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Using Application Performance Lifecycle

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Mercury Business Availability Center

Using Application Performance Lifecycle

Version 6.2

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Mercury Business Availability Center, Version 6.2
Using Application Performance Lifecycle

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Mercury Interactive Corporation
379 North Whisman Road
Mountain View, CA 94043
Tel: (650) 603-5200
Toll Free: (800) TEST-911
Customer Support: (877) TEST-HLP
Fax: (650) 603-5300

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If you have any comments or suggestions regarding this document, please send them by e-mail to documentation@mercury.com.

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Welcome to Using Application Performance Lifecycle

This guide describes how to work with the Application Performance Lifecycle application.

How This Guide Is Organized

The guide contains the following chapters:

Chapter 1 Introduction to Application Performance Lifecycle

Introduces the Application Performance Lifecycle application and describes the Application Performance Lifecycle workflow.

Chapter 2 Working with Application Performance Lifecycle Reports

Describes how to work with Application Performance Lifecycle's Business Process Distribution, Typical Transaction Load, and Location Load Analysis reports in order to generate VuGen script templates and pinpoint other data that can be incorporated in your Mercury Performance Center load test.

Chapter 3 Refining your Script Template in VuGen

Describes how to customize the scripts you generated using Application Performance Lifecycle so that you can use them in a Performance Center load test.

Chapter 4 Configuring and Running a Load Test

Describes how to configure and run a Performance Center load test or a LoadRunner scenario that incorporates the Application Performance Lifecycle-generated VuGen scripts as well as other data from the Application Performance Lifecycle reports.

Chapter 5 Working with the Central Repository Service (CRS)

Describes how to export Application Performance Lifecycle reports to the Central Repository Service (CRS), generate a script template and save it in the CRS, open scripts saved in the CRS, retrieve reports saved in the CRS, and upload scripts saved in the CRS to Performance Center.

Who Should Read This Guide

This guide is intended for quality assurance engineers who want to construct Performance Center load tests based on Real User Monitor transaction data, so that these load tests can more accurately simulate load.

Readers of this guide should be knowledgeable about navigating and using enterprise applications, and be familiar with Mercury Business Availability Center and enterprise monitoring and management concepts. However, this guide assumes that Real User Monitor application, page, and transaction configuration for Application Performance Lifecycle will be performed in conjunction with the person in your organization who is responsible for Real User Monitor administration.

In addition, it is assumed that readers of this guide are quite knowledgeable in working with VuGen and highly skilled in constructing and running load tests using Performance Center.

Getting More Information

For information on using and updating the Mercury Business Availability Center Documentation Library, reference information on additional documentation resources, typographical conventions used in the Documentation Library, and quick reference information on deploying, administering, and using Mercury Business Availability Center, refer to *Getting Started with Mercury Business Availability Center*.

1

Introduction to Application Performance Lifecycle

Application Performance Lifecycle is designed to integrate between Mercury Business Availability Center and Mercury Performance Center, enabling you to construct load tests based on real-user transaction data collected by the Real User Monitor.

This chapter describes:	On page:
Overview of Application Performance Lifecycle	1
Working with Application Performance Lifecycle	2

Overview of Application Performance Lifecycle

Application Performance Lifecycle enables quality assurance engineers to design load tests based on data leveraged from a production environment, rather than a testing environment. Using Application Performance Lifecycle, the QA engineer can construct load tests that are based on real-user transaction data and are therefore a more accurate simulation of load than standard Performance Center load tests. Application Performance Lifecycle thus increases the effectiveness of load tests and provides the QA team with more accurate test results.

To achieve this goal, Application Performance Lifecycle provides the following:

- Production Analysis reports from which the QA engineer can extract real-user transaction data to be used in Performance Center load tests
- the ability to create Virtual User Generator (VuGen) script templates, based on real-user activity

Working with Application Performance Lifecycle

Working with Application Performance Lifecycle involves performing the following procedures:

1 **Ensure that Real User Monitor transactions are defined and that a transaction snapshot collection schedule is configured.**

For details on configuring Real User Monitor transactions and a transaction snapshot collection schedule, see "Configuring the Real User Monitor" in *End User Management Data Collector Configuration*.

2 **In Application Performance Lifecycle's Production Analysis reports, analyze production performance data, export the data you want to use when building a Performance Center load test, select the real-user transactions and sessions you want to use in your VuGen scripts, and generate script templates.**

For details on extracting the data you require from the Production Analysis reports, see Chapter 2, "Working with Application Performance Lifecycle Reports."

3 **In VuGen, refine the script templates.**

For details on the customization required to adjust the scripts generated by Application Performance Lifecycle for use in a Performance Center load test, see Chapter 3, "Refining your Script Template in VuGen."

4 In Performance Center or LoadRunner, set up and run a load test or scenario that incorporates the scripts you created and refined and emulates the real-user behavior displayed in the Production Analysis reports.

For details on how to configure and run a load test in Performance Center or a scenario in LoadRunner that incorporates production data, see Chapter 4, "Configuring and Running a Load Test."

2

Working with Application Performance Lifecycle Reports

You use Application Performance Lifecycle's Production Analysis reports to pinpoint data that you want to use in building your Performance Center load test.

This chapter describes:	On page:
Business Process Distribution Report	6
Typical Transaction Load Report	15
Location Load Analysis Report	21
Using Application Performance Lifecycle Reports – A Case Scenario	25

Business Process Distribution Report

The Business Process Distribution report shows transaction run and transaction response time data over time for the configured transactions monitored by the Real User Monitor. You can drill down in this report to view data for each session in which the displayed transactions were run.

In addition, you use the Business Process Distribution report to create VuGen script templates that can be used in a Performance Center load test. You can create a VuGen script template in one of two ways:

- by instructing Application Performance Lifecycle to automatically generate a script template based on a session it selects
- by manually selecting the specific session you want to include in your script template

This section includes the following topics:

- "Generating the Business Process Distribution Report" on page 6
- "Analyzing the Business Process Distribution Report" on page 10
- "Replaying a Session" on page 14
- "Generating a Script Template" on page 15

Generating the Business Process Distribution Report

You select the time range and granularity for the Business Process Distribution report as you would for any other Mercury Business Availability Center report. For details, see "Working in Reports" in *Working with Applications*. Note that if you already selected a time range in one of the other Production Analysis reports, the time range you previously selected will automatically be displayed in the Business Process Distribution report.

You then select one of two filter options – **Show X transactions** or **Transaction Selection**:

- **Show X transactions** – Choose the number of real-user transactions you want the report to display and the criteria according to which you want Application Performance Lifecycle to select the transactions it displays.

You can choose to display the transactions:

- **with the greatest number of runs** – If you select this option, Application Performance Lifecycle displays the real-user transactions that experienced the highest total number of run instances.
- **with the worst response times** – If you select this option, Application Performance Lifecycle displays the real-user transactions that experienced the greatest overall transaction time.
- **with the highest session popularity** – If you select this option, Application Performance Lifecycle displays the real-user transactions that were most popular among the sessions. Popularity is determined by dividing the number of unique sessions running a transaction by the total number of sessions.
- **with the lowest availability** – If you select this option, Application Performance Lifecycle displays the real-user transactions that experienced the lowest transaction availability.

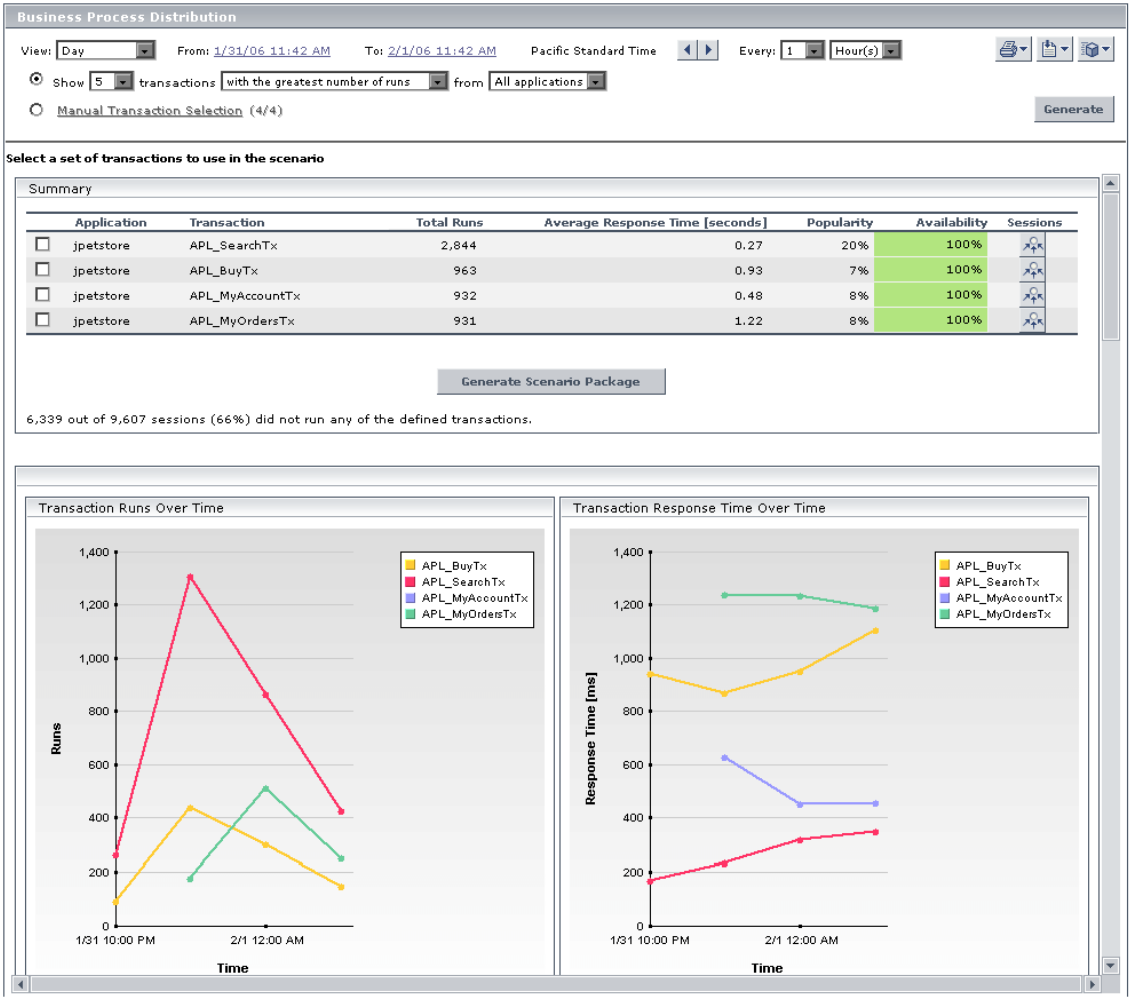
You can choose to display the transactions from all monitored applications that meet the selected criteria, or you can choose to display only transactions that were defined for a specific application.

- **Transaction Selection** – In the Select Transactions dialog box, choose **All applications** to display the transactions from all monitored applications, or choose a specific application to display only transactions that were defined for that application. Select the transaction(s) for which you want to view data, and click the first arrow. To view data for all the transactions listed, click the second arrow. Click **OK** to close the dialog box and save your settings.

Note: If you already selected transactions in one of the other Production Analysis reports, these transactions will automatically be selected in the Business Process Distribution report.

When you click the **Generate** button, the Business Process Distribution report displays the following:

- a summary table listing each transaction, the application with which the transaction is associated, the total number of run instances for the transaction, the average total transaction time, the percentage of unique sessions in which the transaction was run, and the transaction's availability. (Note that the color-coding of the Availability column is based on the transaction's availability in relation to the transaction availability threshold you defined in Monitor Administration.)
- the percentage of sessions in which the displayed transactions were run, which provides you with an indication of the number of sessions covered by the Real User Monitor transactions you configured
- the Transaction Runs Over Time graph
- the Transaction Response Time Over Time graph


Business Process Distribution
View: Day
From: 1/31/06 11:42 AM
To: 2/1/06 11:42 AM
Pacific Standard Time
Every: 1 Hour(s)
Show 5 transactions with the greatest number of runs from All applications
Manual Transaction Selection (4/4)
Generate
Select a set of transactions to use in the scenario
Summary
Application Transaction Total Runs Average Response Time [seconds] Popularity Availability Sessions
jpetstore APL_SearchTx 2,844 0.27 20% 100%
jpetstore APL_BuyTx 963 0.93 7% 100%
jpetstore APL_MyAccountTx 932 0.48 8% 100%
jpetstore APL_MyOrdersTx 931 1.22 8% 100%
Generate Scenario Package
6,339 out of 9,607 sessions (66%) did not run any of the defined transactions.
Transaction Runs Over Time
Runs
Time
1/31 10:00 PM
2/1 12:00 AM
APL_BuyTx
APL_SearchTx
APL_MyAccountTx
APL_MyOrdersTx
Transaction Response Time Over Time
Response Time [ms]
Time
1/31 10:00 PM
2/1 12:00 AM
APL_BuyTx
APL_SearchTx
APL_MyAccountTx
APL_MyOrdersTx

Note: You can print the report, produce a printer-friendly version of the report in .pdf format, format the report in .csv or .xml format, send the report by e-mail, publish the report with updated data, or save the report to the report repository using the toolbar at the top right-hand corner of the report. For details, see "Sharing and Storing Reports" in *Working with Applications*.



If the Central Repository Service (CRS) is enabled, you can export a PDF of the report to the CRS by selecting **Export > Central Repository Service**. For details on exporting the report to the CRS, see "Exporting a Report to the CRS" on page 42.

Analyzing the Business Process Distribution Report

You use the Business Process Distribution report to pinpoint the Real User Monitor transactions with the greatest number of runs and the highest session popularity. You then drill down in this report to view the individual sessions in which these transactions were run. You can also use the Business Process Distribution report to pinpoint the transactions that were problematic in terms of response time and availability and drill down so that you can isolate the sessions, and pages within the sessions, that were problematic.

You select a session—either one that was popular and contained a large number of transaction runs, or one that was problematic in terms of response time or availability—as the basis for your VuGen script template. Alternatively, you can select transactions from the Business Process Distribution report and instruct Application Performance Lifecycle to automatically select a session for each transaction and generate a VuGen script template based on this session.

Note: You can use this report in conjunction with the Typical Transaction Load report to ensure that the transactions you select reflect typical transaction behavior during the selected time period. For details on using the Business Process Distribution report in conjunction with the Typical Transaction Load report, see "Using Application Performance Lifecycle Reports – A Case Scenario" on page 25.

To analyze the Business Process Distribution report:

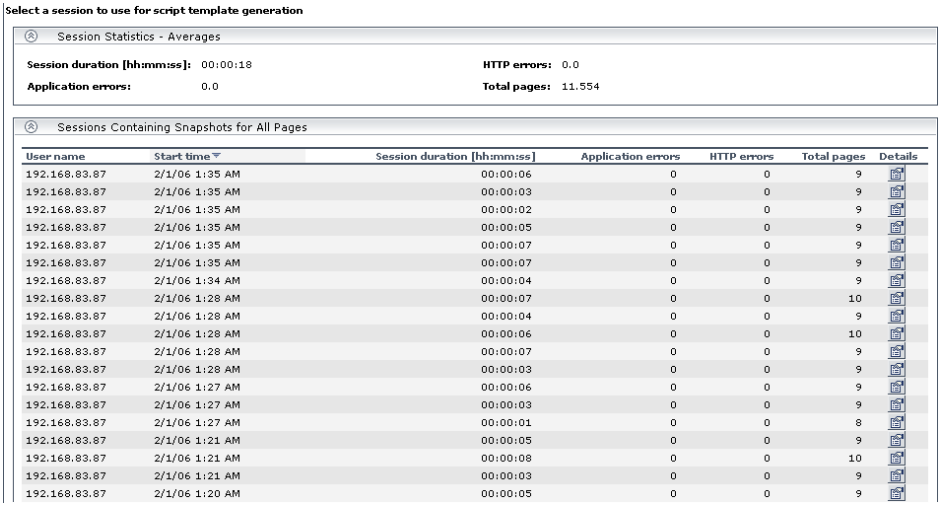
1 Select a transaction, based on the total number of runs for the transaction as well as the transaction's session popularity (or response time/availability data), and click the **View Sessions** button.



Note: You can also select one or more transactions and click **Generate Scenario Package** to instruct Application Performance Lifecycle to automatically select a session for each transaction and generate a VuGen script template based on this session. For each transaction, Application Performance Lifecycle selects the session with a combination of the greatest number of runs, the shortest duration, and the least number of errors. Application Performance Lifecycle then generates a VuGen script template based on each session, as well as a Summary report containing the Business Process Distribution report, the Typical Transaction Load report, and the Location Load Analysis report for the selected transactions.

If you have enabled the CRS on the Infrastructure Settings Manager page, you are prompted to save the scenario package in the repository. For details on enabling the CRS and saving the package in the repository, see "Saving a Script Template or Scenario Package in the CRS" on page 43. If the CRS is not enabled, you are prompted to save the scenario package in your regular directory structure.

When you click the **View Sessions** button, The Sessions page opens, displaying data for each session in which the selected transaction was run and a transaction snapshot was collected, as well as certain key statistic averages of all the displayed sessions.



Select a session to use for script template generation

Session Statistics - Averages

Session duration [hh:mm:ss]:	00:00:18	**HTTP errors:**	0.0
Application errors:	0.0	**Total pages:**	11.554

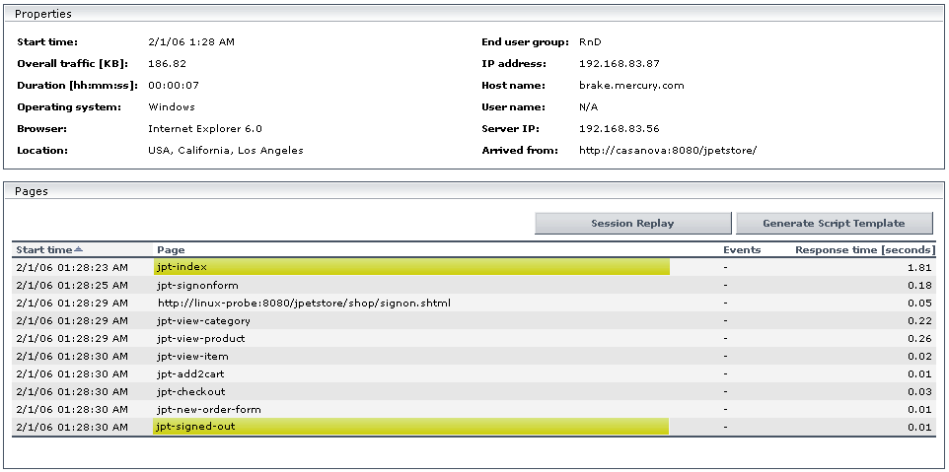
Sessions Containing Snapshots for All Pages

User name	Start time	Session duration [hh:mm:ss]	Application errors	HTTP errors	Total pages	Details
192.168.83.87	2/1/06 1:35 AM	00:00:06	0	0	9	
192.168.83.87	2/1/06 1:35 AM	00:00:03	0	0	9	
192.168.83.87	2/1/06 1:35 AM	00:00:02	0	0	9	
192.168.83.87	2/1/06 1:35 AM	00:00:05	0	0	9	
192.168.83.87	2/1/06 1:35 AM	00:00:07	0	0	9	
192.168.83.87	2/1/06 1:35 AM	00:00:07	0	0	9	
192.168.83.87	2/1/06 1:34 AM	00:00:04	0	0	9	
192.168.83.87	2/1/06 1:28 AM	00:00:07	0	0	10	
192.168.83.87	2/1/06 1:28 AM	00:00:04	0	0	9	
192.168.83.87	2/1/06 1:28 AM	00:00:06	0	0	10	
192.168.83.87	2/1/06 1:28 AM	00:00:07	0	0	9	
192.168.83.87	2/1/06 1:28 AM	00:00:03	0	0	9	
192.168.83.87	2/1/06 1:27 AM	00:00:06	0	0	9	
192.168.83.87	2/1/06 1:27 AM	00:00:03	0	0	9	
192.168.83.87	2/1/06 1:27 AM	00:00:01	0	0	8	
192.168.83.87	2/1/06 1:21 AM	00:00:05	0	0	9	
192.168.83.87	2/1/06 1:21 AM	00:00:08	0	0	10	
192.168.83.87	2/1/06 1:21 AM	00:00:03	0	0	9	
192.168.83.87	2/1/06 1:20 AM	00:00:05	0	0	9	

For additional information on the Sessions page, see “Session Analyzer Report” in *Using End User Management*.

2 Select the session you want to use for your VuGen script, based on page hit and error data, and click the **View Session Details** button. The Session Details page opens, displaying general session and event information, as well a list of all the pages accessed as part of the session and the events and

response time for each page. The pages that were included in the selected transaction's definition are highlighted.



Properties

Start time:	2/1/06 1:28 AM	**End user group:**	RnD
Overall traffic [KB]:	186.82	**IP address:**	192.168.83.87
Duration [hh:mm:ss]:	00:00:07	**Host name:**	brake.mercury.com
Operating system:	Windows	**User name:**	N/A
Browser:	Internet Explorer 6.0	**Server IP:**	192.168.83.56
Location:	USA, California, Los Angeles	**Arrived from:**	http://casanova:8080/jpetstore/

Pages

Session Replay | Generate Script Template

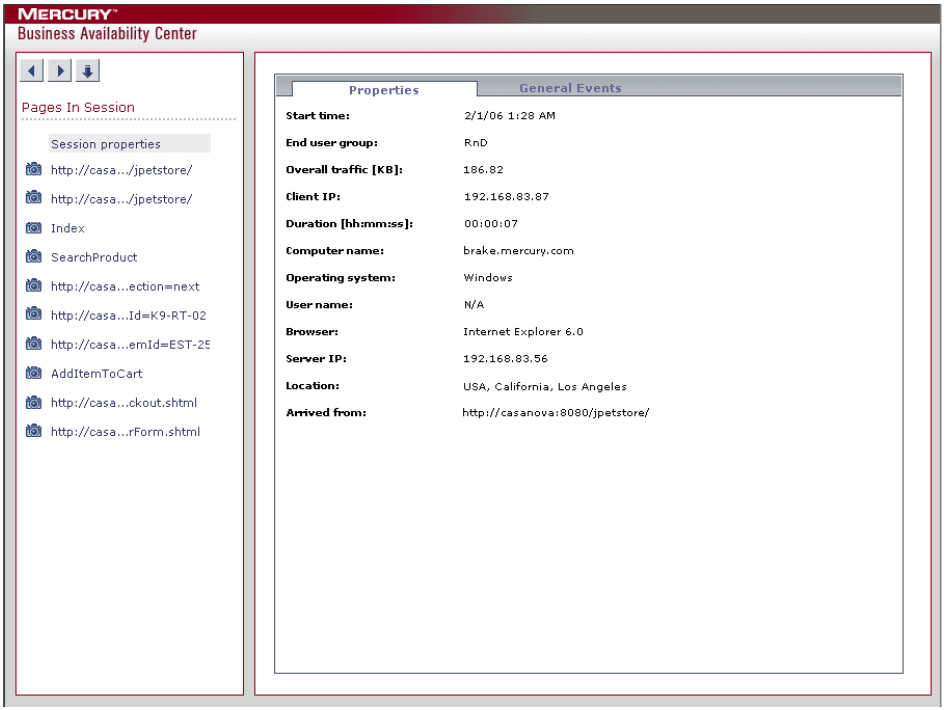
Start time	Page	Events	Response time [seconds]
2/1/06 01:28:23 AM	jpt-index	-	1.81
2/1/06 01:28:25 AM	jpt-signonform	-	0.18
2/1/06 01:28:29 AM	http://linux-probe:8080/jpetstore/shop/signon.shtml	-	0.05
2/1/06 01:28:29 AM	jpt-view-category	-	0.22
2/1/06 01:28:29 AM	jpt-view-product	-	0.26
2/1/06 01:28:30 AM	jpt-view-item	-	0.02
2/1/06 01:28:30 AM	jpt-add2cart	-	0.01
2/1/06 01:28:30 AM	jpt-checkout	-	0.03
2/1/06 01:28:30 AM	jpt-new-order-form	-	0.01
2/1/06 01:28:30 AM	jpt-signed-out	-	0.01

Note: Event data is displayed only if you configured events for the application with which the transaction you are viewing is associated. For information on events and their configuration, see "Configuring Events" in *End User Management Data Collector Configuration*.

For additional information on the Session Details page, see "Viewing Session Details" in *Using End User Management*.

Replaying a Session

To replay a session page by page in your Web browser, click **Session Replay**. The Session Flow window opens, displaying two panes.



In the left pane, a list of all the pages in the session is displayed, as well as an entry for the session properties. In the right pane are two tabs. If you click **Session properties** in the left pane list, the **Properties** tab displays general session properties and the **General Events** tab displays the name and description of configured events that occurred in the session. If you click a page in the left pane list, the **Snapshot View** tab displays the snapshot of the page, if it exists, and the **Details** tab displays general page details and configured events that occurred on the page. To view the HTML source code of a snapshot, click the **View Source** button at the bottom of the snapshot. A new window opens displaying the source code.



To navigate through the pages of the session, click the **Previous** and **Next** arrows in the top left corner. To save the session as an HTML file, click the **Save** button. If you have enabled the CRS, the session is saved in the repository. Otherwise, the session is saved to the directory you specify within your file system.

Generating a Script Template

From the Session Details page, you click **Generate Script Template** to generate a template for your VuGen script that includes the pages in the current session. If you have enabled the CRS on the Infrastructure Settings Manager page, you are prompted to save the script template in the repository. For details on enabling the CRS and saving scripts in the repository, see "Saving a Script Template or Scenario Package in the CRS" on page 43. If the CRS is not enabled, you are prompted to save the script template in your regular directory structure.

Note that you should generate a script template for each transaction you would like to include in your Performance Center load test.

Tip: Save all your script templates in the same directory so that they are all easily accessible when constructing a Performance Center load test.

Typical Transaction Load Report

The Typical Transaction Load report shows the average transaction load (the number of Real User Monitor transaction runs) during a typical hour, day, or week within a larger time frame that you select. You use the data in this report to view the typical load on your system during specific time frames, which can assist you in determining the time frame you want to use for your Performance Center load test.

In addition, you can use the data in this report, together with the data in the Business Process Distribution report, to assist you in selecting the transactions to include in your VuGen script templates.

This section includes the following topics:

➤ "Generating the Typical Transaction Load Report" on page 16

➤ "Analyzing the Typical Transaction Load Report" on page 19

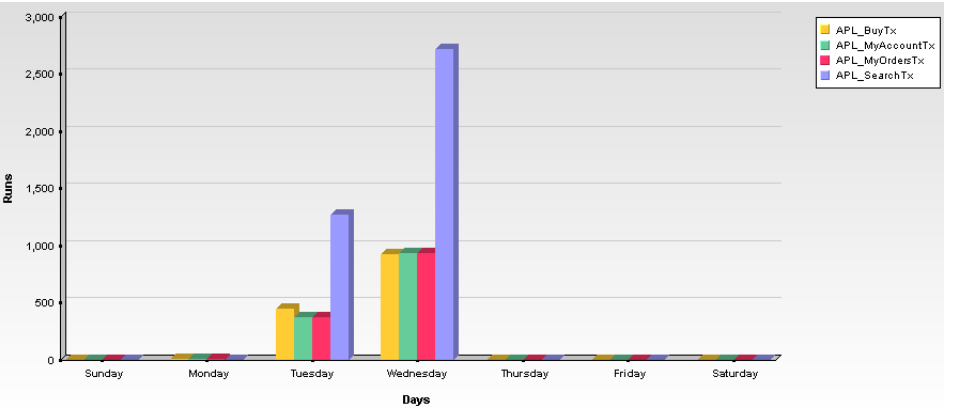
Generating the Typical Transaction Load Report

From the **View a typical** list, select **Hour**, **Day**, or **Week**. Then select the time range during which you want to view a typical hour, day, or week, the way you would select the time range for any other Mercury Business Availability Center report. For details, see "Working in Reports" in *Working with Applications*. Note that if you already selected a time range in the other Business Process Distribution report, the time range you previously selected will automatically be displayed in the Typical Transaction Load report.

By default, the Typical Transaction Load report displays data for the transactions you previously selected in the Business Process Distribution report. If the Typical Transaction Load report is the first Production Analysis report you are accessing, or if you want to display data for a different group of transactions, click the **Transaction Selection** link. In the Select Transactions dialog box, choose **All applications** to display the transactions from all monitored applications, or choose a specific application to display only transactions that were defined for that application. Select the transaction(s) for which you want to view data, and click the first arrow. To view data for all the transactions listed, click the second arrow. Click **OK** to close the dialog box and save your settings.

When you click the **Generate** button, the Typical Transaction Load report displays the following:

- **In the View as Graph tab:** a graph showing the average number of transaction runs for the selected transactions during a typical hour, day, or week within the time frame you specified.



Note that the transaction runs for each sub-unit are an average of the transaction runs for all the occurrences of the sub-unit during the specified time frame. For example, in the above graph, the transaction runs listed for the **APL_SearchTx** transaction on Tuesday are an average of all the **APL_SearchTx** transaction runs on Tuesdays over the course of the specified month.

- **In the View as Table tab:** a table showing the average number of transaction runs per sub-unit (day, hour, or minute) for each selected transaction, as well as an average of each sub-unit for all selected transactions, an average of all sub-units for each transaction, and an average of all the sub-units for all the transactions.

Transaction	Monday	Tuesday	Wednesday	Average
APL_BuyTx	3.00	441.00	920.00	454.67
APL_MyAccountTx	1.00	368.00	932.00	433.67
APL_MyOrdersTx	1.00	366.00	931.00	432.67
APL_SearchTx	0.00	1,270.00	2,713.00	1,327.67
Average	**1.25**	**611.25**	**1,374.00**	**662.17**

To exclude certain days of the week from the calculation of a typical day or hour, click the **Working Days** link. In the Working Days dialog box, clear the days of the week you want to exclude from the Typical Transaction Load report's calculation of a typical day or hour, and click **OK**.

To exclude certain hours of the day from the calculation of a typical hour, click the **Working Hours** link. In the Working Hours dialog box, select a range other than 12:00 AM to 11:00 PM, and click **OK**. The Typical Transaction Load report includes only the hours you selected in its calculation of a typical hour.

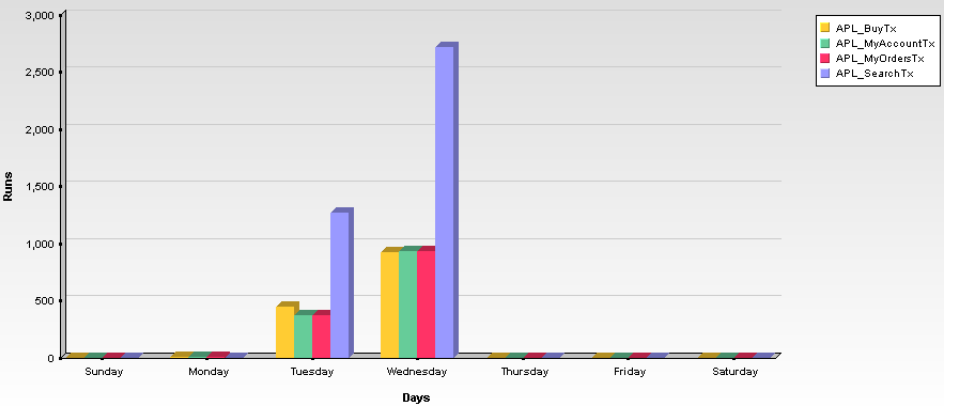
Note: You can print the report, produce a printer-friendly version of the report in .pdf format, format the report in .csv or .xml format, send the report by e-mail, publish the report with updated data, or save the report to the report repository using the toolbar at the top right-hand corner of the report. For details, see "Sharing and Storing Reports" in *Working with Applications*.



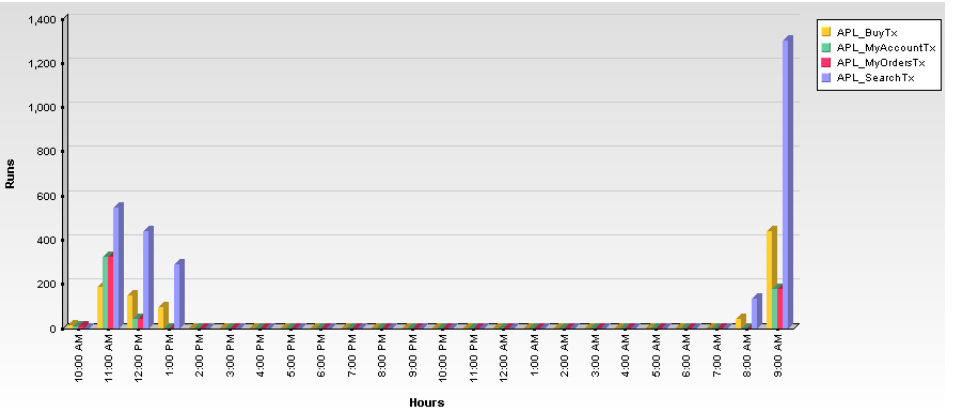
If the Central Repository Service (CRS) is enabled, you can export a PDF of the report to the CRS by selecting **Export > Central Repository Service**. For details on exporting the report to the CRS, see "Exporting a Report to the CRS" on page 42.

Analyzing the Typical Transaction Load Report

You use the Typical Transaction Load report to view the average transaction load during a typical week, day, or hour. In general, you use the Typical Transaction Load report, and the ability to drill down within this report, to pinpoint the time frame you want to use for your Performance Center load test. For example, if you selected to view a typical week during the past month, the Typical Transaction Load report may display data such as the following.



Since Wednesday is typically the day with the greatest number of transaction runs, you would choose to run your load test on a Wednesday. To view the specific hours on Wednesday at which transaction load was typically at its peak, click one of the bars in the Wednesday column. The Typical Transaction Load graph displays the typical load for each hour on Wednesday.



Since load is typically greatest at 9:00 AM or 11:00 AM, you would choose to run your load test during this time range. Note that you can also drill down to view the minutes during which transaction load was typically at its peak, however this data is less relevant for the construction of a load test than the typical daily and hourly data.

Note: You can also use this report in conjunction with the Business Process Distribution report to determine whether a large number of runs displayed for a transaction in the Business Process Distribution report is typical of the transaction's behavior during the selected time period. If the Typical Transaction Load report indicates that the transaction load displayed in the Business Process Distribution report is typical of the transaction's load during the selected time period, it is recommended that you use the transaction for your VuGen script.

Location Load Analysis Report

The Location Load Analysis report shows the transaction load (the number of Real User Monitor transaction runs) and bit rate (bits per second) per end-user location. You use the data in this report in configuring Vusers and load generators for your Performance Center load test, as well as the run-time settings for your Application Performance Lifecycle-generated VuGen script.

This section includes the following topics:

➤ "Generating the Location Load Analysis Report" on page 21

➤ "Analyzing the Location Load Analysis Report" on page 23

Generating the Location Load Analysis Report

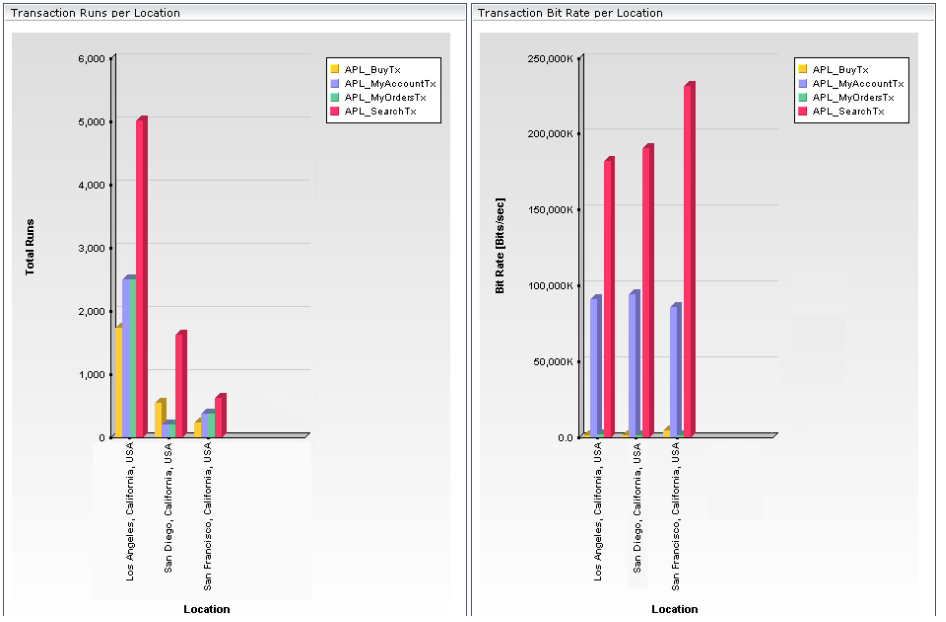
You select the time range for the Location Load Analysis report as you would for any other Mercury Business Availability Center report. For details, see "Working in Reports" in *Working with Applications*. Note that if you already selected a time range in one of the other Production Analysis reports, the time range you previously selected will automatically be displayed in the Location Load Analysis report.

If you already selected transactions in one of the other Production Analysis reports, by default the Location Load Analysis report displays data for the previously selected transactions. If the Location Load Analysis report is the first Production Analysis report you are accessing, or if you want to display data for a different group of transactions, click the **Transaction Selection** link. In the Select Transactions dialog box, choose **All applications** to display the transactions from all monitored applications, or choose a specific application to display only transactions that were defined for that application. Select the transaction(s) for which you want to view data, and click the first arrow. To view data for all the transactions listed, click the second arrow. Click **OK** to close the dialog box and save your settings.

To select locations to be displayed in the Location Load Analysis report, click the **Location Selection** link. By default, the Select Locations dialog box displays the locations associated with the transactions you selected. Select the location(s) for which you want to view data, and click the first arrow. To view data for all the locations listed, click the second arrow. To view data for locations that have not been assigned names, select the **Use unknown locations** check box. Click **OK** to close the dialog box and save your settings.

When you click the **Generate** button, the Location Load Analysis report displays the following:

➤ **In the View as Graph tab:** the **Transaction Runs per Location** graph, showing the total number of transaction runs for each location at which the selected transactions were run, and the **Transaction Bit Rate per Location** graph, showing the transaction bit rate (bits per second) for each location at which the selected transactions were run.



➤ **In the View as Table tab:** a table listing the bit rate (bits/second) and total number of runs for each transaction at each location, as well as an average of the bit rates and total runs of all the transactions at a location, an average of the bit rates and total runs for each transaction across all locations, and an overall average bit rate and total run calculation for all transactions across all locations.

	APL_BuyTx		APL_MyAccountTx		APL_SearchTx		APL_MyOrdersTx		Average	
Location	Bitrate [Bits/sec]	Total Runs	Bitrate [Bits/sec]	Total Runs	Bitrate [Bits/sec]	Total Runs	Bitrate [Bits/sec]	Total Runs	Bitrate [Bits/sec]	Runs
Los Angeles, California, USA	986,926.51	1,728	90,733,629.8	2,488	182,127,139.43	5,014	1,465,535.36	2,486	68,828,307.78	2,929
San Diego, California, USA	837,160.62	539	93,903,525.33	192	190,291,022.63	1,613	1,044,494.71	192	71,519,050.82	634
San Francisco, California, USA	4,077,468.05	224	85,439,809.74	369	231,718,670.75	614	1,001,510.73	367	80,559,364.82	393.5
Average	1,967,185.06	830.33	90,025,654.95	1,016.33	201,378,944.27	2,413.67	1,170,513.6	1,015	73,635,574.47	1,318.83

Note: You can print the report, produce a printer-friendly version of the report in .pdf format, format the report in .csv or .xml format, send the report by e-mail, publish the report with updated data, or save the report to the report repository using the toolbar at the top right-hand corner of the report. For details, see "Sharing and Storing Reports" in *Working with Applications*.



If the Central Repository Service (CRS) is enabled, you can export a PDF of the report to the CRS by selecting **Export > Central Repository Service**. For details on exporting the report to the CRS, see "Exporting a Report to the CRS" on page 42.

Analyzing the Location Load Analysis Report

You use the Location Load Analysis report to view the distribution of Real User Monitor transaction runs among end-user locations, as well as the bit rate of each transaction at each location. You then use the location data in selecting load generators, the transaction run data in distributing Vusers among load generators, and the bit rate data in configuring each script's network speed simulation settings.

For example, if you selected to view location data for four transactions—**APL_BuyTx**, **APL_MyAccountTx**, **APL_SearchTx**, and **APL_MyOrdersTx**—during the past month, the Location Load Analysis report may display data such as the following.

	APL_BuyTx		APL_MyAccountTx		APL_SearchTx		APL_MyOrdersTx		Average	
Location	Bitrate [Bits/sec]	Total Runs	Bitrate [Bits/sec]	Total Runs	Bitrate [Bits/sec]	Total Runs	Bitrate [Bits/sec]	Total Runs	Bitrate [Bits/sec]	Runs
Los Angeles, California, USA	986,926.51	1,728	90,733,629.8	2,488	182,127,139.43	5,014	1,465,535.36	2,486	68,828,307.78	2,929
San Diego, California, USA	837,160.62	539	93,903,525.33	192	190,291,022.63	1,613	1,044,494.71	192	71,519,050.82	634
San Francisco, California, USA	4,077,468.05	224	85,439,809.74	369	231,718,670.75	614	1,001,510.73	367	80,559,364.82	393.5
Average	1,967,185.06	830.33	90,025,654.95	1,016.33	201,378,944.27	2,413.67	1,170,513.6	1,015	73,635,574.47	1,318.83

Based on this report, you may choose to select load generators from one or more of the above locations when configuring your load test. Your distribution of Vusers among the load generators would most likely be based on the distribution of transaction load (that is, the number of transaction runs being run) among the above locations. For an explanation of configuring load tests based on Production Analysis report data, see Chapter 4, “Configuring and Running a Load Test.”

In addition, you would use the bit rate data in this report in configuring the Network: Speed Simulation VuGen run-time settings of the Application Performance Lifecycle-generated scripts that you are using for your load test. For example, if you generated a script based on the **APL_SearchTx** transaction and planned to run this script from two load generators—one located in Los Angeles and the other in San Francisco—you would do the following:

- create two copies of the script;
- set the custom bandwidth for the script being run from Los Angeles at 182,127,139 bits per second;
- set the custom bandwidth for the script being run from San Francisco at 231,718,670 bits per second.

For details on configuring Application Performance Lifecycle-generated scripts based on data from the Location Load Analysis report, see “Setting the Speed Simulation” on page 32.

Using Application Performance Lifecycle Reports – A Case Scenario

This section describes a typical case scenario in which a user worked with all three Application Performance Lifecycle reports to obtain the information he required to construct a Performance Center load test.

Initially, the user accessed the Business Process Distribution report to view data for the five transactions with the greatest number of run instances during the period of a week, from January 26, 2006 to February 2, 2006. The Business Process Distribution report showed that **APL_SearchTx** was the transaction with the greatest number of runs—a total of 4,114 transaction runs—as well the most popular transaction (run in 18% of the sessions).

Application	Transaction	Total Runs	Average Response Time [seconds]	Popularity	Availability	Sessions
jpetstore	APL_SearchTx	4,114	0.25	18%	100%	

To verify that this data reflected the typical transaction load for the **APL_SearchTx** transaction during this time period, the user accessed the Typical Transaction Load report and viewed data for a typical week during the monthly period of January 2, 2006 to February 2, 2006. The Typical Transaction Load report showed that the average transaction load for the **APL_SearchTx** transaction was indeed significant during this period of time.

Transaction	Monday	Tuesday	Wednesday	Average
APL_SearchTx	0.00	1,270.00	2,713.00	1,327.67

The user then drilled down further in the Typical Transaction Load report to discover the specific hours on Wednesday (the day with the greatest number of transaction runs) during which transaction load was typically at its peak.

Transaction	10:00 AM	11:00 AM	12:00 PM	1:00 PM	8:00 AM	9:00 AM	Average
APL_SearchTx	0.00	544.00	440.00	286.00	131.00	1,300.00	450.17

The drilldown showed that load was typically greatest at 9:00 AM, so the user decided that he would later run his load test at this hour. To be able to use this data as well as the average transaction run data later on, when configuring a load test, the user saved the report in .PDF format.

Having received confirmation of the significance of the **APL_SearchTx** transaction, the user returned to the Business Process Distribution report to generate a VuGen script of a session in which the **APL_SearchTx** transaction was run. To view the sessions in which **APL_SearchTx** was run and a transaction snapshot was collected, the user clicked the **View Sessions** button. After viewing error and page hit data for each displayed session, the user selected to view details of a session with 1 application error, 1 HTTP error, and 13 page hits.

User name	Start time	Session duration [hh:mm:ss]	Application errors	HTTP errors	Total pages	Details
192.168.83.87	2/1/06 1:13 AM	00:00:21	1	1	13	

The user then clicked the **View Session Details** button to view details of the end user that ran the selected session, as well as the pages that were accessed as part of the session (with those included in the transaction highlighted).

Pages

Session Replay | Generate Script Template

Start time	Page	Events	Response time [seconds]
2/1/06 01:13:21 AM	jpt-index	-	0.08
2/1/06 01:13:21 AM	jpt-signonform	-	0.14
2/1/06 01:13:25 AM	http://linux-probe:8080/jpetstore/shop/signon.shtml	-	0.01
2/1/06 01:13:27 AM	jpt-view-category	-	0.02
2/1/06 01:13:27 AM	jpt-view-product	-	0.01
2/1/06 01:13:29 AM	jpt-view-item	-	9.42
2/1/06 01:13:39 AM	jpt-add2cart	-	0.05
2/1/06 01:13:39 AM	jpt-checkout	-	0.03
2/1/06 01:13:39 AM	jpt-new-order-form	-	0.19
2/1/06 01:13:39 AM	jpt-ordered	-	0.05
2/1/06 01:13:39 AM	jpt-ordered	-	2.63
2/1/06 01:13:42 AM	jpt-signed-out	-	0.05

After viewing all of this data, the Application Performance Lifecycle user decided to use this session as the basis for a VuGen script and clicked **Generate Script Template** on the Session Details page to Application Performance Lifecycle to create a script template from the session. The user saved the generated script to the CRS.

To prepare additional data for the configuration of his load test, the user accessed the Location Load Analysis report and selected to view location data for the **APL_SearchTx** transaction. The Location Load Analysis report showed that end users at three locations—Los Angeles, San Diego, and San Francisco—ran the **APL_SearchTx** transaction.

	APL_SearchTx	
Location	Bit Rate [Bits/sec]	Total Runs
Los Angeles, California, USA	222,267,206.3	1,887
San Diego, California, USA	190,291,022.63	1,613
San Francisco, California, USA	231,718,670.75	614
Average	**214,758,966.56**	**822.8**

To be able to use this data for his Performance Center load test, the user saved the Location Load Analysis report in .PDF format.

Based on this report, the user decided to run the script he generated from three different load generators, each located at one of the above locations. To do so, the user created three different copies of the script and set the Network: Speed Simulation VuGen run-time settings for each script according to the bit rate for the location from which the script was going to be run (for details, see “Setting the Speed Simulation” on page 32). The user also based his distribution of Vusers among the load generators on the distribution of total runs among the above locations. (For details on configuring load tests, see Chapter 4, “Configuring and Running a Load Test.”)

Note: The above case scenario describes the generation of one script, based on one transaction, however a true use case will typically include several scripts, based on several different transactions.

3

Refining your Script Template in VuGen

To use Application Performance Lifecycle-generated scripts in a Performance Center load test, you must first customize them using VuGen.

Note: If you exported the script templates you created in Application Performance Lifecycle to the CRS, see "Opening a Script Saved in the CRS" on page 44 for details on how to open the script templates in VuGen.

This chapter describes:	On page:
Parameterizing Recorded Values	30
Correlating Recorded Values	32
Setting the Speed Simulation	32

Parameterizing Recorded Values

When you generate a script using Application Performance Lifecycle, the script contains the actual end-user values that the Real User Monitor recorded. If you want to perform the script's actions (query, submit, and so forth) using different values from those recorded by the Real User Monitor, you must replace the values with parameters.

For example, suppose you generated a script containing the following statement that searches a library's database for the title **UNIX**:

```
web_submit_form("db2net.exe",
        ITEMDATA,
        "name=library.TITLE",
        "value=UNIX",
        ENDITEM,
        "name=library.AUTHOR",
        "value=",
        ENDITEM,
        "name=library.SUBJECT",
        "value=",
        ENDITEM,
        LAST);
;
```

When you run this script in a Performance Center load test, you do not want to repeatedly use the same value, **UNIX**. You therefore replace the constant value with a parameter:

```
web_submit_form("db2net.exe",
        ITEMDATA,
        "name=library.TITLE",
        "value={Book_Title}",
        ENDITEM,
        "name=library.AUTHOR",
        "value=",
        ENDITEM,
        "name=library.SUBJECT",
        "value=",
        ENDITEM,
        LAST);
```

When you run a load test using a parameterized script, Vusers substitute the parameter with different values from a data source that you specify. The data source can be either a file or internally generated variables.

For detailed instructions on replacing the constant values in your generated script with parameters, as well as setting the properties and data source for these parameters, see "Working with VuGen Parameters" in *Using Mercury Virtual User Generator*.

Notes:

- You can parameterize complete strings or parts of strings.
- You can define more than one parameter for functions with multiple arguments (such as URLs, server names, and IP addresses).

Correlating Recorded Values

In addition to parameterizing the script you generated using Application Performance Lifecycle, you must correlate certain statements within the script. Correlation allows you to link statements by using the results of one statement as input for another.

You correlate statements for one or both of the following reasons:

- to generate dynamic data – For example, if the Real User Monitor session from which you generated your script was identified by the date and time, when you try to replay a script of this session, it will fail because the current time is different than the original recorded time. Only if you correlate the date and time will you be able to save it as dynamic data and use it throughout the load test or session step run.
- to accommodate unique data records – For example, if the Real User Monitor recorded a session requiring the use of unique values, such as the process of opening a new bank account, replaying a script of the session will fail because the recorded value already exists and cannot be recreated. Correlating the value enables you to create additional unique values—based on the recorded value—to be used throughout the load test or session step run.

For detailed instructions on correlating a script, see "Correlating Statements" in *Using Mercury Virtual User Generator*.

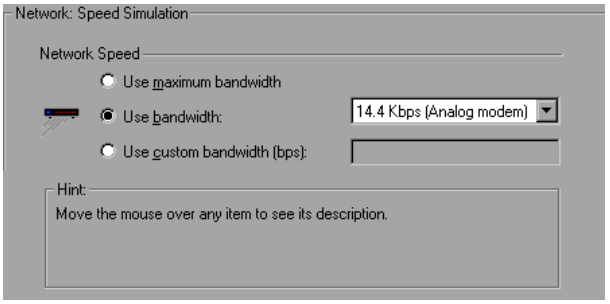
Setting the Speed Simulation

You set the speed simulation for your Application Performance Lifecycle-generated script based on data contained in the Location Load Analysis report.

To set the speed simulation for a script:

1 In VuGen, select **Vuser** > **Run-Time Settings** or click the **Run-Time Settings** button on the toolbar to open the Run-Time Settings dialog box.

2 In the Run-Time Settings tree, select the **Network: Speed Simulation** node.



3 Select **Use custom bandwidth** and specify the bit rate of the location from which you want to run the script, according to the bit rate displayed for this location (for the transaction upon which the script is based) in the Location Load Analysis report. For example, if the transaction upon which your script is based was run by a significant number of users in Los Angeles, California, you would specify the bit rate displayed for Los Angeles in the Location Load Analysis report's Transaction Bit Rate Per Location graph.

Note: If you want to run the same script from several different locations, you can save several copies of the script and assign each copy a custom bandwidth reflecting the bit rate of a specific location. For details on assigning load generators to each copy of the script, see Chapter 4, "Configuring and Running a Load Test."

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4 Click **OK** to apply the updated run-time settings.

4

Configuring and Running a Load Test

This chapter describes how to configure and run Performance Center and LoadRunner load tests that incorporate the scripts you created using Application Performance Lifecycle and emulate the real-user behavior displayed in the Production Analysis reports.

This chapter describes:	On page:
Configuring and Running a Load Test in Performance Center	35
Configuring and Running a Scenario in LoadRunner	37

Configuring and Running a Load Test in Performance Center

After you have refined your Application Performance Lifecycle-generated scripts using VuGen, you can create a load test in Performance Center that incorporates these scripts and emulates the real-user behavior displayed in the Production Analysis reports.

This section describes how to incorporate the Application Performance Lifecycle-generated scripts and Production Analysis report data in designing a load test. For detailed instructions on creating a load test, refer to the *Mercury Performance Center User's Guide*.

To incorporate Application Performance Lifecycle-generated scripts in a load test:

Connect VuGen to the Performance Center Web server and either upload your script files directly to the Performance Center Web server or save them in the file system. For detailed instructions, see "Uploading Vuser Scripts" in *Using Mercury Virtual User Generator*.

If you saved the Application Performance Lifecycle-generated scripts in the CRS, see "Uploading Scripts from the CRS to Performance Center" on page 45 for details on uploading the scripts to the Performance Center Web server.

To incorporate the Production Analysis report data in a load test:

1. Access the Business Process Distribution, Typical Transaction Load, and Location Load Analysis reports that you printed, e-mailed, or saved while working with the Production Analysis reports. For details on retrieving a report from the CRS, see "Retrieving a Report Saved in the CRS" on page 45.
2. In Performance Center, select **Load Tests** > **Create/Edit** from the left menu to open the Load Tests page.
3. Click **New Load Test** to create a new load test.
4. In the **Design Groups** tab, select the scripts you generated using Application Performance Lifecycle and customized in VuGen. Select one or more load generators to run each script, based on the location data in the Location Load Analysis report. For example, if the transaction upon which one of your scripts is based was run from Los Angeles, California, you would select one or more load generators located in Los Angeles to run this particular script.

Note: Ensure that the Network: Speed Simulation run-time settings of each script are set to match the bit rate specified in the Location Load Analysis report for the location from which the script is being run. For details on configuring Network: Speed Simulation run-time settings, see "Setting the Speed Simulation" on page 32.

Distribute the Vusers among the Vuser groups based on the distribution of transaction load among the locations displayed in the Location Load Analysis report, represented by the load generators you selected for each group. For example, if the transactions upon which your scripts are based were run from three locations and each location ran approximately one third of the transactions, you would distribute the Vusers evenly among the Vuser groups.

The overall number of Vusers for your load test should be based on the average transaction run data in the Typical Transaction Load report. In specifying the number of Vusers to run, however, ensure that you take into account the difference in scaling between load test and production environments.

5 In the **Scheduler** tab, configure the Ramp Up and Ramp Down of Vusers based on data in the Typical Transaction Load report. For example, if the Typical Transaction Load report showed that an average of 100 transactions were run at the beginning of the time period you selected to use for your load test and 80 transactions were run at the end of this time period, you might configure your load test to start 100 Vusers every hour and stop 80 Vusers every hour. Note, however, that you must take into account the difference in scaling between load test and production environments.

6 Complete your load test configuration and run the load test from the Load Tests Configuration page by clicking **Start**, or from the Load Tests page by clicking the **Run Test** icon in the row of the load test that you want to run. For details on configuring and running a load test, refer to the *Mercury Performance Center User's Guide*.

Configuring and Running a Scenario in LoadRunner

After you have refined your Application Performance Lifecycle-generated scripts using VuGen, you can create a manual scenario in the LoadRunner Controller that incorporates these scripts and emulates the real-user behavior displayed in the Production Analysis reports.

This section describes how to incorporate the Application Performance Lifecycle-generated scripts and Production Analysis report data in designing a manual scenario. For detailed instructions on creating a manual scenario, refer to the *Mercury LoadRunner Controller User's Guide*.

To incorporate Application Performance Lifecycle-generated scripts in a scenario:

1. In the New Scenario dialog box, choose **Manual Scenario**. Do not select the **Use the Percentage Mode** check box.
2. Click the **Browse** button, navigate to the directory in which you saved the Application Performance Lifecycle-generated scripts that you modified using VuGen, and select the scripts.

   If these scripts are saved in the CRS, see "Opening a Script Saved in the CRS" on page 44 for details on selecting them.
3. Click the **Add** button to add the scripts to your scenario.

To incorporate the Production Analysis report data in a scenario:

1. Access the Business Process Distribution, Typical Transaction Load, and Location Load Analysis reports that you printed, e-mailed, or saved while working with the Production Analysis reports. For details on retrieving a report from the CRS, see "Retrieving a Report Saved in the CRS" on page 45.
2. In LoadRunner, to the right of the Scenario Groups pane, click the **Add Group** button. Select a script you generated using Application Performance Lifecycle and customized in VuGen. Select one or more load generators to run the script, based on the Location Load Analysis report's location data for the transaction upon which the script is based. For example, if the transaction upon which one a script is based was run from Los Angeles, California, you would select one or more load generators located in Los Angeles to run this script.

Note: Ensure that the Network: Speed Simulation run-time settings of the script are set to match the bit rate specified in the Location Load Analysis report for the location from which the script is being run. For details on configuring Network: Speed Simulation run-time settings, see "Setting the Speed Simulation" on page 32.

Select a quantity of Vusers for the group. Note that Vusers should be distributed among Vuser groups based on the distribution of transaction load among the locations displayed in the Location Load Analysis report, represented by the load generators you selected for each group. For example, if the transactions upon which your scripts are based were run from three locations and each location ran approximately one third of the transactions, you would distribute the Vusers evenly among the Vuser groups.

The overall number of Vusers for your scenario should be based on the average transaction run data in the Typical Transaction Load report. In specifying the number of Vusers, however, ensure that you take into account the difference in scaling between load test and production environments.

Note: You use the Add Group dialog box to add each Application Performance Lifecycle-generated script you want to include in your scenario. Since each location requires specific script network run-time settings, each location requires its own unique script. For details on preparing a script to be run from each location, see "Setting the Speed Simulation" on page 32.

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3 In the Schedule Builder, configure the Ramp Up and Ramp Down of Vusers based on data in the Typical Transaction Load report. For example, if the Typical Transaction Load report showed that an average of 100 transactions were run at the beginning of the time period you selected to use for your load test and 80 transactions were run at the end of this time period, you might configure your load test to start 100 Vusers every hour and stop 80 Vusers every hour. Note, however, that you must take into account the difference in scaling between load test and production environments.

4 Complete your scenario configuration and run the scenario from the Run tab of the Controller. For details on configuring and running a scenario, refer to the *Mercury LoadRunner Controller User's Guide*.

5

Working with the Central Repository Service (CRS)

This chapter describes how to export Production Analysis reports to the CRS, generate a script template or scenario package and save it in the CRS, open scripts saved in the CRS, retrieve reports saved in the CRS, and upload scripts saved in the CRS to Performance Center.

This chapter describes:	On page:
Exporting a Report to the CRS	42
Saving a Script Template or Scenario Package in the CRS	43
Opening a Script Saved in the CRS	44
Retrieving a Report Saved in the CRS	45
Uploading Scripts from the CRS to Performance Center	45

Exporting a Report to the CRS

By default, the CRS is enabled on the Infrastructure Settings Manager page and you can export the Production Analysis reports to the CRS.

Note: If the CRS was disabled, you can re-enable it by accessing the Infrastructure Settings Manager page (**Admin** > **Platform** > **Setup and Maintenance** > **Infrastructure Settings**), clicking **Foundations**, selecting **Production Analysis**, locating the CRS Enabled entry in the Production Analysis – Central Repository Service table, and setting the property value to **true**.

To export a report to the CRS:

1 From the toolbar at the top right-hand corner of the report, select **Export** > **Central Repository Service**. A new browser window opens, displaying **Report** under **Type**.



2 In the **Name** text box, enter the name under which you want to save the report in the repository.

3 In the **Description** text box, enter a description of the report. Note that this field is optional.

4 Browse the Root directory tree to select the folder in which you want to save the report. The files that are currently stored in the selected folder are displayed in the Folder Content table on the right.



To save the report in a new folder, click the **Create New Folder** button, enter the folder name and description, click **OK**, and then click the **Refresh** button to view the new folder in the directory tree.





To rename a folder, click the **Rename Folder** button, enter the new folder name, click **OK**, and then click the **Refresh** button to view the new folder name in the directory tree. To delete a folder, click the **Delete Folder** button and click **Yes**.

5 Click **Save**. If the save process has been completed successfully, **Report saved to repository** is displayed at the top of the browser window.

6 Click **Close** to close the browser window and return to the report you were viewing.

Saving a Script Template or Scenario Package in the CRS

By default, the CRS is enabled on the Infrastructure Settings Manager page and you can save your generated script templates or a scenario package in the CRS.

Note: If the CRS was disabled, you can re-enable it by accessing the Infrastructure Settings Manager page (**Admin** > **Platform** > **Setup and Maintenance** > **Infrastructure Settings**), clicking **Foundations**, selecting **Production Analysis**, locating the CRS Enabled entry in the Production Analysis – Central Repository Service table, and setting the property value to **true**.

To save a scenario package or script template in the CRS:

1 Click the **Generate Scenario Package** button in the Business Process Distribution report, or the **Generate Script Template** button at the top of the Session details page. A new browser window opens, displaying **Scenario Package** or **VuGen Script** under **Type**.

2 In the **Name** text box, enter the name under which you want to save the scenario package or script template in the repository.

3 In the **Description** text box, enter a description of the scenario package or script template. Note that this field is optional.

4 Browse the Root directory tree to select the folder in which you want to save the scenario package or script template. The files that are currently stored in the selected folder are displayed in the Folder Content table on the right.



To save the scenario package or script template in a new folder, click the **Create New Folder** button, enter the folder name and description, click **OK**, and then click the **Refresh** button to view the new folder in the directory tree.





To rename a folder, click the **Rename Folder** button, enter the new folder name, click **OK**, and then click the **Refresh** button to view the new folder name in the directory tree. To delete a folder, click the **Delete Folder** button and click **Yes**.

5 Click **Generate**. If the generation process has been completed successfully, **Scenario package saved to repository** or **VuGen script template saved to repository** is displayed at the top of the browser window.

6 Click **Close** to close the browser window and return to main page or Session Details page of the Business Process Distribution report.

Opening a Script Saved in the CRS

You can open scripts saved in the CRS from both VuGen and the LoadRunner Controller.

To open a script saved in the CRS:

1 In the main VuGen window, select **Tools** > **Quality Center Connection**. In the LoadRunner Controller's New Scenario dialog box, click the **Quality Center** button.

2 In the Quality Center Connection dialog box, enter the CRS URL, **http://<Mercury Business Availability Center server machine>:8080/qcbin**, and click **Connect**.

3 Click **Browse** in the Controller, or select **File** > **Open** in VuGen, to select the scripts you saved in the CRS. If the scripts were automatically generated by Application Performance Lifecycle, they are located in a zip file within the scenario package file you created.

Note: When you save your scripts after editing them in VuGen, they are automatically saved in the CRS.

Retrieving a Report Saved in the CRS

You can retrieve a report saved in the CRS in order to incorporate its data in your Performance Center load test or LoadRunner scenario.

To retrieve a report saved in the CRS:

1 Access the CRS URL (**http://<Mercury Business Availability Center server machine>:8080/qcbin**).

2 Download the report PDF saved in the CRS by clicking the **Download** button. If the report is a Summary report that is part of a scenario package, it can be downloaded from the scenario package zip file.



Uploading Scripts from the CRS to Performance Center

To incorporate scripts saved in the CRS in your Performance Center load test, you must upload the scripts to the Performance Center Web server.

To upload scripts from the CRS to Performance Center:

1 In the main VuGen window, select **Tools** > **Quality Center Connection** and open the scripts you saved in the CRS as described in "Opening a Script Saved in the CRS" on page 44.

2 Connect VuGen to the Performance Center Web server as described in "Connecting VuGen to Performance Center" in *Using Mercury Virtual User Generator*.

3 Upload the script files to the Performance Center Web server as described in "Uploading Vuser Scripts" in *Using Mercury Virtual User Generator*.

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