, packet loss, and link settings. As a result, your test scenario runs in an environment that more reliably and accurately represents the real-world conditions experienced by end users.

HP Network Virtualization includes a global library of network conditions from cities around the world. Because the network parameters are provided by HP Network Virtualization, you do not need to manually enter this information.

The following table presents the most typical effects that you can configure:

Effect	Description
Latency	The time, in milliseconds, that it takes an IP packet to cross the network. This is usually affected by geographical distance, the available bandwidth, the network load on the route between the two ends, and whether this is a terrestrial link.
Packet Loss	The chance of losing IP packets while data travels through a network. Packets can get lost due to link faults or due to extreme network load.
Bandwidth	The capacity of your network to transfer data.

You can create more meaningful results by configuring several load generators or groups of Vusers with a unique set of network effects, and by giving each set a unique location path. For example, you could define a location from **New York** to **London** and another one from **Los Angeles** to **New York**.

After running a performance test, view the results in the Performance Test Run page or the LoadRunner Analysis. For details on the Performance Test Run page, see ["Performance Test Run Page" on page 261](#). For details on viewing results in Analysis, see the *HP LoadRunner Analysis User Guide*.

For details on how to integrate Network Virtualization into your performance test, see ["How to Integrate Network Virtualization into a Performance Test" on page 292](#).

This section also includes:

- ["Defining Virtual Locations" on the next page](#)
- ["Excluding Machines from Network Virtualization" on the next page](#)
- ["Viewing Network Virtualization Graphs" on the next page](#)
- ["Workflow for Working with Network Virtualization" on page 291](#)

Defining Virtual Locations

From within Performance Center, HP Network Virtualization enables you to define different network locations and conditions for virtualizing in the test environment, so each end user geography and the unique conditions associated with each can be accurately represented. For example, you can define end point locations in **London** and **New York** and emulate the network path between those two cities. You add locations in the Network Virtualization Settings dialog box. You can define global virtualization settings or configure the settings for each of the locations separately. For details, see ["Network Virtualization Settings Dialog Box" on page 300](#).

Excluding Machines from Network Virtualization

In some situations, you may need to exclude certain machines from the network virtualization as they could inappropriately affect the emulation. When a machine is excluded from network virtualization, network traffic to that machine does not suffer any network effects and is not included in the network virtualization results.

The following machines are excluded by default:

- The Controller machine or the MI Listener and proxy server
- The Diagnostics Commander server
- The Performance Center server
- The SiteScope server (configured to monitor Performance Center servers and hosts)

In addition to the machines that are excluded by default, consider excluding the following machines:

- In a Multi-protocol performance test that includes a Web server and a database server, where information from the database server is not required as a part of the performance test, exclude the database server
- All deployment and software upgrade servers
- Where you run and store scripts on a shared network drive

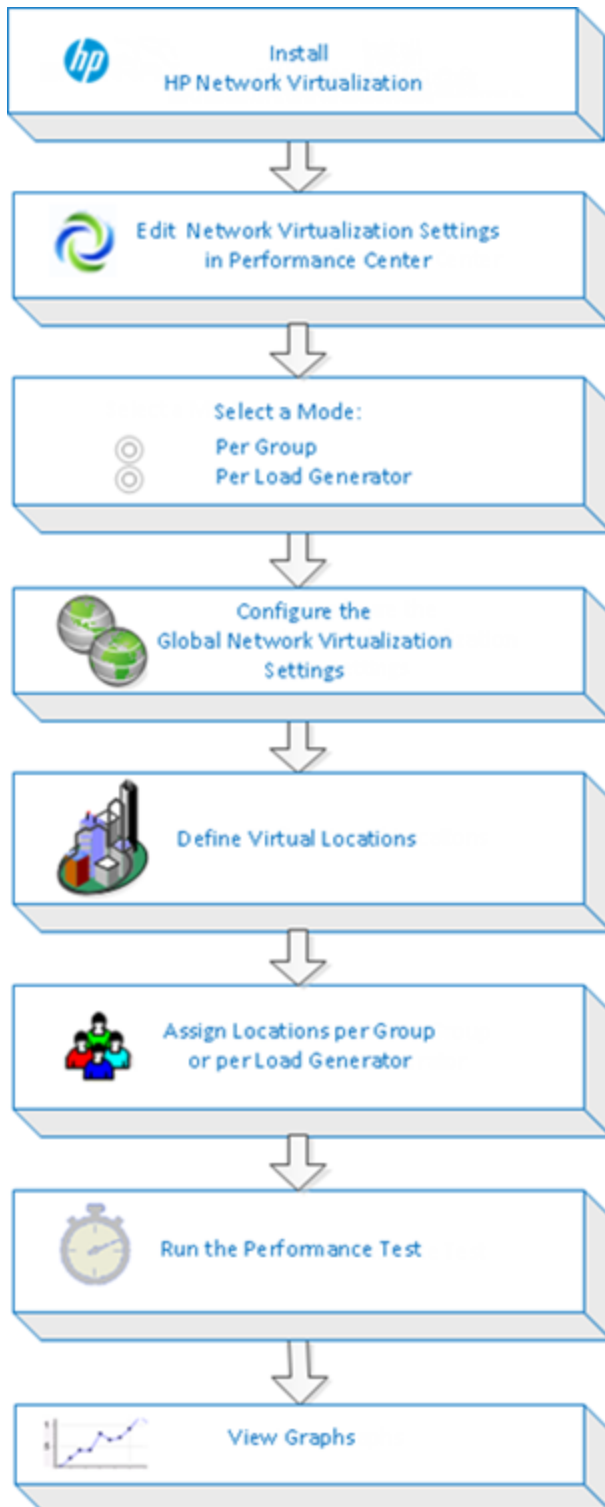
Viewing Network Virtualization Graphs

Network Virtualization starts and stops automatically as you start and stop the performance test. Network Virtualization monitors are assigned automatically when the performance test run starts and metrics are automatically collected during the performance test run. You can view the network virtualization metrics during the performance test run in the Performance Test Run page. For details on the Performance Test Run page, see ["Performance Test Run Page" on page 261](#).

You can also view the results in LoadRunner Analysis. For more details on viewing results in Analysis, see the *HP LoadRunner Analysis User Guide*.

Workflow for Working with Network Virtualization

The following workflow shows how to integrate Network Virtualization into a performance test



How to Integrate Network Virtualization into a Performance Test

This following describes how to integrate Network Virtualization into your performance test and how to view the metrics in Analysis.

To learn more about Network Virtualization, see ["Network Virtualization Overview" on page 289](#).

This task includes the following steps:

- ["Prerequisites" below](#)
- ["Open network virtualization " below](#)
- ["Enable network virtualization and choose a virtualization method" on the next page](#)
- ["Set the global network virtualization settings" on the next page](#)
- ["Add virtual locations" on the next page](#)
- ["For network virtualization per Group - Define the settings for each group" on page 294](#)
- ["For network virtualization per Load Generator - Define the settings for each load generator" on page 294](#)
- ["For network virtualization per Load Generator - Define the same settings for all load generators" on page 294](#)
- ["Run the performance test" on page 295](#)
- ["View the graphs" on page 295](#)

1. Prerequisites

- Make sure that you have HP Network Virtualization installed on the following machines:
 - the Performance Center server
 - the load generators
 - the Controller
- Make sure that you have a properly designed performance test. For more information, see ["How to Define a Performance Test Workload" on page 128](#).

2. Open network virtualization

- a. In the Performance Test Designer window, click **Groups & Workload**. For user interface

details, see ["Performance Test Designer > Groups & Workload" on page 134](#).

- b. **Open network virtualization.** In the **Groups & Workload** view, select **Advanced > Network Virtualization Settings**. The Network Virtualization Settings dialog box opens. For user interface details, see ["Network Virtualization Settings Dialog Box" on page 300](#).
3. Enable network virtualization and choose a virtualization method
 - a. **Enable Network Virtualization.** In the Network Virtualization Settings dialog box, select **Enable Network Virtualization**.
 - b. **Select a method.** Select **Per Group** or **Per Load Generator**.

Use the default **Per Group** to perform network virtualization per Vuser group. This option enables you to emulate multiple virtual locations on the same load generator. It makes it easier to switch between load generators used in your performance test.

Use **Per Load Generator** to perform network virtualization per load generator, where each machine can only emulate a single location.
4. Set the global network virtualization settings
 - a. Click **Global Settings** to define the global options for all network virtualizations. This opens the interface to HP Network Virtualization.
 - b. Indicate if you want to allow packet capture and which recording method to use, **cyclic** or **non-cyclic**. It is recommended that you do not enable packet capture as this requires a larger memory allocation and may affect performance.
 - c. In the **IP Filter** section, specify any machines that you may want to exclude from network virtualization for all locations. For details on which machines to exclude, see ["Network Virtualization Overview" on page 289](#).
5. Add virtual locations
 - a. In the **Add new virtual location** field, type a location name.

Note: For location names, only use English letters. You cannot use the following characters: \ / : " ? ' < > | * % ^ , ! { } () ; = #

- b. Click **Add**. This opens the interface to HP Network Virtualization.
 - c. In the Shunra NV **Virtualization** tab, select a definition mode such as **Import from library** or **Custom**. If you select **Import from library**, Shunra NV automatically uses its built-in settings for the location you select. If you select **Custom**, you need to manually specify the network effects to apply to the location, such as latency, loss, and client bandwidth.


Manage virtual locations. In the Network Virtualization Virtual Locations pane, you can add, modify, duplicate, or delete a virtual location. You can also import locations from other tests.

- d. In the Shunra NV **Options** tab's **Bandwidth allocation** section, select **Share bandwidth between all users** unless you are testing mobile applications.
 - e. In the **Options** tab's **IP Filter** box, specify any machines that you may want to exclude from network virtualization for this location. For details on which machines to exclude, see ["Network Virtualization Overview" on page 289](#).
 - f. Click **OK** to close the Shunra NV interface. The location is added to the Network Virtualization Settings dialog box. To enable the location, select the check box.
 - g. Repeat the above steps for each location.
6. For network virtualization per Group - Define the settings for each group
 - a. **Select virtual location.** In the Performance Test Designer window click **Groups & Workload**, under the **Virtual Location** column, click the **Select virtual location** link. The Virtual Location dialog box opens.
 - b. Select a virtual location.
7. For network virtualization per Load Generator - Define the settings for each load generator
 - a. In Performance Test Designer window click **Groups & Workload**, in the **LG Distribution** box, select **Assign manually**.

Note: For more details on LG distribution methods, see ["Performance Test Designer > Groups & Workload" on page 134](#).

- b. Under the **Load Generator** column, click the **Select Load Generator** link. The Select Load Generators dialog box opens. For user interface details, see ["Select Load Generators Dialog Box " on page 168](#).
- c. **Assign one or more load generators.** Select the **Automatch** or **Specific** tab. Select one or more load generators.
- d. **Select virtual location.** Under the **Virtual Locations** column, click the **Select Virtual Location** link for each selected load generator. The Select Virtual Location dialog box opens. Select a virtual location.

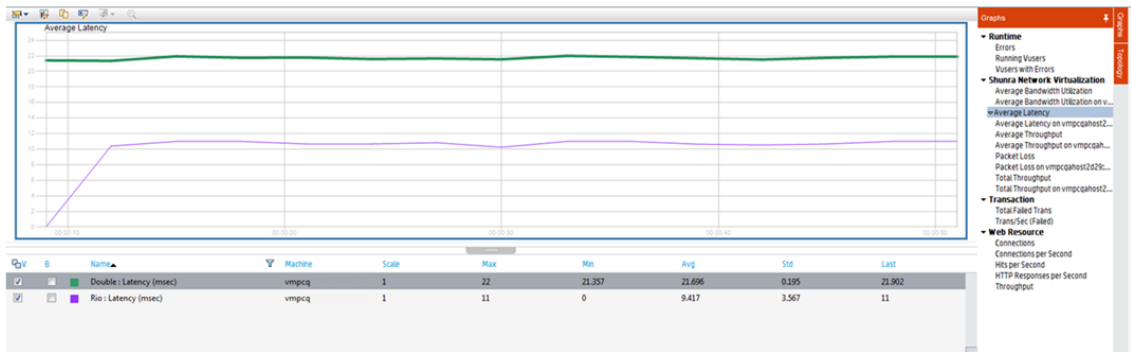
8. For network virtualization per Load Generator - Define the same settings for all load generators
 - a. In the Performance Test Designer window click **Groups & Workload**, in the **LG Distribution**

- box, select **Assign all to each group**.
- b. In the **LG** box, specify the number of automatch load generators for the test.
- c. Click the **Configure Load Generators Properties** button . The Automatch Load Generators Properties dialog box opens. For user interface details, see ["Automatch Load Generators Properties Dialog Box" on page 171](#).
9. Run the performance test
- Run the test to check its performance. For more details on running a performance test, see ["How to Manage a Performance Test Run" on page 242](#).
10. View the graphs
- Network virtualization metrics are automatically collected during the performance test run. You can view all the network virtualization metrics in the Performance Test Run Page or the LoadRunner Analysis.
- For more details on the Performance Test Run page, see ["Performance Test Run Page" on page 261](#). For more details on viewing results in Analysis, see the *HP LoadRunner Analysis User Guide*.

Network Virtualization Graphs

Average Latency Graph

This graph shows the average recorded time required for a packet of data to travel from the indicated source point to the required destination, measured in milliseconds.

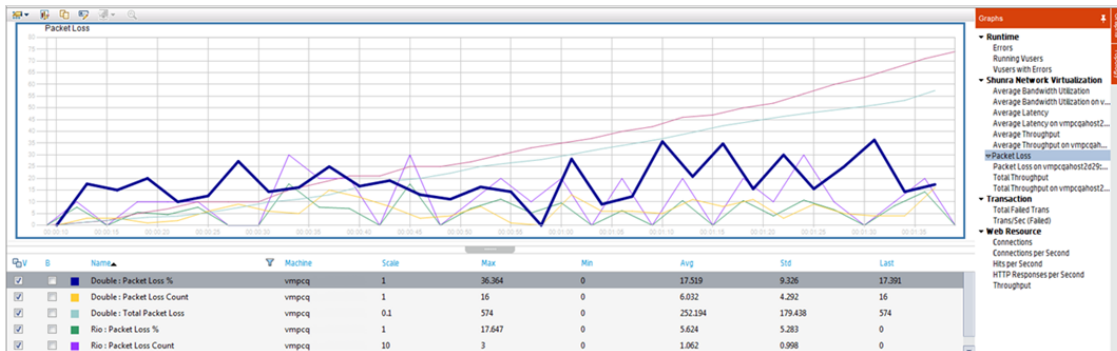


Purpose	Helps you evaluate the time required for a packet of data to travel over the network.
----------------	---

X-axis	Elapsed time since the start of the run.
Y-axis	The average latency—the time in milliseconds required for a packet of data to reach its destination.
See also	<ul style="list-style-type: none"> • "Network Virtualization Overview" on page 289 • "Performance Test Run Page" on page 261

Packet Loss Graph

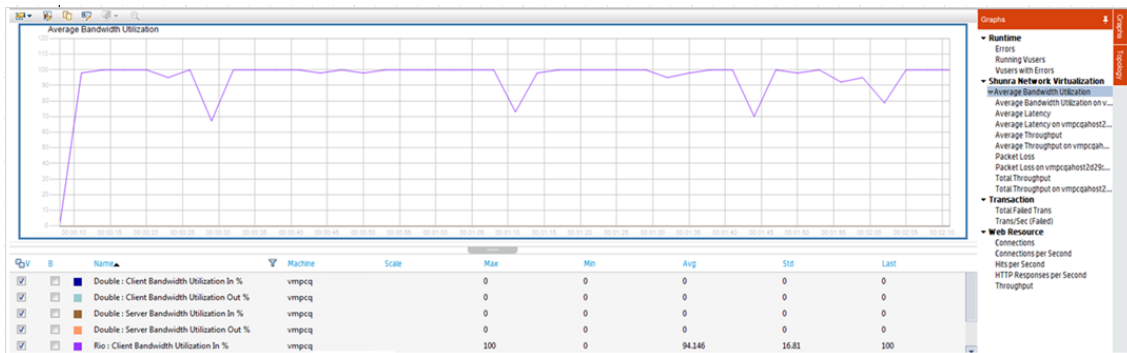
This graph shows packets lost during the last second of the test run. Packet loss occurs when data packets fail to reach their destination. It can result from gateway overload, signal degradation, channel congestion, or faulty hardware.



Purpose	Helps you understand how many data packets were lost over a specific time interval.
X-axis	Elapsed time since the start of the run.
Y-axis	Includes the following measurements: <ul style="list-style-type: none"> • The percentage of lost packets from all packets that were sent. • The number of data packets that were lost over 60 seconds. • The total number of packets that were lost.
See also	<ul style="list-style-type: none"> • "Network Virtualization Overview" on page 289 • "Performance Test Run Page" on page 261

Average Bandwidth Utilization Graph

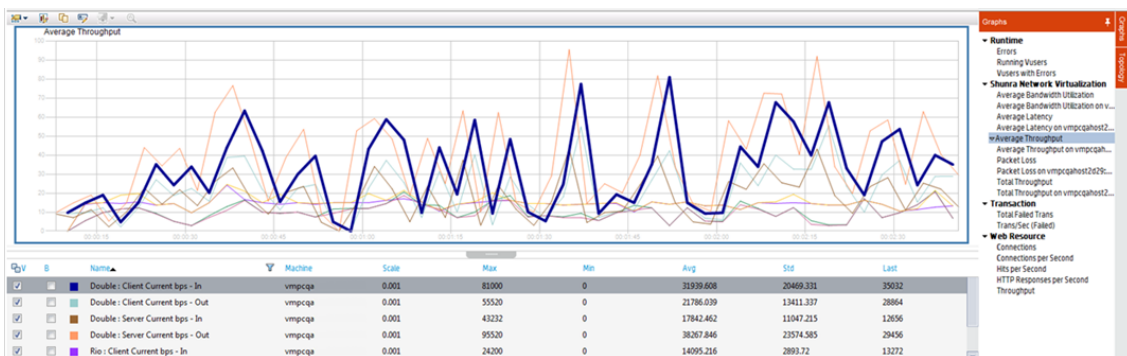
This graph shows the average bandwidth utilized by a virtual user or a virtualized location from the maximum available bandwidth allocated for it during the last second, measured in percentages.



Purpose	Helps you evaluate the bandwidth used over your network.
X-axis	Elapsed time since the start of the run.
Y-axis	The percentage of bandwidth utilization.
See also	<ul style="list-style-type: none"> "Network Virtualization Overview" on page 289 "Performance Test Run Page" on page 261

Average Throughput Graph

This graph shows the average data traffic passing to or from the virtualized location, measured in kilobytes per second (kbps).

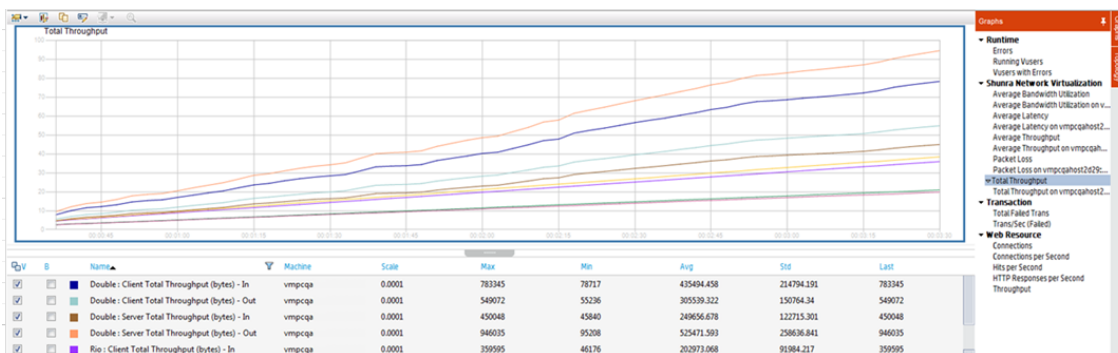


Purpose	Helps you evaluate the amount of load Vusers generate, in terms of server and client throughput. The graph shows metrics for input and output traffic for both the server and client machines. Use the legend below the graph to determine the line color for each metric.
X-axis	Elapsed time since the start of the run.

Y-axis	<p>The rate of data passing to and from the virtual location, in kbps for the following metrics per group or load generator:</p> <ul style="list-style-type: none"> • Input to the client machine • Output from the client machine • Input to the server machine • Output from the server machine
See also	<ul style="list-style-type: none"> • "Total Throughput Graph" below • "Network Virtualization Overview" on page 289 • "Performance Test Run Page" on page 261

Total Throughput Graph

Displays the total data traffic passing to or from the virtualized location, measured in kilobytes.



Purpose	<p>Helps you evaluate the total amount of load that Vusers generate while running a scenario with network virtualization.</p> <p>The graph shows metrics for input and output traffic for both the server and client machines. The legend below the graph indicates the line color for each of these metrics.</p>
X-axis	Elapsed time since the start of the run.
Y-axis	Throughput of the server, in kilobytes per second (Kbps).
See also	<ul style="list-style-type: none"> • "Average Throughput Graph" on the previous page • "Network Virtualization Overview" on page 289 • "Performance Test Run Page" on page 261

Network Virtualization User Interface

This section includes:





Network Virtualization Settings Dialog Box	300
Import Virtual Locations Dialog Box	301

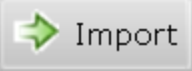
Network Virtualization Settings Dialog Box

This dialog box enables you to configure your network virtualization settings.

To access	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Test Management > Test Plan. 2. Select a performance test in the test plan tree and click Edit Test. 3. In the Performance Test Designer window, click Groups & Workload. 4. Select Advanced > Network Virtualization Settings.
Important information	To access this dialog box, you must have HP Network Virtualization installed on your machine.
Relevant tasks	"How to Integrate Network Virtualization into a Performance Test" on page 292

User interface elements are described below:

UI Elements	Description
Enable Network Virtualization	<p>Enables Network Virtualization per one of the following:</p> <ul style="list-style-type: none"> • Per Group. Assigns network virtualization locations per Vuser group. (Default) • Per Load Generator. Assigns network virtualization locations per load generator. Each machine can only emulate a single location.
Global Settings	Opens the HP Network Virtualization interface for defining the global setting for the virtualization. For more details on global settings, see "How to Integrate Network Virtualization into a Performance Test" on page 292 .
 Rename	Enables you to modify the virtual location name and description.
 Edit Location	Opens the HP Network Virtualization interface for editing the location. For details, see the relevant third party software documentation.
 Duplicate	Duplicates the virtual location.
 Delete	Deletes the selected virtual location from the Virtual Locations list and any associated groups or load generators.

UI Elements	Description
	Opens the Import Virtual Locations dialog box enabling you to import virtual locations from another test. For details, see "Import Virtual Locations Dialog Box" below.
Location Name	Indicates the virtual location name.
Description	The description of the virtual location.
Add new virtual location	Enables you to add a new virtual location. Type the location name and click Add . Opens the HP Network Virtualization interface for setting the virtualization properties and location options. For more details on adding virtual locations, see "How to Integrate Network Virtualization into a Performance Test" on page 292.

Import Virtual Locations Dialog Box

This dialog box enables you to import virtual locations from another test.

To access	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Test Management > Test Plan. 2. Select a performance test in the test plan tree and click Edit Test. 3. In the Performance Test Designer window, click Groups & Workload. 4. Select Advanced > Network Virtualization Settings. 5. Click the Import button.
Important information	To access this dialog box, you must have HP Network Virtualization installed on your machine.
Relevant tasks	"How to Integrate Network Virtualization into a Performance Test" on page 292

User interface elements are described below:

UI Elements	Description
Test Set	A list of available test sets from which to select tests with virtual locations.
ID	The ID number of the test.
Name	The name of the test.
Responsible	The user responsible for the test.
Last Modified	The date on which the test was last modified.

UI Elements	Description
Virtual Locations Preview pane	Displays the location names included in a selected test.

Limitations for Network Virtualization

- Network virtualization integration does not comply with accepted Internationalization (I18N) conventions.
- The network virtualization software may consume large amounts of memory, since the technology delays traffic and captures traffic for later analysis. To verify that the load generator machine has sufficient memory, compare the load generator memory consumption with and without the virtualization.
- Network virtualization software integration is not supported for the Linux platform.
- You cannot run a scenario on the same load generator from two different Controller machines if they both have network virtualization enabled.

Chapter 20: Trending

This chapter includes:

- Trend Reports Overview305
- Trend by Quality Attributes Template - Trended Measurements308
- Measurement Acronyms309
- Trend Reports User Interface311

Trend Reports Overview

The ALM Performance Center trend reports allow you to compare performance test run data over time, thereby giving you better visibility and control of your application's performance.

By comparing the same measurement in more than one instance of a test run, you can identify whether its performance trend is improving or regressing.

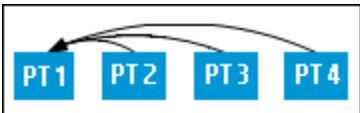
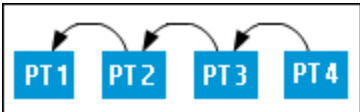
For example, if you were interested in the performance trend of the transaction response time measurement, the trend report clearly displays whether over several instances of a test run, this value has increased or decreased from one run to another - a performance regression or improvement respectively.

This section also includes:

- ["Comparison Methods" below](#)
- ["Trend Thresholds" on the next page](#)
- ["Custom Measurement Mapping" on page 307](#)

Comparison Methods

There are two methods of comparing measurements contained in a performance test run for the purposes of identifying performance trends: Compare to Baseline and Compare to Previous.

Comparison Method	Description
Compare to Baseline	<p>You select one performance test run in the trend report and define it as the baseline. All measurements in the report are then compared to the measurements contained in the baseline.</p> 
Compare to Previous	<p>All measurements in a performance test are compared to the measurements in the performance test run that immediately precedes it in the report.</p> 

It is important to understand the difference between the two comparison methods. The following example will illustrate how the same data can yield different results depending on the method you select.

As shown in the image below, the average Transaction Response Time measurement is being trended from four performance test runs: **3**, **4**, **5**, and **6**.

Transaction Response Time(Compare to baseline)					
Name	Type	Average			
		6/24/2010 (3[Base])	6/24/2010 (4)	6/24/2010 (5)	6/24/2010 (6)
All	TRT	4.567	1.22 (-73.29%)	2.32 (-49.2%)	12.455 (+172.72%)
TRX_01	TRT	2.045	4.073 (+99.17%)	2.035 (-0.49%)	1.05 (-48.66%)
TRX_02	TRT	1.045	2.07 (+98.09%)	1.015 (-2.87%)	1.051 (+0.57%)
TRX_03	TRT	3.053	3.067 (+0.46%)	2.009 (-34.2%)	2.654 (-13.07%)
TRX_04	TRT	6.055	6.868 (+13.43%)	5.011 (-17.24%)	7.05 (+16.43%)

Performance test run (PT) **3** has been defined as the baseline (as indicated by the word **Base** in parentheses). The average transaction response times contained in the other performance test runs are compared to PT **3** only.

In PT **3**, the average transaction response time for **TRX_01** was **2.045**. The average transaction response time for the same transaction in PT **5** was **2.035**, which represents a slightly faster response time and therefore a slight improvement in the performance of this measurement. The percentage difference between the two figures is displayed in brackets, in this case **-0.49%**.

However, if the Compare to Previous comparison method was selected, then the average transaction response time in PT **5** would be compared not to PT **3**, but rather to PT **4** (since **4** precedes it in the table). The value for PT **4** is **4.073** while for PT **5** it's **2.035**, a percentage difference of **-50.04%**.

Transaction Response Time (Compare to previous run)					
Name	Type	Average			
		6/24/2010 (3[Base])	6/24/2010 (4)	6/24/2010 (5)	6/24/2010 (6)
All	TRT	4.567	1.22 (-73.29%)	2.32 (+90.16%)	12.455 (+436.85%)
TRX_01	TRT	2.045	4.073 (+99.17%)	2.035 (-50.04%)	1.05 (-48.4%)
TRX_02	TRT	1.045	2.07 (+98.09%)	1.015 (-50.97%)	1.051 (+3.55%)
TRX_03	TRT	3.053	3.067 (+0.46%)	2.009 (-34.5%)	2.654 (+32.11%)
TRX_04	TRT	6.055	6.868 (+13.43%)	5.011 (-27.04%)	7.05 (+40.69%)

Using exactly the same data, the two comparison methods have yielded very different results. Only a slight improvement with the Compare to Baseline method (**-0.49%**), while a more significant improvement with the Compare to Previous method (**-50.04%**).

Trend Thresholds

To identify significant improvements or regressions in performance, you can define unique thresholds to track differentials between measurements being compared. If a differential exceeds a defined threshold, that value appears in a predetermined color, identifying it as an improvement, minor regression, or major regression.

For example, if you define an improvement threshold for comparing transaction response times as 50%, then any transaction response time that is 50% lower than that of the baseline or previous run (depending on the comparison method) will appear in the color you defined for improvements.

In the example below, the following performance thresholds for the transaction response time (TRT) measurement have been defined:

- **Improvement.** At least 90% decrease
- **Major Regression.** At least 50% increase

These threshold definitions mean that any performance improvements or regressions which exceeds these percentages will be displayed in color, making them more identifiable.

In the following table, the Compare to Previous comparison method is used.

Transaction Response Time (Compare to previous run)				
Name	Type	Average		
		6/24/2010 (3[Base])	6/24/2010 (4)	6/24/2010 (5)
Action_Transaction	TRT	0.002	0.94 (+46900%)	0 (-100%)
All	TRT	0.002	0.311 (+15450%)	0 (-100%)

In the table above, we see that the value of the TRT measurement for the **Action_Transaction** in performance test run **4** is **46900%** higher than in performance test run **3** - a performance regression which far exceeds the defined threshold for major regressions. Therefore, the value appears in red, the default color for major regressions.

The corresponding value for performance test run **5** represents a **100%** improvement on performance test run **4**. Since this percentage exceeds the defined threshold for improvements, the value appears in green, the default color for improvements.

Custom Measurement Mapping

The Custom Measurement Mapping feature allows you to reconcile inconsistent transaction or monitor names between performance test runs, thereby allowing you to properly trend these measurements.

The following are two examples of when you would use the Custom Measurement Mapping feature:

- **Inconsistent transaction name**

You run a performance test that contains the transaction **BuyBook**. A while later you run the performance test again. However, in the time between the two performance test runs, the transaction name has been changed to **TRX_01_BuyBook**.

As a result of this inconsistent naming, you cannot obtain any trending information for this measurement, as Performance Center cannot recognize that the two transactions are actually the same, and compare them for trending purposes.

To overcome this problem, you map the two measurements (**BuyBook** and **TRX_01_BuyBook**) to a new third measurement which you create, for example **Buy_Book_mapped**. You add this new user-defined measurement to the trend report. Performance Center can then compare two instances of the **Buy_Book_mapped** transaction and give you meaningful trending information.

You can give the new transaction the same name as one of the current transactions. Additionally, you can configure the mapping so that all future instances of the transaction are automatically mapped to the new transaction name.

- **Inconsistent monitor name**

You want to compare your application's performance when it runs on different operating systems or when it runs on different Web/application servers.

You run the performance test once on a Windows platform, and then again on a Linux platform. You then want to compare the CPU utilization between the two runs. However, each platform provides a different name for this measurement. For example, **% Processor Time (Processor_Total)** in Windows, and **CPU Utilization** in Linux.

Performance Center cannot successfully obtain trending information for this measurement because the measurement names may be different.

To overcome this problem, you map the two measurements (**% Processor Time (Processor_Total)** and **CPU Utilization**) to a third measurement which you create, for example **CPU_mapped**. You then add this new user-defined measurement to the trend report. Performance Center can then compare the two instances of the **CPU_mapped** transaction and give you meaningful trending information.

You can give the new monitor the same name as one of the current monitors. Additionally, you can configure the mapping so that all future instances of the monitor are automatically mapped to the new monitor name.

Trend by Quality Attributes Template - Trended Measurements

The following table shows which measurements are trended, and by which quality attribute the information is displayed when the Trend by Quality Attributes template is selected:

Quality Attribute	Trended Measurement
Performance	Transaction Response Time (compared to baseline). For more information on comparison methods, see "Trend Reports Overview" on page 305 .
System Performance	CPU utilization Disk utilization Available memory

Quality Attribute	Trended Measurement
Availability	Transaction Summary (compared to baseline). For more information on comparison methods, see "Trend Reports Overview" on page 305 .
Repeatability	Transaction Percentiles (compared to baseline). For more information on comparison methods, see "Trend Reports Overview" on page 305 .
Stability	Error Statistics Transaction Failures

Measurement Acronyms

The following table lists all the measurement acronyms that might be used in the trend report:

Data Type	Full Name	Initials
Vusers	Running Vusers	VU
Errors	Errors	ERR
Transactions	Transaction Response Time	TRT
	Transaction Per Second	TPS
	Transaction Summary	TRS
Web Resources	Hits per Second Throughput Connections	WEB
User Defined Data Points	User Defined Data Points	UDP
System Resources	Windows Resources	WIN
	UNIX Resources	UNX
	Server Resources	SRVR
	SNMP	SNMP
	SiteScope	SiS
Web Server Resources	Apache	APA
	MS IIS	IIS
	iPlanet	PLA

Data Type	Full Name	Initials
Web Application Server Resources	Ariba	ARI
	ATG Dynamo	ATG
	BroadVision	BDV
	ColdFusion	CFU
	MS ASP	ASP
	Oracle Application Server	OAS
	SilverStream	SST
	WebLogic	WL
	WebSphere	WS
Database Server Resources	DB2	DB2
	Oracle	ORA
	MS SQL	SQL
	Sybase	SYB
ERP/CRM Server Resources	SAP	SAP
	SAP Portal	SAPP
	SAP CCMS	CCMS
	SAP GUI	SAPU
	Siebel Web Server	SIEB
	Siebel Server Manager	SIEB
J2EE	Server Request	J2EE
.NET	Server Request	NET
Additional Components	COM+	COM
	.NET	NET
Application Deployment Solution	Citrix MetaFrame XP	CTRX
Middleware Performance	IBM WebSphere MQ	MQ
Application Traffic Measurement	F5 BIG-IP	F5

Trend Reports User Interface

This section includes:





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- Create New Trend Report Page313
- <Report Name> Trend Report314
- Trend Overview Tab315
- Trend View Tabs317
- Trend Views318
- Export Trend Report Page323
- Select Columns Dialog Box324
- Select Test Runs to Trend Report Dialog Box327
- Threshold Settings Dialog Box329
- Custom Measurement Mapping Dialog Box330
- Add Trend Views to Tab Dialog Box332
- Measurements Configuration Dialog Box333

Performance Trending Module

This module enables you to manage trend reports. It displays a list of available reports, and enables you to create new reports, and to delete or duplicate existing reports.

To access	On the My Performance Center navigation bar, select Runs & Analysis > Trending .
Tip	On the ALM sidebar, under Performance Center , select Performance Lifecycle to view the five most recently created trending reports.
Relevant tasks	"How to Manage a Performance Test Run" on page 242

User interface elements are described below (unlabeled elements are shown in angle brackets):

UI Elements	Description
<My Performance Center common UI elements>	For My PC menus and buttons, see "My Performance Center Window" on page 23 .
 New Trend Report	Opens the Trend Report creation page, which enables you to create trend reports.
 Duplicate	Creates a duplicate of the selected report.
 Rename	Enables you to edit the report name and description.
 Delete	Deleted the selected report.
ID	The trend report ID number.
Report Name	The name of the report.
Description	A description of the report.
Modified by	The user who last modified the report.
Responsible	The user who created the report.
Last Modified	The date on which the report was last modified.
Runs	The number of trended runs contained in the report.

Create New Trend Report Page

This page enables you to create trend reports.

To access	<ol style="list-style-type: none">1. On the My Performance Center navigation bar, select Runs & Analysis > Trending.2. On the Performance Trending page, click New Trend Report.
Relevant tasks	"How to Manage a Performance Test Run" on page 242

General Details Pane

User interface elements are described below:

UI Elements	Description
Name	The name of the report.
Description	A description of the report.

Contents and Layouts Pane

User interface elements are described below:

UI Elements	Description
Description	A description of the selected template.
Transaction Trends template	<p>Provides trend views that display trending information for the following measurements:</p> <ul style="list-style-type: none">• Transaction Response Time• Transaction Pass/Fail Summary• Transactions per Second




UI Elements	Description
Transactions and Monitors Trends template	Provides trend views that display trending information for the following measurements: <ul style="list-style-type: none"> • Transaction Response Time • Transaction Summary • System Resources (specifically: CPU utilization, Disk utilization, and Available memory)
Trend by Quality Attributes template	Provides trend views that display trending information from the point of view of quality attributes. For a table which displays which measurements are trended and by which quality attribute, see "Trend by Quality Attributes Template - Trended Measurements" on page 308 .
User Defined template	This template provides only the basic layout for the report with no further predefined tab or trend view configuration.





<Report Name> Trend Report

This page enables you to manage the test runs that are included in the report, as well as to manage the trend views which display the trending information.

To access	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Runs & Analysis > Trending. 2. On the Performance Trending page, in the Trend Reports grid, click the name of the report to open. The report opens as an additional tab on the My Performance Center Dashboard.
------------------	---

User interface elements are described below (unlabeled elements are shown in angle brackets>):

UI Elements	Description
 Export to PDF	Opens the Export Trend Report page, which enables you to export the selected report to a .pdf file. For user interface details, see "Export Trend Report Page" on page 323 .
 Thresholds	Opens the Threshold Settings dialog box, which enables you to define the thresholds to be used for identifying performance improvements and regressions. For user interface details, see "Threshold Settings Dialog Box" on page 329 .
 Custom Measurement Mapping	Opens the Custom Measurement Mapping dialog box, which enables you to define and customize mapped measurements. For user interface details, see "Custom Measurement Mapping Dialog Box" on page 330 .



UI Elements	Description
 Edit Layout	Enables you to edit layout within a trend view tab.
 Active tabs	Enables you to view tabs that are not currently displayed. Note: A maximum of five tabs can be displayed at one time.
 Refresh	Refreshes the information contained in the report.
	Add a New Tab. Adds a new tab to the report.
<Trend Views>	Trend views are display items that present trending information, and are contained within the <trend view tabs>. For more information, see "Trend Views" on page 318 .
<Trend View tabs>	The <trend view tabs> contain the trend views and are defined by the template on which the report is based. For more information, see "Trend View Tabs" on page 317 .
Trend Overview tab	The Trend Overview tab displays the test runs trended in the report, and provides options for managing the test runs. For more information, see "Trend Overview Tab" below .




Trend Overview Tab

The Trend Overview tab is used for managing the information contained in the trend report.

To access	The Trend Overview tab is displayed by default when you access a <report name> Trend Report.
Important information	The Trend Overview tab is common to all trend reports, irrespective of which template is selected.
See also	"<Report Name> Trend Report " on the previous page

User interface elements are described below (unlabeled elements are shown in angle brackets>):

UI Elements	Description
	Add runs to trend report. Opens the Select Test Runs to Trend Report dialog box. For user interface details, see "Select Test Runs to Trend Report Dialog Box" on page 327 .
	Remove run from trend report. Remove test runs from the trend report.

UI Elements	Description
	<p>Set run as baseline. Sets the selected test run as the baseline run for comparing test runs. For more information on comparison methods, see "Trend Reports Overview" on page 305.</p> <p>Note: The first run which is added to the report is automatically defined as the baseline.</p>
	<p>Move Run Up/Down. Moves the selected test run up or down in the run order. Changing the position of the test run may have an effect on the comparison value when the Compare to previous method is selected. For more information on comparison methods, see "Trend Reports Overview" on page 305.</p>
	<p>Customize Table Columns. Customizes which columns appear in the Trended Runs table. For user interface details, see "Select Columns Dialog Box" on page 324.</p>
<Trended runs table>	<p>Displays information for all trended test runs in the report. It is divided into three sections, General Details, Workload Characteristics, and Performance Overview.</p>
General Details	<p>Columns in this section display general information relating to the test run.</p> <p>For a list of the available fields under this section see Customize Table Columns above.</p>
Performance Overview	<p>Columns in this section contain information relating to the overall performance of your application.</p> <p>The purpose of this section is to provide you with basic overview trending information without having to open a trend view. The basic trend information is shown by upward or downward arrows that indicate performance improvements or regressions with regards the baseline only. For more information on comparison methods, see "Trend Reports Overview" on page 305.</p> <p>For a list of the available fields under this section see Customize Table Columns above.</p>







UI Elements	Description
Run Information pane	<p>Displays details for the selected test run. The following information is displayed:</p> <ul style="list-style-type: none"> • Performance Test Set. The test set from which the test was run. • Test. The name of the test. • Comments. Comments about the test run. • Run Date. The date of the test run. • State. The publish state of the run. Either Trended or Not Trended. If Not Trended, then the reason for this error appears in this field. A link appears to republish the run after you have fixed the error.
Workload Characteristics	<p>Columns in this section are intended to display enough information in order for you to identify whether the test runs are similar enough in terms of workload, and therefore suitable for trending.</p> <p>The values displayed in this section are relevant only for the selected time range. Changing the selected time range will likely lead to different results. For more information on the Define Time Range filter, see "Select Test Runs to Trend Report Dialog Box" on page 327.</p> <p>For a list of the available fields under this section see Customize Table Columns above.</p>

Trend View Tabs

A report tab can contain any number of trend views. The tabs are defined by the template on which the report is based, and which sets the name of the tab and automatically includes trend views that are related to its name.

To access	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Runs & Analysis > Trending. 2. On the Performance Trending page, in the Trend Reports grid, click the name of the report to open. The report opens as an additional tab on the My Performance Center Dashboard. The trend view tabs are displayed by default.
Important information	The trend view tabs which appear by default depend on which template the report is based on.
See also	"<Report Name> Trend Report " on page 314

User interface elements are described below (unlabeled elements are shown in angle brackets):

UI Elements	Description
<tab management menu>	<p>Select a trend view tab and click the  down arrow to open the tab management menu, which contains the following options (not available on the Trend Overview tab):</p> <ul style="list-style-type: none"> •  Add View to Tab. Opens the Add Trend Views to Tab dialog box. For user interface details, see "Add Trend Views to Tab Dialog Box" on page 332. •  Edit Tab Title. Enables you to change the name of the tab. •  Move Tab Left. Moves the tab left in the tab order. •  Move Tab Right. Moves the tab right in the tab order. •  Delete This Tab. Deletes the tab and all of the trend views contained in it, from the report.
<Trend view>	A display item that presents trending information. For more information, see "Trend Views" below .

Trend Views

A trend view is a display item that presents trending information for a particular performance metric, for example, transaction response time.

To access	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Runs & Analysis > Trending. 2. On the Performance Trending page, in the Trend Reports grid, click the name of the report to open. The report opens as an additional tab on the My Performance Center Dashboard. The trend view tabs are displayed by default. <p>Trend Views are contained within the trend view tabs. The trend view tabs are displayed by default.</p>
See also	"<Report Name> Trend Report " on page 314

Edit Trend View Menu

This menu contains options that enable you to edit the trend view's display and comparison settings.

To access	<p>On the trend view, click the Open edit menu button  (Not available in the Trend Overview tab).</p>
------------------	--


User interface elements are described below:

UI Elements	Description
3D Mode (stacked bar chart view only)	Enables you to view the chart in 3D.
Color Trends (table view only)	Activates the trend report's threshold settings. For more information about thresholds, see "Trend Reports Overview" on page 305 .
Compare to baseline/previous (table view only)	Enables you to change the comparison method displayed in the trend view. For more information on comparison methods, see "Trend Reports Overview" on page 305 .
Delete this Trend View	Deletes the trend view.
Do not show difference (table view only)	Enables you to hide value differentials between test runs. It is recommended to use this setting when exporting the report to a CSV format.
Edit Display Setting	<p>Enables you to change the appearance of the trend view. The available settings are:</p> <ul style="list-style-type: none"> • Table view. This view is best suited for displaying comparisons between measurements. You can view threshold settings in this view only. For more information, see "Display Setting: Table" on the next page. • Line graph view. This view is best suited for displaying trending information graphically over a timeline. For more information, see "Display Setting: Line Graph" on the next page. • Stacked bar chart view. This view displays trending information graphically over a timeline. It is best suited for trending a small number of multiple measurements. For more information, see "Display Setting: Stacked" on page 322.
Edit Trend View Title	Enables you to edit the trend view title.
Export to CSV (table view only)	Enables you to export the report to a CSV format.
Select Measurements	Opens the Measurements Configuration dialog box, which enables you to add measurements to the trend view. For user interface details, see "Measurements Configuration Dialog Box" on page 333 .

UI Elements	Description
Show difference as value/percentage (table view only)	Enables you to define how to display value differentials between test runs in the trend view - as values or as percentages.
Show Values (stacked bar chart view only)	Enables you to view the measurement values on the actual bar columns.

Display Setting: Table

This section explains the Table trend view display setting.


To access	<ol style="list-style-type: none">1. On the trend view, click the Open edit menu button  (Not available in the Trend Overview tab).2. Select Edit Display Setting.3. In the Edit Display Setting dialog box, select Table.
Important information	You can view threshold settings in table view only.

User interface elements are described below (unlabeled elements are shown in angle brackets):

UI Elements	Description
<Measurement value name>	The name of the measurement value being trended, for example, minimum, maximum, average, and so on.
<Measurement value>	The actual value of the measurement being trended, and its comparison value, displayed per test run. For more information about comparison methods, see "Trend Reports Overview" on page 305 .
Name	The name of the measurement being compared.
Type	The type of measurement being compared.

Display Setting: Line Graph

This section explains the Line Graph trend view display setting.

To access	<ol style="list-style-type: none"> 1. On the trend view, click the Open edit menu button  (Not available in the Trend Overview tab). 2. Select Edit Display Setting. 3. In the Edit Display Setting dialog box, select Line.
Important information	<ul style="list-style-type: none"> • When you hold the cursor over the line graph, a tooltip appears displaying the exact amount of units for that measurement, correct to the nearest test run on the timeline. In other words, if you hold the cursor near the left point of the line graph, you see the value of the first test run. • When you click a section in the line graph/measurement in the legend, it becomes highlighted, as does the corresponding section in the legend/line graph.


User interface elements are described below (unlabeled elements are shown in angle brackets):

UI Elements	Description
<graph slope>	The upward or downward slope of the line represents an upward or downward change in the measurement's unit. For example, a higher transaction response time (which is a performance regression), or a higher transactions per second value (which is a performance improvement).
<x-axis>	Lists the test runs according to their run date.
<y-axis>	<p>The relevant unit of measurement.</p> <p>Example: For the Transaction Response Time measurement, the y-axis values represent seconds, while for the transactions per second measurement, the values represent the number of transactions.</p>
B	Displays the measurement in bold.
C	Displays the color of the measurement as it appears in the graph. Click the colored square in the column to select a different color for the measurement.
Function	Displays the value of the measurement being trended.
Name	The name of the measurement.
Scale	<p>Indicates the scale of the measurement. When viewing information in the line graph view, you can adjust the scale of any measurement to make comparing measurements more meaningful.</p> <p>To change the scale of a measurement, click the value in the column and select the desired scale from the Set Scale box that opens. You can also apply the selected scale to all the measurements in the graph.</p>

UI Elements	Description
Type	Contains an acronym that identifies the measurement type. For a full list of available acronyms, see "Measurement Acronyms" on page 309 .
V	Determines whether the measurement is visible. All measurements are displayed by default. Clear the check box to hide a measurement.

Display Setting: Stacked

This section explains the Stacked Bar Chart trend view display setting.

To access	<ol style="list-style-type: none"> On the trend view, click the Open edit menu button  (Not available in the Trend Overview tab). Select Edit Display Setting. In the Edit Display Setting dialog box, select Stacked.
Important information	<ul style="list-style-type: none"> If different values are selected for the same measurement (for example, Maximum and Average transaction response times), then the measurements appear as stacked bars. That is, the values appear above each other for the bar that represents the transaction response time measurement for a specific test run. When you hold the cursor over a bar, a tooltip appears which displays the exact number of units for that measurement, correct for that test run. When you click a section in the bar chart/measurement in the legend, it becomes highlighted, as does the corresponding section in the legend/bar chart.

User interface elements are described below (unlabeled elements are shown in angle brackets):

UI Elements	Description
<bar height>	The height of the bar represents the change in the measurement's unit. For example, a higher transaction response time, which represents a performance regression, or a higher transactions per second value, which represents a performance improvement.
<x-axis>	Lists the test runs according to their run date.

UI Elements	Description
<y-axis>	The relevant unit of measurement. Example: For the Transaction Response Time measurement, the y-axis values represent seconds, while for the transactions per second measurement, the values represent the number of transactions.
C	Displays the color of the measurement as it appears in the graph. Click the colored square in the column to select a different color for the measurement.
Function	Displays the value of the measurement being trended.
Name	The name of the measurement.
Scale	Indicates the scale of the measurement. When viewing information in the line graph view, you can adjust the scale of any measurement to make comparing measurements more meaningful. To change the scale of a measurement, click the value in the column and select the desired scale from the Set Scale box that opens. You can also apply the selected scale to all the measurements in the graph.
Type	Contains an acronym that identifies the measurement type. For a full list of available acronyms, see "Measurement Acronyms" on page 309 .
V	Determines whether the measurement is visible. All measurements are displayed by default. Clear the check box to hide a measurement.

Export Trend Report Page

This page enables you to export the selected trend report to a .pdf file.

To access	<ol style="list-style-type: none"> On the My Performance Center navigation bar, select Runs & Analysis > Trending. On the Performance Trending page, in the Trend Reports grid, click the name of the report to open. The report opens as an additional tab on the My Performance Center Dashboard.
See also	"<Report Name> Trend Report " on page 314


User interface elements are described below:

UI Elements	Description
Details area	Enables you to define report details, such as report title, author, and summary.

UI Elements	Description
Logo area	Enables you to set the image that is placed on the cover page of the report and at the top of each page of the report. The HP logo is available by default.
content area	Enables you to specify data to include in your report, such as a title page, table of contents, and trend views.

Select Columns Dialog Box

This dialog box enables you to select columns to be displayed in the <report name> Trend Report's Trend Overview tab.

To access	On the <report name> Trend Report, select the Trend Overview tab, and click the Customize table columns button  .
Important information	Due to space limitations, the names of the columns in the Trend Overview tab may differ from how they appear in this dialog box. In these cases, column names as they appear in the Trend Overview tab appear in parentheses.
See also	"<Report Name> Trend Report " on page 314

Select Columns for 'General Details' Section

User interface elements are described below:

UI Elements (A-Z)	Description
Project Name (Project)	The name of the project in which the test was run.
Publish State (State)	Indicates whether the test run was successfully added to the report or not, either trended or not trended respectively. A test run that was not successfully added appears in red and a tooltip displays the reason. Note: Displayed by default.
Run By	The name of the user who ran the test. Note: Displayed by default.

UI Elements (A-Z)	Description
Run Date (Date)	The date of the load test run. Note: Displayed by default.
Run Duration (Duration)	The duration of the test run, in minutes. Note: Displayed by default.
Run ID	The run ID. Note: Displayed by default.
Test Name (Test)	The name of the test.
Test Version	The version of the test.
Total Vusers in Run (Total Vusers)	The number of Vusers in the test run, within the selected time range.
Trended Time Range (Trended Range)	The time range within the test run that is selected for trending.

Select Columns for 'Workload Characteristics' Section

User interface elements are described below:

UI Elements (A-Z)	Description
Hits per Second (HPS)	The average number of hits per second within the trended time range.
Passed Transactions per Minute (TPM)	The number of transactions that passed per minute of the test run within the selected time range. Note: Displayed by default.

UI Elements (A-Z)	Description
Passed Transactions per Second (TPS)	<p>The number of transactions that passed per second of the test run within the selected time range.</p> <p>Note: Displayed by default.</p>
Total Hits (Hits)	The total number of hits per second within the trended time range.
Total Number of Transactions (Transactions)	<p>The total number of transactions in the test run that passed, failed or stopped within the selected time range.</p> <p>Note: Displayed by default.</p>
Total Throughput (Throughput)	The total throughput within the trended time range.
Total Vusers in Trended Range (Trended Vusers)	<p>The maximum number of running Vusers within the trended time range.</p> <p>Note: Displayed by default.</p>
Throughput per Second (Throughput per Sec.)	The amount of throughput per second within the selected time range.

Select Columns for 'Performance Overview' Section


User interface elements are described below:

UI Elements (A-Z)	Description
Average Transaction Response Time (Response Time)	<p>The weighted average transaction response time for all the transactions within the selected time range.</p> <p>Note: Displayed by default.</p>
Errors per Second (EPS)	<p>The average amount of errors per second within the selected time range.</p> <p>Note: Displayed by default.</p>
Failed Transactions (Failed)	The actual amount of transactions that failed within the selected time range.

UI Elements (A-Z)	Description
Passed Transactions (Passed)	The actual amount of transactions that passed within the selected time range.
Total Errors (Errors)	The total number of errors within the selected time range.
Transaction Success Rate (Success)	The percentage of the total amount of transactions that passed within the selected time range. Note: Displayed by default.




Select Test Runs to Trend Report Dialog Box

This dialog box enables you to add performance test runs to the report.

To access	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Runs & Analysis > Trending. 2. On the Performance Trending page, in the Trend Reports grid, click the name of the report to open. The report opens as an additional tab on the My Performance Center Dashboard. 3. On the <report name> Trend Report, select the Trend Overview tab, and click the Add runs to trend report button .
Important information	<ul style="list-style-type: none"> • In order to add performance test runs to the trend report, there must be a data processor present in your project pool. • The process whereby ALM Performance Center extracts the performance test data from Analysis is very labor intensive on the data processor, and may take anywhere from several minutes to over an hour. It is recommended that you use a machine dedicated for this purpose. • ALM Performance Center extracts the performance test data from Analysis using a granularity of 16 seconds. This value might be different from the defined granularity in Analysis, and may lead to slight variations when comparing values between Analysis and ALM Performance Center.


User interface elements are described below:

UI Elements	Description
Project	A list of available projects from which to select test instances to trend.
Test Set	A list of available test sets from which to select test instances to trend.

UI Elements	Description
Test	The tests contained in the selected test set.
	Refresh. Enables you to refresh the dialog box information.
Load Data	Populates the test runs table with all analyzed instances of the selected test.
Run ID	The Run ID.
Run Name	The name of the test run.
Time Range	<p>The duration of the test run that is selected for trending.</p> <div> <p>Example: If a test run's overall duration is 30 minutes, and the time range is defined as 0-15min, then only the first 15 minutes of the test run will be considered for trending.</p> <p>Default: The whole test run is selected.</p> </div>
Exec Date	The date and time of the test run.
Duration	The duration (in minutes) of the test run.
Max Vusers	The maximum number of running Vusers during the test run.
Total Transactions Passed	The total number of passed transactions during the test run.
Total Errors	The total number of errors during the test run.
	<p>Time Range filter. Opens the Define Time Range dialog box, which enables you to change the defined time range within a test run for trending purposes.</p> <p>In the Define Time Range dialog box, select one of the following options:</p> <ul style="list-style-type: none"> • Trend Complete Run. Makes all data collected from the beginning to the end of the test run available for trending. • Trend Part of Run. Makes only part of the test run available for trending. Select the desired part of the run to trend by entering the start and end times in the Start Time and End Time boxes.
	Adds the selected test runs to the trend report.

Threshold Settings Dialog Box

This dialog box enables you to define which percentage differentials between measurement constitute significant improvements or regressions in performance.

To access	<div><div><div>1. On the My Performance Center navigation bar, select Runs & Analysis > Trending.</div><div>2. On the Performance Trending page, in the Trend Reports grid, click the name of the report to open. The report opens as an additional tab on the My Performance Center Dashboard.</div><div>3. On the <report name> Trend Report, click the Set Thresholds button</div></div><div></div></div>
Important information	<div>The threshold definition and color settings are applied on a global level and hold true across all trend views in the report.</div>

User interface elements are described below:




UI Elements	Description
Measurement Type	<p>Includes the following measurement types:</p> <ul style="list-style-type: none">• Transaction Response Time (TRT). Measures whether the average transaction response time of the transactions over a specified time interval exceeds the defined threshold.• Transactions per Second (TPS). Measures the number of times a transaction was executed in a second.• Transaction Summary Pass (TRS). Measures the actual amount of transactions that passed within the trended time range.• Transaction Summary Fail (TRS). Measures the actual amount of transactions that failed within the trended time range.• Total Errors (ERR). Measures the total number of errors within the trended time range.• Errors per Second (EPS). Measures the average amount of errors per second within the trended time range.• Hits (WEB). Measures the total number of transaction hits to the Web server within the trended time range.• Throughput (WEB). Measures the total throughput to the Web server within the trended time range.
Improvement	Enter the percentage differential between instances of the measurement that will be considered an improvement in performance.
Minor Regression	Enter the percentage differential between instances of the measurement that will be considered a minor regression in performance.
Major Regression	Enter the percentage differential between instances of the measurement that will be considered a major regression in performance.

Custom Measurement Mapping Dialog Box

This dialog box enables you to map measurements with different names to a new single measurement which you create.

To access	<ol style="list-style-type: none">1. On the My Performance Center navigation bar, select Runs & Analysis > Trending.2. On the Performance Trending page, in the Trend Reports grid, click the name of the report to open. The report opens as an additional tab on the My Performance Center Dashboard.3. On the <report name> Trend Report, click the Custom Measurement Mapping button .
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User interface elements are described below:

UI Elements	Description
 Create New Mapping	<p>Opens the Add New Mapping dialog box, enabling you to create a new mapped measurement.</p> <p>In the Add New Mapping dialog box, enter the following information:</p> <ul style="list-style-type: none">• Name. The name of the new mapped measurement.• Description. A description of the new mapped measurement.• Data Type. Select the measurement type: Transaction, Monitor, or Other.
 Duplicate Mapping	Creates a duplicate of the selected mapped measurement.
 Refresh	Refreshes the mapped measurements table.
Date Type	The mapped measurement's data type.
Description	A description of the mapped measurement.

UI Elements	Description
Details	<p>A table which lists all the test runs in the trend report. The runs appear in the same order as they appear in the Trend Overview tab.</p> <p>Click in the Type and Name fields to select which measurements to map to the mapped measurement.</p> <p>The following fields appear in the table:</p> <ul style="list-style-type: none"> • Run ID. The test run ID. • Type. The measurement type. • Name. The measurement name. <p>Note: When you use the Default option, all future instances of the measurement are automatically mapped to the current settings.</p>
ID	The mapped measurement's ID.
Name	The mapped measurement's name.

Add Trend Views to Tab Dialog Box

This dialog box enables you to add trend views to a trend report.

To access	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Runs & Analysis > Trending. 2. On the Performance Trending page, in the Trend Reports grid, click the name of the report to open. The report opens as an additional tab on the My Performance Center Dashboard. 3. Select the desired trend view tab. 4. Click the  down arrow next to the tab name to open the tab management menu and select + Add View to Tab.
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User interface elements are described below:

UI Elements	Description
Monitors Trend Views	Trend measurements related to monitors.

UI Elements	Description
Other Trend Views	Trend measurements other than transactions and monitor measurements (Web Resources and Error Statistics). Included in this section are three basic non-configured trend views, each one based on one of the trend view display options. You can select one of these trend views and customize it as desired.
Transactions Trend Views	Trend measurements related to transactions.

Measurements Configuration Dialog Box

Each trend view has a default set of measurements that it trends. This dialog box enables you to add additional measurements.

To access	<ol style="list-style-type: none">1. On the My Performance Center navigation bar, select Runs & Analysis > Trending.2. On the Performance Trending page, in the Trend Reports grid, click the name of the report to open. The report opens as an additional tab on the My Performance Center Dashboard. The trend view tabs are displayed by default. Trend Views are contained within the trend view tabs.3. On a trend view, click the Open edit menu button  (Not available in the Trend Overview tab), then select Select Measurements.
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Trend Data Types Pane


The Trend Data Types pane contains a list of the measurements that are available for trending. Only measurements that contain data appear.

User interface elements are described below:

UI Elements	Description
Monitors	All monitor related measurements that contain data.
Others	All non-transaction/monitor measurements.
Transactions	All transactions that contain data.
User-Defined	This node appears only if you have mapped any measurements. For more information on mapped measurements, see "Trend Reports Overview" on page 305 .

Measurement Selection Pane

User interface elements are described below:

UI Elements (A-Z)	Description
	Rule. This icon indicates that the measurement has already been selected using an automatic selection rule.
Define automatic selection rule	Opens the Automatic Selection Rule dialog box, which enables you use regular expressions to define a rule that automatically selects measurements to be included in the trend view. The automatic selection rule applies to measurements that are currently displayed in the trend report data, as well as any future measurements.
Name	The name of the available measurement.
Select values to trend	Displays the available values of the selected measurement which can be included in the trend view.

Chapter 21: Performance Application Lifecycle (PAL)

This chapter includes:

PAL Overview	337
How to Work with PAL	339
How to Create Data Sets from IIS, Google Analytics, or Webtrends	341
PAL User Interface	343

PAL Overview

Performance Application Lifecycle (PAL) is a process which enables better communication between the development and operation teams around the testing and monitoring of applications.

PAL enables you to use user traffic and system monitoring data in production to design a performance test that closely resembles production behavior. You can import production data from HP Business Service Management (BSM), Webtrends Analytics, Microsoft IIS W3C Extended Log Format, and Google Analytics.

Using the production system information, you can generate PAL reports to analyze and compare results between the production data and the performance test data. Based on the results of these comparisons, performance tests can be tuned to resemble production system activity.

PAL's importance stems from the basic need to correctly plan testing initiatives. Without a clear understanding of what users are doing in production, and how the production system behaves, it is very difficult to:

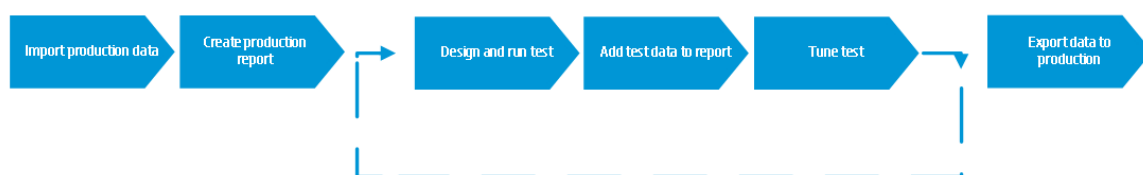
- focus testing on the most widely used business cases and scenarios
- test the system under appropriate loads
- define testing targets (for example, Service Level Agreements)

This section also includes:

- ["PAL Flow" below](#)
- ["Comparison Methods" on the next page](#)
- ["PAL Thresholds" on page 339](#)
- ["Tuning Performance Tests" on page 339](#)

PAL Flow

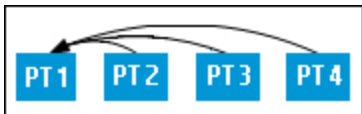
The PAL flow includes the following main steps:

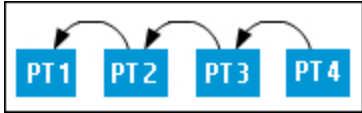


Step	Description
Import production data	Import data from the production systems. Performance Center supports data from HP Business Service Management (BSM), Webtrends Analytics, Microsoft IIS W3C Extended Log Format, and Google Analytics. Different production monitoring systems provide different data which may influence which information is available to the user.
Create production report	Create a report based on the production data. The report displays information on the different activities that were observed in production. For example, measurements related to transactions, such as hits and response time.
Design and run test	Use the production report to create a performance test. The first performance test design will probably exhibit very different behavior from production and is only a starting point for tuning. Execute the performance test to gather traffic data and other information.
Add test data to report	Add performance test data to the report and compare it to the production data. This comparison is the basis of the performance test tuning process.
Tune test	Update the performance test to try bring the behavior and patterns of usage to resemble production as closely as possible. This is an iterative process in which the performance test is updated, executed, and compared until it resembles the load in production.
Export data to production	Export various items that can help speed up the deployment of a new version to production. This information may include the scripts that can be used in Business Service Management (BSM) monitoring and the SiteScope templates that can be re-used in production. The information should be exported once the defined performance test has been run on the final version of the application and the application has been certified for release.

Comparison Methods

There are two methods of comparing measurements contained in a performance test run for the purposes of comparing testing environment data with real production environment data.

Comparison Method	Description
Compare to Baseline	<p>You select one performance test run in the PAL report and define it as the baseline. All measurements in the report are then compared to the measurements contained in the baseline.</p> 

Comparison Method	Description
Compare to Previous	<p>All measurements in a performance test are compared to the measurements in the performance test run that immediately precedes it in the report. Compare to previous depends on the order of the data sets in the report.</p> 

PAL Thresholds

To identify significant differences in performance, you can define unique thresholds to track differentials between measurements being compared. If a differential exceeds a defined threshold, that value appears in a predetermined color, identifying it as a minor difference, or major difference.

Tuning Performance Tests

The first time you run your performance test it will probably exhibit very different behavior than your production report. Remember that the output generated is only a starting point for tuning. Based on your PAL comparison reports, update the performance test, run it again, and compare the updated performance test to production. Continue this iterative process until the performance test closely resembles production.

You can tune the test during runtime or after the run ends. When tuning during runtime, the framework enables you to continuously adjust the data to view your changes almost immediately.

How to Work with PAL

This task describes how to work with PAL to create a testing environment similar to your real production environment.

This task includes the following steps:


1. Open PAL

On the My Performance Center navigation bar, select **Runs & Analysis > PAL**.

2. Define a PAL application


- a. In the upper-right corner of the window, click **Manage PAL Applications**. The Manage PAL Applications Dialog Box opens.
- b. Add an application. For user interface details, see ["Manage PAL Applications Dialog Box" on page 345](#).

3. Import production data


- a. In the **Data Set** tab, select a data set folder and click  **Import...**. The Upload Production Data Set Dialog Box opens. For user interface details, see ["Upload Production Data Set Dialog Box" on page 346](#).
- b. Upload the data set file. The data file is stored as a .zip file.

For information on how to create data sets using IIS W3C extended log format, Google Analytics, or Webtrends, see ["How to Create Data Sets from IIS, Google Analytics, or Webtrends" on the next page](#).

4. Create production report

- a. In the **Reports** tab, select a report folder and click  **New PAL Report**. The Create New Performance Application Lifecycle Report Dialog Box opens. For user interface details, see ["Create New Performance Application Lifecycle Report Dialog Box" on page 346](#).
- b. In the Create New Performance Application Lifecycle Report Dialog Box, click **Create**. The report opens as an additional tab on the My Performance Center Dashboard. The report contains sub-tabs. The Data Sources sub-tab is displayed by default. For user interface details, see ["<Report Name> PAL Report" on page 349](#).
- c. Define data sets and performance metrics to be used for the production report. For example, you can set threshold settings, custom measurement mappings, and scaling factors.

5. Design performance test based on production report


- a. On the My Performance Center navigation bar, select **Test Management > Test Plan**. In the test tree, click . The Create New Performance Test dialog box opens. For user interface details, see ["Create New Performance Test Dialog Box" on page 124](#).
- b. Define the performance test. For more details, see ["Performance Test Designer Window" on page 122](#).

6. Run performance test

In the Performance Test Set pane, select the performance test and click **RunTest**. The Run dialog box opens. For user interface details, see ["Run Test Dialog Box" on page 270](#).

7. Add performance test data to the report

- a. On the My Performance Center navigation bar, select **Runs & Analysis > PAL**. In the Reports tab, select a PAL report. The Data Sources tab is displayed by default.

- b. Add the performance test data to the report. For user interface details, see ["Data Sources Tab" on page 352](#).
 - c. Click the report sub-tabs to view and compare production and performance test behavior. For user interface details, see ["PAL Report View Tabs" on page 353](#).
 8. Tune the performance test
 - a. Based on the comparison report, edit the performance test and rerun the test. For user interface details, see ["Test Lab Module" on page 249](#).
 - b. View the updated report and compare the performance test and production data. For user interface details, see ["PAL Report View Tabs" on page 353](#).
 - c. Continue tuning until the performance test closely resembles production. You can tune the test during runtime or after the run ends.
 9. Export the test run details
 - a. Open the Test Run Pane. For user interface details, see ["Test Lab Module" on page 249](#).
 - b. View the result information for the selected test run.
 - c. To export test run data once the performance test has run on the final version of the application, click  **Export PAL Data**. For user interface details, see ["Export PAL Data Dialog Box" on page 348](#).

How to Create Data Sets from IIS, Google Analytics, or Webtrends

This task describes how to create a data sets from IIS W3C Extended Log File Format, Google Analytics, or Webtrends.

Note: This task is part of a higher-level task. For details, see ["How to Work with PAL" on page 339](#).

Creating Data Sets from IIS W3C Extended Log File Format

This task includes the following steps:

1. Create log files
 - a. Open the Internet Information Services (IIS) Manager window.

- b. Under **Connections**, select a Website (not a virtual directory).
 - c. In the right pane, select **Logging**.
 - d. In the Log File section, under **Format**, verify that **W3C** is selected.
 - e. Click the **Select Fields** button and select the following fields: **Date**, **Time**, **Client IP Address**, **Server Name**, **Server Port**, **Method**, **URI Stem**, **URI Query**, **Protocol Status**, **Time Taken**, **Host**, **User Agent**, **Cookie**, and **Referer**.
 - f. Under **Directory**, set the directory location for storing the logs.
2. Create the IIS data set file.
Open the PAL Data Set Creator wizard to create the IIS data set file. For user interface details, see ["PAL Data Set Creator Wizard" on page 369](#).

Creating Data Sets from Google Analytics

This task includes the following steps:

1. Create a new custom report.
 - a. From Google Analytics, click the **Customization** tab.
 - b. Click the **New Custom Report** button.
 - c. Add a title name.
 - d. In the **Type** section, select **Flat Table**.
 - e. In the **Metric Groups** section, add **Unique Visitors** and **Pageviews**.
 - f. In the **Dimensions** section, add **Page** and Hour of **Day**.
 - g. In the **Views** section, select Web sites.
 - h. Click **Save**.
2. Export the report.
Open the report, and select **Export > CSV**.
3. Create the Google Analytics data set file.
Open the PAL Data Set Creator wizard to create the Google Analytics data set file. For user interface details, see ["PAL Data Set Creator Wizard" on page 369](#).

Creating Webtrends Data Sets

Open the PAL Data Set Creator wizard to create the Webtrends data set file. For user interface details, see ["PAL Data Set Creator Wizard" on page 369](#).

PAL User Interface

This section includes:

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PAL Module






This pane enables you to import data from the production system.

To access	On the My Performance Center navigation bar, select Runs & Analysis > PAL .
Relevant tasks	"How to Work with PAL" on page 339
See also	"PAL Overview" on page 337

Reports Tab

This tab enables you to create PAL reports.




User interface elements are described below:



UI Elements	Description
 New PAL Report	The Create New Performance Application Lifecycle Report Dialog Box opens, enabling you to define a PAL report. For user interface details, see "Create New Performance Application Lifecycle Report Dialog Box" on page 346 .
	Enables you to define folder for storing PAL reports.
	Enables you to duplicate select PAL report.
	Enables you to rename selected item.
	Enables you to delete selected item.

Data Sets Tab

This tab enables you to import and manage data sets from the production system.

User interface elements are described below:

UI Elements	Description
 Import...	Opens the Upload Production Data Set. For more details, see "Upload Production Data Set Dialog Box" on page 346 .
	Enables you to add a data set folder.
	Enables you edit the data set folder details.





UI Elements	Description
	Saves the data set locally in ZIP format.
	Enables you to delete the data set folder.

Manage PAL Applications Dialog Box

This dialog box enables you to associate PAL entities, such as data sets with a specific AUT.


To access	<ol style="list-style-type: none"> On the My Performance Center navigation bar, select Runs & Analysis > PAL. In the upper-right corner of the window, click Manage PAL Applications.
Relevant tasks	"How to Work with PAL" on page 339
See also	"PAL Overview" on page 337

User interface elements are described below:

UI Elements	Description
 New Application	Defines a new application.
 Refresh	Refreshes the table.
 Edit	Edits a selected application.
 Delete	Deletes a selected application.
ID	The ID number of the application.
Name	The name of the application.
Description	A description of the application.

Upload Production Data Set Dialog Box

This dialog box enables you to upload production data set files.


To access	<ol style="list-style-type: none">1. On the My Performance Center navigation bar, select Runs & Analysis > PAL.2. In the Data Sets tab, click  Import...
Relevant tasks	"How to Work with PAL" on page 339
See also	"PAL Overview" on page 337

User interface elements are described below:

UI Elements	Description
Name	The name of the data set file.
Description	A description of the data set file.
Select production data set file	Click the Browse button to select the data set file.
Select Folder	Indicates the folder for storing the data set file.
Take application name from data set	Uses the application defined in the data set file.
Choose an Application	Indicates the application for use with the data set file.
Messages	Indicates the progress of the uploading process.
Upload	Uploads the data set file to the specified location.

Create New Performance Application Lifecycle Report Dialog Box

This dialog box enables you to create PAL reports.

To access	<ol style="list-style-type: none">1. On the My Performance Center navigation bar, select Runs & Analysis > PAL.2. In the Reports tab,  New PAL Report.
Relevant tasks	"How to Manage a Performance Test Run" on page 242

General Details Area

User interface elements are described below:

UI Elements	Description
Name	The name of the report.
Description	A description of the report.
Location	The location of the report.

Application Area

User interface elements are described below:

UI Elements	Description
Select an application to base the report upon	List the available applications.

Template Area


User interface elements are described below:

UI Elements	Description
Based on HP BSM Production Info	<p>A report based on HP Business Service Management (BSM). This template displays the following preconfigured PAL report views:</p> <ul style="list-style-type: none">• Workload Data• Performance Data• Distribution Data• Monitors Data

UI Elements	Description
Based on HP BSM Production Info - Advanced	<p>A report based on HP Business Service Management (BSM). This template displays the following preconfigured PAL report views:</p> <ul style="list-style-type: none"> • Workload Data • Performance Data • Distribution Data • Monitors Data • Top 10 Hits, Top 10 Users and Workload Data • Top 10 Response Time and Performance Data • Top 10 Hits Percentage and Distribution Data
Based on non-BSM info (e.g., WebTrends)	<p>A report based on on WebTrends and other non-HP data sources. This template displays the following preconfigured PAL report views:</p> <ul style="list-style-type: none"> • Workload Data • Performance Data • Distribution Data
Empty	Provides only the basic layout for the report without the preconfigured PAL report views.
Description	A description of the selected template.

Export PAL Data Dialog Box

This dialog box enables you to export test run data once the load test has run on the final version of the application.

To access	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Runs & Analysis > PAL. 2. Click .
Relevant tasks	"How to Work with PAL" on page 339
See also	"PAL Overview" on page 337

User interface elements are described below:

UI Elements	Description
Description	The description of the exported test run data.
Run Info	The list of exported information.
Application	Indicates the associated application.
Export	Saves the data set locally in ZIP format.










<Report Name> PAL Report

This tab enables you to view and manage the PAL report. The PAL reports includes multiple tabs that allow you manage the data that is included in the report, as well as to manage the views which display the PAL information.

The screenshot shows the PAL Report interface. At the top, there's a navigation bar with 'Home' and 'PAL Report(3001...' tabs. Below this is a toolbar with various icons for exporting, thresholds, mapping, scaling, filtering, and layout. The main area has a tabbed interface with 'Data Sources', 'Configuration', 'Workload', 'Performance', 'Distribution', 'Monitoring', and 'Over Time'. The 'Data Sources' tab is active, showing a table with columns: Type, ID, Package/Run Name, Test Name, Start Time, Duration, and Scaling Factor. The table contains one row: Production (Prod), 1001 (base), ALM1, N/A, 3/28/2012 1:00:00 PM, 01:00:00, and 1. Below the table, there's a 'Report Item Information' section with details about the data set and its state. At the bottom, there's a 'PAL Report Completion' section with a progress bar at 25% and two cards: 'Add load test results' and 'Group similar transactions'.

To access	<ol style="list-style-type: none"> On the My Performance Center navigation bar, select Runs & Analysis > PAL. In the Reports tab, click a report.
Important information	The PAL sub-tabs which appear by default depend on which template the report is based on. The Data Sources tab is common to all PAL reports irrespective of which template is selected.
Relevant tasks	"How to Work with PAL" on page 339
See also	"PAL Overview" on page 337


User interface elements are described below (unlabeled elements are shown in angle brackets>):

UI Elements	Description
 Export to PDF	Opens the Export Report to PDF dialog box, which enables you to export the selected report to a .pdf file. For user interface details, see "Export Report to PDF Dialog Box" on the next page .
 Thresholds	Opens the Threshold Settings dialog box, which enables you to define the thresholds to be used for identifying major and minor differences between production and testing data. For user interface details, see "Threshold Settings Dialog Box" on page 362 .
 Transactions Mapping & Grouping	Opens the Transactions Mapping and Grouping Dialog Box, which enables you to map and group similar transactions in your production data or in your load test results. For user interface details, see "Transactions Mapping and Grouping Dialog Box" on page 365 .
 Monitors Mapping	Opens the Monitors Mapping dialog box which enables you to map production and testing monitored hosts to monitor measurements, such as CPU, memory, and virtual memory used. For user interface details, see "Monitors Mapping Dialog Box" on page 363 .
 Scaling Factor	Opens the Set Scaling Factors dialog box, which enables you to define the scaling factor. For user interface details, see "Set Scaling Factors Dialog Box" on page 367 .
 Global Filter	Opens the Global Filter dialog box, which enables you to filter the transactions displayed in the PAL report views. For user interface details, see "Set Global Transactions Filter Dialog Box" on page 368 .
 Edit Layout ▼	Enables you to arrange views within a PAL view tab.
 Active tabs	Enables you to view tabs that are not currently displayed.
 Refresh	Refreshes the information contained in the report.
Data Sources Tab	The Data Sources tab is used for managing the information contained in the PAL report. For more details, see "Data Sources Tab" on page 352 .

UI Elements	Description
<PAL report view tabs>	The PAL report view tabs contain the PAL report views and are defined by the template on which the report is based. For more details, see "PAL Report View Tabs" on page 353 .
<PAL report views>	PAL report views are display items that present PAL information, and are contained within the PAL report view tabs. For more information, see "PAL Report Views" on page 354 .
+	Add a New Tab. Adds a new tab to the report.

Export Report to PDF Dialog Box

This page enables you to export the selected PAL report to a .pdf file.

To access	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Runs & Analysis > PAL. 2. In the Reports tab, click a report. 3. Click  Export to PDF.
See also	"<Report Name> PAL Report" on page 349

User interface elements are described below:






UI Elements	Description
Details area	Enables you to define report details, such as report title, author, and summary.
Logo area	Enables you to set the image that is placed on the cover page of the report and at the top of each page of the report. The HP logo is available by default.
content area	Enables you to specify data to include in your report, such as a title page, table of contents, and report views.



Data Sources Tab

The Data Sources tab is used for managing the information contained in the PAL report.

To access	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Runs & Analysis > PAL. 2. In the Reports tab, click a report. The Data Sources tab is displayed by default.
Important information	The Data Sources tab is common to all PAL reports, irrespective of which template is selected.
See also	"<Report Name> PAL Report" on page 349

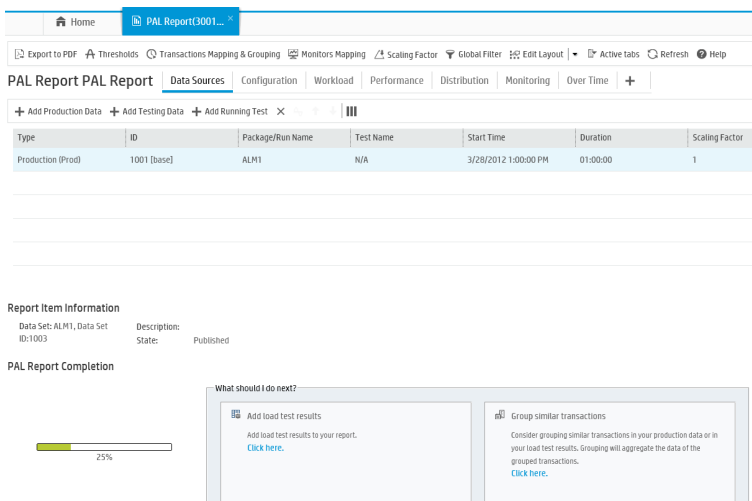
User interface elements are described below:

UI Elements	Description
 Add Production Data	Opens the Add Data dialog box and displays the Production tab. Select the production data to be used for comparison. For user interface details, see "Add Data Dialog Box" on page 359 .
 Add Testing Data	Opens the Add Data dialog box and displays the Test Run Results tab. Select the testing data to be used for comparison. For user interface details, see "Add Data Dialog Box" on page 359 .
 Add Running Test	<p>Opens the Select Run Test dialog box and displays all the tests that are currently running. To tune a test during runtime, select a running test, select the refresh frequency rate from the Refresh Time Intervals drop-down list. Click OK. The test is added to the Data Sources tab.</p> <div> <p>Note: A test added during runtime is displayed in blue in the Data Sources grid. After the test run ends, you can publish it by clicking Add Testing Data. The test will now be displayed in black.</p> </div>
	Remove item from report. Removes production data sets or test runs from the PAL report.
	<p>Set run as baseline. Sets the selected item (production data set or test run) as the baseline run for the comparison.</p> <div> <p>Note: The first item which is added to the report is automatically defined as the baseline.</p> </div>

UI Elements	Description
	Move Up/Down. Moves the selected item up or down in the order. Changing the position of the report item may have an effect on the comparison value when the Compare to previous method is selected. For more information on comparison methods, see "PAL Overview" on page 337 .
	Customize Table Columns. Customizes which columns appear in the PAL Runs table. For user interface details, see "Select Columns Dialog Box" on page 361 .
<Data Sources grid>	Displays information for all the items in the report. For a list of the available fields, see Customize Table Columns above.
Report Item Information	Includes a description and current state of the selected report item.
PAL Report Completion	Indicates the flow for completing the report.

PAL Report View Tabs







A report tab can contain any number of views. The tabs are defined by the template on which the report is based. The tabs and views can be customized.



- | | |
|------------------|---|
| To access | <ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Runs & Analysis > PAL. 2. In the Reports tab, click a report. The report opens as an additional tab on the My Performance Center Dashboard. The PAL report view tabs are displayed. |
|------------------|---|

Important information	<ul style="list-style-type: none"> The view tabs which appear by default depend on which template the report is based on. For user interface details on the Data Sources tab, see "Data Sources Tab" on page 352.
Relevant tasks	"How to Work with PAL" on page 339
See also	"PAL Overview" on page 337

User interface elements are described below (unlabeled elements are shown in angle brackets>):

UI Elements	Description
	<p>Click the down arrow next to the tab name to open the tab management menu, which contains the following options:</p> <ul style="list-style-type: none">  Add View to Tab. Opens the Add Views to Tab dialog box. For user interface details, see "Add Views To Tab Dialog Box" on page 356.  Edit Tab Title. Enables you to change the name of the tab.  Move Tab Left. Moves the tab left in the tab order.  Move Tab Right. Moves the tab right in the tab order.  Delete This Tab. Deletes the tab and all of the trend views contained in it, from the report. <p>Note: This option is not available for all views.</p>
<PAL report view>	A display item that presents PAL information within a PAL report view tab. For more information, see "PAL Report Views" below .




PAL Report Views

A PAL report view is a display item that presents PAL information for a particular performance metric.

To access	<ol style="list-style-type: none"> On the My Performance Center navigation bar, select Runs & Analysis > PAL. In the Reports tab, click a report. The report opens as an additional tab on the My Performance Center Dashboard. The PAL report view tabs are displayed. The PAL report views are contained within the tabs.
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Relevant tasks	"How to Work with PAL" on page 339
See also	"PAL Report View Tabs" on page 353

User interface elements are described below:

UI Elements	Description
	Edit PAL report view. Contains options that enable you to edit the PAL report view's display and comparison settings.
	Show in Maximized/Normal view. Maximizes or returns to the normal PAL report view.
	Minimizes/Maximizes data. Minimizes or maximizes the displayed data.

PAL Report View Menu

Important	Some options are not available in all views.
------------------	--

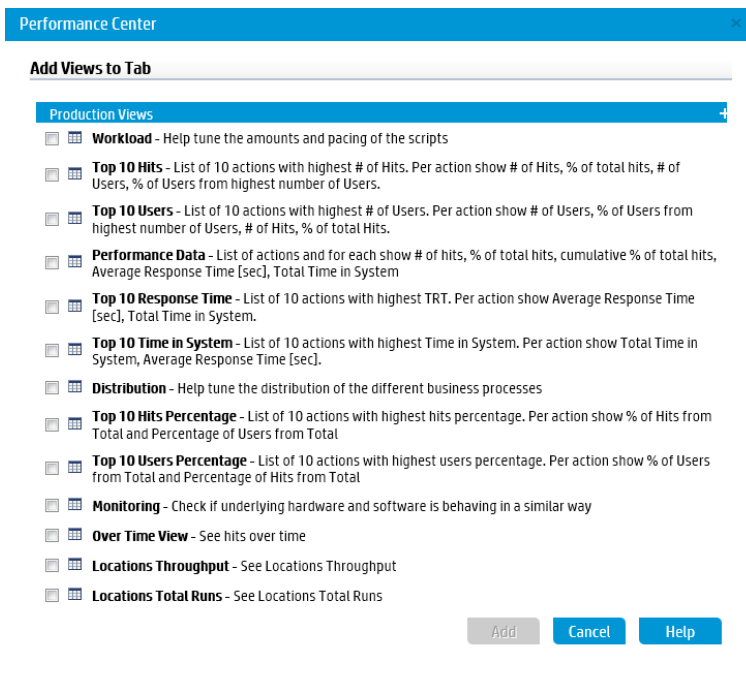
User interface elements are described below:



UI Elements	Description
Select Measurements	Opens the Measurements Configuration dialog box, which enables you to add measurements to the view. For user interface details, see "Select Measurements Dialog Box" on page 358 .
Edit Display Setting	Enables you to change the appearance of the view. The available settings are table view, line graph view, and stacked bar chart view.
Edit View Title	Enables you to edit the view title.
Compare to baseline/previous	Enables you to change the comparison method displayed in the view. For more information on comparison methods, see "Comparison Methods" on page 338 .
Show difference as value/percentage	Enables you to define how to display value differences between items or data sets in the view - as values or as percentages.
Do not show difference	Enables you to hide value differences between items or data sets. It is recommended to use this setting when exporting the view to a CSV format.
Color View	Activates the PAL report's threshold settings.

UI Elements	Description
Export to CSV	Enables you to export the view to a CSV format.
Delete this View	Deletes the view.


Add Views To Tab Dialog Box

This dialog box enables you to add views to a PAL report view tab.



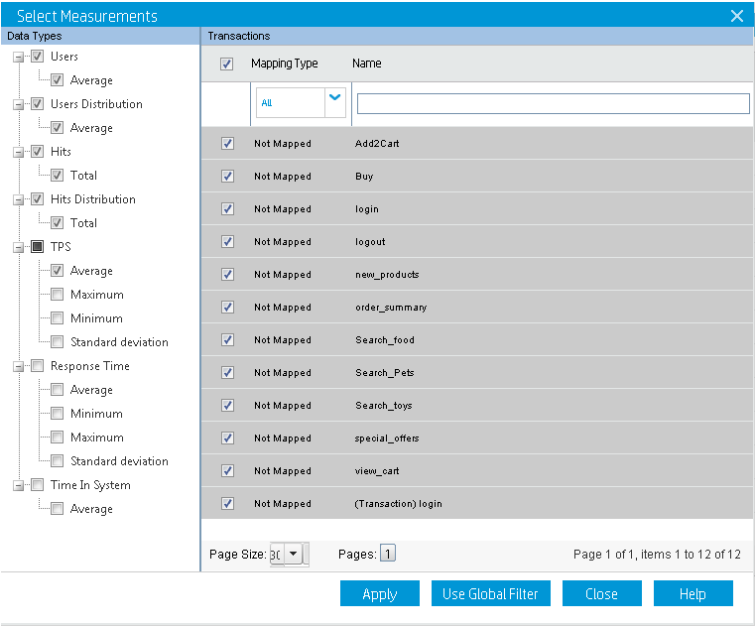
To access	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Runs & Analysis > PAL. 2. In the PAL Reports tab, click a report. The report opens as an additional tab on the My Performance Center Dashboard. The PAL report view tabs are displayed. 3. Click the  down arrow next to the tab name to open the tab management menu and select  Add View to Tab.
Important Information	Some views are not relevant for all report types.
See also	"PAL Report View Tabs" on page 353


User interface elements are described below:

UI Elements	Description
Workload	Displays data that will help you tune the amounts and pacing of the scripts.
Top 10 Hits	Lists the top ten actions with the highest number of hits.
Top 10 Users	Lists the top ten actions with the highest number of users.
Performance Data	Shows the number of hits for each action, as well as response time, and total time in system.
Top 10 Response Time	Lists the top ten actions with the highest total response time in seconds.
Top 10 Time in System	Lists the top ten actions with the highest time in the system in seconds.
Distribution	Displays distributions of different business processes.
Top 10 Hits Percentage	Lists the top ten actions with highest number of hits by percentage.
Top 10 Users Percentage	List the top ten actions with highest number of users by percentage.
Monitoring	Displays monitoring data that helps compare the behavior of the underlying hardware and software in the production and testing systems.
Over Time View	Displays hits over time in the production system.
Locations Throughput	Displays location throughput.
Locations Total Runs	Displays total runs per location.
 Add	Adds select views to a PAL report view tab.

Select Measurements Dialog Box



Each PAL view has a default set of measurements that it uses. This dialog box enables you to customize the measurements displayed in a selected report view.



To access	<ol style="list-style-type: none">1. On the My Performance Center navigation bar, select Runs & Analysis > PAL.2. In the Reports tab, click a report. The report opens as an additional tab on the My Performance Center Dashboard. The PAL report view tabs are displayed.3. On a PAL report view, select the menu button , then select Select Measurements.
Important Information	The term transaction applies to any activity measured by testing and production systems. This includes VuGen script transactions, HP RUM transactions and actions, and URLs measured by other production systems.

User interface elements are described below:

UI Elements	Description
Data Types pane	Displays transactions with data. The transactions are enabled based on existing data.


UI Elements	Description
Transactions Pane	<p>This pane displays the following:</p> <ul style="list-style-type: none"> • <Top check box>. Selects/clears all transactions in the grid. To select/clear a specific transaction, select/clear the check box to the left of the transaction name. • Mapping Type. Indicates the mapping type: All, Mapped, Not Mapped. • Name. Enables you to locate a specific transaction. Type the name and press Enter. • Page Size. Sets the number of transactions displayed per page.
	Applies the changes.
	Includes the transactions from the Set Global Transactions Filter dialog box. For more details, see "Set Global Transactions Filter Dialog Box" on page 368 .

Add Data Dialog Box

This dialog box enables you to add production data sets and performance test runs to the report. The added data is used for comparison and it is the basis for the load test tuning process.


To access	<ol style="list-style-type: none"> 1. On the My Performance Center navigation bar, select Runs & Analysis > PAL. 2. In the Reports tab, click a report. The report opens as an additional tab on the My Performance Center Dashboard. The PAL report view tabs are displayed. 3. In the Data Sources tab, click Add Production Data or Add Testing Data
------------------	--

User interface elements are described below:

UI Elements	Description
Production Tab	Enables you to select a production data set for the PAL report.
Test Run Results Tab	Enables you to select a test run for the PAL report.
	Adds the selected production data set and test run results to the PAL report.


Production Tab


User interface elements are described below:

UI Elements	Description
	<p>Enables you to filter the data sets displayed in the production grid.</p> <p>Select one of the following options:</p> <ul style="list-style-type: none"> • Only data sets linked to the report application. Displays data sets associated with PAL application defined in the selected report. • All. Displays all data sets regardless of a selected PAL application.
Name	The name of the data set.
ID	The data set ID.
Type	The data set type.
Date Uploaded	The date the data set was uploaded.
Description	The description of the data set.
Application	The application associated with the data set.

Test Run Results Tab


User interface elements are described below :

UI Elements	Description
	<p>Enables you to filter the results displayed in the run results grid. Includes the following options: Project, Test Set, and Test.</p>
ID	The Run ID.
Run Name	The name of the test run.
Time Range	<p>The duration of the test run that is selected.</p> <p>Example: If a test run's overall duration is 30 minutes, and the time range is defined as 0-15 min, then only the first 15 minutes of the test run will be considered for trending.</p> <p>Default: The whole test run is selected.</p>

UI Elements	Description
	<p>Time Range filter. Opens the Define Time Range dialog box, which enables you to change the defined time range within a test run for reporting purposes.</p> <p>Select one of the following options:</p> <ul style="list-style-type: none"> • Publish Complete Run. Makes all data collected from the beginning to the end of the test run available for the report. • Publish Part of Run. Makes only part of the test run available for the report. Select the desired part of the run by entering the start and end times in the Start Time and End Time boxes.
Exec Date	The date and time of the test run.
Duration	The duration (in minutes) of the test run.
Max Vusers	The maximum number of running Vusers during the test run.
Total Transactions Passed	The total number of passed transactions during the test run.
Total Errors	The total number of errors during the test run.

Select Columns Dialog Box

This dialog box enables you to select columns to be displayed in the <report name> PAL Report's Data Sources tab.

To access	On the <report name> PAL Report, select the Data Sources tab, and click the Customize table columns button  .
See also	"<Report Name> PAL Report" on page 349


User interface elements are described below:

UI Elements	Description
Duration	The duration of the test run, in minutes.
Global Filter	The applied global filter.
ID	The run ID.

UI Elements	Description
Name	The package or run name.
Publish Progress	Indicates whether the report item was successfully added to the report.
Test Name	The test name.
Scaling	Indicated the scaling factor. For more details on setting the scaling factor, see "Set Scaling Factors Dialog Box" on page 367 .
Start Time	The date and time of the report item.
Type	Indicates the type of report item.

Threshold Settings Dialog Box

This dialog box enables you to define threshold values for the PAL measurement types.

To access	On the <report name> PAL Report, click  Thresholds .
Important information	<ul style="list-style-type: none"> The term transaction applies to any activity measured by testing and production systems. This includes VuGen script transactions, HP RUM transactions and actions, and URLs measured by other production systems. The threshold definition and color settings are applied on a global level and hold true across all views in the report.


User interface elements are described below (unlabeled elements are shown in angle brackets):

UI Elements	Description
Measurement Type	The type of measurement.
Minor Difference	Enter a threshold value for indicating a minor difference between the production and test data.
Major Difference	Enter a threshold value for indicating a major difference between the production and test data.
<color settings>	Enables you to select in which color the measurement appears in the report. Click the colored square in the column to select a different color for the measurement.
Response Time	Measures the average response time transactions take to complete (in seconds).

UI Elements	Description
Hits	Measures the total number of transaction hits over the entire test run.
Hits Distribution	The percentage of transaction hits occurrence from the total amount of all transaction hits.
Users	Counts the number of users that performed a specific transaction.
Users Distribution	The percentage of transaction users from the total amount of users in all transactions.
Time In System (Hits X Response time)	Total time a specific transaction was running in the system. Calculated by multiplying the average transaction response time by the number of hits.
Transactions per Second (TPS)	The number of times a transaction was executed in a second. Calculated by dividing the number of hits by the duration of the data set.
HP SiteScope Monitors (SiS)	The metrics monitored by HP SiteScope.

Monitors Mapping Dialog Box



This dialog box enables you to map monitored hosts and monitors.



To access	On the <report name> PAL Report, click  Monitors Mapping .
Relevant tasks	"How to Work with PAL" on page 339
See also	"<Report Name> PAL Report" on page 349 "PAL Overview" on page 337

Monitored Hosts Tab

Enables you to create mapping for the monitored hosts.

User interface elements are described below (unlabeled elements are shown in angle brackets>):




UI Elements	Description
 Create New Mapping	Adds a new mapping.
 Duplicate Mapping	Creates a duplicate of the selected mapping.


UI Elements	Description
 Delete Mapping	Deletes a selected mapping.
 Refresh	Refreshes the list of mappings.
<top grid>	Includes the following columns: ID. The mapping ID. Name. The mapping name. Description. A description of the mapping.
Mapping Information: Name	The mapping name.
Mapping Information: Description	A description of the mapping.
Mapping Information: Details	Lists details of a selected measurement. The following fields are displayed in the table: <ul style="list-style-type: none"> • Data Set ID. The data set ID. • Data Set Type. The measurement type. • Name. The monitored host name.
Messages	Indicates the status of the mapping.

Monitors Tab

Enables you to create mapping for monitor measurements.


User interface elements are described below (unlabeled elements are shown in angle brackets):

UI Elements	Description
 Create New Mapping	Adds a new mapping.
 Duplicate Mapping	Creates a duplicate of the selected mapping.
 Delete Mapping	Deletes a selected mapping.

UI Elements	Description
 Refresh	Refreshes the list of mappings.
<top grid>	Includes the following columns: ID. The mapping ID. Name. The mapping name. Description. A description of the mapping.
Mapping Information: Name	The mapping name.
Mapping Information: Description	A description of the mapping.
Mapping Information: Monitored Hosts Mapping	The host whose measurements are being monitored. Click in the field to select which monitored host to map to the mapped measurement.
Mapping Information: Details	Lists details of a selected measurement. The following fields are displayed in the table: <ul style="list-style-type: none"> • Data Set ID. The data set ID. • Data Set Type. The measurement type. • Name. The monitor measurement name.
Messages	Indicates the status of the mapping.

Transactions Mapping and Grouping Dialog Box

This dialog box enables you to map and group similar transactions in your production data or in your load test results. Grouping and mapping aggregates the data of the grouped transactions.




To access	On the <report name> PAL Report, click  Transactions Mapping & Grouping .
Important Information	The term transaction applies to any activity measured by testing and production systems. This includes VuGen script transactions, HP RUM transactions and actions, and URLs measured by other production systems.
Relevant tasks	"How to Work with PAL" on page 339
See also	"<Report Name> PAL Report" on page 349 "PAL Overview" on page 337

Mapping Production to Testing > Transactions Section

The pane enables you to map between production and load test transactions in order to have comparable data in your report. This is relevant in cases where transactions that measure the same business process have different names.

For example the transaction for measuring the search page is called Search in the VuGen script whereas the production system calls it Find. Mapping between the transactions makes them comparable.


User interface elements are described below:





UI Elements	Description
 Import >	Enables you to import mappings from other reports.
 Delete	Enables you to delete a selected mapping.
Production	Lists the available production transactions.
Performance Test	Lists the available testing transactions or groups and enables you to map a testing transaction or a group to a production transaction.
Mapping Name	The mapping name of a production transaction. This is the transaction name that will be used in the reports.
Status	Indicates whether the production transaction is mapped or not.
	Applies the mapping changes.

Internal Transactions Grouping > Load Test or Production Transactions Section

This pane enables you to group similar transactions in your production data or in your load test results. This is important when similar transactions are given different names. For example the Login transaction has a suffix added to denote the script it's in, so that several Login transactions are measured (for example. **login_1**, **login_2**, **login_3**, etc.) although they all measure the same business process. Grouping will aggregate the data of the grouped transactions.

User interface elements are described below:

UI Elements	Description
 New	Clears details in the Group Details pane.

UI Elements	Description
 Delete	Deletes a selected group name from the Grouping Name pane.
Grouping Name	Lists the available groups.  This icon indicates that the group is created using regular expressions. The group contains measurements that are currently displayed under Available Measurements , as well as any future measurements.
Group's Name & Selected Measurements	Enter a group name. Use the arrows to move measurements between Selected Measurements and Available Measurements . To save the group, click the Group button.
Available Measurements	Lists the available transaction measurements. <ul style="list-style-type: none"> Use the arrows to move measurements between Available Measurements and Selected Measurements.  Filter . Enables you to locate a specific measurement, type the measurement name and click this button. The results are displayed below. Create group using this regular expression. Enables you use regular expressions to define a rule that automatically selects measurements to be included in a group. The automatic selection rule applies to measurements that are currently displayed under Available Measurements, as well as any future measurements. To define a rule, type the regular expression and select the Create group using this regular expression check box. The applicable measurements are added under Selected Measurements.
	Enables you to group the selected transaction measurements. The group name is added to the Grouping Name pane.

Set Scaling Factors Dialog Box

This dialog box enables you to readjust data set durations and differences, to enable you to compensate for the dissimilarity between the data sets due to different durations or difference in system configuration (for example, number and power of servers). It also enables you to plan for larger loads.

To access	On the <report name> PAL Report, click  Scaling Factor .
------------------	--

Duration Adjustments Pane

Affects the following measurement types: Hits and Time in System.

User interface elements are described below:

UI Elements	Description
Adjust data set duration	Adjusts duration differences of data sets to match the data set duration used for the baseline.

Scaling Factors Pane

Affects the following measurement types: Hits, Users, Time in System, and transaction per second (TPS).

User interface elements are described below:


UI Elements	Description
Data Set ID	The data set ID.
Data Set Type	The data set type (Production or Testing).
Data Set Duration	The duration of the data set.
Scaling Factor	Indicates the scale of the measurement. To change the scale of a measurement, click the upward/downward arrow to adjust to the desired scale.

Scaling Factors Preview Pane

The pane previews the scaling factor changes set to the affected measurements. For example, x2 indicates the measurement is being multiplied by 2.

Set Global Transactions Filter Dialog Box

This dialog box enables you to filter transactions from the PAL report views.

To access	On the <report name> PAL Report, click  Global Filter .
Important Information	This filter does not affect mapped transactions.
Relevant tasks	"How to Work with PAL" on page 339

Percentage Filter Tab

This tab enables you to set the filter percentage.

User interface elements are described below:

UI Elements	Description
Data Set ID	The data set ID.
Data Set Type	The data set type (Production or Testing).
Global Filter	Indicates the filter percentage. To change the percentage of a filter, click the upward/downward arrow to adjust to the desired value.

Transaction Selection Tab


This tab enables you to select the transactions to be displayed in the report views.

User interface elements are described below:

UI Elements	Description
<Top check box>	Selects/clears all transactions in the grid. To select/clear a specific transaction, select/clear the check box to the left of the transaction name.
Mapping Type	Indicates the mapping type: All , Mapped , Not Mapped .
Name	Enables you to locate a specific transaction. Type the name and press Enter .
Page Size	Sets the number of transactions displayed per page.

PAL Data Set Creator Wizard

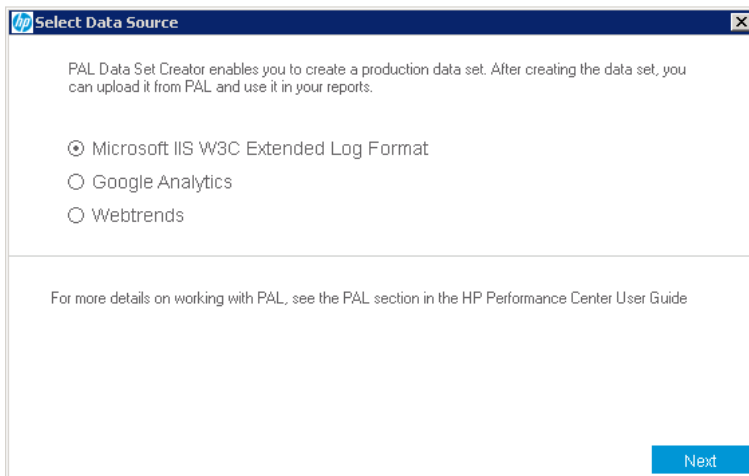
This wizard enables you to create production data sets using IIS W3C Extended Log File Format, Google Analytics, or Webtrends. After creating the data sets, you can upload them from PAL and use them in your reports.

To access	In the upper-right corner of the My Performance Center window, click  . Click PAL Data Set Creator .
Relevant tasks	<ul style="list-style-type: none"> • "How to Create Data Sets from IIS, Google Analytics, or Webtrends" on page 341 • "How to Work with PAL" on page 339

Wizard map	This wizard contains: "Select Data Source Page" below > "Select Log to Import Page" on the next page > "Webtrends Credentials Page" on page 372 > "Webtrends Data Extractor Page" on page 373
See also	<ul style="list-style-type: none"> • "PAL Overview" on page 337 • "Upload Production Data Set Dialog Box" on page 346

Select Data Source Page

This wizard page enables you to select a data source type.



Important information	General information about this wizard is available here: "PAL Data Set Creator Wizard" on the previous page .
Wizard map	The "PAL Data Set Creator Wizard" on the previous page contains: "Select Data Source Page" above > "Select Log to Import Page" on the next page > "Webtrends Credentials Page" on page 372 > "Webtrends Data Extractor Page" on page 373
See also	<ul style="list-style-type: none"> • "PAL Overview" on page 337 • "Upload Production Data Set Dialog Box" on page 346

User interface elements are described below:

UI Element	Description
Microsoft IIS W3C Extended Log Format	Creates a production data set file using IIS W3C Extended Log File Format.

UI Element	Description
Google Analytics	Creates a production data set file using Google Analytics.
Webtrends	Creates a production data set file using Webtrends.

Select Log to Import Page

This wizard page enables you to select Google Analytics and IIS W3c logs.

Important information	<ul style="list-style-type: none"> General information about this wizard is available here: "PAL Data Set Creator Wizard" on page 369. Available only if you selected Microsoft IIS W3C Extended Log Format or Google Analytics in the "Select Data Source Page" on the previous page.
Wizard map	<p>The "PAL Data Set Creator Wizard" on page 369 contains:</p> <p>"Select Data Source Page" on the previous page > "Select Log to Import Page" above > "Webtrends Credentials Page" on the next page > "Webtrends Data Extractor Page" on page 373</p>
See also	<ul style="list-style-type: none"> "PAL Overview" on page 337 "Upload Production Data Set Dialog Box" on page 346

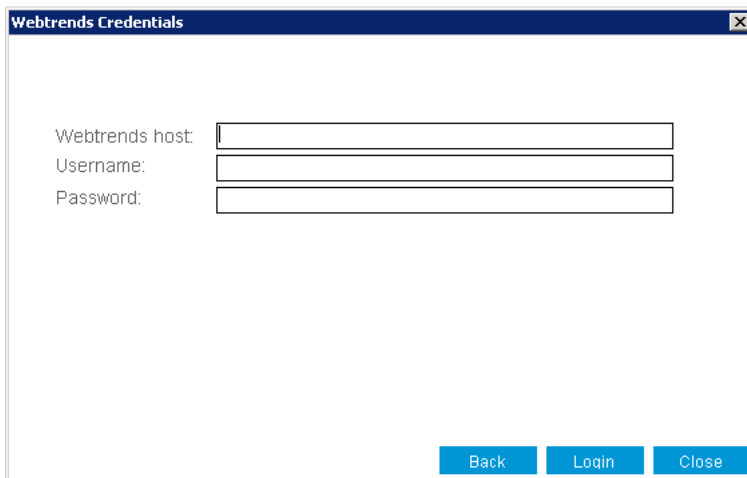
User interface elements are described below:

UI Element	Description
Application Name	The PAL application name.
Log Location	Enables you to browse for, and select, a log.

UI Element	Description
Date	The date of the log file.
Hour	Defines the time range for sampling the log.
Session Name	Defines the session name. Available for: IIS W3C Extended Log File Format
Create	Creates the data set file.

Webtrends Credentials Page

This wizard page enables you to connect to a Webtrends host.



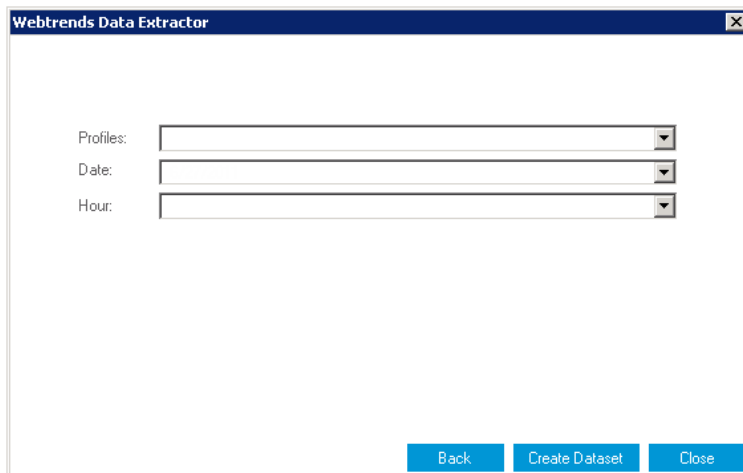
Important information	<ul style="list-style-type: none"> General information about this wizard is available here: "PAL Data Set Creator Wizard" on page 369. Available only if you selected Webtrends in the "Select Data Source Page" on page 370.
Wizard map	<p>The "PAL Data Set Creator Wizard" on page 369 contains:</p> <p>"Select Data Source Page" on page 370 > "Select Log to Import Page" on the previous page > "Webtrends Credentials Page" above > "Webtrends Data Extractor Page" on the next page</p>
See also	<ul style="list-style-type: none"> "PAL Overview" on page 337 "Upload Production Data Set Dialog Box" on page 346

User interface elements are described below:

UI Element	Description
Webtrends host	Indicates the Webtrends host name.
Username	Indicates the user name. Note: You must have permissions to access the Data Extraction API.
Password	Indicates the password.

Webtrends Data Extractor Page

This wizard page enables you to create a Webtrends dataset.



Important information	<ul style="list-style-type: none"> General information about this wizard is available here: "PAL Data Set Creator Wizard" on page 369. Available only if you selected Webtrends in the "Select Data Source Page" on page 370.
Wizard map	<p>The "PAL Data Set Creator Wizard" on page 369 contains:</p> <p>"Select Data Source Page" on page 370 > "Select Log to Import Page" on page 371 > "Webtrends Credentials Page" on the previous page > "Webtrends Data Extractor Page" above</p>
See also	<ul style="list-style-type: none"> "PAL Overview" on page 337 "Upload Production Data Set Dialog Box" on page 346

User interface elements are described below:

UI Element	Description
Profiles	Indicates the Webtrends profile.
Date	Defines the date for sampling the Webtrends data.
Hour	Defines the time range for sampling the Webtrends data.
Create Dataset	Creates a Webtrends dataset.

Part 6: Online Monitoring

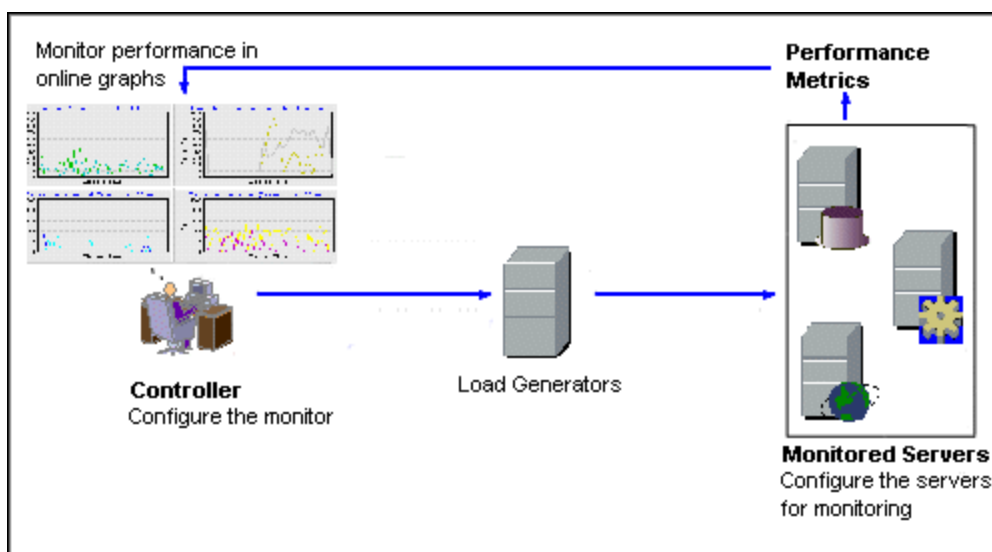
Chapter 22: Working with ALM Performance Center Online Monitors

This chapter includes:

Monitoring Process Overview	379
How to Set Up the Monitoring Environment – Workflow	379
Monitor Types	380

Monitoring Process Overview

Before monitoring a performance test, you need to set up and configure the ALM Performance Center monitoring components. Each monitor has different configuration requirements that are explained in the specific monitoring chapters. The following diagram illustrates the ALM Performance Center 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.

For details, see ["How to Set Up the Monitoring Environment – Workflow" below](#).

How to Set Up the Monitoring Environment – Workflow

This task describes how to set up the ALM Performance Center online monitoring environment. You specify the machines and measurements that the Controller will monitor during performance test execution in the ALM Test Resources module. During performance test execution, the collected measurement data appears in the online graphs.

1. Configure the monitoring environment on the server machine

To use the following monitors, you must first install or configure monitoring components on the server machine. For details about configuring the monitoring components, see the specific

monitoring sections.

- ["How to Set up the Citrix Monitoring Environment" on page 445](#)
- ["How to Set Up the IBM WebSphere MQ Monitor" on page 453](#)
- ["How to Enable and Configure J2EE/.NET Diagnostics" on page 205](#)
- ["How to Set Up the Network Monitoring Environment" on page 408](#)
- ["How to Set Up the Oracle Monitoring Environment" on page 421](#)
- ["How to Set up the UNIX Monitoring Environment" on page 400](#)

2. Configure the 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.

- For information about selecting the servers to monitor and selecting the measurements to monitor, see ["How to Create and Configure Monitor Profiles" on page 65](#).
- For details about each monitor's default measurements, refer to the relevant reference section for the monitor.

Monitor Types

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

The online monitors are divided into the following categories:

Monitor Type	Description
Run-Time Monitors	Display 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 "Run-Time and Transaction Monitoring" on page 384 .
Transaction Monitors	Display the transaction rate and response times. For more information, see "Run-Time and Transaction Monitoring" on page 384 .
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 performance test run. For more information, see "Web Resource Monitors" on page 390 .

Monitor Type	Description
System Resource Monitors	Measure the Windows, Linux, Server, and SNMP resources used during a performance test run. For more information, see "System Resource Monitoring" on page 398 .
Network Monitors	Displays information about the network delays on your system. For more information, see "Network Delay Monitoring" on page 406 .
Firewall Monitor	Measures statistics related to the firewall servers during the scenario run.
Web Server Resource Monitors	Measure statistics related to the Microsoft IIS and Apache Web servers during the performance test run. For more information, see "Web Server Resource Monitoring" on page 414 .
Web Application Server Resource Monitors	Measure statistics related to the Microsoft ASP application servers during the performance test run. For more information, see "Web Application Server Resource Monitoring" on page 418 .
Database Server Resource Monitors	Measure statistics related to the SQL server, and Oracle databases during the performance test run. For more information, see "Database Resource Monitoring" on page 420 .
Network Virtualization Monitors	Measure statistics related to network virtualization, such as Packet Loss and Latency. For information, see "Network Virtualization Graphs" on page 295 .
Service Virtualization Monitors	Measure statistics related to HP Service Virtualization, per operation and service. For information, see "Service Virtualization Monitoring" on page 151 .
SiteScope Monitor	Use the SiteScope monitor and its counters to measure resources. For information, see the documentation provided with SiteScope.
Flex Monitors	Measure statistics related to Flex RTMP connections and throughput, as well as buffering time. For details, see "Flex Monitoring" on page 428 .
Streaming Media Monitors	Measure statistics related to the RealPlayer Client and Media Player Client servers during the scenario run. For more information, see "Streaming Media Monitoring" on page 432 .
ERP/CRM Server Resource Monitors	Measure statistics related to Siebel Server Manager during the performance test run. For more information, see "ERP/CRM Server Resource Monitoring" on page 436 .

Monitor Type	Description
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 <i>HP Diagnostics User Guide</i> .
Application Deployment Solutions Monitors	Measures statistics related to the Citrix MetaFrame XP server during a performance run. For more information, see " Application Deployment Solution Monitoring " on page 444.
Middleware Performance Monitors	Measure statistics related to the IBM WebSphere MQ servers during a scenario run. For more information, see " Middleware Performance Monitoring " on page 452.
Infrastructure Resources Monitor	Displays information about network client data points during a scenario run using the Network Client graph. For more information, see " Infrastructure Resources Monitoring " on page 462.

Chapter 23: Run-Time and Transaction Monitoring

This chapter includes:

Run-Time Graph Overview	385
Transaction Monitor Graphs Overview	387

Run-Time Graph Overview

The **Run-Time** monitor provides information about the status of the Vusers participating in the performance test, as well as 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 Run-Time monitor is enabled by default—it automatically begins monitoring Vusers at the start of a performance test.

You can view the following Run-Time monitor graphs during a test run:

Running Vusers Graph

The monitor's **Running Vusers** graph provides information about the status of the Vusers running in the current performance test 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.

The Name 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.

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.

By default, ALM Performance Center 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.

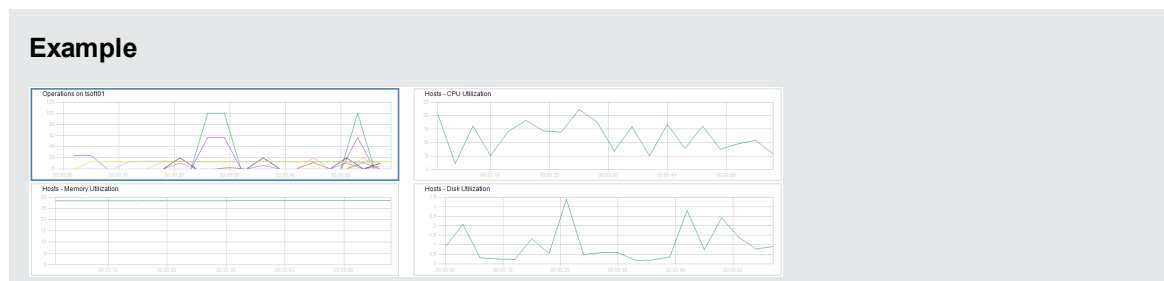
You can also view data points offline, after the completion of the performance test. For more information, see the *HP LoadRunner Analysis User Guide*.

Error Statistics Graph

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

Operations Graph

The Operations graph shows virtual service operations performance counters on all the SV servers that are used in the scenario. It only shows services that are used in the scenario.



The **Operations on <server>** graph shows the measurement (y-axis) as a function of the elapsed time in the performance test (x-axis).

Measurement	Description
Average Response Time	Average response time of virtual service in milliseconds.
Hit Rate	The number of requests per second of the virtual service operation.
Throughput	Data sent and received by virtual service operation measured in megabytes.

Services Graph

The Services monitor displays information about the virtual services used during a test run.

The **Services on <server>** graph shows the measurement (y-axis) as a function of the elapsed time in the performance test (x-axis).



Measurement	Description
Average Response Time	Average Response Time on virtual service in milliseconds.
Data Simulation Accuracy	Accuracy of Data Model emulation on virtual service displayed as a percentage. Accuracy is compared to the recorded behavior on the corresponding actual service, if available.
Hit Rate	The number of requests per second of the virtual service.
Performance Simulation Accuracy	Accuracy of performance model emulation on virtual service displayed as a percentage. Accuracy is compared to the recorded behavior on the corresponding actual service, if available.
Throughput	Data sent and received on virtual service measured in megabytes per second.

Vusers with Errors Graph

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

Transaction Monitor Graphs Overview

The Transaction monitor displays the transaction rate and response time during a test run. The Transaction monitor is enabled by default—it automatically begins monitoring Vuser transactions at the start of a test run. To conserve resources, you can disable the Transaction monitor from the Controller.

You can view the following Transaction monitor graphs during a test run:

- 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 performance test (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 performance test (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 performance test (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 performance test (x-axis).

Note:

- If there are no transactions defined in your Vuser script or if no transactions are being executed, no data will be displayed in the online monitor graphs.
- To generate Web Page diagnostics for each transaction, configure the Diagnostics options from the Controller.

Chapter 24: Web Resource Monitors

This chapter includes:

- Web Resource Monitoring Overview391
- WebSocket Statistics Monitor394
- HTTP Status Codes395

Web Resource Monitoring Overview

The Web Resource monitor enables you to analyze the following resources on the Web server during a performance test run: throughput, HTTP requests, downloaded pages, server retries, TCP/IP connections, and SSL connections.

You can view the following resource monitor graphs during a test run:

Hits per Second Graph

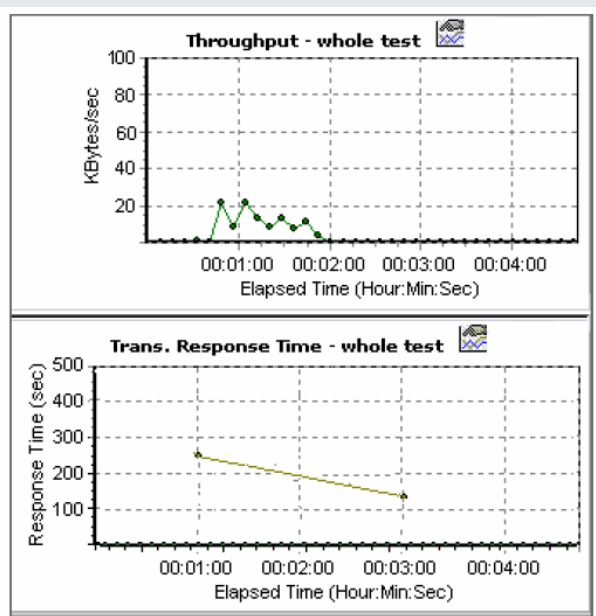
The **Hits Per Second** graph shows the number of hits (HTTP requests) to the Web server (y-axis) as a function of the elapsed time in the performance test (x-axis). This graph can display the whole step, or the last 60, 180, 600, or 3600 seconds. You can compare this graph to the Transaction Response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

Throughput Graph

The **Throughput** graph shows the amount of throughput (y-axis) on the Web server during each second of the test 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 performance test run (x-axis).

The HTTP responses are grouped by status code. You can also group the results shown in this graph by script (using the "Group By" function) to locate scripts which generated error codes.

For a list of status codes and their explanations, see ["HTTP Status Codes" on page 395](#).

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 test run (x-axis). This graph helps you evaluate the amount of load Vusers generate, in terms of the number of pages downloaded.

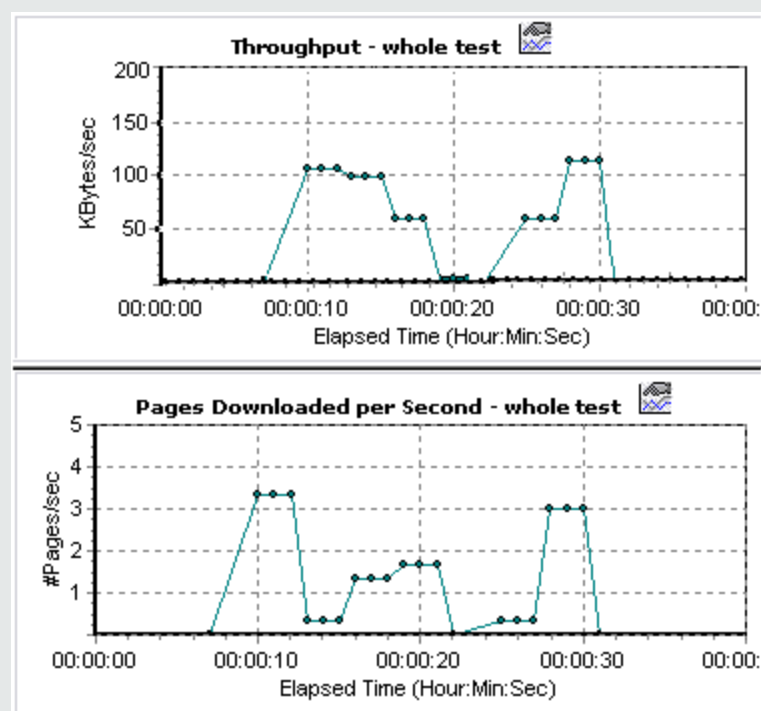
Note: To view the Pages Downloaded per Second graph, you must select **Pages per second (HTML Mode only)** from the script's Run-time settings Preferences tab before running your performance test.

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 performance test, 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 performance test (x-axis).

A server connection is retried when:

- The initial connection was unauthorized
- Proxy authentication is required
- The initial connection was closed by the server

- The initial connection to the server could not be made
- 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 performance test (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 performance test (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 performance test (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 have 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 (using the run-time settings **Browser Emulation** node), 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.

WebSocket Statistics Monitor

This **Web Resource** graph shows WebSocket statistics during the run.

Purpose	Provides you with statistics for WebSocket connections, byte rate, and failed connections.
----------------	--

X-axis	Elapsed time since the start of the run.
Y-axis	WebSocket per second throughout the whole scenario.
Note	You cannot change the granularity of the x-axis to a value that is less than the Web granularity you defined in the General tab of the Options dialog box.

HTTP Status Codes

The following table displays a list of HTTP status codes. These codes appear in the ["Web Resource Monitoring Overview" on page 391](#).

Code	Description	Code	Description
200	OK	405	Method Not Allowed
201	Created	406	Not Acceptable
202	Accepted	407	Proxy Authentication Required
203	Non-Authoritative Information	408	Request Timeout
204	No content	409	Conflict
205	Reset content	410	Gone
206	Partial content	411	Length Required
300	Multiple Choices	412	Precondition Failed
301	Moved Permanently	413	Request Entity Too Large
302	Found	414	Request - URI Too Large
303	See Other	415	Unsupported Media Type
304	Not Modified	416	Requested range not satisfiable
305	Use Proxy	417	Expectation Failed
307	Temporary Redirect	500	Internal Server Error
400	Bad Request	501	Not Implemented
401	Unauthorized	502	Bad Gateway
402	Payment Required	503	Service Unavailable
403	Forbidden	504	Gateway Timeout
404	Not Found	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>.

Chapter 25: System Resource Monitoring

This chapter includes:

System Resource Monitors Overview	399
Windows Resource Monitoring	399
UNIX Resource Monitoring	399
SNMP Resource Monitoring	399
SiteScope Resource Monitoring	400
How to Set up the UNIX Monitoring Environment	400
UNIX Resources Performance Counters	401
Windows Resource Performance Counters	403

System Resource Monitors Overview

You use ALM Performance Center's System Resource monitors to monitor a machine's system resource usage during a performance test run and isolate server performance bottlenecks.

A primary factor in a transaction's response time is its system resource usage. Using the ALM Performance Center resource monitors, you can monitor the Windows, UNIX, SiteScope, and SNMP server on a machine during a test run, and determine why a bottleneck occurred on a particular machine.

The resource monitors are automatically enabled when you execute a test run. 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 test run.

Windows Resource Monitoring

The Windows Resources monitor shows the Windows resources measured during the test run. Windows measurements correspond to the built-in counters available from the Windows Performance Monitor.

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.

UNIX Resource Monitoring

The UNIX Resources monitor shows the UNIX resources measured during the test run. 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. For a description of the measurements, see ["UNIX Resources Performance Counters" on page 401](#).

Note: You must configure an **rstatd** daemon on all UNIX machines being monitored. For information see ["How to Set up the UNIX Monitoring Environment" on the next page](#).

SNMP Resource Monitoring

The SNMP Resource monitor shows statistics for a Windows or UNIX machine 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).

SiteScope Resource Monitoring

The SiteScope Resources monitor graph shows the SiteScope resources measured during the test run. 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.

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.

How to Set up the UNIX Monitoring Environment

This task describes how to configure the UNIX environment before setting up the UNIX monitor.

This task includes the following steps:

- ["Verify whether the rstatd daemon is already configured" below](#)
- ["Configure the rstatd daemon" below](#)
- ["Configure the monitor for a UNIX machine over a firewall \(optional\)" on the next page](#)
- ["Configure the monitor measurements on the Controller" on the next page](#)

1. Verify whether the rstatd daemon is already configured

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

- The **rup** command reports various machine statistics, including rstatd configuration. Run the following command on the UNIX machine 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.

2. Configure the rstatd daemon

If the rstatd daemon is not yet configured, follow these steps to configure it:

- a. On the UNIX machine, run the command: **su root**
- b. 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.
- c. 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.

- d. Run **rup** again.

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

3. Configure the monitor for a UNIX machine over a firewall (optional)

To monitor a UNIX machine over a firewall, you must run a UNIX utility called `rpcinfo` and identify the rstatd's port number.

Run **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.

4. Configure the monitor measurements on the Controller

For task details, see ["How to Create and Configure Monitor Profiles" on page 65](#).

For a description of the available UNIX monitor measurements, see ["UNIX Resources Performance Counters" below](#).

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.

Measurement	Description
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 in.
Swap-out rate	Number of processes being swapped out.
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.

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%.
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.

Object	Measurement	Description
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.
Physical Disk	% 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.
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.
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.

Chapter 26: Network Delay Monitoring

This chapter includes:

- Network Monitoring Overview407
- How to Set Up the Network Monitoring Environment408
- How to Configure the Linux Source Machine for Network Monitoring409
- Network Delay Monitoring User Interface411
- Troubleshooting and Limitations412

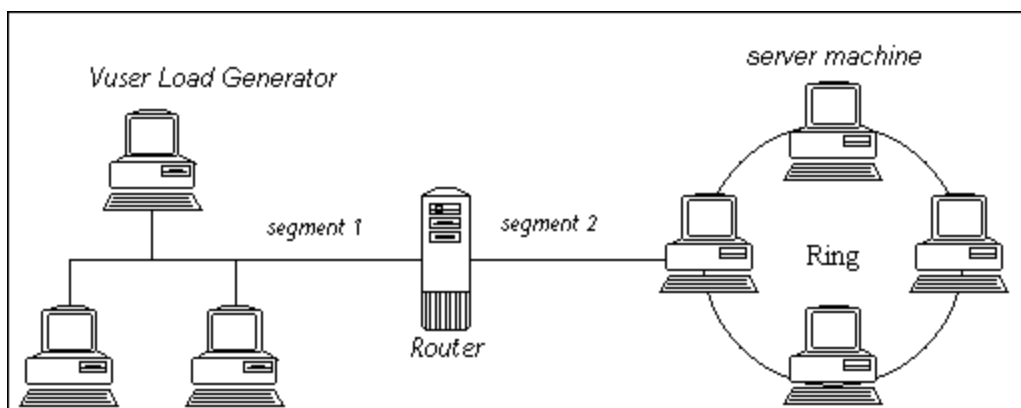
Network Monitoring Overview

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

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

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 Vuser machine, data must travel over several segments.



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 performance test time. Each defined path is represented by a separate line with a different color in the graph.

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.

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.

- For information about how to set up the network monitoring environment, see ["How to Set Up the Network Monitoring Environment" on the next page.](#)
- For information about how to configure the Linux source machine for network monitoring, see ["How to Configure the Linux Source Machine for Network Monitoring" on page 409.](#)

How to Set Up the Network Monitoring Environment

This task describes how to prepare your environment for network monitoring.

To learn more about network monitoring, see ["Network Monitoring Overview" on the previous page](#).

This task includes the following steps:

- ["Prerequisites" below](#)
- ["Configure the Linux source machine - optional" below](#)
- ["Configure the firewall between the source and destination machines - Optional " below](#)
- ["Configure the Network monitor on the Controller" on the next page](#)

1. Prerequisites

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

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

2. Configure the Linux source machine - optional

You can run the Network monitor on Linux source machines, using UDP or ICMP. Before running the Network monitor from a Linux source machine, configure the source machine. For task details, see ["How to Configure the Linux Source Machine for Network Monitoring" on the next page](#).

3. Configure the firewall between the source and destination machines - Optional

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 Performance Center agent, MI Listener, and Network Delay monitor for monitoring over a firewall.

4. Configure the Network monitor on the Controller

For task details, see ["How to Create and Configure Monitor Profiles" on page 65](#).

How to Configure the Linux Source Machine for Network Monitoring

This task describes how to configure a UNIX source machine before running the network monitor.

To learn more about network monitoring, see ["Network Monitoring Overview" on page 407](#).

This task includes the following steps:

- ["Assign permissions where Performance Center is installed locally" below](#)
- ["Assign permissions where Performance Center is installed on the network" on the next page](#)
- ["Connect to the Linux Source Machine Through RSH " on the next page](#)
- ["Connect to the Linux Source Machine Through the Agent" on page 411](#)

1. Assign permissions where Performance Center is installed locally

Follow these steps to assign root permissions to the **merc_webtrace** process:

- a. Log in to the source machine as root.
- b. Type: **cd <performance center_installation>/bin** to change to the **bin** directory.
- c. Type: **chown root merc_webtrace** to make the root user the owner of the **merc_webtrace** file.
- d. Type: **chmod +s merc_webtrace** to add the s-bit to the file permissions.
- e. To verify, type **ls -l merc_webtrace**. The permissions should look like this: **-rwsrwsr-x**.

2. Assign permissions where Performance Center is installed on the network

In a Performance Center 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**:

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

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/<performance center>**), since all of them use the same **mdrv.dat**.

- b. Add the following line to the **<performance center_installation>/dat/mdrv.dat** file, in the **[monitors_server]** section:

```
ExtCmdLine=-merc_webtrace_path /local/xxx
```

- c. Log in to the source machine as root.
- d. Type: `cd performance center_installation/bin` to change to the **bin** directory.
- e. Type: `chown root merc_webtrace` to make the root user the owner of the **merc_webtrace** file.
- f. Type: `chmod +s merc_webtrace` to add the s-bit to the file permissions.
- g. To verify, type `ls -l merc_webtrace`. The permissions should look like:
`-rwsrwsr-x`.

3. Connect to the Linux Source Machine Through RSH

Follow these instructions if the Controller is connected to the source machine through RSH (default connection mode). In this case 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.

- a. On the Performance Center host machine, type `cd <Performance Center installation>/bin` to change the bin directory.
- b. Run **CryptonApp.exe**.
- c. In the **Password** box, type your RSH user name and password, separated by a vertical bar symbol. For example, `myname|mypw`.

- d. Click **Generate**. An encoded string is displayed in the Encoded string field.
- e. Click **Copy** to copy the encoded string to the clipboard.
- f. Add the following line to the **<performance center_installation>/dat/monitors/ndm.cfg** file, in the [hosts] section:

`Host = <encrypted string copied from clipboard>`
- g. Close and open the current performance test. ALM Performance Center will read the updated configuration file and recognize the source machine for monitoring.

4. Connect to the Linux Source Machine Through the Agent

Follow these instructions for activating agent daemon on the source machine if the Controller is not connected to the source machine through RSH.

- a. Type `m_daemon_setup -install` from the **<performance center_installation>/bin** directory.
- b. Make sure that the agent daemon is running whenever you activate the Network monitor.
- c. To stop the Network Delay Monitor agent daemon, type `m_daemon_setup -remove`.

Network Delay Monitoring User Interface

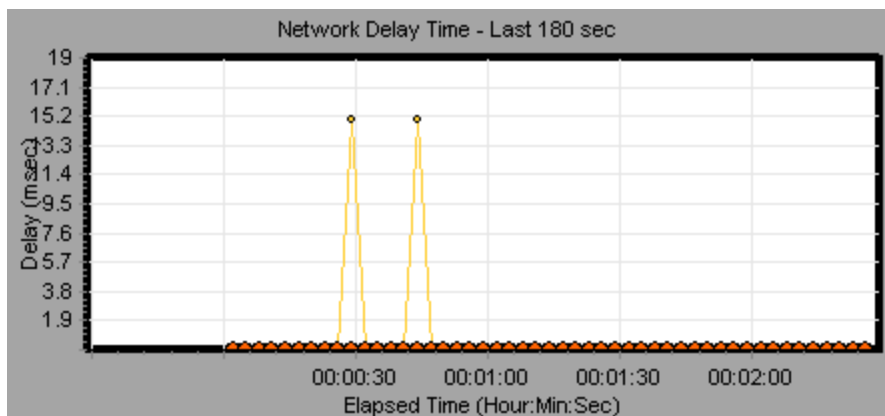
This section includes:

- ["Network Delay Time Graph" below](#)

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 performance test 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.



Troubleshooting and Limitations

This section describes troubleshooting for the Network Delay monitor.

If monitoring is unsuccessful and ALM Performance Center 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 **<performance center 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.
 - 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 **<performance center root folder>\dat\mdrv.dat** file, and rerunning the Network

monitor:

```
ExtCmdLine=-traceroute_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.

Chapter 27: Web Server Resource Monitoring

This chapter includes:

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Web Server Resource Monitoring Overview

Web Server Resource monitors provide you with information about the resource usage of the Microsoft IIS and Apache Web servers during performance test 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 test.

For information about how to configure the monitors on the Controller, see ["How to Set Up the Monitoring Environment – Workflow" on page 379](#).

How to Change the Apache Default Server Properties

This task describes how to modify the Apache default server properties that are defined in the monitor configuration file.

1. Open the **apache.cfg** file in the **<performance center server root folder>\dat\monitors** directory.
2. Edit the following parameters after the **Delimiter=:** statement:

InfoURL. Server statistics information URL

ServerPort. Server port number

SamplingRate. Rate (milliseconds) at which the monitor will poll the server for the statistics information. If this value is greater than 1000, ALM Performance Center will use it as its sampling rate. Otherwise, it will use the sampling rate defined in the Monitors tab of the Options dialog box.

3. Save and close the file.

Apache Performance Counters

The following table describes the measurements and server properties that can be monitored on the Apache Web server during the test run:

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.

Microsoft IIS Performance Counters

The following table describes the measurements and server properties that can be monitored on the Microsoft IIS Web server during the test run:

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.

Chapter 28: Web Application Server Resource Monitoring

This chapter includes:

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MS Active Server Pages Performance Counters	419

Web Application Server Resource Monitoring Overview

You use ALM Performance Center's Web Application Server Resource monitors to monitor Microsoft Active Server Pages servers during a test run and isolate application server performance bottlenecks.

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

MS Active Server Pages Performance Counters

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

Measurement	Description
Errors per Second	The number of errors per second.
Requests Wait Time	The number of milliseconds the most recent request was waiting in the queue.
Requests Executing	The number of requests currently executing.
Requests Queued	The number of requests waiting in the queue for service.
Requests Rejected	The total number of requests not executed because there were insufficient resources to process them.
Requests Not Found	The number of requests for files that were not found.
Requests/sec	The number of requests executed per second.
Memory Allocated	The total amount of memory, in bytes, currently allocated by Active Server Pages.
Errors During Script Run-Time	The number of failed requests due to run-time errors.
Sessions Current	The current number of sessions being serviced.
Transactions/sec	The number of transactions started per second.

Chapter 29: Database Resource Monitoring

This chapter includes:

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Database Resource Monitoring Overview

ALM Performance Center's Database Server Resource monitors measure database resource usage statistics for Oracle, or SQL Servers during a performance test run. You use these monitors to isolate database server performance bottlenecks.

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.

Before defining the monitoring measurements for the Oracle monitors in the Controller, you must set up the monitoring environment on the database server.

For details about the Oracle monitor configuration, see ["How to Set Up the Oracle Monitoring Environment" below](#).

How to Set Up the Oracle Monitoring Environment

This task describes how to set up the monitor environment before monitoring an Oracle database server.

Note: If a problem occurs in setting up the Oracle environment, check the Oracle server to view the error messages.

This task includes the following steps:

- ["Prerequisites" below](#)
- ["Configure the Oracle client/server connection" on the next page](#)
- ["Connect to the monitored server machine and verify the connection" on page 423](#)
- ["Modify the monitoring sample rate \(optional\)" on page 423](#)
- ["Configure the Oracle monitor on the Controller" on page 423](#)

1. Prerequisites

- Ensure that the Oracle client libraries are installed on the Controller machine.
- Verify that `%OracleHome%\bin` is included in the path environment variable. If it is not, add it.
- 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**
- Ensure that the Performance Center Server is installed in a directory whose path does not

include any of the following characters: () : ; * \ / " ~ & ? { } \$ % | < > + = ^ [].

- Verify that the Oracle server you want to monitor is up and running. Note that it is possible to monitor several Oracle database servers concurrently.

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.

2. Configure the Oracle client/server connection

Set the connection parameters so the Oracle client (Controller machine) can communicate with the Oracle server(s) you plan to monitor.

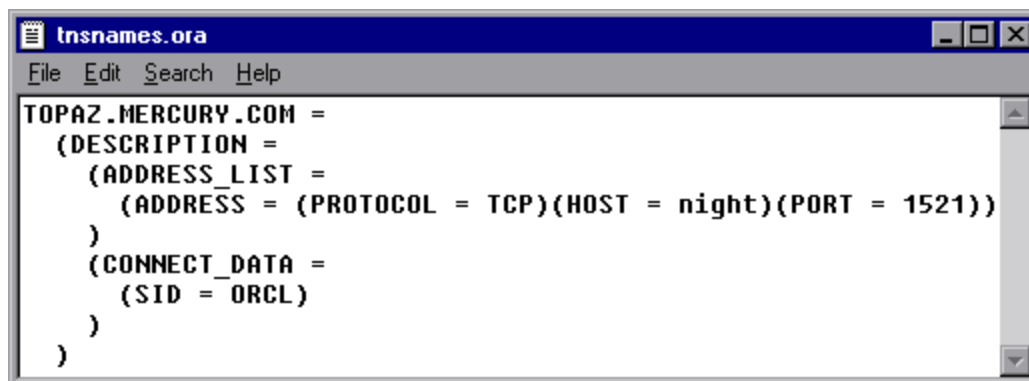
On the Controller machine, set the following configuration parameters either by editing the **tnsnames.ora** file in a text editor, or using the Oracle service configuration tool.

Example:

Start > Programs > Oracle for Windows NT > Oracle Net8 Easy Config

- 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)

Example:



```
tnsnames.ora
File Edit Search Help
TOPAZ.MERCURY.COM =
  (DESCRIPTION =
    (ADDRESS_LIST =
      (ADDRESS = (PROTOCOL = TCP)(HOST = night)(PORT = 1521))
    )
    (CONNECT_DATA =
      (SID = ORCL)
    )
  )
```

3. Connect to the monitored server machine and verify the connection
 - a. 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**).
 - b. Verify connection with the Oracle server by performing **tnsping** from the Controller machine.

Note: There may be a problem connecting if the Oracle server is behind a DMZ/firewall that limits its communication to application servers accessing it.

- c. Run SQL*Plus from the Controller and attempt to log in to the Oracle server(s) with the desired username/password/server combination.
 - d. 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.
4. Modify the monitoring sample rate (optional)

To change the length of each monitoring sample (in seconds), edit the **dat\monitors\vmmon.cfg** file in the Performance Center root folder. The default rate is 10 seconds.

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.

5. Configure the Oracle monitor on the Controller
For task details, see ["How to Create and Configure Monitor Profiles" on page 65](#).

Oracle Performance Counters

The following measurements are most commonly used when monitoring the Oracle server (from the V\$SYSSTAT table):

Measurement	Description
CPU used by this session	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.

Measurement	Description
Bytes received via SQL*Net from client	The total number of bytes received from the client over Net8.
Logons current	The total number of current logons.
Opens of replaced files	The total number of files that needed to be reopened because they were no longer in the process file cache.
User calls	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.
SQL*Net roundtrips to/from client	The total number of Net8 messages sent to, and received from, the client.
Bytes sent via SQL*Net to client	The total number of bytes sent to the client from the foreground processes.
Opened cursors current	The total number of current open cursors.
DB block changes	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.
Total file opens	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.

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
% 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.
% Processor Time	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%.
Cache Hit Ratio	The percentage of time that a requested data page was found in the data cache (instead of being read from disk).
I/O - Batch Writes/sec	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.
I/O - Lazy Writes/sec	The number of 2K pages flushed to disk per second by the Lazy Writer.
I/O - Outstanding Reads	The number of physical reads pending.
I/O - Outstanding Writes	The number of physical writes pending.
I/O - Page Reads/sec	The number of physical page reads per second.
I/O - Transactions/sec	The number of Transact-SQL command batches executed per second.

Measurement	Description
User Connections	The number of open user connections.

Chapter 30: Flex Monitoring

This chapter includes:

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Flex RTMP Connections Graph

This graph shows the number of open RTMP connections at any time during the load test scenario run. The throughput represents the amount of data that the Vusers received from the server or sent to the server at any given second.

Purpose	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).
X-axis	Elapsed time since the start of the scenario run.
Y-axis	Number of connections.

Flex RTMP Throughput Graph

This graph shows the amount of throughput (in bytes) on the RTMP/T server during each second of the load test scenario run. The throughput represents the amount of data that the Vusers received from the server or sent to the server at any given second.

Purpose	Helps you evaluate the amount of load that Vusers generate, in terms of server throughput.
X-axis	Elapsed time since the start of the scenario run.
Y-axis	Throughput of the server in bytes
Note	You cannot change the granularity of the x-axis to a value that is less than the Web granularity you defined in the General tab of the Options dialog box.

Flex RTMP Other Statistics Graph

This graph shows various statistics about Flex RTMP Vusers.

Purpose	The graph shows the duration taken to perform various RTMP tasks.
X-axis	Elapsed time since the start of the scenario run.
Y-axis	Task duration (in milliseconds).

Flex Streaming Delivery Graph

This graph displays the total number of streams that were successfully delivered by the server. A successful delivery is indicated when the server initiates a "NetStream.Stop" message at the end of the requested stream.

Purpose	Helps you evaluate the amount of load that Vusers generate, in terms of server throughput.
X-axis	Elapsed time since the start of the scenario run.
Y-axis	Number of streams delivered

Flex Average Buffering Time Graph

This graph displays the average buffering time for RTMP streams.

Purpose	Helps you evaluate the amount of load that Vusers generate, in terms of time spent for streams in the buffer.
X-axis	Elapsed time since the start of the scenario run.
Y-axis	Buffering time in milliseconds

Chapter 31: Streaming Media Monitoring

This chapter includes:

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Streaming Media Monitoring Overview

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.

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.

- The Real Client monitor graph 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.
- 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.

RealPlayer Client Performance Counters

The following table describes the RealPlayer Client measurements that are monitored:

Measurement	Description
Current Bandwidth (Kbits/sec)	The number of kilobytes in the last second
Buffering Event Time (sec)	The average time spent on buffering
Network Performance	The ratio (percentage) between the current bandwidth and the actual bandwidth of the clip
Percentage of Recovered Packets	The percentage of error packets that were recovered
Percentage of Lost Packets	The percentage of packets that were lost
Percentage of Late Packets	The percentage of late packets

Time to First Frame Appearance (sec)	The time for first frame appearance (measured from the start of the replay)
Number of Buffering Events	The average number of all buffering events
Number of Buffering Seek Events	The average number of buffering events resulting from a seek operation
Buffering Seek Time	The average time spent on buffering events resulting from a seek operation
Number of Buffering Congestion Events	The average number of buffering events resulting from network congestion
Buffering Congestion Time	The average time spent on buffering events resulting from network congestion
Number of Buffering Live Pause Events	The average number of buffering events resulting from live pause
Buffering Live Pause Time	The average time spent on buffering events resulting from live pause

Media Player Client Performance Counters

The following table describes the Media Player Client measurements that are monitored:

Measurement	Description
Average Buffering Events	The number of times Media Player Client had to buffer incoming media data due to insufficient media content.
Average Buffering Time (sec)	The time spent by Media Player Client waiting for sufficient amount of media data in order to continue playing media clip.
Current bandwidth (Kbits/sec)	The number of kbits per second received.
Number of Packets	The number of packets sent by server for a particular media clip.
Stream Interruptions	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.

Stream Quality (Packet-level)	The percentage ratio of packets received to total packets.
Stream Quality (Sampling-level)	The percentage of stream samples received on time (no delays in reception).
Total number of recovered packets	The number of lost packets that were recovered. This value is only relevant during network playback.
Total number of lost packets	The number of lost packets that were not recovered. This value is only relevant during network playback.

Chapter 32: ERP/CRM Server Resource Monitoring

This chapter includes:

- ERP/CRM Server Resource Monitoring Overview 437
- Siebel Server Manager Performance Counters 437
- Siebel Server Manager Monitor - Troubleshooting and Limitations 438
- How to Set Up the PeopleSoft (Tuxedo) Resource Monitor 439
- How to Set Up the SAPGUI Server Resource Monitor 440
- PeopleSoft (Tuxedo) Performance Counters 441
- SAPGUI Performance Counters 442

ERP/CRM Server Resource Monitoring Overview

You use ALM Performance Center's ERP/CRM server resource monitors to monitor ERP/CRM servers during a performance test run and isolate server performance bottlenecks.

The Siebel Server Manager monitor displays statistics about the resource usage of a Siebel Server Manager during the scenario run.

Siebel Server Manager Performance Counters

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

Measurement	Description
Average Connect Time	The average connection time.
Average Reply Size	The average size of a user reply.
Average Request Size	The average size of a user request.
Average Requests Per Session	The average number of user requests per session.
Average Response Time	The average amount of time that it takes the server to respond to a request.
Average Think Time	The average amount of think time taken to respond to a request.
Avg SQL Execute Time	The average SQL execute time.
Avg SQL Fetch Time	The average SQL fetch time.
Avg SQL Parse Time	The average SQL parse time.
CPU Time	The CPU time used in the work process.
Elapsed Time	The total amount of elapsed time.
Num of DBConn Retries	The number of database connection retries.
Num of DLRbk Retries	The number of DLRbk retries.
Num of Exhausted Retries	The total number of retries that expired.
Number of SQL Executes	The total number of SQL executes.
Number of SQL Fetches	The total number of SQL fetches.

Number of SQL Parses	The total number of SQL parses.
Number of Sleeps	The number of sleeps.
Object Manager Errors	The total number of object manager errors.
Reply Messages	The total number of reply messages.
Request Messages	The total number of request messages.
SQL Execute Time	The total SQL execute time.
SQL Fetch Time	The total SQL fetch time.
SQL Parse Time	The total SQL parse time.
Sleep Time	The total sleep time.
Tests Attempted	The number of tests attempted.
Tests Failed	The number of tests that failed.
Tests Successful	The number of tests that were successful.
Total Reply Size	The total reply size, measured in bytes.
Total Request Size	The total request size, measured in bytes.
Total Response Time	The total response time.
Total Tasks	The total number of tasks.
Total Think Time	The total think time.

Siebel Server Manager Monitor - Troubleshooting and Limitations

This section describes troubleshooting for the Siebel Server Manager Monitor

The Siebel Server Manager monitor uses a Siebel command line utility (svrmgr) to gather it's statistics. If you are having trouble getting the Siebel Server Manager monitor to work, run this command from the Siebel Server Manager client:

```
svrmgr /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:$PATH$/svrmgr /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 $PASSWORD$
```

How to Set Up the PeopleSoft (Tuxedo) Resource Monitor

This task describes the working order for 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.

This task includes the following steps:

- ["Prerequisites" below](#)
- ["Define the environment variables on the Controller machine" below](#)
- ["Check the Workstation Listener \(WSL\) Process" on the next page](#)
- ["Configure the PeopleSoft \(Tuxedo\) monitor on the Controller" on the next page](#)

1. Prerequisites

Ensure that a Tuxedo workstation client (not a native client), version 6.3 or later, 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.

2. Define the environment variables on the Controller machine

- a. Set the **TUXDIR** variable to the Tuxedo installation directory (for example, **V:\environ\32\Tuxedo 8.0**).
- b. Add the Tuxedo **bin** directory to the **PATH** variable.

3. Check the Workstation Listener (WSL) Process

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.

4. Configure the PeopleSoft (Tuxedo) monitor on the Controller

For task details, see ["How to Create and Configure Monitor Profiles" on page 65](#).

How to Set Up the SAPGUI Server Resource Monitor

This task describes the working order for setting up the monitoring environment.

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 task includes the following steps:

- ["Prerequisites" below](#)
- ["Enable the last minute load from the client" below](#)
- ["Configure the SAPGUI Server Resource monitor on the Controller" on the next page](#)

1. Prerequisites

Note: Once the SAPGUI monitor is activated on the Controller machine, you cannot record a SAPGUI protocol script on that machine.

- 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.)

2. Enable the last minute load from the client

From the SAPGUI client application, click **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.

3. Configure the SAPGUI Server Resource monitor on the Controller

For task details, see ["How to Create and Configure Monitor Profiles" on page 65.](#)

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
Machine	% Busy Clients - The percent of active clients currently logged in to the Tuxedo application server that are waiting for a response from the application server.
	Active Clients - The total number of active clients currently logged in to the Tuxedo application server.
	Busy Clients - The total number of active clients currently logged in to the Tuxedo application server that are waiting for a response from the application server.
	Current Accessers - The number of clients and servers currently accessing the application either directly on this machine or through a workstation handler on this machine.
	Current Transactions - The number of in use transaction table entries on this machine.
	Idle Clients - 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.
Queue	Workload Completed/second - The total workload on all the servers for the machine that was completed, per unit time.
	Workload Initiated/second - The total workload on all the servers for the machine that was initiated, per unit time.
	% Busy Servers - The percent of active servers currently handling Tuxedo requests.
	Active Servers - The total number of active servers either handling or waiting to handle Tuxedo requests.
	Busy Servers - The total number of active servers currently busy handling Tuxedo requests.

Monitor	Measurements
	Idle Servers - The total number of active servers currently waiting to handle Tuxedo requests.
	Number Queued - The total number of messages which have been placed on the queue.
Server	Requests/second - The number of server requests handled per second.
	Workload/second - 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)	Bytes Received/sec - The total number of bytes received by the workstation handler, per second.
	Bytes Sent/sec - The total number of bytes sent back to the clients by the workstation handler, per second.
	Messages Received/sec - The number of messages received by the workstation handler, per second.
	Messages Sent/sec - The number of messages sent back to the clients by the workstation handler, per second.
	Number of Queue Blocks/sec - 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.

SAPGUI Performance Counters

The following table lists the most commonly monitored counters:

Measurement	Description
Average CPU time	The average CPU time used in the work process.
Average response time	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 SAPGUI and the dispatcher is not included in this value.

Measurement	Description
Average wait time	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.
Average load time	The time needed to load and generate objects, such as ABAP source code and screen information, from the database.
Database calls	The number of parsed requests sent to the database.
Database requests	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.
Roll ins	The number of rolled-in user contexts.
Roll outs	The number of rolled-out user contexts.
Roll in time	The processing time for roll ins.
Roll out time	The processing time for roll outs.
Roll wait time	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.
Average time per logical DB call	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.

Chapter 33: Application Deployment Solution Monitoring

This chapter includes:

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Citrix MetaFrame Performance Counters	446

Application Deployment Solution Monitoring Overview

Using ALM Performance Center's Application Deployment Solution monitor, you can isolate server performance bottlenecks by monitoring the Citrix server during a performance test run.

ALM Performance Center's Citrix monitor provides you with information about the application deployment usage of the Citrix server during performance test execution. The Citrix monitor allows you to monitor the server performance statistics from Citrix 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 performance test.

For information about how to set up the Citrix monitoring environment, see ["How to Set up the Citrix Monitoring Environment" below](#).

How to Set up the Citrix Monitoring Environment

This task describes the working order for setting up the monitoring environment.

To learn more about application deployment solution monitoring, see ["Application Deployment Solution Monitoring Overview" above](#).

1. Prerequisites

- Make sure that Citrix Server has been installed and is running.
- If Citrix Server machine is running Windows 2000, make sure that the server machine is also running the Remote Registry service.
- Measurements that monitor instances are valid for the currently running Citrix session only. If you run this test 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 Guide*.

2. Map the Network Drive

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.

3. Launch PerfMon

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.

4. Open the Connection with the Citrix Server

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.

5. Configure the Citrix Monitor on the Controller

For task details, see ["How to Create and Configure Monitor Profiles" on page 65](#).

Citrix MetaFrame Performance Counters

The following sections describe some of the counters that can be measured.

- ["Non-Virtual Counters" below](#)
- ["Virtual Channel Counters" on page 448](#)

Non-Virtual Counters

The following table describes non-virtual counters:

Measurement	Description
% Disk Time	The percentage of elapsed time that the selected disk drive services read or write requests.
% Processor Time	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%.
File data Operations/sec	The rate that the computer issues Read and Write operations to file system devices. This does not include File Control Operations.

Measurement	Description
Interrupts/sec	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.
Output Session Line Speed	This value represents the line speed from server to client for a session in bps.
Input Session Line Speed	This value represents the line speed from client to server for a session in bps.
Page Faults/sec	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.
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.
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, but instead remain in main memory as long as they are allocated.
Private Bytes	The current number of bytes this process has allocated that cannot be shared with other processes.
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.

Measurement	Description
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.
Latency – Session Average	This value represents the average client latency over the life of a session.
Latency – Last Recorded	This value represents the last recorded latency measurement for this session.
Latency – Session Deviation	This value represents the difference between the minimum and maximum measured values for a session.
Input Session Bandwidth	This value represents the bandwidth from client to server traffic for a session in bps.
Input Session Compression	This value represents the compression ratio for client to server traffic for a session.
Output Session Bandwidth	This value represents the bandwidth from server to client traffic for a session in bps.
Output Session Compression	This value represents the compression ratio for server to client traffic for a session.
Output Session Linespeed	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
Input Audio Bandwidth	This value represents the bandwidth from client to server traffic on the audio mapping channel. This is measured in bps.
Input Clipboard Bandwidth	This value represents the bandwidth from client to server traffic on the clipboard mapping channel. This is measured in bps.
Input COM1 Bandwidth	This value represents the bandwidth from client to server traffic on the COM1 channel. This is measured in bps.

Measurement	Description
Input COM2 Bandwidth	This value represents the bandwidth from client to server traffic on the COM2 channel. This is measured in bps.
Input COM Bandwidth	This value represents the bandwidth from client to server traffic on the COM channel. This is measured in bps.
Input Control Channel Bandwidth	This value represents the bandwidth from client to server traffic on the ICA control channel. This is measured in bps.
Input Drive Bandwidth	This value represents the bandwidth from client to server traffic on the client drive mapping channel. This is measured in bps.
Input Font Data Bandwidth	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.
Input Licensing Bandwidth	This value represents the bandwidth from server to client traffic on the licensing channel. This is measured in bps.
Input LPT1 Bandwidth	This value represents the bandwidth from client to server traffic on the LPT1 channel. This is measured in bps.
Input LPT2 Bandwidth	This value represents the bandwidth from client to server traffic on the LPT2 channel. This is measured in bps.
Input Management Bandwidth	This value represents the bandwidth from client to server traffic on the client management channel. This is measured in bps.
Input PN Bandwidth	This value represents the bandwidth from client to server traffic on the Program Neighborhood channel. This is measured in bps.
Input Printer Bandwidth	This value represents the bandwidth from client to server traffic on the printer spooler channel. This is measured in bps.
Input Seamless Bandwidth	This value represents the bandwidth from client to server traffic on the Seamless channel. This is measured in bps.
Input Text Echo Bandwidth	This value represents the bandwidth from client to server traffic on the local text echo data channel. This is measured in bps.
Input Thinwire Bandwidth	This value represents the bandwidth from client to server traffic on the Thinwire (graphics) channel. This is measured in bps.
Input VideoFrame Bandwidth	This value represents the bandwidth from client to server traffic on the VideoFrame channel. This is measured in bps.
Output Audio Bandwidth	This value represents the bandwidth from server to client traffic on the audio mapping channel. This is measured in bps.

Measurement	Description
Output Clipboard Bandwidth	This value represents the bandwidth from server to client traffic on the clipboard mapping channel. This is measured in bps.
Output COM1 Bandwidth	This value represents the bandwidth from server to client traffic on the COM1 channel. This is measured in bps.
Output COM2 Bandwidth	This value represents the bandwidth from server to client traffic on the COM2 channel. This is measured in bps.
Output COM Bandwidth	This value represents the bandwidth from server to client traffic on the COM channel. This is measured in bps.
Output Control Channel Bandwidth	This value represents the bandwidth from server to client traffic on the ICA control channel. This is measured in bps.
Output Drive Bandwidth	This value represents the bandwidth from server to client traffic on the client drive channel. This is measured in bps.
Output Font Data Bandwidth	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.
Output Licensing Bandwidth	This value represents the bandwidth from server to client traffic on the licensing channel. This is measured in bps.
Output LPT1 Bandwidth	This value represents the bandwidth from server to client traffic on the LPT1 channel. This is measured in bps.
Output LPT2 Bandwidth	This value represents the bandwidth from server to client traffic on the LPT2 channel. This is measured in bps.
Output Management Bandwidth	This value represents the bandwidth from server to client traffic on the client management channel. This is measured in bps.
Output PN Bandwidth	This value represents the bandwidth from server to client traffic on the Program Neighborhood channel. This is measured in bps.
Output Printer Bandwidth	This value represents the bandwidth from server to client traffic on the printer spooler channel. This is measured in bps.
Output Seamless Bandwidth	This value represents the bandwidth from server to client traffic on the Seamless channel. This is measured in bps.
Output Text Echo Bandwidth	This value represents the bandwidth from server to client traffic on the local text echo data channel. This is measured in bps.
Output Thinwire Bandwidth	This value represents the bandwidth from server to client traffic on the Thinwire (graphics) channel. This is measured in bps.

Measurement	Description
Output VideoFrame Bandwidth	This value represents the bandwidth from server to client traffic on the VideoFrame channel. This is measured in bps.

Chapter 34: Middleware Performance Monitoring

This chapter includes:

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Middleware Performance Monitoring Overview

A primary factor in a transaction's response time is the Middleware performance usage. ALM Performance Center's Middleware Performance monitors provide you with information about the Middleware performance usage of the IBM WebSphere MQ server during performance test 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 the performance test.

The IBM WebSphere MQ monitor is used to monitor channel and queue performance counters on an IBM WebSphere MQ (version 5.x) Server.

How to Set Up the IBM WebSphere MQ Monitor

This task describes how to configure the Controller and IBM WebSphere MQ machines:

1. Prerequisites

Ensure that an IBM WebSphere MQ Client Connection (version 5.21 only) is installed on the Controller machine.

2. Configure the server environment 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.

- a. Run the following MQSC command:
`ALTER QMGR PERFMEV(ENABLED).`
- b. Set the queue attributes. For a list of queue attributes, ["IBM WebSphere MQ Queue Attributes" on page 456](#).

3. Add the monitored server to the Controller

- a. In the Controller Run view, click the IBM WebSphere MQ graph in the graph tree, and drag it into the right pane.
- b. Right-click the graph and select **Add Measurements**, or click anywhere on the graph and select **Monitors > Add Measurements**. The IBM WebSphere MQ dialog box opens.

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

- c. The first time that you add measurements, 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**.
- d. In the **Resource Measurements** section of the IBM WebSphere MQ dialog box, click **Add**.

4. Configure the IBM WebSphere MQ monitor

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.

- Specify the connection information and measurements in the MQ Monitor Add Measurements dialog.

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.
Status - Current Depth	Current count of messages on a local queue. This measurement applies only to local queues of the monitored queue manager.
Status - Open Input Count	Current count of open input handles. Input handles are opened so that an application may "put" messages to a queue.
Status - Open Output Count	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
Event - Channel Activated (events per second)	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.
Event - Channel Not Activated (events per second)	Event generated when a channel, attempts to become active but inhibited from doing so due to a shortage of queue manager channel slots.
Event - Channel Started (events per second)	Event generated when a channel is started.
Event - Channel Stopped (events per second)	Event generated when a channel is stopped, regardless of source of stoppage.
Event - Channel Stopped by User (events per second)	Event generated when a channel is stopped by a user.
Status - Channel State	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).

Status - Messages Transferred	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.
Status - Buffer Received	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.
Status - Buffer Sent	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.
Status - Bytes Received	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.
Status - Bytes Sent	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.

IBM WebSphere MQ Queue Attributes

You set the following queue attributes using the MQSC command `ALTER QMGR PERFMEV(ENABLED)`:

Measurement	Set Event Attributes
Event - Queue Depth High	<ul style="list-style-type: none"> • 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. • QDPHIEV(action) - where action is the word "ENABLED" or "DISABLED", enabling or disabling the generation of the event, respectively.
Event - Queue Depth Low	<p>To enable the event for a queue, the following attributes of the queue must be set:</p> <ul style="list-style-type: none"> • 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. • QDPLOEV(action) - where action is the word "ENABLED" or "DISABLED", enabling or disabling the generation of the event, respectively.

Event - Queue Full	<ul style="list-style-type: none"> • 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. • QDPMAXEV(action) – where action is the word "ENABLED" or "DISABLED", enabling or disabling the generation of the event, respectively.
Event - Queue Service Interval High	<ul style="list-style-type: none"> • QSVCINT(integer) – where integer is a value expressed as milliseconds, in the range of 0 and 999,999, inclusive. Note: this value is shared with Queue Service Interval OK. • QSVCIEV(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.
Event - Queue Service Interval OK	<ul style="list-style-type: none"> • 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. • QSVCIEV(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.

How to Set Up the Tuxedo Monitoring Environment

This task describes the working order for setting up the monitoring environment.

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.

1. Prerequisites

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.

2. Define the Tuxedo Environment Variables

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.

3. Check the Workstation Listener (WSL) Process

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.

4. Configure the Tuxedo monitor on the Controller

For task details, see ["How to Create and Configure Monitor Profiles" on page 65](#).

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
Machine	% Busy Clients - The percent of active clients currently logged in to the Tuxedo application server that are waiting for a response from the application server.
Machine	Active Clients - The total number of active clients currently logged in to the Tuxedo application server.
Machine	Busy Clients - The total number of active clients currently logged in to the Tuxedo application server that are waiting for a response from the application server.
Machine	Current Accessers - The number of clients and servers currently accessing the application either directly on this machine or through a workstation handler on this machine.
Machine	Current Transactions - The number of in-use transaction table entries on this machine.
Machine	Idle Clients - 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.

Monitor	Measurements
Machine	Workload Completed/second - The total workload on all the servers for the machine that was completed, per unit time.
Machine	Workload Initiated/second - The total workload on all the servers for the machine that was initiated, per unit time.
Queue	% Busy Servers - The percent of active servers currently handling Tuxedo requests.
Queue	Active Servers - The total number of active servers either handling or waiting to handle Tuxedo requests.
Queue	Busy Servers - The total number of active servers currently busy handling Tuxedo requests.
Queue	Idle Servers - The total number of active servers currently waiting to handle Tuxedo requests.
Queue	Number Queued - The total number of messages which have been placed on the queue.
Server	Requests/second - The number of server requests handled per second
Server	Workload/second - 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)	Bytes Received/sec - The total number of bytes received by the workstation handler, per second.
Workstation Handler (WSH)	Bytes Sent/sec - The total number of bytes sent back to the clients by the workstation handler, per second.
Workstation Handler (WSH)	Messages Received/sec - The number of messages received by the workstation handler, per second.
Workstation Handler (WSH)	Messages Sent/sec - The number of messages sent back to the clients by the workstation handler, per second.
Workstation Handler (WSH)	Number of Queue Blocks/sec - 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.

Tuxedo tpinit.ini File

The **tpinit.ini** file is saved in the recorded script's directory. It contains information for connecting the Tuxedo monitor to the server. The client logon information is located in the Logon section of the **tpinit.ini** file.

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=
```


Chapter 35: Infrastructure Resources Monitoring

This chapter includes:

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Infrastructure Resources Monitoring Overview

You can monitor network client resources for FTP, POP3, SMTP, IMAP, and DNS Vusers during a performance test run and isolate client performance bottlenecks.

Activating the Network Client Monitor

The Network Client online monitor graph is only available during performance tests that run relevant scripts, such as FTP, POP3, and so forth.

You can view this 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
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 7: Runtime Settings Configuration

Chapter 36: Script Runtime Settings

This chapter includes:

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Runtime Settings > Internet Protocol > Preferences	470
Runtime Settings > Internet Protocol > Content Check	482
Runtime Settings > General > Miscellaneous > Multithreading	482

Script Runtime Settings Overview

Before you run a performance test, you can configure the behavior of the Vuser scripts in the test using runtime settings. You can configure general settings and protocol-specific settings.

General Settings

After you record a Vuser script, you can configure its runtime settings. The runtime settings define the way the script runs, such as delay between actions, the number of times to repeat an action, and the level of logging.

Configuring runtime settings allows you to emulate different kinds of user activity. For example, you can emulate a user who responds immediately to the server, or a user who stops and thinks before each response. You can also configure the runtime settings to specify how many times the Vuser should repeat a set of actions.

Protocol-Specific Settings

Before replaying a Vuser script, you can configure its runtime settings. The runtime settings define the way the script runs, using settings that are specific for your particular environment.

Different combinations of runtime settings are available for each protocol. When you open the runtime settings, only the relevant nodes will be displayed.


For protocol-specific tips, see ["Protocol Specific Runtime Settings" on the next page](#).

For task details, see ["How to Configure Runtime Settings" below](#).

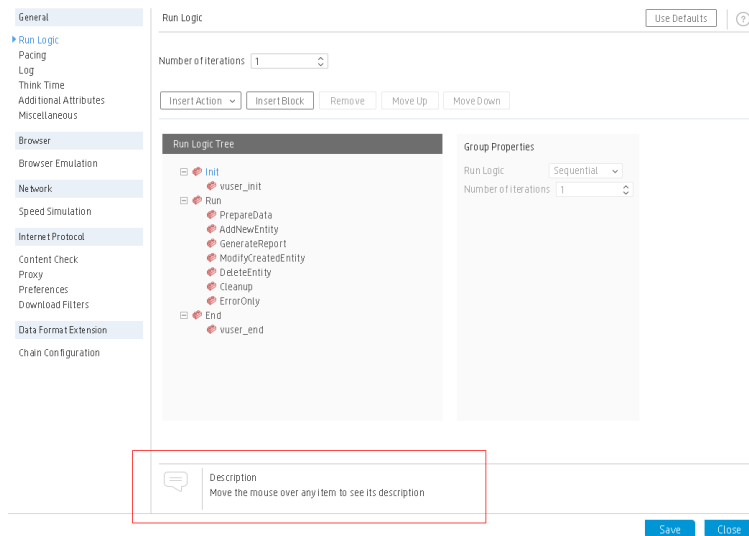
How to Configure Runtime Settings

This task describes how to open and configure runtime settings to define the way a script runs.

To configure the runtime settings in a Vuser script:

1. On the My Performance Center navigation bar, select **Test Management > Test Plan**. Select a performance test in the test plan tree and click **Edit Test**.
2. In the **Groups & Workload** view, select a Vuser group and click **Edit Runtime Settings** . The Edit Runtime Settings dialog box opens.
3. Select the runtime settings type to edit and define the required information.

- Different combinations of runtime settings are available for each protocol. When you open the runtime settings, only the relevant nodes will be displayed.
- If you do not edit the runtime settings, the script runs using the default runtime settings, or the last saved runtime settings if the script was recorded in VuGen.
- For information about each of the runtime settings, see the mouseover hints by each field in the Description pane of the Runtime Settings window.



See Also:

- For an overview on the runtime settings, see ["Script Runtime Settings Overview" on the previous page](#).
- For protocol-specific tips, see ["Protocol Specific Runtime Settings" below](#).
- For Internet protocol preferences, see ["Runtime Settings > Internet Protocol > Preferences" on page 470](#).
- For Internet protocol content check, see ["Runtime Settings > Internet Protocol > Content Check " on page 482](#).
- For the Multithreading runtime option, see ["Runtime Settings > General > Miscellaneous > Multithreading" on page 482](#)

Protocol Specific Runtime Settings

The following sections provide tips for configuring the Runtime Settings for specific protocols.

For information about each of the Runtime settings, see the mouseover hints by each field.

All Protocols

In the **General > Miscellaneous** node, follow these guidelines:

- It is not recommended to enable both the **Continue on Error** and **Generate Snapshot on Error** options in a load test environment. This configuration may adversely affect the Vusers' performance.
- If you require the Vusers to generate breakdown data for diagnostics (J2EE) during the test run, do not use automatic transactions. Instead, manually define the beginning and end of each transaction.
- Automatic transactions are not relevant for HP Business Service Management.

MMS (Multimedia Messaging Service)

For the MMS (Multimedia Messaging Service) protocol, it is recommended that you run Vusers as a process.

To configure this options, open the Runtime settings and select the **General > Miscellaneous** node.

RDP (Remote Desktop Protocol)

- In the **Advanced** node, disable the options that are not essential for your test, in order to conserve system resources on the remote desktop server.
- In the **RDP Agent** node, for the **RDP agent log folder** option—if no folder is specified and the agent log destination was set to **File**, the log is saved in the temp folder of the user on the server.

RTE (Remote Terminal Emulation)

In the **RTE** node, in the **Delay before typing** option, the delay settings determine how Vusers execute **TE_type** functions.

- **First key.** Specifies the time in milliseconds, that a Vuser waits before entering the first character of a string.
- **Subsequent keys.** Specifies the time in milliseconds, that a Vuser waits between submitting successive characters.

Note: You can use the **TE_typing_style** function to override the Delay settings for a portion of a Vuser script.

SAP GUI

In the SAPGUI **General** node, the **Show SAP Client during replay** option shows an animation of the actions in the SAP client during replay. The benefit of this, is that you can closely follow the actions of the Vuser and see how the forms are filled out. This option, however, requires additional resources and may affect the performance of your load test.

Take ActiveScreen snapshots during replay. This feature captures replay snapshots with Control ID information for all active objects. ActiveScreen snapshots differ from regular ones, in that they allow you to see which objects were recognized by VuGen in the SAP GUI client. As you move your mouse across the snapshot, VuGen highlights the detected objects. You can then add new steps to the script

directly from within the snapshot. It also allows you to add steps interactively from within the snapshot for a specific object. For more information, see the *HP Virtual User Generator User Guide*.

TruClient - IE / TruClient - Firefox

Settings that you modify In the **Load > Browser** node, only affect TruClient Vusers in load mode.

These settings correspond to those in the **Browser Settings** tab in the TruClient General Settings Dialog Box. However, the settings that you modify in the TruClient General Settings Dialog Box only affect interactive mode.

When you save your script in interactive mode, the settings that you modified in the **Browser Settings** tab are applied to these **Load** Runtime settings.

Runtime Settings > Internet Protocol > Preferences

You use the **Internet Protocol Preferences** runtime settings to control the Vusers in the following areas:

- Image and Text Checks
- Generating Web Performance Graphs
- Advanced Web Runtime Options
- Additional Options for Internet Preferences

This node is only available for specific protocols. When you open the Runtime Settings, only the relevant nodes will be displayed.

The user interface elements are described below:

UI Element	Description
Checks	<ul style="list-style-type: none">• Enable image and text checks. Allows the Vuser to perform verification checks during replay by executing the verification functions web_find or web_image_check. This option only applies to statements recorded in HTML-based mode. Vusers running with verification checks use more memory than Vusers who do not perform checks. <p>Default value: disabled.</p>

UI Element	Description
Web Performance Graph Generation	<p>Instructs a Vuser to collect data for Web Performance graphs. You view the Hits per Second, Pages per Second, and Response Bytes per Second (Throughput) graphs during test execution using the online monitors and after test execution using the Analysis. You view the Component Breakdown graph after test execution using the Analysis. Select the types of graph data for the Vuser to collect.</p> <p>Note: If you do not use the Web performance graphs, disable these options to conserve memory.</p>
Advanced	<ul style="list-style-type: none"> • Use WinInet replay instead of Sockets (Windows only). Instructs VuGen to use the WinInet replay engine instead of the standard Sockets replay. VuGen has two HTTP replay engines: Sockets-based (default) or WinInet based. The WinInet is the engine used by Internet Explorer and it supports all of the features incorporated into the IE browser. The limitations of the WinInet replay engine are that it is not scalable and does not support Linux. In addition, when working with threads, the WinInet engine does not accurately emulate the modem speed and number of connections. VuGen's proprietary sockets-based replay is a lighter engine that is scalable for load testing. It is also accurate when working with threads. The limitation of the sockets-based engine is that it does not support SOCKS proxy. If you are recording in that type of environment, use the WinInet replay engine. Default value: disabled (socket-based replay engine). • Include File name and line in automatic transaction names. Creates unique transaction names for automatic transactions by adding file name and line number to the transaction name. • List non-critical resource errors as warnings. Returns a warning status for a function which failed on an item that is not critical for load testing, such as an image or Java applet that failed to download. This option is enabled by default. If you want a certain warning to be considered an error and fail your test, you can disable this option. You can set a content-type to be critical by adding it to the list of Non-Resources. For more information, see the <i>HP Virtual User Generator User Guide</i>. • Save snapshot resources locally. Saves the snapshot resources to files on the local machine.

HTTP

UI Element	Description
HTTP version	<p>Specifies which version HTTP to use: version 1.0 or 1.1. This information is included in the HTTP request header whenever a Vuser sends a request to a Web server.</p> <p>HTTP 1.1 supports the following features:</p> <ul style="list-style-type: none"> • Persistent Connections—see "Keep-Alive HTTP connections" below. • HTML compression—see Accept Server-Side Compression below. • Virtual Hosting—multiple domain names sharing the same IP address.
Keep-Alive HTTP connections	<p>Keep-alive is a term used for an HTTP extension that allows persistent or continuous connections. These long-lived HTTP sessions allow multiple requests to be sent over the same TCP connection. This improves the performance of the Web server and clients.</p> <p>The keep-alive option works only with Web servers that support keep-alive connections. This setting specifies that all Vusers that run the Vuser script have keep-alive HTTP connections enabled.</p> <p>Default value: enabled.</p>
Include Accept-Language request header	<p>Provides a comma-separated list of accepted languages. For example, en-us, fr, and so forth. For more information, see the <i>HP Virtual User Generator User Guide</i>.</p>
Mark HTTP errors as warnings	<p>Issues a warning instead of an error upon failing to download resources due to an HTTP error.</p>
HTTP-request connect timeout (sec)	<p>The time, in seconds, that a Vuser will wait for the connection of a specific HTTP request within a step before aborting. Timeouts provide an opportunity for the server to stabilize and respond to the user.</p> <p>Maximum value: 32000 seconds.</p>
HTTP-request receive timeout (sec)	<p>The time, in seconds, that a Vuser will wait to receive the response of a specific HTTP request within a step before aborting. Timeouts provide an opportunity for the server to stabilize and respond to the user.</p> <p>Maximum value: 32000 seconds.</p>
HTTP Keep-Alive timeout (sec)	<p>A time limit within which some activity must be performed on an HTTP connection. If this timeout is reached, the connections is closed during replay.</p>

UI Element	Description
Request zlib headers	Sends request data to the server with the zlib compression library headers. By default, requests sent to the server include the zlib headers. This option lets you emulate non-browser applications that do not include zlib headers in their requests. Default value: Enabled.
Accept server-side compression	Indicate to the server that the replay can accept compressed data. The available options are: None (no compression), gzip (accept gzip compression), gzip, deflate (accept gzip or deflate compression), and deflate (accept deflate compression). Note that by accepting compressed data, you may significantly increase the CPU consumption. Default value: Accept gzip and deflate compression. To manually add compression, enter the following function at the beginning of the script: <code>web_add_auto_header("Accept-Encoding", "gzip");</code> To verify that the server sent compressed data, search for the string Content - Encoding: gzip in the section of the server's responses of the replay log. The log also shows the data size before and after decompression.
Delete unreferenced cache entries	Delete cache entries that have not been referenced within the specified number of iterations. Set to zero (0) to never delete cache entries.

General

UI Element	Description
Enable snapshots during replay	Create snapshots during replay. Note: Disabling replay snapshots will improve the replay speed. However, snapshot-dependent features such as DFE and correlations, will not be able to use data captured during the replay. This may cause unstable behavior.
DNS caching	Instructs the Vuser to save a host's IP addresses to a cache after resolving its value from the Domain Name Server. This saves time in subsequent calls to the same server. In situations where the IP address changes, as with certain load balancing techniques, be sure to disable this option to prevent Vuser from using the value in the cache. Default value: enabled.
Convert to/from UTF-8	Converts received HTML pages and submitted data from and to UTF-8. You enable UTF-8 support in the recording options. For more information, see the <i>HP Virtual User Generator User Guide</i> .

UI Element	Description
Charset to use for converting HTML	The character set to use to convert received HTMLs and submitted data from/to the set charset. This option is ignored if you enabled the previous option, '\Convert to/from UTF-8\'.
Mark step timeouts caused by resources as a warning	Issues a warning instead of an error when a timeout occurs due to a resource that did not load within the timeout interval. For non-resources, VuGen issues an error. Default value: disabled.
Parse HTML content-type	When expecting HTML, parse the response only when it is the specified content-type: HTML , text/html , TEXT any text, or ANY , any content-type. Note that text/xml is not parsed as HTML. Default value: TEXT .
Step download timeout (sec)	The time that the Vuser will wait before aborting a step in the script. This option can be used to emulate a user behavior of not waiting for more than x seconds for a page. Maximum value: 32000 seconds. The timeout settings are primarily for advanced users who have determined that acceptable timeout values should be different for their environment. The default settings should be sufficient in most cases. If the server does not respond in a reasonable amount of time, check for other connection-related issues, rather than setting a very long timeout which could cause the scripts to wait unnecessarily.
Network buffer size	Sets the maximum size of the buffer used to receive the HTTP response. If the size of the data is larger than the specified size, the server will send the data in chunks, increasing the overhead of the system. When running multiple Vusers from the Controller, every Vuser uses its own network buffer. This setting is primarily for advanced users who have determined that the network buffer size may affect their script's performance. The default is 12K bytes. The maximum size is 0x7FFF FFFF.
Print NTLM information	Print information about the NTLM handshake to the standard log.
Print SSL information	Print information about the SSL handshake to the standard log.
Maximum number of failure-matches to list as errors	Limit the number of content-check failures that are issued as errors, where a failure is indicated by the appearance of a string (Fail=Found). This applies to match criteria using a left and right boundary. All subsequent matches are listed as informational messages. The default is 10. Default value: 10 matches.

UI Element	Description
Maximum redirection depth	The maximum number of allowed redirections. Default value: 10.
Maximum number of 'META Refresh' on a single page	The maximum number of times that a META refresh can be performed per page. Default value: 2.
Convert ContentCheck values to UTF-8	Store the values in the ContentCheck XML file in UTF-8. Default value: disabled.
Limit the Tree view request body to	Limit the number of request body bytes displayed in Tree-View. Set to zero (0) for no limit.
Limit the stored snapshot to	Limit the size of each snapshot file to a specific number of kilobytes. Enter 0 to indicate no limit.
IP version	The IP version to be used: IPv4, IPv6 or automatic selection. The default value is IPv4.
web_sync retry interval	The time to wait (in milliseconds) between testing the condition that yields false and the next retry. The default value is 1000.
web_sync retry timeout	The maximum time (in milliseconds) during which retries are allowed. If the computed timeout exceeds the step timeout (as determined by the 'Step download timeout' setting), the latter is used.
WebSocket callback interval	The time interval in milliseconds, before repeating a call to a WebSocket callback handler. This must be a non-zero value.
Prefetch and prerender callback timer interval	The time interval in milliseconds, before repeating a call to Prefetch and Prerender callback handlers. This must be a non-zero value.

Authentication

UI Element	Description
Add a fixed delay upon authentication	Automatically adds think time to the Vuser script for emulating a user entering authentication information (username and password). This think time will be included in the transaction time. Default value: 0.
Disable NTLM2 session security	Use full NTLM 2 handshake security instead of the more basic NTLM 2 session security response. Default value: No.
Use the native Windows NTLM implementation	Use the Microsoft Security API for NTLM authentication instead of the indigenous one. Default value: No.
Override credentials in a Windows native NTML implementation	Use the credentials provided by the user at logon.
Enable integrated authentication	Enable Kerberos-based authentication. When the server proposes authentication schemes, use Negotiate in preference to other schemes. Default value: No.
Induce heavy KDC load	Do not reuse credentials obtained in previous iterations. Enabling this setting will increase the load on the KDC (Key Distribution Server). To lower the load on the server, set this option to Yes in order to reuse the credentials obtained in previous iterations. This option is only relevant when Kerberos authentication is used. Default value: No.
Use canonical name in SPN	Use the canonical name instead of the original hostname retrieved from the URL, to generate SPN (Service Principal Name). Default value: Yes.
Append non-default port to SPN	Append the port number to the SPN, if the specified port is a non-standard one (neither 80 nor 443). Default value: No.
Enable retrieving keys from nCipher HSM	Enables LoadRunner to retrieve private keys from the nCipher HSM (Hardware Security Module). This option loads and initializes the CHIL engine necessary to retrieve these keys. Default value: Yes.

Logging

UI Element	Description
Print buffer line length	Line length for printing request/response header/body and/or JavaScript source, disabling wrapping.
Print buffer escape for binary zeros only	<ul style="list-style-type: none">• Yes. Escape only binary zeros when printing request/response headers/body and/or JavaScript source.• No. Escape any unprintable/control characters.
Limit the maximum response size written to the log	Limits the size of the log containing the response data.

JavaScript

UI Element	Description
Enable running JavaScript code	Enable running Web JavaScript steps, such as <code>web_js_run()</code> and <code>web_js_reset()</code> . This option creates a JavaScript runtime engine even in the there are no JavaScript steps in the script.
JavaScript Engine runtime size	The memory size in kilobytes, to allocate for the JavaScript engine runtime. One runtime engine will be created for all Vusers in a process.
JavaScript Engine stack size per thread	The memory size in kilobytes, to allocate for each Vuser thread in the JavaScript engine.

Click & Script Preferences

UI Element	Description
General	<ul style="list-style-type: none">• Home Page URL. The URL of the home page that opens with your browser (default is about:blank).• DOM-based snapshots. Instructs VuGen to generate snapshots from the DOM instead of from the server responses. Default value: Yes.• Charset conversions by HTTP. Perform charset conversions by the 'Content-Type:.....; charset=...' HTTP response header. Overrides 'Convert from /to UTF-8.'• Reparse when META changes charset. Reparse HTML when a META tag changes the charset. Effective only when Charset conversions by HTTP is enabled. Auto means reparsing is enabled only if it used in the first iteration.• Fail on JavaScript error. Fails the Vuser when a JavaScript evaluation error occurs. Default value: No (issue a warning message only after a JavaScript error, but continue to run the script).• Initialize standard classes for each new window project. When enabled, the script—the src compiled script, will not be cached.• Ignore acted on element being disabled. Ignore the element acted on by a Vuser script function being disabled.

UI Element	Description
Timers	<ul style="list-style-type: none"> • Optimize timers at end of step. When possible, executes a <code>setTimeout/setInterval/<META refresh></code> that expires at the end of the step before the expiration time Default value: Yes. • Single <code>setTimeout/setInterval</code> threshold (seconds). Specifies an upper timeout for the <code>window.setTimeout</code> and <code>window.setInterval</code> methods. If the delay exceeds this timeout, these methods will not invoke the functions that are passed to them. This emulates a user waiting a specified time before clicking on the next element. Default value: 5 seconds. • Accumulative <code>setTimeout/setInterval</code> threshold (seconds). Specifies a timeout for the <code>window.setTimeout</code> and <code>window.setInterval</code> methods. If the delay exceeds this timeout, additional calls to <code>window.setTimeout</code> and <code>window.setInterval</code> will be ignored. The timeout is accumulative per step. Default value: 30 seconds. • Reestablish <code>setInterval</code> at end of step. 0 = No; 1 = Once; 2 = Yes. • Limit no-network timers at end of step: Limit the number of <code>setTimeout/setInterval</code> specified script evaluations at the end of a step when no network requests are issued. Set to zero (0) for no limit. The default value is 100. This limit is only used when 'Optimize timers at end of step' is enabled.
History	<ul style="list-style-type: none"> • History support. Enables support for the <code>window.history</code> object for the test run. The options are Enabled, Disabled, and Auto. The Auto option instructs Vusers to support the <code>window.history</code> object only if it was used in the first iteration. Note that by disabling this option, you improve performance. Default value: auto. • Maximum history size. The maximum number of steps to keep in the history list. Default value: 100 steps.

UI Element	Description
Navigator Properties	<ul style="list-style-type: none"> • navigator.browserLanguage. The browser language set in the navigator DOM object's browserLanguage property. Default value: The recorded value. Scripts created with older recording engines use en-us by default. • navigator.systemLanguage. The system language set in the navigator DOM object's systemLanguage property. Default value: The recorded value. Scripts created with older recording engines use en-us by default. • navigator.userLanguage. The user language set in the navigator DOM object's userLanguage property. Default value: The recorded value. Scripts created with older recording engines use en-us by default.
Screen Properties	<ul style="list-style-type: none"> • screen.width Sets the width property of the screen DOM object in pixels. Default value: 1024 pixels. • screen.height Sets the height property of the screen DOM object in pixels. Default value: 768 pixels. • screen.availWidth Sets the availWidth property of the screen DOM object in pixels. Default value: 1024 pixels. • screen.availHeight. Sets the availHeight property of the screen DOM object in pixels. Default value: 768 pixels.

UI Element	Description
Memory Management	<ul style="list-style-type: none"> • Default block size for DOM memory allocations. Sets the default block size for DOM memory allocations. If the value is too small, it may result in extra calls to malloc, slowing the execution times. Too large a block size, may result in an unnecessarily big footprint. Default value: 16384 bytes. • Memory Manager for dynamically-created DOM objects. Yes—Use the Memory Manager for dynamically-created DOM objects. No—Do not use the Memory Manager, for example when multiple DOM objects are dynamically created in the same document as under SAP. Auto—Use the protocol recommended (default Yes for all protocols except for SAP). • JavaScript Runtime memory size (KB). Specifies the size of the JavaScript runtime memory in kilobytes. Default value: 256 KB. • JavaScript Stack memory size (KB). Specifies the size of the JavaScript stack memory in kilobytes. Default value: 32 KB.
Web Javascript	<ul style="list-style-type: none"> • Enable running Javascript code. Yes—Enables running web Javascript steps, such as <code>web_js_run()</code> and <code>web_js_reset()</code>. No—Web Javascript steps can not be run. Note that enabling this option causes the creation of a Javascript Engine Runtime, even if there are no Javascript steps in the script. Default value: No • Javascript Engine runtime size (KB). Specifies the size of the Javascript Engine Runtime memory in kilobytes. One Runtime will be created for all Vusers in a process. Default value: 10240 KB • Javascript Engine stack size per-thread (KB). Specifies the size of each Vuser thread in the Javascript Engine memory, in kilobytes. Default value: 32 KB

Runtime Settings > Internet Protocol > Content Check

You use the **Internet Protocol Content Check** runtime option to check the contents of a page for a specific string. This is useful for detecting non-standard errors. In normal operations, when your application server fails, the browser displays a generic HTTP error page indicating the nature of the error. The standard error pages are recognized by VuGen and treated as errors, causing the script to fail. Some application servers, however, issue their own error pages that are not detected by VuGen as error pages. The page is sent by the server and it contains a formatted text string, stating that an error occurred.

For example, suppose that your application issues a custom page when an error occurs, containing the text **ASP Error**. You instruct VuGen to look for this text on all returned pages. When VuGen detects this string, it fails the replay.

Note: VuGen searches the body of the pages—not the headers.

Runtime Settings > General > Miscellaneous > Multithreading

The **Multithreading** runtime option enables you to run each Vuser in a separate process or in a separate thread.

The Controller uses a driver program (such as *mdrv.exe* or *r3vuser.exe*) to run your Vusers. If you run each Vuser as a process, then the same driver program is launched (and loaded) into the memory again and again for every instance of the Vuser. Loading the same driver program into memory uses up large amounts of RAM (random access memory) and other system resources. This limits the numbers of Vusers that can be run on any load generator.

Alternatively, if you run each Vuser as a thread, the Controller launches only one instance of the driver program (such as *mdrv.exe*), for every 50 Vusers (by default). This driver process/program launches several Vusers, each Vuser running as a thread. These threaded Vusers share segments of the memory of the parent driver process. This eliminates the need for multiple re-loading of the driver program/process saves much memory space, thereby enabling more Vusers to be run on a single load generator.

Note: For MMS (Multimedia Messaging Service) protocol, it is recommended that you run Vusers as a process.

Part 8: Performance Center Administration

Chapter 37: Performance Center Administration – Introduction

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Performance Center Administration Overview

Performance Center administration is performed in Lab Management. You must be a Lab Management administrator to perform these tasks.

Lab Management administrators are defined in the ALM Site Administration site. For details on how to create a Lab Management administrator user, see the *HP ALM Lab Management Guide*.

Performance Center administration responsibilities include managing lab resources, such as hosts and host pools, creating and maintaining testing assets, and other administration tasks.

For related task details, see ["How to Work with Performance Center Administration" below](#).

How to Work with Performance Center Administration

This section lists the tasks that a Lab Management administrator can perform. Some tasks are available only for projects with Performance Center licenses.

Prerequisites

To perform any of these tasks, you must be a Lab Management administrator. For details on how to create a Lab Management administrator, see the *HP ALM Lab Management Guide*.

Perform initial Performance Center configuration

Immediately after installing the Performance Center components, the relevant component's configuration tool opens, prompting you for initial configuration settings. If this configuration was skipped, you must configure the settings manually before you can start working with Performance Center.

For details, see ["How to Initially Configure Performance Center" on page 491](#).

Create Performance Center projects and define project settings

You create projects in Site Administration, and define the limits and other settings for the project in Lab Management, in the Project Settings module. For details, see the *HP ALM Lab Management Guide*.

Manage and maintain Performance Center lab resources

You manage hosts, host pools, host locations, and relevant MI Listeners from the Lab Resources modules. For details, see the *HP ALM Lab Management Guide*.

When you plan to perform maintenance tasks on the hosts—such as installing patches, rebooting hosts, and so on—it is recommended to reserve these hosts in timeslots. This way, you can be sure that they will be available for maintenance. For details, refer to the *HP ALM Lab Management Guide*.

View and manage performance test runs

The test runs from Performance Center can be viewed and managed in the Test Runs module. For details, see the *HP ALM Lab Management Guide*.

View Performance Center usage reports

Performance Center usage reports provide you with an overall analysis of Performance Center. The analysis includes site users, resource usage, concurrent resource usage vs. license limitations, timeslot usage, resource usage by duration and runs, VUDS usage, protocol usage, and cloud utilization and operations. For details, see the *HP ALM Lab Management Guide*.

You can also export these reports to PDF and Excel format. For details, see the *HP ALM Lab Management Guide*.

Upload application patches

Before you can install application patches on Performance Center Servers and hosts, you must upload the patches to the system. For details, see the *HP ALM Lab Management Guide*.

Manage Performance Center Servers

You manage Performance Center Servers in Lab Management from the PC Servers module. For details, see the *HP ALM Lab Management Guide*.

Manage Performance Center and Performance Center host licenses

You manage the Performance Center license and Performance Center host license in Lab Management from the Licenses module. For details, see the *HP ALM Lab Management Guide*.

Manage Diagnostic Servers and Mediators

Integrating diagnostics modules with ALM enables monitoring and analysis of the performance of complex applications under test. For details on setting up the diagnostics modules, see the *HP ALM Lab Management Guide*.

Maintain system health

You track and maintain the health of the system Lab Management from the System Health module. For details, see the *HP ALM Lab Management Guide*.

Change the Performance Center system user

You use the System Identity Utility, installed on the Performance Center Server, to change the Performance Center system user on the Performance Center Server and hosts. For details, see ["How to Change the System User" on page 497](#).

Update the Communication Security passphrase


You use the System Identity Utility, installed on the Performance Center Server, to update the Communication Security passphrase on the Performance Center Server and hosts. For details, see ["How to Update the Communication Security Passphrase" on page 496](#).

Update the secure host communication settings

Initially, you define secure communication settings on each Performance Center host or standalone load generator using the Host Security Setup utility, installed locally on each host or load generator. For details, see ["How to Configure Security Settings Locally on Hosts" on page 510](#).

To update these settings on all the hosts and load generators simultaneously, you can use the Host Security Manager, installed on the Performance Center Server. For details, see ["How to Update Host Security Settings Remotely" on page 511](#).

Configure general Performance Center settings

You manage general Performance Center settings in Lab Management. On the masthead, click  and select **Performance Center General Settings**. For user interface details, see the *HP ALM Lab Management Guide*.

Chapter 38: Initial Performance Center Configuration

This chapter includes:

- Initial Performance Center Configuration Overview 491
- How to Initially Configure Performance Center 491

Initial Performance Center Configuration Overview

Immediately after installing the Performance Center Server and hosts, the relevant component's configuration tool opens, prompting you for initial configuration settings. If any parts of the configuration were skipped, you must configure the settings manually before you can start working with Performance Center.

You can perform the configuration by running the configuration tool on the relevant machine, or alternatively by defining the settings manually in Lab Management.

For details on running the relevant configuration tools, see the *HP ALM Performance Center Installation Guide*.

For details on configuring the initial settings in Lab Management, see ["How to Initially Configure Performance Center" below](#).

How to Initially Configure Performance Center

This task describes how to manually perform the initial configuration of the Performance Center Server and hosts in Lab Management.

This task includes the following steps:

- ["Prerequisites" below](#)
- ["Log into Lab Management" below](#)
- ["Add the Performance Center Server\(s\) to ALM" on the next page](#)
- ["Add the Performance Center license and the host license" on the next page](#)
- ["Add Performance Center hosts to the system" on the next page](#)

1. Prerequisites

- The Performance Center Server and Performance Center hosts must be installed according to instructions provided in the *HP ALM Performance Center Installation Guide*.
- To perform any of these tasks, you must be a Lab Management administrator. For details on how to create a Lab Management administrator, refer to the *HP ALM Lab Management Guide*.

2. Log into Lab Management

- a. Open your Web browser and type the ALM URL in the following format:

`http://<ALM>[:port number]/qcbn`

- b. In the HP Application Lifecycle Management window that opens, click **Lab Management**.
 - c. Enter your Lab Management Administrator user name and password and click **Login**.
3. Add the Performance Center Server(s) to ALM
On the Lab Management sidebar, under **Servers**, select **PC Servers**, and add your Performance Center Server. For details on how to add a Performance Center Server, refer to the *HP ALM Lab Management Guide*.
4. Add the Performance Center license and the host license
On the Lab Management sidebar, under **Performance Center**, select **PC Licenses**.

Add the Performance Center license, and then the host license. For interface details, refer to the *HP ALM Lab Management Guide*.
5. Add Performance Center hosts to the system
On the Lab Management sidebar, under **Lab Resources**, select **Hosts**. For user interface details, refer to the *HP ALM Lab Management Guide*.

Chapter 39: Performance Center System Administration

This chapter includes:

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Required Policies for the Performance Center System User	498
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ALM Performance Center Communication Security

During installation of ALM and the Performance Center Server and hosts, a passphrase, known as the **Communication Security passphrase**, is defined. This passphrase enables secure communication between the Performance Center components and ALM. This passphrase must be identical on all of the components of the system.

The Communication Security passphrase can be updated from time to time. For information about updating the Communication Security passphrase, see ["How to Update the Communication Security Passphrase" on the next page](#).

Performance Center System User

During installation of the Performance Center Server and hosts, a default Performance Center system user, **IUSR_METRO** (default password **P3rfoRm@1nce**), is created in the Administrators user group of the server/host machines.

Note: To prevent security breaches, you can replace Performance Center's default system user by creating a different local system user, or by using a domain user.

For stronger security, you can create a non-administrator Performance Center system user in a local group under the Users group. This system user has the permissions granted to any user in the Users group with extended rights to Web services and the HP file system and registry.

With these limited permissions, such a system user cannot perform all administrative system tasks. You need to specify a configuration user (a user with administrative privileges that is defined on the Performance Center Server and hosts) that Performance Center uses when administrative tasks are required on the system. After the tasks are complete, the system user reverts back to itself, with its limited Performance Center user permissions.

Note: The configuration user is saved in the database so that whenever an administrative-level system user is required to perform a task, the system automatically uses the configuration user, without asking for its credentials.

The Performance Center Server is installed with the System Identity Utility that enables you to manage the Performance Center system user on the Performance Center Server and hosts from one centralized location.

Using this utility, you can periodically update the Performance Center system user name and password. For more information, see ["How to Change the System User" on page 497](#).

Remote Performance Center Server and Host Administration

To perform administrative tasks on the Performance Center Server or hosts (such as adding, configuring, or resetting a Performance Center Server/host), Performance Center must use a user with administrative privileges. This must be the Performance Center system user with administrative privileges or, if the Performance Center system user is non-administrative, a configuration user.

When the Performance Center system user has administrative privileges and is defined on the remote machine, tasks are performed upon request. After validating the Performance Center system user or configuration user, Performance Center can perform required tasks.

How to Update the Communication Security Passphrase

This task describes how to update the Communication Security passphrase on the ALM-Performance Center system components.

To learn more about ALM-Performance Center communication security, see ["ALM Performance Center Communication Security" on the previous page](#).

This task includes the following steps:

- ["Update the Communication Security passphrase on ALM" below](#)
 - ["Update the Communication Security passphrase on the Performance Center components" below](#)
1. Update the Communication Security passphrase on ALM
 - a. In Site Administration, update the **COMMUNICATION_SECURITY_PASSPHRASE** default parameter. For details, see the *HP Application Lifecycle Management Administrator Guide*.
 - b. Restart the HP Application Lifecycle Management service on the ALM server.
 2. Update the Communication Security passphrase on the Performance Center components

The System Identity Utility is installed on the Performance Center Server. You use this utility to update the Communication Security passphrase on the Performance Center Server and hosts from one centralized location.

- a. From the Performance Center Server installation's bin directory, open the System Identity Utility (<**Performance Center Server Installation directory**>/bin/IdentityChangerUtil.exe).

Note: You can run this utility from any one of the Performance Center Servers in the system.

- b. Enter the ALM details to connect to ALM.

- c. The System Identity Utility opens. For user interface details, see ["System Identity Utility Window" on page 500](#).

In the **Communication Security Passphrase** section, select **Change**, and enter the new Communication Security passphrase.

- d. Click **Apply**.

How to Change the System User

You use the System Identity Utility, installed on the Performance Center Server, to change the system user on the Performance Center Server and hosts.

When you change the system user, or a user's password, the System Identity Utility updates the Performance Center Server and hosts.

To learn more about the Performance Center system user, see ["Performance Center System User" on page 495](#).

This task includes the following steps:

- ["Prerequisites" below](#)
- ["Launch the System Identity Utility on the Performance Center Server" below](#)
- ["Change the details of the Performance Center user" on the next page](#)
- ["Verify that the system user was changed on the Performance Center Server" on the next page](#)

1. Prerequisites

- When changing the system user, Performance Center must be down. That is, all users must be logged off the system and no tests may be running.
- When changing the user password:
 - Ensure that each host is listed in the Machines table under **one alias only**.
 - In the case of a domain user, when the domain IT team notifies you that the password is to be changed, you need to temporarily change the Performance Center system user on the Performance Center Server and hosts to a different user. After the domain IT team has changed the password of the domain user and has notified you of this change, you need to change the Performance Center system user back to the domain user on the Performance Center Server and hosts.

2. Launch the System Identity Utility on the Performance Center Server

- a. In the Performance Center Server installation's **bin** directory, open the System Identity Utility

(<Performance Center Server Installation directory>/bin/IdentityChangerUtil.exe).

- b. Enter the ALM details to connect to ALM.

The System Identity Utility opens. For user interface details, see ["System Identity Utility Window" on page 500](#).

3. Change the details of the Performance Center user

Enter the relevant details to update and click **Apply**. The utility updates the Performance Center Server and hosts, starting with the Performance Center Server.

In the lower part of the utility window, the **Machines** table displays the status of each machine during the configuration process.

If the utility is unable to change the user on the Performance Center Server, it stops the configuration, rolls back the change, and issues a message explaining why the change cannot be made. Correct the error and click **Apply** again.

When configuration completes successfully on the Performance Center Server, the utility proceeds with the configuration of the hosts. The utility attempts to configure all the hosts, even if the configuration on one or more hosts is unsuccessful. In this case, after the utility has attempted to configure all the hosts, correct the errors on the failed hosts, and click **Reconfigure**. The utility runs again on the whole system.

4. Verify that the system user was changed on the Performance Center Server
 - a. Open IIS Manager. Under **Sites > Default Web Site**, choose a virtual directory.
 - b. Under **Authentication** select **Anonymous Authentication**. Verify that the anonymous user defined was changed for the following virtual directories: **PCS**, **LoadTest** and **Files** (a virtual directory in LoadTest).
 - c. Check in the **PCQCWSAppPool** and **LoadTestAppPool** application pools that the identity is the Performance Center user.

Required Policies for the Performance Center System User

This section describes the policies required for the Performance Center system user.

Note: This section applies to:

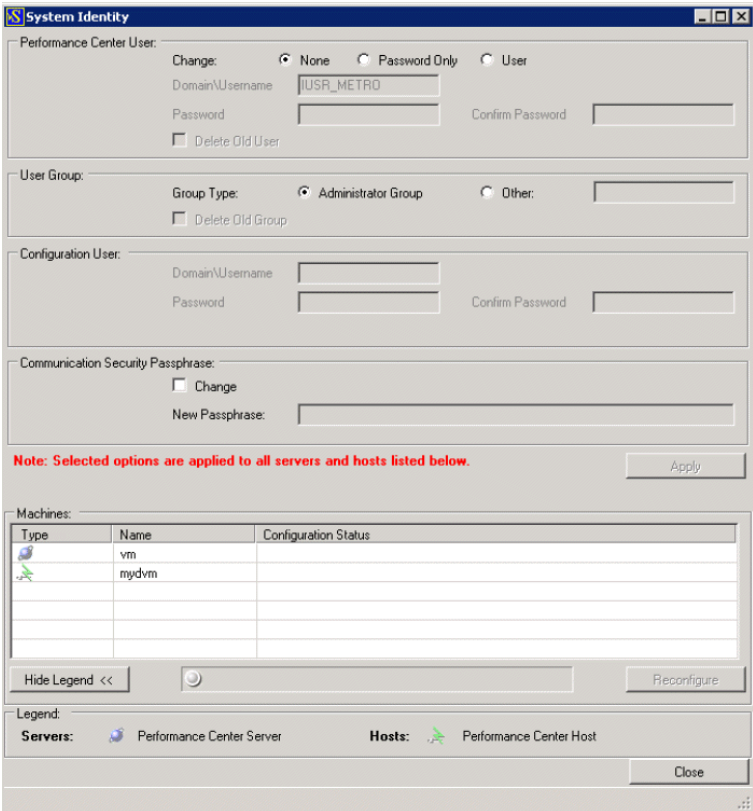
- An administrative or non-administrative Performance Center user
- All Performance Center servers and hosts

The Performance Center user must be granted all of the following policies:

Policy	Reason
Create global object	For Autolab running Vusers on the Controller.
Batch logon rights	The minimum policies required to run Web applications.
Service logon rights	The minimum policies required to run Web applications.
Access this computer from the network	The minimum policies required to run Web applications.
Log on locally	Required by infra services. For example, after reboot, the system logs in with the Performance Center system user.

System Identity Utility Window

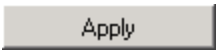



This utility enables you update the ALM-Performance Center Communication Security passphrase, as well as the Performance Center system user and/or password on the Performance Center Server and hosts from one centralized location.



To access	From the Performance Center Server installation's bin directory, open the System Identity Utility (<Performance Center Server Installation directory>/bin/IdentityChangerUtil.exe).
Important information	<ul style="list-style-type: none">• This utility does not apply changes to UNIX machines, Standalone Load Generators, or machines that are located over the firewall.• When updating the Communication Security passphrase, it is essential that it is updated in ALM as well.• This utility applies changes to the Performance Center servers and hosts listed in the Machines grid.• When changing the system user, Performance Center must be down. That is, all users must be logged off the system and no tests may be running.

Relevant tasks	<ul style="list-style-type: none"> • "How to Change the System User" on page 497 • "How to Update the Communication Security Passphrase" on page 496
See also	<ul style="list-style-type: none"> • "Performance Center System User" on page 495 • "ALM Performance Center Communication Security" on page 495

User interface elements are described below:

UI Elements	Description
	Applies the selected changes on the Performance Center Server and hosts, starting with the Performance Center Server.
 	Hides/shows the legend.
	If, when applying a change, there are errors on any of the Performance Center hosts, troubleshoot the problematic host machines, then click Reconfigure . The utility runs again on the Performance Center Server and hosts.

UI Elements	Description
Performance Center User	<p>The Performance Center system user details.</p> <ul style="list-style-type: none"> • Change. Enables you to select which detail to change. <ul style="list-style-type: none"> ■ None. Do not change the user's name or password. ■ Password Only. Enables you to change only the Performance Center system user's password. Note: When changing the password: <ul style="list-style-type: none"> - Ensure that each host is listed in the Machines table under one alias only. - In the case of a domain user, when the domain IT team notifies you that the password is to be changed, you need to temporarily change the Performance Center system user on the Performance Center Server and hosts to a different user. After the domain IT team has changed the password of the domain user and has notified you of this change, you need to change the Performance Center system user back to the domain user on the Performance Center Server and hosts. ■ User. Enables you to change the Performance Center system user name and password. • Domain\Username. The domain and user name of the Performance Center system user. • Password/Confirm Password. The password of the Performance Center system user. • Delete Old User. If you are changing the user, this option enables you to delete the previous user from the machine. Note: You cannot delete a domain user.
User Group	<p>The details of the user group to which the Performance Center system user belongs.</p> <ul style="list-style-type: none"> • Group type. The type of user group. <ul style="list-style-type: none"> ■ Administrator Group. Creates a user in the Administrators group with full administrator policies and permissions. ■ Other. Creates a local group under the Users group, granting policies and permissions as well as other Performance Center permissions.

UI Elements	Description
Configuration User	<p>If you are creating a non-administrative Performance Center system user, that is, if you selected Other under User Group, you need to configure a configuration user (a system user with administrative privileges) that the non-administrative Performance Center system user can impersonate when it needs to perform administrative tasks. For more details, refer to "Performance Center System User" on page 495.</p> <p>If you selected Delete Old User in the Performance Center User area, ensure that the configuration user you are configuring is not the same as the system user you are deleting. Alternatively, do not delete the old user.</p> <ul style="list-style-type: none"> • Domain\Username. The domain and user name of a system user that has administrator privileges on the Performance Center Server and hosts. • Password/Confirm Password. The password of a system user that has administrator privileges on the Performance Center Server and hosts.
Communication Security Passphrase	<p>The Communication Security passphrase that enables the Performance Center Server and hosts to communicate securely with ALM.</p> <ul style="list-style-type: none"> • Change. Enables you to change the passphrase. • New passphrase. The new Communication Security passphrase. <p>Note: This passphrase must be identical to the Communication Security passphrase defined in ALM. For details, refer to the "How to Update the Communication Security Passphrase" on page 496.</p>

UI Elements	Description
Machines grid	<ul style="list-style-type: none"> • Type. Indicates whether the machine type is a Performance Center server or a host. • Name. The machine name. • Configuration Status. Displays the configuration status on each of the Performance Center components. <ul style="list-style-type: none"> ■ Configuration complete. The system user configuration was completed. ■ Needs to be configured. The Performance Center server/host is pending configuration. Displayed only after the Performance Center Server configuration is complete. ■ Configuring..... The Performance Center Server/host in being configured. ■ Configuration failed. The Performance Center Server/host configuration failed. The utility displays the reason for failure together with this status. <div style="background-color: #f0f0f0; padding: 10px; margin-top: 10px;"> <p>Note:</p> <ul style="list-style-type: none"> ■ If the utility is unable to apply the change on the Performance Center Server, the utility stops the configuration, rolls back the change, and issues a message explaining why the change cannot be applied. Correct the error and click Apply again. ■ When configuration completes successfully on the Performance Center Server, the utility proceeds with the configuration of the hosts. The utility attempts to configure all the hosts, even if the configuration on one or more hosts is unsuccessful. In this case, after the utility has attempted to configure all the hosts, correct the errors on the failed hosts, and click Reconfigure. The utility runs again on the whole system. </div>

Chapter 40: Secure Host Communication

This chapter includes:

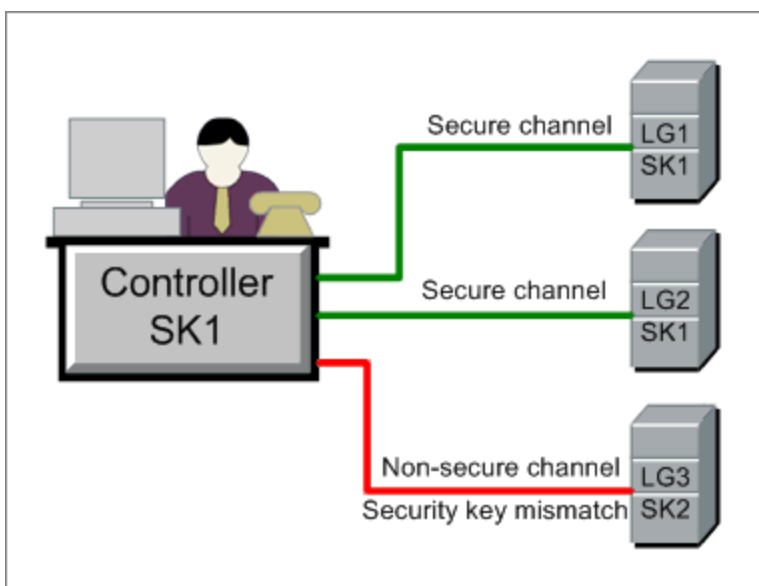
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Secure Host Communication Overview

The need to secure communication channels from hackers attacking the corporate networks is critical. Securing communication channels ensures confidentiality, integrity, and the user's authenticity within the scope of the load testing application.

Because load generators and Controllers serve so many projects, it is essential that the channels between Controllers and load generators remain opaque to all machines except for the Controllers and load generators participating in running performance tests or collating test data after a run.

Secure communication is established between the Controller and load generator hosts using a **security key**. Each host in the system must be set up with the identical security key. If security keys on the hosts do not match, secure communication cannot be established.



A host is in **secure mode** when it has a security key and security is enforced.

A host is in **non-secure mode**:

- if it has no security key
- if it has a security key but security is **not** enforced

When a host in secure mode tries to communicate with a host in non-secure mode, security is automatically enforced on the non-secure host—assuming their security keys match—allowing secure communication to be established.

Note:

- When you run a performance test, if secure communication cannot be established between a secure host (Controller or load generator) and another host participating in the test, the test cannot run.
- By definition, non-secure hosts can communicate with each other and participate in test runs over non-secure channels.

This can be summarized in the following table:

	Both Hosts in Secure Mode	Security Mode on Hosts Differ	Both Hosts in Non-Secure Mode
Security keys match	Test runs over secure channel	Test runs over secure channel	Test runs over non-secure channel
Security keys do not match	Test does not run	Test does not run	Test runs over non-secure channel

Host Security Configuration

When you install the hosts (Controllers and load generators), by default no security settings are defined on them, and communication channels between the hosts are not secure. To enforce secure communication between the hosts, you must configure security settings on each host machine immediately after installing the hosts.

When configuring these settings **for the first time**, to avoid configuration over non-secure channels, you must set the security on each host locally using the **Host Security Setup utility**. For details, see ["How to Configure Security Settings Locally on Hosts" on page 510](#).

After initial security configuration, you can update security settings locally or simultaneously across all the Performance Center hosts from a remote location using the **HP Host Security Manager utility**. This utility is installed on the same Performance Center Server. For details, see ["How to Update Host Security Settings Remotely" on page 511](#).

Remote Security Configuration

You can align security settings across all the Performance Center hosts simultaneously from a remote location using the **HP Host Security Manager utility**.

The utility lists all the Performance Center hosts, as well as the MI Listeners required to connect to the hosts that are over a firewall, where applicable.

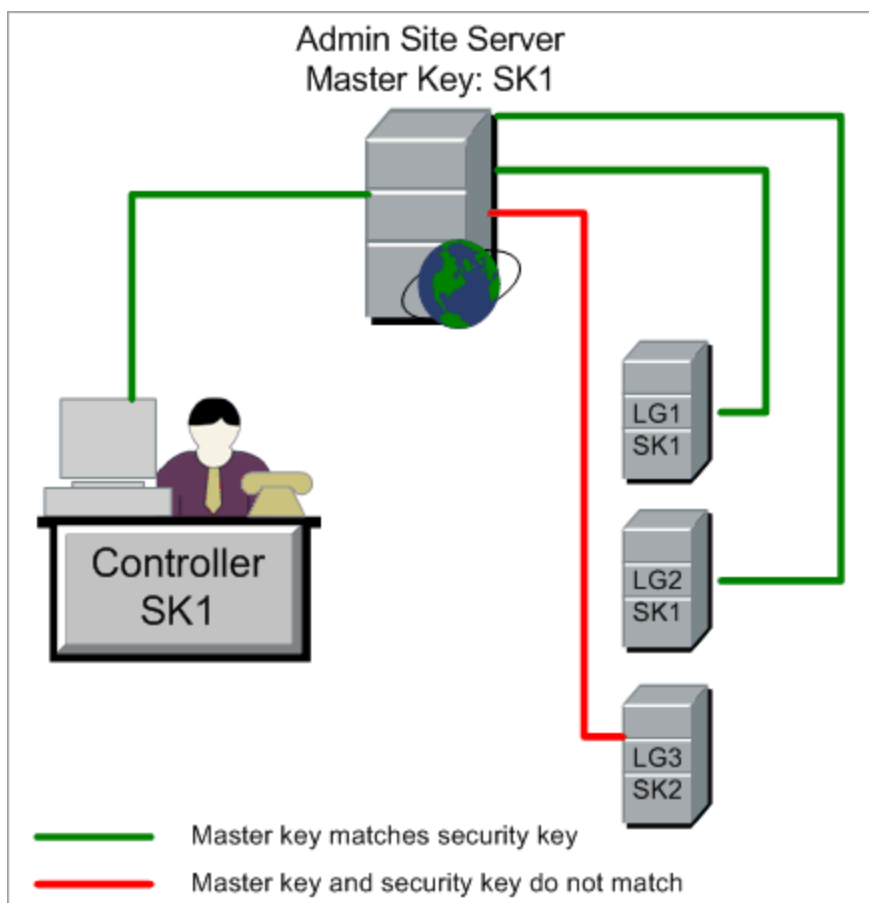
Using Host Security Manager, you can update the security key on all the hosts, or update the security mode on selected hosts. For details, see ["How to Update Host Security Settings Remotely" on page 511](#).

Master Security Key

To update security settings on the hosts, Host Security Manager uses a master key that matches the security keys on all the hosts. This enables secure communication between Host Security Manager and the hosts for the purpose of remotely updating the security settings.

If the master key and security key on a particular host do not match, Host Security Manager cannot update security settings on that host.

When you open Host Security Manager for the first time, you are prompted for a key. Host Security Manager stores this key as a master key for secure communication with the hosts. If you do not enter the key at this point, you are prompted for it again when you try to update the security settings.



Considerations for Updating Linux Load Generators

- Linux load generators that use rsh (remote shell) to connect to the Controller host cannot be updated using Host Security Manager. To update security settings on such load generators, use the local Host Security Setup utility. See ["How to Configure Security Settings Locally on Hosts"](#) on the next

[page](#).

- To update security settings on a Linux load generator using Host Security Manager, you must launch the load generator daemon for a user and manually grant write permissions to the user on **<installation folder>/config**.

Host Security Best Practices

- To avoid sending security settings over a non-secure channel, perform **initial configuration** of the security settings on each host locally (see ["How to Configure Security Settings Locally on Hosts" below](#)).
- Security settings should be changed once a month.
- Security settings can be updated:
 - manually on each host
 - remotely on all hosts simultaneously using the Host Security Manager utility

If the host's settings fail when using the Host Security Manager utility, you must update the settings manually.

How to Configure Security Settings Locally on Hosts

This task describes how to configure security settings locally on Controllers and load generators.

Note: This task is part of a higher-level task. For details, see ["How to Work with Performance Center Administration" on page 487](#).

Windows Hosts

1. On each host, launch the Host Security Setup utility (**Start > All Programs > HP Performance Center Host > Tools > Host Security Setup**).

For user interface details, see ["Host Security Setup Dialog Box" on page 515](#).

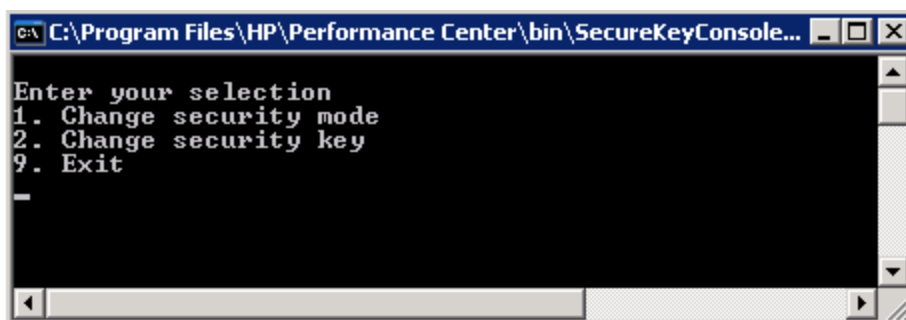
2. Select a security mode for the host.
3. If you selected to enforce secure communication, enter a security key (6 - 16 characters). Enter the key a second time for confirmation.

Linux Hosts

1. Log in as root user and change to tcsh.
2. Go to the **/opt/HP/HP_LoadGenerator** directory and type:

```
>source ./env.csh
```

3. Run **SecurityKeyConsole.exe**, located in the **<Installation_folder>/bin/** directory.



4. In the Console window, enter an option as follows:
 - To change the security mode, enter 1.
 - To change the security key, enter 2.
5. If you are changing the security mode:
 - To turn the security on, enter 1.
 - To turn the security off, enter 0.
6. If you are changing the security key, enter the new key. A valid key is 6 - 16 characters long.

How to Update Host Security Settings Remotely

This task describes how to use Host Security Manager to update security settings on the Performance Center hosts remotely, from the Performance Center Server.

Note: This task is part of a higher-level task. For details, see ["How to Work with Performance Center Administration" on page 487](#).

This task includes the following steps:

- ["Prerequisites" below](#)
- ["Register Performance Center hosts in Host Security Manager" below](#)
- ["Update the security settings" below](#)
- ["Results" on the next page](#)

1. Prerequisites

- Each host must have a security key defined on it, and all of the hosts' security keys must be identical.
- Host Security Manager must have a master security key that is identical to the security key on all of the hosts. For details, see ["Remote Security Configuration" on page 508](#).

2. Register Performance Center hosts in Host Security Manager

For Host Security Manager to communicate with the Performance Center hosts, you must first register the hosts in Host Security Manager.

Note: Every time you use Host Security Manager to update security settings, make sure that the list of hosts in Host Security Manager is updated.

- a. Open Host Security Manager: On the Performance Center Server, select **Start > All Programs > HP Performance Center Server > Tools > Host Security Manager**. For user interface details, see ["Host Security Manager Window" on page 514](#).
- b. Before opening, the tool prompts you for the ALM login credentials. Enter the credentials.
- c. In the Host Security Manager, click **Get Performance Center Hosts**. The list of hosts is updated as follows:
 - The hosts—and, where relevant, their associated MI Listeners—are imported from ALM into the utility.
 - If you are updating the list, hosts that are no longer in ALM are removed from the list.

3. Update the security settings

- a. Update the desired security setting:

- **Security key.** Click **Update Security Key**, enter the new key, and enter it again for confirmation.
 - **Security Mode.** Select the hosts in the list that you want to update. To select multiple hosts, hold down the CTRL key on your keyboard while selecting the relevant hosts. Click **Update Security Mode**, and select a security mode.
- b. Click **Update**.

Host Security Manager attempts to update the security setting on the hosts listed under **Update progress**. As it attempts to update each host, it displays the update status, **Updated** or **Failed**, before attempting to update the next host.

If a host is not updated successfully, check for possible reasons. You can stop the update process by clicking **Stop**.

If there is a mismatch between Host Security Manager's master security key and the host's security key, the Update Error dialog box opens, prompting you for an appropriate action:

- **Skip host.** Skip updating this host.
- **Establish a secure channel using this key.** Use a different security key to communicate securely with the host.
- **Communicate over non-secure channel.** Update the security setting over a non-secure channel. **This action is not recommended**, especially when updating the host security to secure mode. You should rather update the security setting locally on the host (see ["How to Configure Security Settings Locally on Hosts" on page 510](#)).

To apply the selected error-handling action to all similar mismatches, select **Use this solution with all similar mismatches**.

Note: The security key update also updates Host Security Manager's master security key. If the update fails on all of the hosts, Host Security Manager's master key is not updated.

4. Results

If the update was successful, Host Security Manager displays the time and status of the security key/mode update for each host.

Secure Host Communication User Interface

This section includes:

Host Security Manager Window	514
Host Security Setup Dialog Box	515


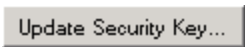
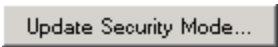
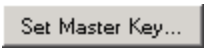

Update Security Key Dialog Box	516
Update Security Mode Dialog Box	517

Host Security Manager Window

This window enables you to update security settings remotely on all of the hosts in the performance testing system.

To access	On the Performance Center server select Start > All Programs > HP Performance Center Server > Tools > Host Security Manager .
Important information	<ul style="list-style-type: none"> You must provide Host Security Manager with a master security key before you can update the security settings. Every time you use Host Security Manager to update security settings, click Get Performance Center Hosts to make sure that the list of hosts is up to date.
Relevant tasks	"How to Update Host Security Settings Remotely" on page 511
See also	" Secure Host Communication Overview " on page 507

User interface elements are described below (unlabeled elements are shown in angle brackets):

UI Elements	Description
	Imports all the hosts defined in ALM into Host Security Manager.
	Opens the Update Security Key dialog box, enabling you to update the security key on all the hosts. For details, see " Update Security Key Dialog Box" on page 516 .
	Opens the Update Security Mode dialog box, enabling you to update the security mode on selected hosts. For details, see " Update Security Mode Dialog Box" on page 517 .
	Opens the Set Master Key dialog box where you update Host Security Manager's master security key.
	Opens the History dialog box, enabling you to view the history of updates made to the hosts. The information displayed includes the date of the update, the operation (key/mode update), and the update status (Passed/Failed).

UI Elements	Description
<Hosts table>	<p>Displays the following information:</p> <ul style="list-style-type: none"> • Host Name/IP. The name or IP address of the host. • Host Type. The type of host: Controller/Load Generator. • MI Listener. When the host is over a firewall, the name of the MI Listener through which the host communicates with the other hosts. • Last Key Update. The last time the security key was updated. • Key Update Status. The status of the last security key update. • Last Security Mode Update. The last time the security mode was updated. • Security Mode Update Status. The status of the last security mode update. <p>Tip: You can sort the details on this page in ascending or descending order by clicking the heading of the column by which you want to sort. Click the column heading again to reverse the sort order.</p>

Host Security Setup Dialog Box

This dialog box enables you to update a host's security settings manually.

To access	On the host machine, select Start > All Programs > Performance Center Host > Tools > Host Security Setup
Important information	<p>When configuring security settings on hosts for the first time, to avoid configuration over non-secure channels, it is recommended to configure security settings on each host locally using the Host Security Setup utility.</p> <p>After initial security configuration, you can update security settings locally, or simultaneously across all the hosts in the system using the HP Host Security Manager utility installed on the Performance Center Server. For details, see "Remote Security Configuration" on page 508.</p>
Relevant tasks	"How to Configure Security Settings Locally on Hosts" on page 510
See also	"Host Security Configuration " on page 508

User interface elements are described below (unlabeled elements are shown in angle brackets):


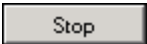
UI Elements	Description
Select a security mode	<p>Select one of the following security modes:</p> <ul style="list-style-type: none"> • Allow non-secure communication. Allows the host to communicate with other machines over a non-secure channel. (Default) • Enforce secure communication. Enforces the host to communicate with other machines over a secure channel. If you select this option, you must provide the key (6 - 16 characters long) matching the security key on the other hosts with which it needs to communicate.

Update Security Key Dialog Box

This dialog box enables you to update the security key simultaneously on all the hosts.

To access	In Host Security Manager, click Update Security Key .
Important information	<p>When you update the security key, the Host Security Manager's master security key is also updated.</p> <p>If the update fails on all the hosts, the Host Security Manager's master key is not updated.</p>
Relevant tasks	"How to Update Host Security Settings Remotely" on page 511

User interface elements are described below:



UI Elements	Description
	Updates the security key on all of the hosts.
	Stops updating the hosts.
Security Key/Confirm Security Key	<p>Enter the new security key to be updated on all the hosts, and a second time for confirmation.</p> <p>Note: The key must be 6 - 16 characters long.</p>
Update progress	Displays the hosts and their status during and after the update.

Update Security Mode Dialog Box

This dialog box enables you to update the security mode simultaneously on selected hosts.

To access	In Host Security Manager, click Update Security Mode .
Relevant tasks	"How to Update Host Security Settings Remotely" on page 511

User interface elements are described below:

UI Elements	Description
	Updates the security mode on the selected hosts.
	Stops updating the hosts.
Security mode	Select a security mode: <ul style="list-style-type: none">• Non-secure. Allows non-secure communication.• Secure. Enforces secure communication.
Update progress	Displays the hosts, their previous status (if known), and their status during and after the update.

Troubleshooting and Limitations

This section describes troubleshooting and limitations for secure host communication.

Cannot Run Test Over Secure Channels

Problem description: When you try to run a test over secure channels, the test cannot initialize because it cannot connect to a Controller or load generator.

Troubleshooting:

Verify that the reason the test cannot run is because of a security key mismatch: try to run the same test with the same hosts from a local Controller.

If a Security Key Mismatch error is displayed in the error log, the keys do not match. Align the security keys on all the host machines.

Test Run Fails. Load Generator Status is Changed to Resource Failure

Problem description: When trying to run a test over secure channels, the test fails to run and the load

generator status changes to **Resource Failure**.

Troubleshooting: To re-enable the load generators, manually reset the status on each affected load generator to **Operational**.

When Opening Host Security Manager Get Unhandled Exception

Problem description: When you open Host Security Manager for the first time, a message displays the following exception: **Unhandled exception has occurred....**

Troubleshooting: Click **Continue** to close the message window.

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Feedback on User and Administrator Guide (ALM Performance Center 12.20)

Just add your feedback to the email and click send.

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