HP Real User Monitor

For the Windows and Linux operating systems

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Real User Monitor Administration Guide

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Contents

Real User Monitor Administration Overview

This guide provides detailed instructions on how to configure and administer the HP Real User Monitor (RUM) data collector.

For details on installing and upgrading RUM, see the Real User Monitor Installation and Upgrade Guide.

Note: If you are an HP Software-as-a-Service customer, you must contact an HP Software Support representative to receive connection information that enables you to work with RUM.

This guide contains the following parts:

- "RUM Introduction and Compatibility" on page 14

  Introduces RUM and explains how it works.

- "Data Collection Methods" on page 26

  Describes the different methods by which the RUM Probe can obtain monitored data.

- "Configuring and Administering Real User Monitor" on page 43

  Explains how to configure a RUM Probe by changing the default settings, as well as how to configure and administer the RUM Engine and how to administer RUM's MySQL database. Also provides guidelines for hardening RUM, deploying RUM in a SiteMinder environment, and publishing RUM data.

- "Supporting Specific Protocols" on page 195

  Explains how to configure and work with RUM for monitoring specific protocols.

Part 1

RUM Introduction and Compatibility

Chapter 1

Introducing RUM Administration

This chapter introduces HP Real User Monitor (RUM) and explains how it works.

This chapter includes the following topics:

- "Overview of RUM" below
- "How RUM Works" below
- "Ports Used by RUM" on page 17
- "Overview of RUM Performance Measurements" on page 18
- "Installing and Administering RUM" on page 23

Overview of RUM

RUM monitors both user and system initiated network traffic between client machines and servers and between servers, collecting network and server performance and availability data in real time. This enables administrators to pinpoint the cause of delays and quantify the business impact of detected performance issues related to end users. When performance and availability exceed specified thresholds, HP Business Service Management (BSM) proactively alerts application managers who, using the End User Management (EUM) reports, analyze the collected data to isolate the root cause of detected problems.

> **Tip:** For a description of the process required to set up and use RUM to monitor applications, see "How to Set up Real User Monitors" in the BSM Application Administration Guide.

How RUM Works

RUM consists of three major components: the probe, the engine, and the MySQL database.

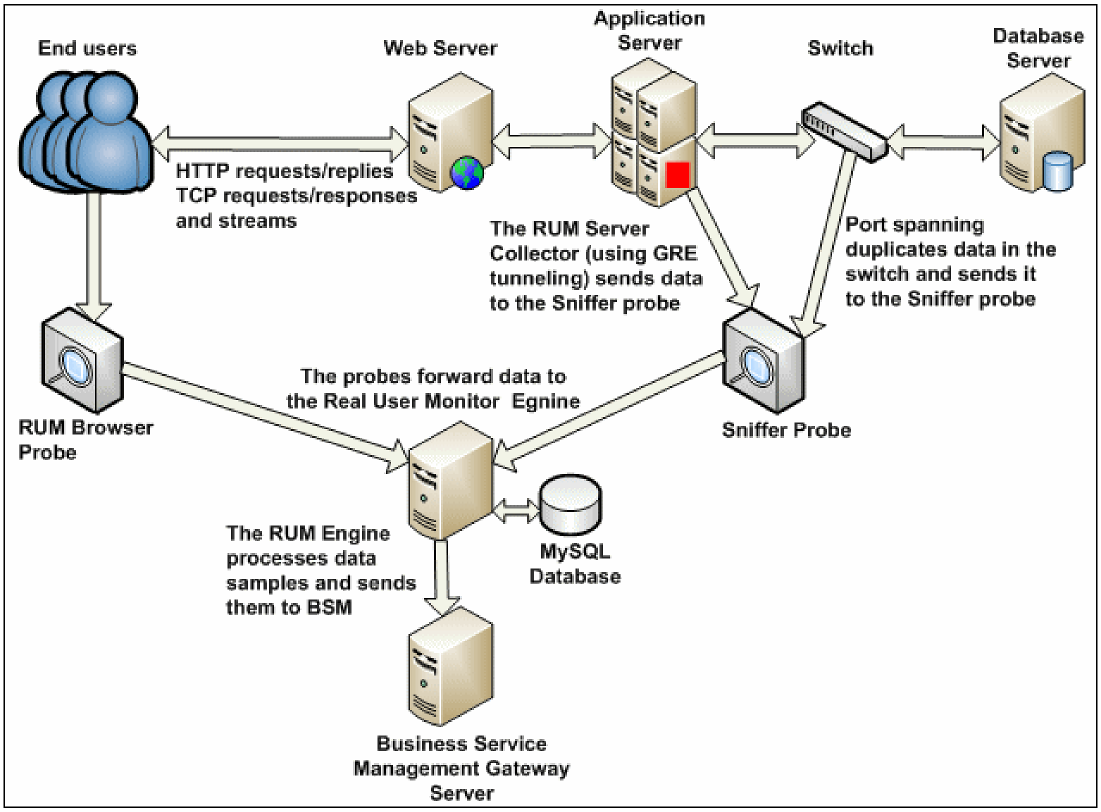
- The **probe** receives data on end-user experience and/or applications, carries out initial processing on this data, and sends it to the RUM Engine. There are two types of probe:
  - **Sniffer Probe** - a non-intrusive, passive listening device that is subject to the same traffic the server receives. The traffic can be collected in a number of different ways. For details, see "RUM Data Collection Methods" on page 27.
  - **RUM Browser Probe** - collects user experience data directly from the client, for monitored web or mobile applications. For details, see "RUM Browser Probe" on page 38.
- The **engine** receives the data collected by the probe and assembles this data according to the configuration specifications it receives from HP Business Service Management (BSM), that have been configured in End User Management Administration. The engine transmits the page, transaction, end-user, and server data samples it creates to the BSM Gateway Server. The

BSM Gateway Server then distributes the data to the relevant BSM components, which create RUM alerts, reports, and Service Health views.

> **Note:** If the RUM Engine fails or is temporarily unavailable, or is unable to copy data from the RUM Probe, the RUM Probe continues to collect data. The last two hours worth of data is saved on the RUM Probe and this data is copied by the RUM Engine when it becomes available again.

- The **MySQL database** acts as RUM's repository for data that the RUM Engine does not forward to BSM immediately, or at all. The MySQL database stores the RUM Engine's configuration settings, session click-streams (pages and snapshots included in a session), and the open sessions summary.

The following diagram shows how RUM receives user-experience and application data and passes it on to BSM.

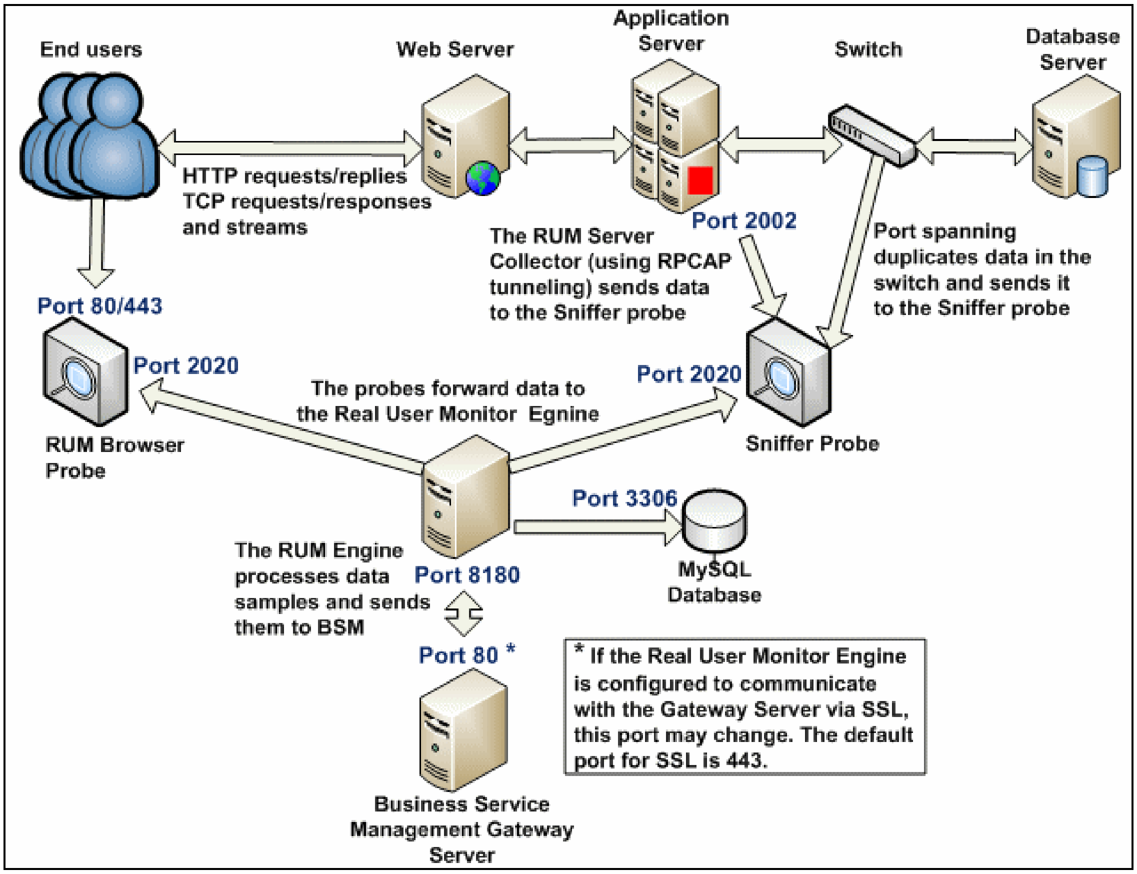


Use the EUM reports to analyze network and application performance and availability data for the servers, applications, pages, transactions, events, and end users that you configure for monitoring, as well as general statistics that are collected and sent by the probes to the engine. When notified by an alert that a certain performance or availability threshold has been exceeded, you can examine the issue in the appropriate reports and try to pinpoint the cause of the problem and the time at which the problem occurred. For detailed information on EUM reports, see "End User Management Reports Overview" in the BSM User Guide.

In addition, RUM data is included in Service Health. For information on displaying RUM data in Service Health, see "Predefined Views for End User Management" in the BSM Application Administration Guide.

Ports Used by RUM

The following diagram shows the various ports used by RUM:


End users
Web Server
Application Server
Switch
Database Server
HTTP requests/replies
TCP requests/responses
and streams
Port 2002
The RUM Server Collector (using RPCAP tunneling) sends data to the Sniffer probe
Port spanning duplicates data in the switch and sends it to the Sniffer probe
Port 80/443
Port 2020
RUM Browser Probe
The probes forward data to the Real User Monitor Egnine
Port 2020
Sniffer Probe
Port 3306
MySQL Database
The RUM Engine processes data samples and sends them to BSM
Port 8180
Port 80 *
* If the Real User Monitor Engine is configured to communicate with the Gateway Server via SSL, this port may change. The default port for SSL is 443.
Business Service Management Gateway Server

Note:

- The BSM Gateway Server initiates a connection to the RUM Engine on port 8180 for retrieving various types of data.
- The RUM Engine initiates a connection to the BSM Gateway Server on port 80 (default) for sending samples.
- The RUM Engine initiates a connection to the RUM Probe on port 2020 for https (which is the default type of communication in RUM version 7.0 and later) and http.
- The RUM Probe does not initiate a connection to any other server in the system.
- There is no direct connection from BSM to the RUM Probe.
- By default, the Snapshot Replay applet retrieves data to a user’s machine via a BSM server. You can configure the applet to retrieve data directly from the RUM Engine, in which case the connection is made on port 8180. For details on configuring from where the Snapshot Replay applet retrieves data, see "Determining How the Real User Monitor Snapshot Applet Retrieves Snapshots" in the BSM User Guide.

Overview of RUM Performance Measurements

This section describes the measurements provided by RUM for the data that it monitors.

This section includes the following topics:

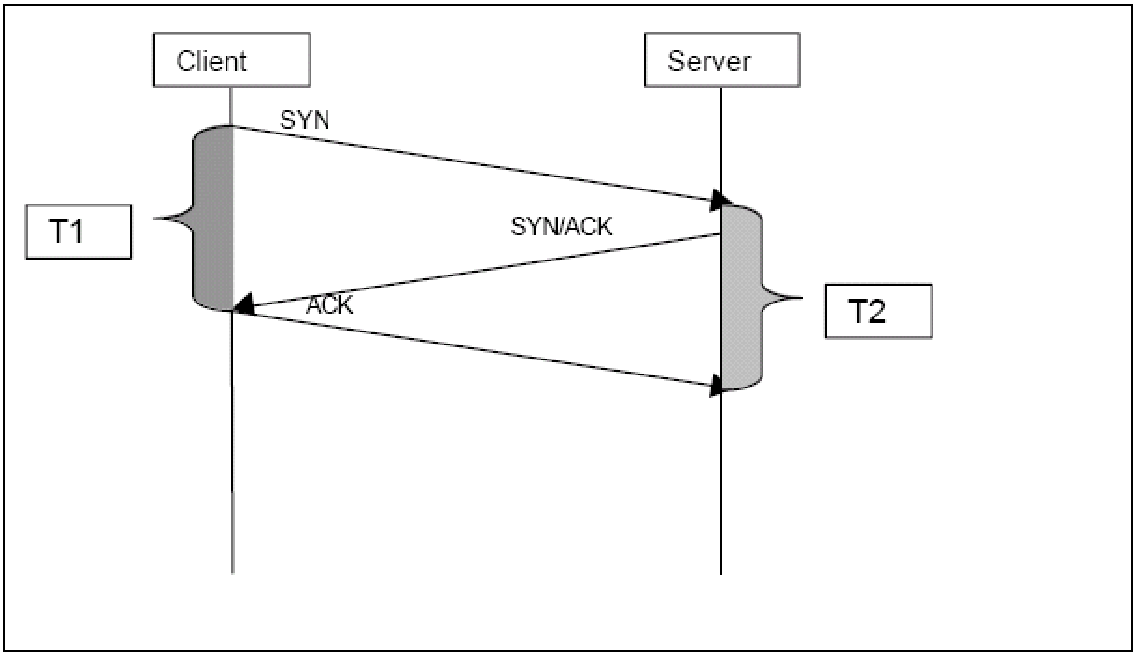
- "Introduction to Performance Measurements" below
- "TCP Request-Response Measurements" on the next page
- "HTTP Measurements" on the next page
- "End User Measurements" on page 23

Introduction to Performance Measurements

To understand RUM performance measurements, a basic knowledge of TCP/IP is beneficial. The following are some of the TCP/IP and http terms used in describing performance measurements:

- **SYN.** A request for connection
- **ACK.** An acknowledgement response
- **GET.** A request for data

Performance measurements are aimed at measuring real-user experience, that is, the end-to-end user experience. To measure both client-side and server-side measurements, the Parallel Technique is used, in which it is assumed that measuring the event on the server side is a close approximation of the event’s measurement on the client side. All RUM measurements are performed on the server side, but provide end-to-end data. The following diagram shows that since the lines are parallel, it is assumed that T1 (client-side measurement)=T2 (server-side measurement).



TCP Request-Response Measurements

It is important to understand the following TCP Request-Response measurements, as they form an integral part of the TCP Request-Response data reported by RUM:

- **Average Response Time.** The time from the first packet of the request, until client acknowledgement of the last packet of the response. Average download time is the sum of average server time and average network time.
- **Average Server Time.** By understanding the TCP protocol, RUM determines which time intervals were spent on server processing (either server application processing time or server kernel processing time). These intervals are incorporated into the average server time. This measurement is better than server time to first buffer as it considers all of the response time.
- **Average Network Time.** The time intervals that were spent by the server waiting for client acknowledgement to arrive are incorporated into the average network time.

HTTP Measurements

HTTP measurements are used by RUM to report page and transaction data to BSM.

This section includes the following topics:

- "Page Performance Measurements" below
- "Component Measurements" on the next page
- "Page Measurements" on page 21
- "Transaction Measurements" on page 22

Page Performance Measurements

The following table describes the performance measurements of pages that appear in RUM reports:

Measurement	How it is Calculated	Why it Matters
Page Time	The end-to-end time it took to download the whole page.	Enables you to discover which pages are slow (exceed their threshold).
Page Server Time	The time spent on the servers to create the response.	Enables you to track server performance issues.
Page Network Time	The time spent on the network to send the response.	Enables you to isolate network delays.
Page Client Time	The time spent on the client side.	Enables you to understand the client's effect on performance.

Measurement	How it is Calculated	Why it Matters
Page Hits	There are separate counters for available and unavailable hits. Unavailable hits are defined by events and errors configured in End User Management Administration.	N/A
Network Latency	Network latency (round trip) per domain.	Enables you to determine whether there is a network problem.
Server Availability	Server is up or down, and the service (application) is up or down, as a percentage of available http requests.	Enables you to determine whether there is a server availability problem.

Component Measurements

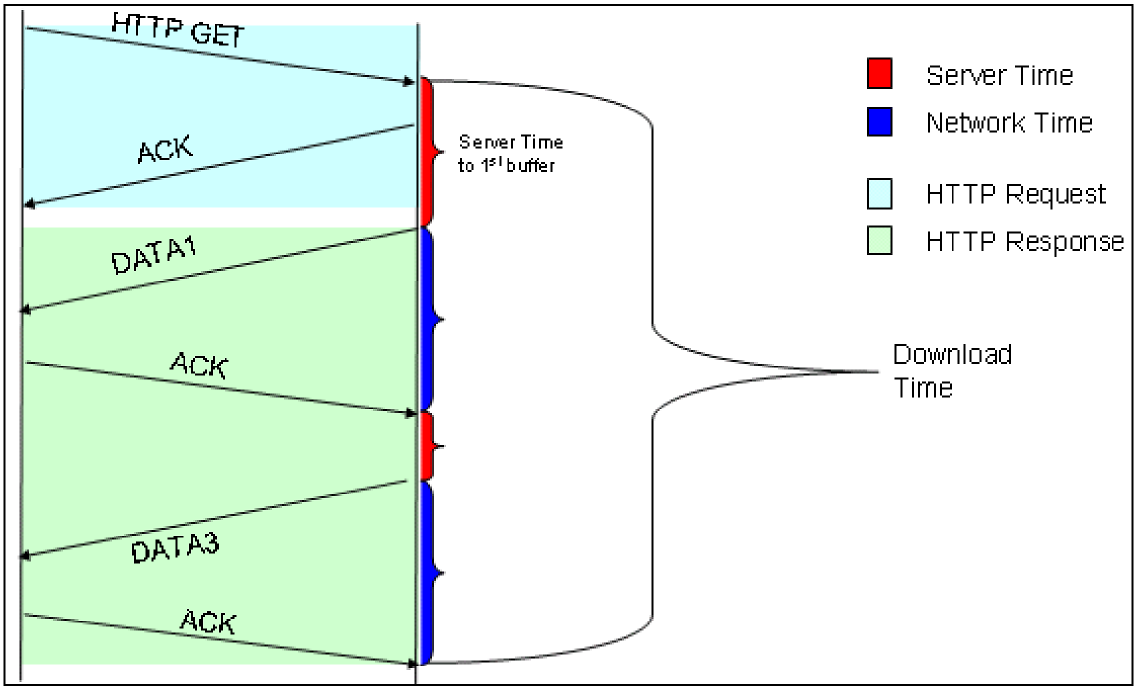
While component measurements are not reported to BSM, it is important to understand them as they form an integral part of page and transaction measurements.

An http component is a single request response couple.

The following component measurements are used in RUM:

- **Component Download Time.** The time from the first packet of the request, until client acknowledgement of the last packet of the response. Component download time is the sum of component server time and component network time.
- **Component Server Time.** By understanding the TCP protocol, RUM determines which time intervals were spent on server processing (either server application processing time or server kernel processing time). These intervals are incorporated into the component server time. This measurement is better than server time to first buffer as it considers all of the response time.
- **Component Network Time.** The time intervals that were spent by the server waiting for client acknowledgement to arrive are incorporated into the component Network time.

The following diagram shows how component download time is calculated from the component server and network times:



Page Measurements

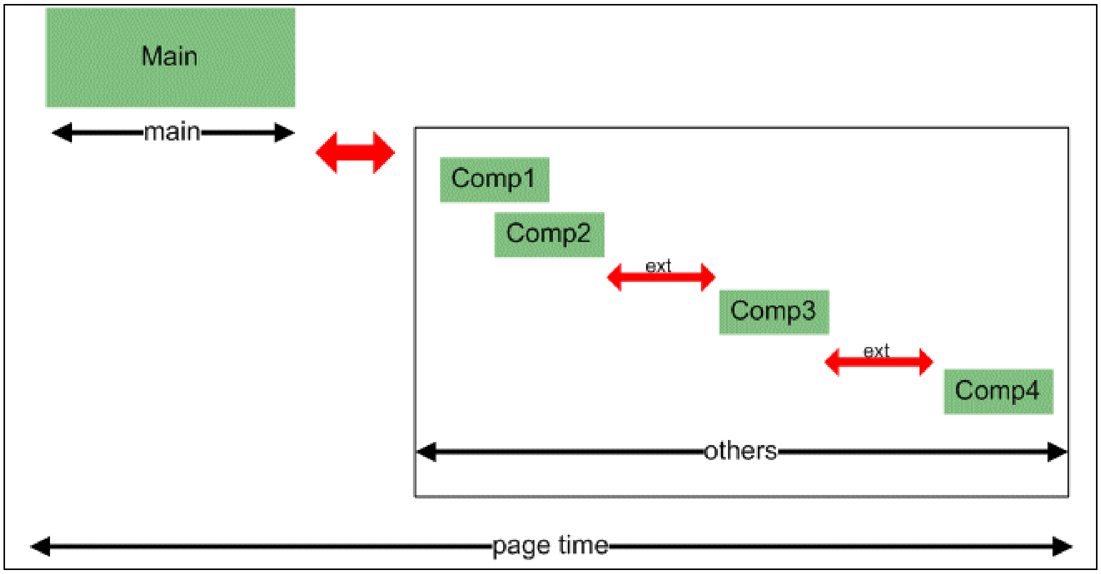
Each HTML page can contain sub-components (such as GIFs, JPGs, and so forth). RUM correlates the main component (the HTML) and the sub-components, and calculates the download time for the whole page.

The following page measurements are used in RUM:

- **Page time.** The time from the first packet of the first component's request to the client ack for the last packet of the last component's response. Page time comprises page client/external time, page network time and page server time.

  Because a single page might be downloaded over several connections, which means two or more components might be downloaded simultaneously, and since there might also be time gaps in the page time in which no component is being downloaded, the total page time might not necessarily equal the sum of all the components' download time.

  The following diagram shows how several components server time or network time might overlap (Comp1 and Comp2). This makes it difficult to define what portion of the page time is server time and what portion is network time. To overcome this, RUM users relative measurements for page breakdown:



- **Page client/external time.** A collection of all the time intervals in the page time in which no component was downloaded. These gaps, which are shown in red in the above diagram, are usually caused by client application processing (such as JavaScript).
- **Page Server Time.** The relative part of the Page Time that was spent on server processing. The formula used to calculate this is:

$$\frac{\sum ComponentServerTime}{\sum ComponentDownloadTime} \bullet (PageTime - PageExternalTime)$$

- **Page network time.** The relative part of the page time that was spent on network transportation. The formula used to calculate this is:

$$\frac{\sum ComponentNetworkTime}{\sum ComponentDownloadTime} \bullet (PageTime - PageExternalTime)$$

Transaction Measurements

An RUM transaction consists of a series of pages. A transaction is matched when RUM has monitored all the pages in the series in the correct order.

The following transaction measurements are used in RUM:

- **Transaction Total Time.** The time from the beginning of the download of the first page until the end of the download of the last page.
- **Transaction Net Time.** The portion of the total time that was actually spent downloading the pages. This calculation excludes gaps between the pages, which are considered as user think time. Transaction net time comprises the following measurements:
  - **Transaction Server Time.** The relative part of net time that was spent on server processing. This is calculated considering the server time of the pages. Server time is counted only once for pages that have overlapping sever time. Transaction server time = net transaction time * (total server time / total download time).

- **Transaction Network Time.** The relative part of net time that was spent on network transportation. This is calculated considering the network time of the pages. Network time is counted only once for pages that have overlapping network time. Transaction network time = net transaction time * (total network time / total download time).
- **Transaction Client/External Time.** The relative part of net time during which no server processing or network transportation took place (that is, the gaps between components), usually due to client processing. This is calculated considering the client time of the pages. Client time is counted only once for pages that have overlapping client time. Transaction client time = net transaction time * (total client time / total download time).

The following example shows the applicable times for a transaction comprising two pages:

	Start Time	End Time	Download Time	Server Time	Client Time	Network Time	Total Time
Page 1	0	10	10	4	4	2	
Page 2	8	18	10	2	4	4	
Net Transaction Time			18	5.4	7.2	5.4	18

It is possible for a transaction’s server, network, or client time to be less than the individual server, network, or client time of one of its included pages. This can occur when the download time of the pages included in the transaction overlap, but register different measurements for the same time period. For example, two pages may be downloading at the same time, but one registers server time while the other registers network time.

End User Measurements

End User Latency is the average RTT (round trip time) for a packet between the server and the client. This calculation is made only for packets that were not delayed because of server or client processing, as server time and client time are not part of the latency measurement.

Installing and Administering RUM

To begin using RUM, you must perform the following steps (after you have installed BSM):

Install the RUM Engine.

For information on installing the RUM Engine and setting up the engine to connect to the Gateway Server, see "Installing the RUM Engine" in the Real User Monitor Installation and Upgrade Guide.

Create and connect to the MySQL database.

You can create and connect to the MySQL database either as part of the RUM Engine installation procedure or separately, at a later time. For details on creating the MySQL database as part of the RUM Engine installation procedure, see "Installing the RUM Engine" in the Real User Monitor Installation and Upgrade Guide. For details on creating the MySQL database at a later time, see "Overview of the MySQL Database" on page 156.

Install one or more RUM Probes.

For information on installing a RUM Probe and setting it up to report real-user activity data to the engine, see "Installing the RUM Sniffer Probe" and "Installing the RUM Browser Probe" in the Real User Monitor Installation and Upgrade Guide.

If necessary, reconfigure the connection between RUM and BSM.

If connection parameters (such as SSL, proxy, and authentication) have changed since the installation of BSM, use the RUM Engine’s web console to reconfigure the connection between RUM and BSM. For detailed information, see "Using the RUM Web Console" on page 48.

Configure RUM in BSM End User Management Administration.

In End User Management Administration, you configure the specific application, transactions, actions, events, and end-user groups you want to monitor. For more information, see "How to Set up Real User Monitors" in the BSM Application Administration Guide.

Note: You can create RUM alerts if you want to be notified of certain occurrences while monitoring real-user data. You can view reports of the data collected by RUM in the End User Management application. For information on configuring alerts, see "EUM Alerts Administration Overview" in the BSM Application Administration Guide. For information on viewing RUM reports, see "End User Management Reports Overview" in the BSM User Guide.

Chapter 2

RUM Compatibility Matrix

The following table shows the compatibility between the different versions of RUM and BSM:

	HP Business Service Management									
Compatibility Matrix	**9.22**	**9.21**	**9.20**	**9.13**	**9.12**	**9.10**	**9.0x**	**8.0x**	**7.5x**	**7.0x**
RUM 9.22	✓	✓	✓	✓	✓	✓	x	x	x	x
RUM 9.21	x	✓	✓	✓	✓	✓	x	x	x	x
RUM 9.20	x	x	✓	✓	✓	✓	x	x	x	x
RUM 9.13	x	x	x	✓	✓	✓	x	x	x	x
RUM 9.12	x	x	x	x	✓	✓	x	x	x	x
RUM 9.10	x	x	x	x	x	✓	x	x	x	x
RUM 9.02	x	x	x	x	x	x	✓	x	x	x
RUM 9.01	x	x	x	x	x	x	✓	x	x	x
RUM 9.00	x	x	x	x	x	x	✓	x	x	x
RUM 8.0x	x	x	x	x	x	x	x	✓	x	x
RUM 7.5x	x	x	x	x	x	x	x	x	✓	x
RUM 7.0	x	x	x	x	x	x	x	x	x	✓

Note: RUM 7.01 works only with Business Availability Center 7.01

Part 2

Data Collection Methods

Chapter 3

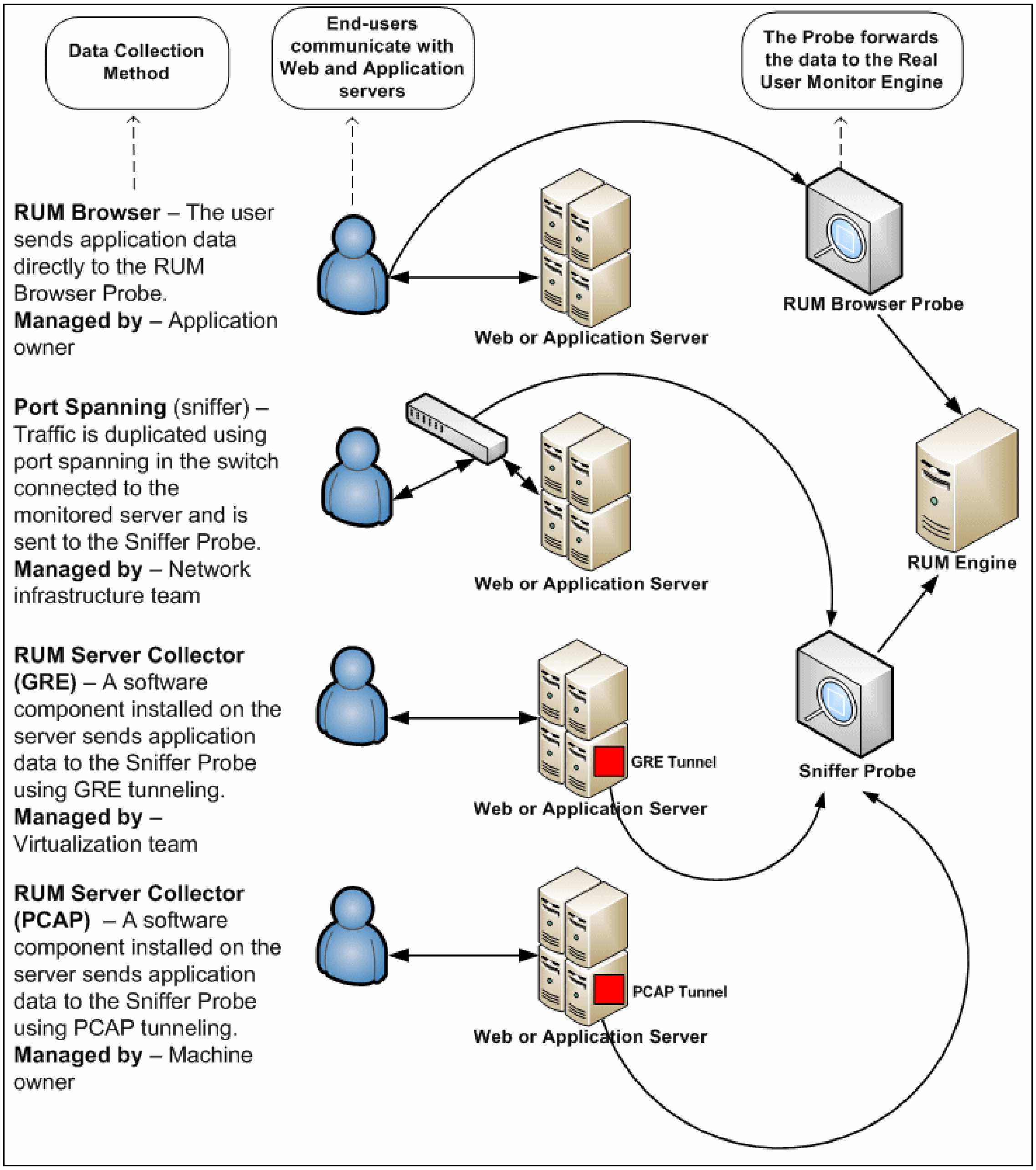
RUM Data Collection Methods

There are a number of ways by which the RUM Probe can obtain data for monitored applications. The available monitoring solutions depend on the type of RUM Probe you use:

- **Sniffer Probe** data collection methods:
  - **Network tap or switch configuration.** For details, see "Data Collection Using a Network Tap or Switch Configuration" on page 29.
  - **RUM Server Collector.** For details, see "Sniffing Using the RUM Server Collector" on page 30.
  - **VMware.** For details see "Duplicating Traffic for RUM with VMware" on page 34.
- **RUM Browser Probe.** For details, see "RUM Browser Probe" on page 38.

For details on installing the RUM Probe, refer to the Real User Monitor Installation and Upgrade Guide.

The following diagram illustrates the data flow for different RUM Probes and their data collection methods:


Data Collection Method
End-users communicate with Web and Application servers
The Probe forwards the data to the Real User Monitor Engine
Web or Application Server
RUM Browser Probe
Web or Application Server
RUM Engine
GRE Tunnel
Web or Application Server
Sniffer Probe
PCAP Tunnel
Web or Application Server

RUM Browser – The user sends application data directly to the RUM Browser Probe. **Managed by** – Application owner

Port Spanning (sniffer) – Traffic is duplicated using port spanning in the switch connected to the monitored server and is sent to the Sniffer Probe. **Managed by** – Network infrastructure team

RUM Server Collector (GRE) – A software component installed on the server sends application data to the Sniffer Probe using GRE tunneling. **Managed by** – Virtualization team

RUM Server Collector (PCAP) – A software component installed on the server sends application data to the Sniffer Probe using PCAP tunneling. **Managed by** – Machine owner

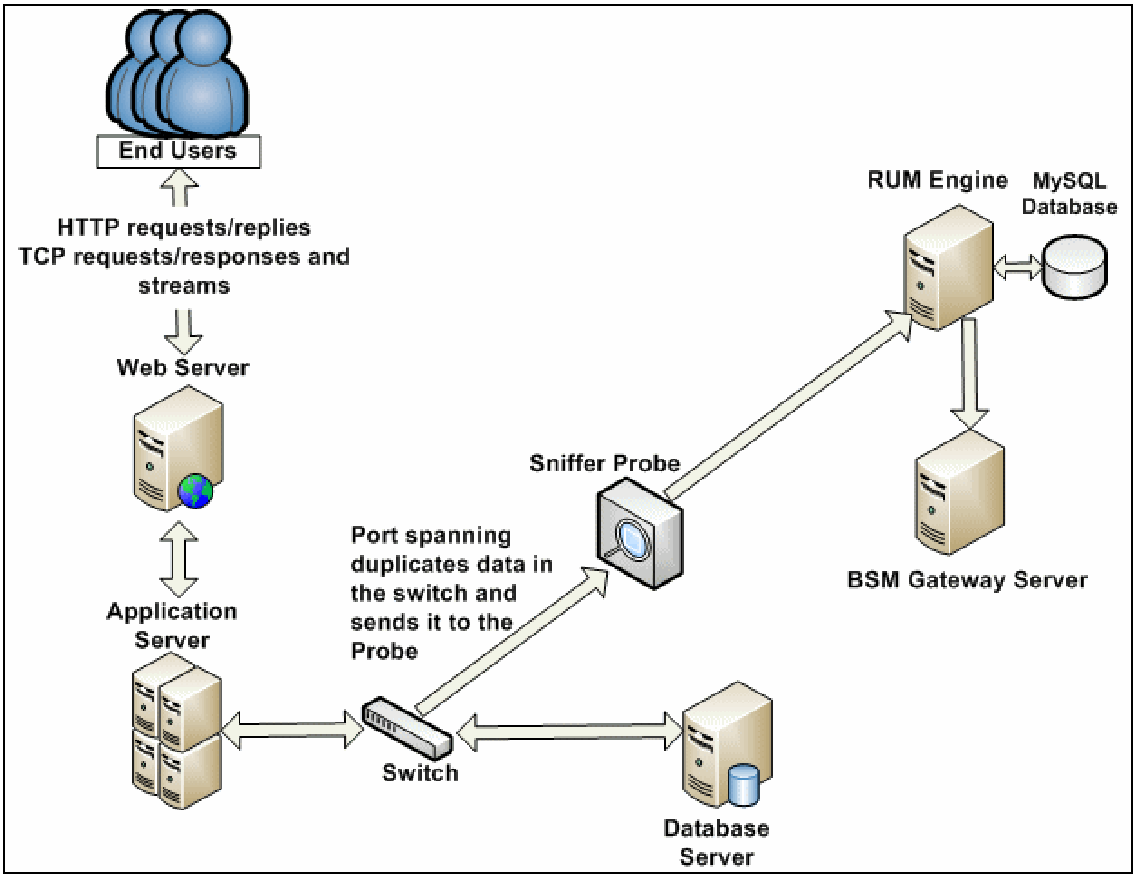
Chapter 4

Data Collection Using a Network Tap or Switch Configuration

The Sniffer Probe is a non-intrusive, passive listening device that is subject to the same traffic the server receives. It is plugged into a network tap that is connected to a monitored server. As end-user traffic passes through the tap, the probe listens to requests and responses sent to and from the server. In this way, data is tracked all the way from the end-user's IP address to the server handling the request.

Note: The configuration in a switch is usually called a mirror or span port, depending on the switch vendor.

The following diagram illustrates the flow for data collection using a network tap or switch configuration:



Chapter 5

Sniffing Using the RUM Server Collector

When it is not possible to use a network tap or port spanning, you can install the RUM Server Collector on a monitored server so that the server sends packets directly to the probe (that is, the probe receives packets directly from the monitored agent). The probe then processes the packets and forwards data to BSM in the regular manner.

The benefit of this is that you only have to be the machine owner of the server on which you install the RUM Server Collector, and are not dependent on the infrastructure team. However, this method does require you to install a software component on the server that runs your application, that is more than just a plug-in to the application.

> **Note:** The recommended data collection method is to use a network tap or port spanning when possible as this eliminates the need to configure and maintain the monitored servers for data collection.

To work with the RUM Server Collector, you must:

1. Install the RUM Sniffer Probe. For details, see "Installing the RUM Sniffer Probe" in the Real User Monitor Installation and Upgrade Guide.
2. Install the RUM Server Collector on the server you want to monitor. For details, see "Installing the RUM Server Collector" below.
3. Configure the RUM Server Collector. For details, see "Configuring the RUM Server Collector" on the next page.
4. Configure the RUM Sniffer Probe to retrieve data from the RUM Server Collector. For details, see "Configuring the RUM Sniffer Probe" on page 32.
5. Start the RUM Server Collector service. For details, see "Administering the RUM Server Collector Service" on page 33.

Installing the RUM Server Collector

This section describes how to install the RUM Server Collector on a server running applications that you want to monitor. The RUM Server Collector can be installed on servers running on Windows or Linux operating systems.

This section includes the following topics:

- "The RUM Server Collector Setup File" below
- "Installing the RUM Server Collector" on the next page

The RUM Server Collector Setup File

The RUM Server Collector setup file can be accessed from the HP Software Support Online web site (http://www.hp.com/go/hpsoftwaresupport). Go to **Software Support Online > Downloads >**

Software Patches and select Application Performance Management as the product. For each version, check for RUM as a sub-product.

Installing the RUM Server Collector

To install the RUM Server Collector:

1. Save the RUM Server Collector setup file (for Windows or Linux) on the machine on which you are installing the probe. For details on the location of the RUM Server Collector setup file, see "The RUM Server Collector Setup File" on the previous page.
2. For Windows installations, ensure that the **packages** directory is in the same location as the Server Collector setup file.
3. Run the setup program:
   - **Windows:** Navigate to the downloaded setup file (**ServerCollector_<version number>_win64_setup.exe**) and double-click it.
   - **Linux:**
     - Log in as the **root** user.
     - Assign full permissions to the setup file: `chmod 777 ./RUMSC_<version number>_Linux64.rpm`
     - Run the setup file: `rpm -ivh RUMSC-<version number>-Linux64.rpm`
4. Follow the online instructions until the setup has successfully completed.
5. On Windows systems, the RUM Server Collector is automatically started after the installation. On Linux systems, you must manually start the RUM Server Collector. For details, see "Administering the RUM Server Collector Service" on page 33.

Configuring the RUM Server Collector

The RUM Server Collector is installed with default settings, which you can change according to your needs. The configuration is stored in the **collector.conf** file that is located in:

- **Windows:** <RUM Server Collector installation directory>\etc\rum_collector\

  (The default RUM Server Collector installation directory is C:\HPRUMServerCollector)
- **Linux:** <RUM Server Collector installation directory>/etc/rum_collector/

  (The default RUM Server Collector installation directory is /opt/HP/RUMSC)

To change the configuration, edit the file, make any of the following changes, and then save the file.

- **Port number.** The default port number used by the RUM Server Collector is **2002**. You can change this number by setting the **port** parameter in the **[general]** section of the file.
- **Allowed clients.** By default, the RUM Server Collector is configured to accept connections from any client (probe). You can limit connections to specific probes by setting a **client** parameter in the **[passive]** section of the file to a specific IP address.

  Set a **client** parameter for each IP address you want to allow to connect to the RUM Server Collector.
- **Security.** By default, the RUM Server Collector is configured to enforce SSL connectivity. You

can changes this by setting the **use_ssl** parameter in the **[security]** section of the file to **false**.

The default security keys and certificates used by the RUM Server Collector for SSL connections are predefined. If you want to use different keys and certificates, you must update the following parameters in the **[security]** section of the file:

- **ssl_ca_file.** The full path to the certificate file used to validate the client certificate sent by the probe.
- **ssl_key.** The full path to the private key file used for accepting server SLL connections from the probe.
- **ssl_cert.** The full path to the certificate file used for accepting server SLL connections from the probe.

Note: When you make changes to the collector.conf file, you must restart the RUM Server Collector service for the changes to take effect. For details, see "Administering the RUM Server Collector Service" on the next page.

Configuring the RUM Sniffer Probe

You can configure any RUM Sniffer Probe to connect to a RUM Server Collector, provided that it has the capacity to handle all the monitored traffic (that is, both the regular sniffed traffic and the RUM Server Collector traffic). A RUM Server Collector can only be connected to one RUM Sniffer Probe, but a RUM Sniffer Probe can be connected to multiple RUM Server Collectors.

To configure the RUM Sniffer Probe to connect to the RUM Server Collector to retrieve data, on the RUM Engine edit the **\HPRUM\conf\configurationmanager\Beatbox_<Sniffer Probe name>_Const_Configuration.xml** file.

In the **[collector]** section of the file, add devices in the following format:

```
device rpcap://[<server name>]:<port number>/<device name>
```

where:

- **<server name>** = the name or IP address of the server on which the RUM Server Collector is installed. (If you use an IP address it must be enclosed in square brackets.)
- **<port number>** = the port number used to access the server on which the RUM Server Collector is installed, as configured in the RUM Server Collector (default 2002).
- **<device name>** = the Windows or Linux device name of the network card used to access the server on which the RUM Server Collector is installed. To monitor all network cards, omit the **<device name>** parameter completely.

Examples:

- **Specific Windows device using IP:** device rpcap://[172.23.61.71]:2002/\Device\WPRO_41_2001_{8568244D-52DE-4CE5-97E7-6DDA2E86E16D}
- **Specific Windows device using server name:** device rpcap://myserver:2002/\Device\WPRO_41_2001_{8568244D-52DE-4CE5-97E7-6DDA2E86E16D}

- **Specific Linux device:** device rpcap://[172.23.61.71]:2002/eth0
- **All devices (Windows or Linux):** device rpcap://[172.23.61.71]:2002/

Administering the RUM Server Collector Service

On Windows systems, the RUM Server Collector is automatically started after the installation. On Linux systems, you must manually start the RUM Server Collector. You can administer the RUM Server Collector service as follows:

Windows: Start, stop, or restart the service from the **services** console.

Linux: Use the command `/etc/init.d/rum_server-collector option`

Valid options are start, stop, restart, or status.

RUM Server Collector Log File

To help troubleshoot problems, you can view the RUM Server Collector log file in the following locations:

Windows: <RUM Server Collector installation directory>\var\log\rum_collector\collector.log

Linux: <RUM Server Collector installation directory>/var/log/rum_collector/collector.log

Uninstalling the RUM Server Collector

This section describes how to uninstall the RUM Server Collector.

Caution: After uninstalling the RUM Server Collector, the Server Collector configuration file and default security keys and certificates are no longer available.

Uninstalling on Windows

To uninstall the RUM Server Collector from Windows, use one of the following options:

- Invoke the Uninstall wizard - `C:\<RUM Server Collector installation directory>\Uninstall\ServerCollector\setup.exe`
- Use standard Windows tools

Uninstalling on Linux

To uninstall the RUM Server Collector from Linux:

1. Stop the RUM Server Collector: `/etc/init.d/rum_server-collector stop`
2. Locate the RUM Server Collector package: `rpm -qa|grep RUMSC`
3. Run the uninstall command: `rpm -e RUMSC-<Version number>.x86_64`

Chapter 6

Duplicating Traffic for RUM with VMware

There are various considerations and solutions for duplicating traffic for RUM when the RUM Probe is installed on a VMware platform.

This chapter includes the following topics:

- "VMware Solutions Overview" below
- "Differences Between Virtual and Physical Environments" below
- "Security" on the next page
- "Configuring Packet Duplication" on the next page
- "References" on page 37

VMware Solutions Overview

VMware can use two different kinds of switches—a regular switch, and a DV (distributed) switch which is part of VMware’s Enterprise Plus solution (for more information, refer to VMware’s vSphere web page (http://www.vmware.com/vmwarestore/vsphere_purchaseoptions.html).

Working with VMware networks involves defining a virtual switch, which is equivalent to a regular switch. On each virtual machine, you can configure one or more virtual ports, which are equivalent to regular network cards. You then connect each such network card to the virtual switch. For more information, refer to the VMware Virtual Networking Concepts guide (http://www.vmware.com/files/pdf/virtual_networking_concepts.pdf).

There are several options for configuring port mirroring for a RUM Probe with VMware ESX. For details, see "Configuring Packet Duplication" on the next page.

Differences Between Virtual and Physical Environments

There are several differences between physical and virtual environments when duplicating network traffic to the RUM Probe:

- In a physical network, there is an option to use network taps or switch port mirroring, but in a virtual environment these features are only partially available.
- In physical environments, the monitored application is tied to a physical machine which RUM then monitors to retrieve the application’s network traffic.
- In virtual environments, the Vmotion feature enables an application to jump between physical machines. If traffic is duplicated for a specific machine, when an application jumps to another machine the probe will not be able to monitor the traffic.
- In a physical network, different applications regularly use different machines and there is an

option to duplicate traffic at a machine level (switches, network taps, and so forth). In a virtual environment, different VMs are regularly installed on the same physical machine.

Security

When you configure the promiscuous mode for a VMware machine, it enables other machines to listen to the traffic. For better security, it is recommended that you only allow specifically required machines to receive traffic duplication.

For more information, refer to Capturing virtual switch traffic with tcpdump and other utilities in the VMware knowledge base.

Configuring Packet Duplication

This section describes how to duplicate traffic to the RUM Probe. The solutions differ depending on whether Vmotion is disabled or enabled.

This section includes the following topics:

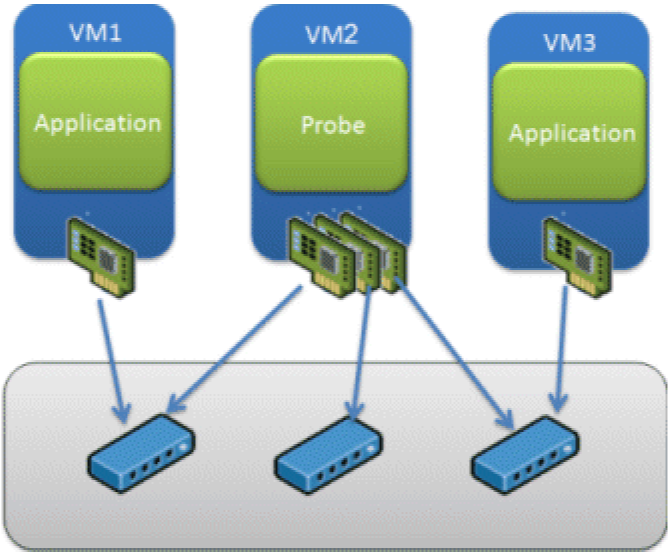
- "Monitoring Traffic when Vmotion is Disabled" below
- "Monitoring Traffic when Vmotion is Enabled" on the next page
- "Packet Duplication Using GRE Tunnel" on page 37

Monitoring Traffic when Vmotion is Disabled

It is easier to duplicate traffic when Vmotion is disabled, although in most deployments Vmotion is enabled.

Monitoring Traffic when the Probe is Installed on the Same ESX

There is an option to deploy the RUM Probe on the same ESX as the monitored application. This is illustrated for the virtual machine VM2 in the example below:



There are two entities in VMware—a virtual switch and portgroups. By default, a guest operating a system's virtual network adapter only receives frames specific for that adapter. Placing the guest adapter in promiscuous mode causes it to detect all frames passed through the virtual switch that are allowed under the VLAN policy for the associated portgroup.

To configure a portgroup or virtual switch for promiscuous mode using the Virtual Infrastructure Client:

1. Select the ESX Server host and click the **Configuration** tab.
2. Click **Properties** next to the virtual switch or portgroup.
3. To allow promiscuous mode on the virtual switch or portgroup, select the name of the virtual switch or portgroup and click **Edit**.
4. Click the **Security** tab.
5. From the Promiscuous Mode drop-down menu, select **Accept**.

Since there is an option to configure several virtual adapters for each virtual machine, and since each virtual adapter can be connected to another virtual switch, there is an option to configure the probe to get the traffic from any virtual switch on the ESX.

For more information, refer to Configuring promiscuous mode on a virtual switch or portgroup in the VMware knowledge base.

Monitoring Traffic when the Probe is Installed on a Different ESX

For details, see "Packet Duplication Using GRE Tunnel" on the next page

Monitoring Traffic when Vmotion is Enabled

If your environment is configured to use the Vmotion feature, you must verify that the RUM Probe will get continuous traffic from the monitored application. You can use one of the following solutions:

Use GRE Tunneling

For details, see "Packet Duplication Using GRE Tunnel" on the next page

Use Virtual Dedicated Taps

Another option is to use virtual taps, but this requires the addition of third party equipment. One of the recommended third parties is the NetOptic Phantom solution.

Install the RUM Probe on the Same ESX as the Monitored Application

Configure the RUM Probe to run on the same ESX as the monitored application. There is an option in VMware to keep two VMs together on the same ESX to improve efficiency. This option can also be used for keeping the probe and monitored application on the same ESX.

To keep two VMs together:

1. Right-click the DRS cluster that contains the VMs you want to keep together.
2. Select **Edit Settings**.
3. Under VMware DRS click **Rules**.

4. To create a rule click **Add**.
5. In the dialog box that opens, enter a name for the rule.
6. Select the rule type **Separate virtual machines/Keep virtual machines together**.
7. Click **Add** to select the virtual machines to which the rule applies. Accept the selection by clicking **OK** twice.
8. Click **OK** to save and exit the settings.

For further details, see http://www.vmware.com/pdf/vmware_drs_wp.pdf.

Use RUM Server Collector

Install the RUM Server Collector to run on the same VM as the monitored application.

Packet Duplication Using GRE Tunnel

When the probe is deployed on a different ESX than the monitored application, it is necessary to send all the packets from the monitored application to the RUM Probe.

In ESX 4.x there is no option to duplicate the traffic with the regular VMware virtual switch. Instead, there is an option to use Cisco Nexus switches to mirror the traffic between different ESXs.

The feature is called ERSPAN. For a detailed description of how to configure ERSPAN, refer to the Cisco documentation.Cisco documentation at http://www.cisco.com/en/US/docs/switches/datacenter/nexus1000/sw/4_0_4_s_v_1_3/system_management/configuration/guide/n1000v_system_9span.html.

RUM 9.22 supports GRE tunneling, which is required for ERSPAN.

In ESX 5.x there is an option to define a mirror port between two ESXs. For details, see http://blogs.vmware.com/networking/2011/08/vsphere-5-new-networking-features-port-mirroring.html.

> **Note:** For VMware 5.1, use the web interface for the port mirror definition (this feature does not exist in the vSphere client).

References

The following references can provide additional, useful information.

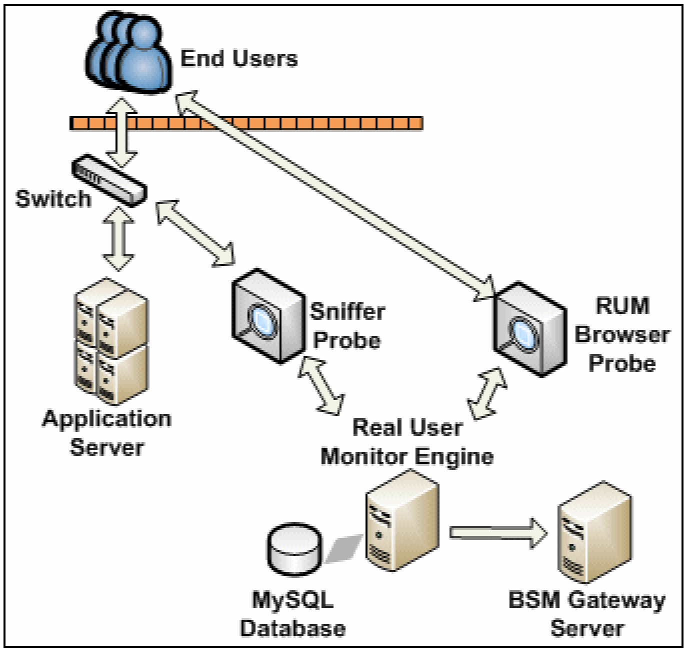
- VMware mirroring configuration (http://books.google.co.il/books?id=F_8qs4lPLpwC&pg=PA207&lpg=PA207&dq=vmware+promiscuous+configure&source=bl&ots=GmuIJOwSnv&sig=fIe0UCKHHPm4GRmBFj4PsLr4wQY&hl=en&ei=st49TJzMOMe2ngf0s_jdDg&sa=X&oi=book_result&ct=result&resnum=7&ved=0CDEQ6AEwBg#v=onepage&q&f=true)
- Defining promiscuous mode in VMware (http://communities.vmware.com/message/371562)

Chapter 7

RUM Browser Probe

The RUM Browser Probe collects user experience data for your users. Unlike the RUM Sniffer Probe that collects traffic by monitoring network packets using traffic duplication, the RUM Browser Probe receives data for monitored web or mobile applications directly from the client (end user).

The following diagram shows the conceptual difference between the RUM Sniffer Probe and the RUM Browser Probe:



You use different solutions for monitoring web and mobile applications with the RUM Browser Probe:

- The RUM browser solution enables you to monitor web applications through an end user's Internet browser. For details, see "Using the RUM Browser Solution to Monitor Web Applications" below.
- The RUM mobile solution enables you to monitor mobile applications through an app on an end user's mobile device. For details, see "Using the RUM Mobile Solution to Monitor Mobile Applications" on page 41.

Using the RUM Browser Solution to Monitor Web Applications

The RUM browser solution enables you to monitor web applications through a user's Internet browser and sends the collected data from the browser directly to the RUM Browser Probe. The advantage of monitoring traffic on the client side instead of the server side, is that the metrics are more accurate as the traffic includes data for the following:

- Proxies
- Content Delivery Networks (CDN)
- External sources (other servers than the one providing the HTML that provide external content such as images)

> **Note:** Data about failures, however, is not included as only successful pages are reported back to the client.

You enable the RUM browser solution by installing a JavaScript snippet in the specific HTML pages you want to monitor. This snippet is responsible for collecting performance data on the client machine and sending the collected data to a specific RUM Browser Probe machine. For details, see "Installing the JavaScript Snippet" in the Real User Monitor Installation and Upgrade Guide.

This section includes the following topics:

- "Supported Browsers" below
- "Getting Started with the RUM Browser Probe" below
- "Configuring Applications in BSM for the RUM Browser Solution" below

Supported Browsers

The RUM browser solution supports the following Internet browsers:

- Internet Explorer
- Google Chrome
- Firefox
- Safari
- Opera

Getting Started with the RUM Browser Probe

To use the RUM browser solution with the RUM Browser Probe, you must:

1. Install the RUM Browser Probe. For details, see "Installing the RUM Browser Probe" in the Real User Monitor Installation and Upgrade Guide.
2. Install the JavaScript snippet in the HTML pages you want to monitor. For details, see "Installing the JavaScript Snippet" in the Real User Monitor Installation and Upgrade Guide.
3. In BSM, configure the web application whose pages you want to monitor. For details, see "Configuring Applications in BSM for the RUM Browser Solution" below.

Configuring Applications in BSM for the RUM Browser Solution

When you configure a web application in End User Management in BSM for monitoring by RUM, some of the configuration settings are not applicable, or must be configured in a certain way, if the application is monitored by a RUM Browser Probe as opposed to a Sniffer Probe. The following table details the relevant configuration settings:

Configuration Setting	Configured In	Remarks
Session Properties	RUM Session Page > Session Properties Area	You must configure the following session properties, although apart from the name, the rest of the session property settings are not used: • Operating System • Browser
User Name Detection	RUM Application General Page > User Name Detection Area	N/A. User name detection can be configured in the JavaScript snippet.
Parameter Extraction	RUM Application General Page > Parameter Extraction Area	N/A
TCP Settings	RUM Application General Page > TCP/Network Settings Area	N/A. TCP data is not reported for applications configured for the RUM Browser Probe.
Session ID	RUM Session Page > Session Identification Area	N/A. The RUM Browser Probe uses its own mechanism for user session tracking.
Exclude BPM Data	RUM Data Collection Page > General Area	N/A
Sensitive Data	RUM Data Collection Page > Sensitive Data Area	N/A
Snapshots	RUM Data Collection Page > Snapshot Collection Area	N/A

Configuration Setting	Configured In	Remarks
Events	RUM Application Events Page	The following events are applicable to applications monitored by the RUM Browser Probe: • **Error Page** • **Text Pattern** - you configure the name of the text pattern event in EUM, but define the actual text pattern settings in the JavaScript snippet. • **Session Pages** • **Page Size** - the RUM Browser Probe cannot always determine page size. • **Page Time** All other events are not applicable to applications monitored by the RUM Browser Probe.

Using the RUM Mobile Solution to Monitor Mobile Applications

The RUM mobile solution enables you to monitor mobile applications through apps on a user's mobile device and sends the collected data from the app directly to the RUM Browser Probe. The advantages of monitoring traffic on the client side instead of the server side are:

- The user experience is measured including the latency of the mobile network.
- Data is broken down by operating system, device, connection, and application version.

This section includes the following topics:

- "Supported Operating Systems" below
- "Getting Started with the RUM Browser Probe" below
- "Configuring Applications in BSM for the RUM Mobile Solution" on the next page

Supported Operating Systems

The RUM mobile solution supports the Android operating system.

Getting Started with the RUM Browser Probe

To use the RUM mobile solution with the RUM Browser Probe, you must:

1. Install the RUM Browser Probe. For details, see "Installing the RUM Browser Probe" in the Real User Monitor Installation and Upgrade Guide.
2. Instrument the Android APK. For details, see "Instrumenting Mobile Apps for Android" in the Real User Monitor Installation and Upgrade Guide.
3. In BSM, configure the mobile application whose pages you want to monitor. For details, see "Configuring Applications in BSM for the RUM Mobile Solution" on the next page.

Configuring Applications in BSM for the RUM Mobile Solution

When you configure a mobile application in End User Management in BSM for monitoring by RUM, some of the configuration settings are not applicable, or must be configured in a certain way, if the application is monitored by a RUM Browser Probe as opposed to a Sniffer Probe. The following table details the relevant configuration settings:

> **Note:** When you configure a new mobile application in End User Management, use the **Network for Mobile Apps** template.

Configuration Setting	Configured In	Remarks
Application Location	RUM General Page > Application Location Area	Do not configure IP ranges for the application. Configure at least one URL.
Session Properties	RUM Session Page > Session Properties Area	Applicable session properties are predefined in the Network for Mobile Apps template and must not be changed.
User Name Detection	RUM Application General Page > User Name Detection Area	N/A
Parameter Extraction	RUM Application General Page > Parameter Extraction Area	N/A
TCP Settings	RUM Application General Page > TCP/Network Settings Area	N/A. TCP data is not reported for applications configured for the RUM Browser Probe.
Session ID	RUM Session Page > Session Identification Area	N/A. The RUM Browser Probe uses its own mechanism for user session tracking.
Exclude BPM Data	RUM Data Collection Page > General Area	N/A
Sensitive Data	RUM Data Collection Page > Sensitive Data Area	N/A
Snapshots	RUM Data Collection Page > Snapshot Collection Area	N/A
Events	RUM Application Events Page	N/A

Part 3

Configuring and Administering Real User Monitor

Chapter 8

Administering the RUM Engine

You administer RUM by using the Windows Start menu and a task bar icon, and use the RUM logs for troubleshooting.

This chapter includes the following topics:

- "Administering RUM Monitor" below
- "RUM Logs" on the next page

Administering RUM Monitor

The Windows Start menu options and the task bar icon that you use to administer RUM are installed during the Windows installation of RUM.

This section includes the following topics:

- "RUM Windows Start Menu" below
- "RUM Engine Nanny" on the next page

RUM Windows Start Menu

To access the RUM Start menu that is added to the Windows machine on which the RUM Engine is installed, select **Start > Programs > RUM**. The menu includes the following options:

Administration

The Administration menu option includes the following options:

Option	Description
RUM Configuration Tool	Runs the RUM Configuration Tool, which enables you to create a MySQL database schema, and to connect RUM to a MySQL database. For details, see "Creating and Connecting to the MySQL Database" on page 156.
Database (only if the MySQL database has been installed)	Opens a submenu with options for starting and stopping the MySQL database on the machine on which it is installed.
Disable RUM	Stops RUM on the specific machine, and disables it from being run automatically whenever the machine is started.
Enable RUM	Starts RUM on the specific machine, and sets it to run automatically whenever the machine is started.

Open RUM Web Console

Selecting this option opens the HP RUM web console used for administering HP RUM. For details, see "Using the RUM Web Console" on page 48.

RUM Engine Nanny

The RUM Engine nanny is responsible for starting and stopping RUM and managing the processes used by it. The nanny runs as a Windows service.

When you enable or disable RUM using the Windows Start menu (**Start > Programs > HP Real User Monitor > Administration**) you start or stop the nanny service, which in turn starts or stops RUM. You can see the status of RUM in the nanny JMX console.

To view the status of RUM:

1. Access the nanny JMX console using the following URL in a browser:
   `http://<RUM Engine machine name or IP address>:22735`

2. When prompted for credentials, enter the same user name and password that are configured for the RUM web console.

3. In the **RUM.Nanny** section, click **RUM.Nanny:service=engine**.

4. In the **List of MBean attributes** table, view the value for the Status attribute. Valid statuses for the RUM Engine process are:

   - Starting
   - Started
   - Stopping
   - Stopped
   - Failed

RUM Logs

RUM logs store messages from RUM modules and are used to troubleshoot problems, and to provide information about the system’s operations. There are three types of logs: engine logs, jboss logs, and core logs. The log files are located in the **<Real User Monitor Engine root>\log** directory.

This section includes:

- "Engine Logs" below
- "Jboss and Tomcat Logs" on the next page
- "Core Logs" on the next page

Engine Logs

Engine logs contain log messages from the different processes. There are two types of engine log files:

- **RUM Engine log files.** Log files for modules within the RUM Engine.
- **Repository log files.** Log files for modules connecting the RUM Engine and its MySQL database.

There is a log for each module and the RUM Engine saves up to 20 files for each log by default. When a file reaches a maximum, default size of 3 MB, a new log file is created automatically. Each time the RUM Engine is restarted, it creates a new set of logs.

The name of the RUM Engine log file consists of the module name, log and the log file number. For example, a module called **clustermanager** would produce the following log files:

```
clustermanager.log
clustermanager.log.1
clustermanager.log.2
...
```

The name of the repository log file consists of the log type (repository), the module name, log and the log file number. For example, a repository module called **dataaccesslayer** would produce the following log files:

```
repository.dataaccesslayer.log
repository.dataaccesslayer.log.1
repository.dataaccesslayer.log.2
...
```

The structure of a message in the log file is as follows: `<timestamp> <invoking thread> <java class name and line number> <message log level> <message content>`. For example:

```
2005-08-03 14:20:32,953 [main] (NodesVerifierManager.java:185) INFO
- Found primary installation on current machine
2005-08-03 14:20:33,125 [main] (NodeVerifierServer.java:103) INFO -
Got host name=paddington from repository. Hostname ID=1
```

Jboss and Tomcat Logs

Jboss and Tomcat log messages are written to the following files in the **<Real User Monitor Engine root>\log** directory:

- **jboss_boot.log.** Logs startup activities including running the jboss process, deployment, and startup status. If RUM fails to start, any problems are written to this log.
- **jboss_server.log.** Logs all jboss activities including jboss messages, deployment and startup status.
- **jboss_tomcat.log.** Logs the Tomcat messages.

Core Logs

Core log messages are written to log files in the **<Real User Monitor Engine root>\log\core** directory.

The core log files contain messages about the general status of the application server on which the RUM Engine is installed, and its services.

Chapter 9

Using the RUM Web Console

After the RUM Engine has been installed and started, you can use the RUM Engine web console to view and configure the connection between RUM and BSM, view other RUM Engine settings, monitor the health of RUM components, and use RUM diagnostic tools.

This chapter includes the following topics:

- "Accessing the RUM Engine Web Console" below
- "Monitoring the Health of RUM Components" on page 53
- "RUM Configuration and Settings" on page 80
- "BSM Connection Settings" on page 80
- "Probe Management" on page 83
- "TransactionVision Connection Settings" on page 101
- "Advanced Settings" on page 103
- "Data Flow Probe Connection Settings" on page 103
- "System Info" on page 104
- "RUM Diagnostics Tools" on page 104

Accessing the RUM Engine Web Console

Use the RUM Engine web console to monitor the health of RUM components. You can also use a number of configuration tools to configure the RUM Engine, as well as view and configure the connection parameters between RUM and BSM. In addition, the RUM web console includes diagnostic tools that you can use in resolving RUM problems.

When you start the RUM Engine after installation, you can access the RUM Engine web console by launching a web browser and entering the following URL: `http://<RUM Engine machine name or IP>:8180`.

When prompted, enter the JMX console authentication credentials (if you do not have these credentials, contact your system administrator).

> **Note:** On a Windows machine on which the RUM Engine is installed, you can also access the RUM Engine web console by selecting **Start > Programs > HP Real User Monitor > Open Real User Monitor Web Console**.

This section includes the following topics:

- "Logging In" on the next page
- "Logging Out" on the next page

- "Changing Login Parameters" below
- "Supporting Smart Card Authentication" on the next page
- "Changing the Language of the RUM Web Console User Interface" on page 52

Logging In

When you access the RUM Engine web console, the login page opens.

Enter the login parameters (login name and password) of a user defined in RUM, and click **Log In**. After logging in, the user name appears at the top right, in the title bar.

Initial access can be gained using the default superuser login parameters: Login Name=**admin**, Password=**admin**. We recommend that the system superuser change this password immediately to prevent unauthorized entry. For details on changing the password, see "Changing Login Parameters" below.

The RUM Engine web console opens, displaying the top menu bar that enables navigation to the configuration, health, tools, and help pages, as well as the **Logout** button.

Note: After three, consecutive, bad log in attempts, you are locked out of the system for a period of time set by your system superuser. Consult your system superuser for details.

Tip for system superusers: You set the lock out time in the **usersLockoutTime** parameter in the **<RUM root directory>\conf\rumwebconsole\rumwebconsole.xml** file. We recommended that you limit access to this file.

Logging Out

When you complete your session, we recommend that you log out of the web site to prevent unauthorized entry, by clicking **Logout** at the top of the page.

Note: You are automatically logged out of the RUM web console after 20 minutes of inactivity.

Changing Login Parameters

You can add, change, and delete RUM users by editing the **<RUM root directory>\conf\rumwebconsole\users.xml** file. In this file, there is a line for each user in the following format:

```
<user login="admin" name="Administrator" password="encryptedPassword"
passwordEncrypted="true"/>
```

Note:

- We recommend that the system superuser limits access to the **<RUM root directory>\conf\rumwebconsole\users.xml** file.
- Changes to the **<RUM root directory>\conf\rumwebconsole\users.xml** file only take effect when the RUM Engine is restarted. When the RUM Engine is started, RUM encrypts the password, and sets the **passwordEncrypted** parameter to **true**.

To add a RUM user:

1. Open the **<RUM root directory>\conf\rumwebconsole\users.xml** file in a text editor.
2. Duplicate the entry for one of the existing users.
3. In the duplicate line, enter the **user name**, **login**, and **password** parameters for the new user. Ensure that the **passwordEncrypted** parameter is **false**.
4. Save the file.

To change a RUM user:

1. Open the **<RUM root directory>\conf\rumwebconsole\users.xml** file in a text editor.
2. In the appropriate line, change the **user name** and **login** parameters as required.
3. To change a user’s password, enter the new password in the **password** parameter and ensure that the **passwordEncrypted** parameter is **false**.
4. Save the file.

To delete a RUM user:

1. Open the **<RUM root directory>\conf\rumwebconsole\users.xml** file in a text editor.
2. Delete the appropriate line.
3. Save the file.

Note: When deleting users, ensure that there is at least one user configured in the users file, or you are unable to access the RUM web console.

Supporting Smart Card Authentication

To support smart card authentication in RUM, you must disable user authentication to the RUM web console and then restrict access to the RUM web console to the actual RUM Engine (local host) machine only. When you restrict access to the RUM web console to the local host only, trying to connect to the RUM web console from a different machine (including from a BSM system using **Admin > End User Management > Settings > Real User Monitor Settings > RUM Engines > Open Real User Monitor Engine's Web Console**) results in an `'Access forbidden'` message.

To support smart card access:

1. Disable user credential authorization when accessing the RUM web console. By disabling user credential authorization, you are not prompted to enter a user name or password when accessing the RUM web console.

   Edit the **<RUM root directory>\conf\common\common.properties** file and change the value of the **CACMode** parameter to **true**.

2. Block access to the RUM web console from any host other than the local host.

   a. Stop the RUM Engine.

   b. Edit the **\WEB-INF\web.xml** file in the **<RUM root directory>\AppServer\deploy\rumwebconsole\rumwebconsole.war** zipped file. (You can edit .war file content using a common zip file editor such as 7zip or WinRAR.)

   c. Uncomment the **<filter>** and **<filter-mapping>** sections:

```
<!-- uncomment for CAC support:  2 places in this file
<filter>
   <filter-name>Remote Address Filter</filter-name>
   <filter-class>org.apache.catalina.filters.RemoteAddrFilter</f
ilter-class>
   <init-param>
      <param-name>allow</param-name>
      <param-value>127\.\d+\.\d+\.\d+|::1|0:0:0:0:0:0:0:1</para
m-value>
   </init-param>
</filter>
-->

<!-- uncomment for CAC support:   2 places in this file
<filter-mapping>
   <filter-name>Remote Address Filter</filter-name>
   <url-pattern>/*</url-pattern>
</filter-mapping>
-->
```

   > **Note:** To uncomment the sections:
   >
   > - Remove the line **<!-- uncomment...** above the section name.
   > - Remove the line **-->** at the end of the section.

   d. Ensure that the changes you make in the **\WEB-INF\web.xml** file are saved to the .war file.

   e. Start the RUM Engine.

Changing the Language of the RUM Web Console User Interface

The RUM web console user interface can be viewed in the following languages in your web browser:

Language	Language Preference in Web Browser
Chinese	Chinese (China) [zh-cn]
English	English (United States) [en-us]
French	French (France) [fr]
German	German (Germany) [de]
Japanese	Japanese [ja]
Korean	Korean [ko]
Russian	Russian (Russia) [ru]
Spanish	Spanish (Spain) [es]

Use the language preference option in your browser to select how to view the RUM web console. The language preference chosen affects only the user’s local machine and not the RUM machines or any other user accessing the same RUM web console. The language is determined when you log in to the RUM web console; changing the language preference in your browser once you have logged in has no effect until you log out and log back in.

To view the RUM web console in a specific language using Internet Explorer:

1. Select **Tools > Internet Options** and click **Languages**. The Language Preference dialog box opens.
2. Select the language in which you want to view the RUM web console.
3. If the language you want is not listed in the dialog box, click **Add** to display the list of languages. Select the language you want to add and click **OK**.
4. Click **Move Up** to move the selected language to the first row.
5. Click **OK** to save the settings.
6. Refresh the page: the RUM web console user interface is displayed in the selected language.

Note:

- Starting from RUM version 7.0, there is no language pack installation. All translated languages are integrated into the RUM Multilingual User Interface.
- Data stays in the language in which it was entered, even if the language of the web browser changes. Changing the language of the web browser on your local machine does not change the language of RUM definitions and configurations.

- If a user selects a language not supported by the RUM Multilingual User Interface, the RUM web console user interface appears in English.

Monitoring the Health of RUM Components

The **Health** drop-down menu on the RUM Engine web console menu bar includes options for displaying the status of the main RUM components and for creating a zip file of the RUM resource and log files for use by HP Software Support.

This section includes:

- "System Status" below
- "Capture Log Files" on page 79

System Status

You use the **System Status** menu option to display the status of the main RUM components. When you select this option, the System Health page opens. You can refresh the data displayed on the System Health page by clicking the **Refresh** button 🔄 at the top, right-hand side of the page.

For each component displayed on the System Health page, there are four possible statuses:

✅	OK
⚠	Minor
❌	Critical
❓	No status

You can drill down to see the status of the entities that comprise the RUM component by clicking the component name.

For each entity displayed, apart from the columns included in the tables below, there is a column called **Value (Value Since Startup)**. If an entity is configured to display a value, it is displayed in this column either as an absolute value (for example, the number of pages published), or as a ratio showing a value for a given time period (for example, the number of session events per second). An additional absolute value may be displayed in brackets, which is the accumulated value of the entity since the RUM Engine was last started.

Note: Entities using ratios have no status until the System Health page has been automatically updated twice by the RUM Engine. This can take several moments (by default, up to six minutes).

The following components are displayed in the System Health page and the table for each lists the included entities and describes the meaning of the different statuses:

- "Configuration Retrieval From BSM Server" below
- "Database" below
- "RUM Sniffer Probe" on the next page
- "RUM Browser Probe" on page 66
- "RUM Engine" on page 69
- "Samples to BSM Server" on page 74
- "ATT" on page 75
- "Data Access Layer" on page 75
- "Partition Manager" on page 77
- "Topology Engine" on page 78
- "Missing Mirrored Data" on page 79

Configuration Retrieval From BSM Server

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Connection to BSM server	Status of the connection to the BSM Gateway Server for retrieving RUM Engine and Probe configurations	Connection to BSM server is operational	N/A	Connection to BSM server is not operational
Data type <type name> retrieval	Status of the last attempt to retrieve data type <type name> configuration from the BSM Gateway Server	Configuration of data type <type name> successfully retrieved from BSM server	N/A	Errors while trying to retrieve configuration data type <type name> from BSM server

Database

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Database connectivity	Status of the connectivity between the RUM Engine and the MySQL database	Connection to database OK	N/A	Connection to database not working

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Database free space	Percentage of free space (including free space in the tablespace) on the disk on which the MySQL database is installed	More than 4% is free.	3–4% is free.	Less than 3% is free.
Database Response Time	Status of the response time between the RUM Engine and the MySQL database	Database response time is normal	Database response time is below normal	Database response time is slow
Database Session Purging Time	The length of time taken to purge old sessions from the database	Purging time is normal	Purging time is slow	N/A
Number of stale queries	The number of database queries aborted because they were stale (running for too long a period)	N/A	N/A	N/A

RUM Sniffer Probe

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
100 Continue Hits	Opens a page that displays for each monitored web application, the number of 100 Continue Hit messages received by the web servers from clients	N/A	N/A	N/A
Active Connections	The number of active TCP connections currently monitored by the RUM Probe	The number of active TCP connections is below the internal permitted number	The number of active TCP connections is close to the internal permitted number	The number of active TCP connections has exceeded the internal permitted number

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Active Sessions	The number of sessions currently monitored by the RUM Probe	The number of active sessions is below the internal permitted number	The number of active sessions is close to the internal permitted number	The number of active sessions has exceeded the internal permitted number
Bytes received for protocol <type>	The number of bytes received by the servers from clients for the protocol <type>	N/A	N/A	N/A
Bytes sent for protocol <type>	The number of bytes sent by the servers to clients for the protocol <type>	N/A	N/A	N/A
Channel "connections" Status	Status of the last attempt to connect to the channel	The RUM Engine has successfully connected to this probe channel	The RUM Engine experienced problems while connecting to this probe channel	The RUM Engine has failed to connect to this probe channel more than three consecutive times
Channel "missing components" Status	Status of the last attempt to connect to the channel	The RUM Engine has successfully connected to this probe channel	The RUM Engine experienced problems while connecting to this probe channel	The RUM Engine has failed to connect to this probe channel more than three consecutive times

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Channel "pages" Status	Status of the last attempt to connect to the channel	The RUM Engine has successfully connected to this probe channel	The RUM Engine experienced problems while connecting to this probe channel	The RUM Engine has failed to connect to this probe channel more than three consecutive times
Channel "poorRequests" Status	Status of the last attempt to connect to the channel	The RUM Engine has successfully connected to this probe channel	The RUM Engine experienced problems while connecting to this probe channel	The RUM Engine has failed to connect to this probe channel more than three consecutive times
Channel "sessions" Status	Status of the last attempt to connect to the channel	The RUM Engine has successfully connected to this probe channel	The RUM Engine experienced problems while connecting to this probe channel	The RUM Engine has failed to connect to this probe channel more than three consecutive times
Configuration to Probe	Status of the last attempt to send the configuration to the RUM Probe	Probe was configured successfully	N/A	Errors during probe configuration process
Connection to Probe	Status of the http connection from the RUM Engine to the RUM Probe	The connection is successful	N/A	There is no connection
Disk Utilization for	The RUM Probe disk utilization on a specific partition	Free disk space is sufficient	Free disk space is nearing its limit	Free disk space is insufficient

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Incomplete Transactions	The percentage of incomplete packets (that is, requests without responses). A high number can indicate a problem with a switch, or with a probe's network configuration.	N/A	N/A	N/A
IPv6 address parsing	The ability of the probe to code and decode IPv6 addresses	No IPv6 application is defined, or an IPv6 application is defined and an IPv6 interface is present on the probe machine	N/A	An IPv6 application is defined, but no IPv6 interface is present on the probe machine
Lost SSL Requests	The percentage of SSL requests for which the decryption failed.	N/A	N/A	N/A
Missing Mirrored Data	Click Missing Mirrored Data to see the entities that comprise the Missing Mirrored Data component.			
Network Captures Retriever Queue Size	The queue size of the probe's network capture files.	N/A	N/A	N/A
Orphan Application Hits	Opens a page that displays for each monitored application, the percentage of page components that could not be correlated to a specific page	N/A	N/A	N/A

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Packet Queue Work	The current number of packets that have been collected from the network devices, but have not yet been processed	The packet rate is normal	The packet rate is nearing the limit for normal processing	The packet rate is too high
Packets filtered IPv4	The number of IPv4 packets that were filtered (that is, that reached the probe, but were not processed)	N/A	N/A	N/A
Packets filtered IPv6	The number of IPv6 packets that were filtered (that is, that reached the probe, but were not processed)	N/A	N/A	N/A
Packets filtered sum	The total number of packets (IPv4 and IPv6) that were filtered (that is, that reached the probe, but were not processed)	N/A	N/A	N/A
Packets lost IPv4	The percentage of IPv4 packets that the RUM Probe has recognized as missing	< 1%	>= 1% < 3%	>= 3%
Packets lost IPv6	The percentage of IPv6 packets that the RUM Probe has recognized as missing	< 1%	>= 1% < 3%	>= 3%
Packets lost sum	The percentage of total packets (IPv4 and IPv6) that the RUM Probe has recognized as missing	< 1%	>= 1% < 3%	>= 3%
Packets processed IPv4	The number of IPv4 packets that were processed	N/A	N/A	N/A
Packets processed IPv6	The number of IPv6 packets that were processed	N/A	N/A	N/A

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Packets processed sum	The total number of packets (IPv4 and IPv6) that were processed	N/A	N/A	N/A
Packets with bad checksum	The percentage of packets with bad checksums	N/A	N/A	N/A
Pages Cached	The number of page views currently being cached to the RUM Probe’s memory	The page rate is stable	The page rate is nearing the limit for normal caching	The page rate is too high
Pages Channel Processing Delay	Displays the difference between the time a page hit was received by the probe to when it was reported to the RUM Engine	N/A	N/A	N/A
Plain Bytes Received	The total number of non SSL bytes received by the servers from clients	The current load of http received traffic is normal	N/A	The current load of http received traffic is too high for a single RUM Probe
Plain Bytes Sent	The total number of non SSL bytes sent by the servers to clients	The current load of http sent traffic is normal	N/A	The current load of http sent traffic is too high for a single RUM Probe
Plain Packets	The total number of non SSL packets processed by the RUM Probe	The http packet rate is normal	N/A	The http packet rate is too high for a single RUM Probe
Probe and Engine Time Difference	Displays the status of the time synchronization between the RUM Engine and Probe	The RUM Engine and Probe are in sync	The RUM Engine and Probe are slightly out of sync	The RUM Engine and Probe are grossly out of sync

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Probe Channel rum-components Guarantee Delivery Files Total Size	The total size of component channel files on the RUM Probe	N/A	N/A	N/A
Probe Channel rum-components Total Guarantee Delivery Files	The number of guaranteed delivery files for the components channel waiting to be read by the RUM Engine	The number of component channel files is normal	The number of component channel files is high, indicating that the RUM Engine might be processing less data than the RUM Probe is producing	N/A
Probe Channel rum-connections Guarantee Delivery Files Total Size	The total size of connection channel files on the RUM Probe	N/A	N/A	N/A
Probe Channel rum-connections Total Guarantee Delivery Files	The number of guaranteed delivery files for the connections channel waiting to be read by the RUM Engine	The number of connection channel files is normal	The number of connection channel files is high, indicating that the RUM Engine might be processing less data than the RUM Probe is producing	N/A
Probe Channel rum-pages Guarantee Delivery Files Total Size	The total size of page channel files on the RUM Probe	N/A	N/A	N/A

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Probe Channel rum-pages Total Guarantee Delivery Files	The number of guaranteed delivery files for the pages channel waiting to be read by the RUM Engine	The number of page channel files is normal	The number of page channel files is high, indicating that the RUM Engine might be processing less data than the RUM Probe is producing	N/A
Probe Channel rum-poor-requests Guarantee Delivery Files Total Size	The total size of poor-request channel files on the RUM Probe	N/A	N/A	N/A
Probe Channel rum-poor-requests Total Guarantee Delivery Files	The number of guaranteed delivery files for the poor-requests channel waiting to be read by the RUM Engine	The number of poor-request channel files is normal	The number of poor-request channel files is high, indicating that the RUM Engine might be processing less data than the RUM Probe is producing	N/A
Probe Channel rum-sessions Guarantee Delivery Files Total Size	The total size of session channel files on the RUM Probe	N/A	N/A	N/A
Probe Channel rum-sessions Total Guarantee Delivery Files	The number of guaranteed delivery files for the sessions channel waiting to be read by the RUM Engine	The number of session channel files is normal	The number of session channel files is high, indicating that the RUM Engine might be processing less data than the RUM Probe is producing	N/A

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Probe Channels Data Flow	Status of retrieving data from the RUM Probe	Data from the probe successfully retrieved	Probe has not produced new data for some time	N/A
Probe Connections Published	The number of connections recorded by the RUM Probe	N/A	N/A	N/A
Probe Connections Processed by Engine	The number of connections that the RUM Engine has started to process	N/A	N/A	N/A
Probe Page Hits	The number of page hits recorded by the RUM Probe	N/A	N/A	N/A
Probe Page Hits Processed by Engine	The number of page hits that the RUM Engine has started to process	N/A	N/A	N/A
Probe Process CPU Utilization	The current percentage of probe utilization of the probe process	Probe utilization is normal	Probe utilization is nearing the limit for a single RUM Probe	N/A
Probe Process Memory	The total amount of non-swapped, physical memory used by the RUM Probe, in kilobytes	Always	N/A	N/A
Probe Process Memory Utilization	The total amount of non-swapped physical memory used by the probe process, out of the total amount of physical system memory, in kilobytes	Memory utilization is normal	Memory utilization is high	Memory utilization is nearing the maximum permissible value
Probe Storage ccomps Number of Errors	The number of non critical errors for components that occurred when working with the database	N/A	N/A	N/A

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Probe Storage ccomps Number of Total Records	The total number of records for components in the database	N/A	N/A	N/A
Probe Storage ccomps Status	The current status of the database for components	Database status is normal	N/A	Database status is bad
Probe Storage mainpagedb Number of Errors	The number of non critical errors for main pages that occurred when working with the database	N/A	N/A	N/A
Probe Storage mainpagedb Number of Total Records	The total number of records for main pages in the database	N/A	N/A	N/A
Probe Storage mainpagedb Status	The current status of the database for main pages	Database status is normal	N/A	Database status is bad
Probe Storage pcapnetwork Number of Errors	The number of non critical errors for network captures that occurred when working with the database	N/A	N/A	N/A
Probe Storage pcapnetwork Number of Total Records	The total number of records for network captures in the database	N/A	N/A	N/A
Probe Storage pcapnetwork Status	The current status of the database for network captures	Database status is normal	N/A	Database status is bad
Received Bytes on Network Device	The total number of bytes received per specific NIC, in bits per second	Network device load is normal	Network device load is nearing the probe’s limit	N/A

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
SSL Bytes Received	The total number of ssl bytes received by the servers from clients	The current load of https received traffic is normal	N/A	The current load of https received traffic is too high for a single RUM Probe
SSL Bytes Sent	The total number of ssl bytes sent by the servers to clients	The current load of https sent traffic is normal	N/A	The current load of https sent traffic is too high for a single RUM Probe
SSL Packets	The total number of ssl packets processed by the RUM Probe	The https packet rate is normal	N/A	The https packet rate is too high for a single RUM Probe
Total Memory	The total amount of physical system memory, in kilobytes	Always	N/A	N/A
SSL Transactions Dropped	The percentage of SSL transactions that could be decrypted	N/A	N/A	N/A
XFF over NAT	Value can be 0 or 1. If 1, the value of “x-forwarder-for” http header has different values within the same connection. Can indicate differences between http and TCP reports on the same application.	N/A	N/A	N/A

RUM Browser Probe

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Active Sessions	The number of sessions currently monitored by the RUM Probe	The number of active sessions is below the internal permitted number	The number of active sessions is close to the internal permitted number	The number of active sessions has exceeded the internal permitted number
Active Sessions per Application	The number of sessions for a specific application currently monitored by the RUM Probe	The number of active sessions is below the internal permitted number	The number of active sessions is close to the internal permitted number	The number of active sessions has exceeded the internal permitted number
Channel "cbd" Status	Status of the last attempt to connect to the channel	The RUM Engine has successfully connected to this probe channel	The RUM Engine experienced problems while connecting to this probe channel	The RUM Engine has failed to connect to this probe channel more than three consecutive times
Channel "connections" Status	Status of the last attempt to connect to the channel	The RUM Engine has successfully connected to this probe channel	The RUM Engine experienced problems while connecting to this probe channel	The RUM Engine has failed to connect to this probe channel more than three consecutive times
Channel "missing components" Status	Status of the last attempt to connect to the channel	The RUM Engine has successfully connected to this probe channel	The RUM Engine experienced problems while connecting to this probe channel	The RUM Engine has failed to connect to this probe channel more than three consecutive times

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Channel "pages" Status	Status of the last attempt to connect to the channel	The RUM Engine has successfully connected to this probe channel	The RUM Engine experienced problems while connecting to this probe channel	The RUM Engine has failed to connect to this probe channel more than three consecutive times
Channel "poorRequests" Status	Status of the last attempt to connect to the channel	The RUM Engine has successfully connected to this probe channel	The RUM Engine experienced problems while connecting to this probe channel	The RUM Engine has failed to connect to this probe channel more than three consecutive times
Channel "sessions" Status	Status of the last attempt to connect to the channel	The RUM Engine has successfully connected to this probe channel	The RUM Engine experienced problems while connecting to this probe channel	The RUM Engine has failed to connect to this probe channel more than three consecutive times
Configuration to Probe	Status of the last attempt to send the configuration to the RUM Probe	Probe was configured successfully	N/A	Errors during probe configuration process
Connection to Probe	Status of the http connection from the RUM Engine to the RUM Probe	The connection is successful	N/A	There is no connection
Pages Cached	The number of page views currently being cached to the RUM Probe's memory	The page rate is stable	The page rate is nearing the limit for normal caching	The page rate is too high
Probe and Engine Time Difference	Displays the status of the time synchronization between the RUM Engine and Probe	The RUM Engine and Probe are in sync	The RUM Engine and Probe are slightly out of sync	The RUM Engine and Probe are grossly out of sync

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Probe Browser Page Hits	The number of hits from a browser on a mobile device	N/A	N/A	N/A
Probe Channel Delay	The delay between the read time from the probe and the current time	N/A	N/A	N/A
Probe Channels Data Flow	Status of retrieving data from the RUM Probe	Data from the probe successfully retrieved	Probe has not produced new data for some time	N/A
Probe Dropped Page Hits Due Other Reasons	The number of pages dropped due to other reasons	N/A	N/A	N/A
Probe Dropped Page Hits Due Traffic	The number of pages dropped due to traffic issues	N/A	N/A	N/A
Probe Dropped Page Hits Due Unresolved Host	The number of pages dropped due to an unresolved host	N/A	N/A	N/A
Probe Dropped Page Hits of Undefined Application	The number of pages dropped as they do not belong to a defined application	N/A	N/A	N/A
Probe License Status	The license status according to the license configured in BSM	The license status is OK	N/A	Check license status and details in BSM
Probe Mobile Page Hits	The number of hits from a mobile device to a remote server	N/A	N/A	N/A
Probe Session Hits	The number of closed sessions monitored by the RUM Probe	N/A	N/A	N/A

RUM Engine

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Application Transaction Count	The total number of open application transactions	Always	N/A	N/A
ATT	Click **ATT** to see the entities that comprise the ATT (Automatic Transaction Tracking) component.			
BBRetriever hold time due to load on Entry Topic	The time (in milliseconds) that the BBRetriever was stopped due to JMS load on the Entry topic	N/A	N/A	N/A
BBRetriever hold time due load on RawEntry Topic	The time (in milliseconds) that the BBRetriever was stopped due to JMS load on the RawEntry topic	N/A	N/A	N/A
BBRetriever hold time due to load on TCP Entry Topic	The time (in milliseconds) that the BBRetriever was stopped due to JMS load on the TCP Entry topic	N/A	N/A	N/A
BBRetriever hold time due load on TCP RawEntry Topic	The time (in milliseconds) that the BBRetriever was stopped due to JMS load on the TCP RawEntry topic	N/A	N/A	N/A
BBRetriever Thrown Objects	The total number of objects thrown by the BBRetriever	N/A	N/A	N/A
BBRetriever Total Actions Published	The number of actions being published by the BBRetriever in the RUM Engine	The number of actions being published is normal	The number of actions being published is above average	The number of actions being published is high

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
BBRetriever Total Connections Published	The number of connections being published by the BBRetriever in the RUM Engine	The number of connections being published is normal	The number of connections being published is above average	The number of connections being published is high
BBRetriever Total Pages Published	The number of pages being published by the BBRetriever in the RUM Engine	The number of pages being published is normal	The number of pages being published is above average	The number of pages being published is high
BBRetriever Total Poor Requests Published	The number of Poor requests published by the BBRetriever in the RUM Engine	N/A	N/A	N/A
Classification total application tiers with classification disabled	The number of applications whose actions will no longer be classified	0	> 0	N/A
Classification total clusters number	The total number of classification clusters	The number is below the threshold	N/A	The number exceeds the threshold
Classification total nodes number	The total number of classification nodes	The number is below the threshold	N/A	The number exceeds the threshold
Data Access Layer	Click **Data Access Layer** to see the entities that comprise the Data Access Layer component.			
Data Publisher Channel Configuration Status	The status of building the last published Data Publisher configuration	Always	N/A	The latest published configuration failed to build
Data Publisher Records failed to be published due to cache overflow	The total number of records which were not successfully published due to cache overflow	0	N/A	>0

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Data Publisher Records failed to be written	The total number of records which were not successfully published	0	N/A	>0
Free Memory	The free memory available for the RUM Engine	The free memory is sufficient for the RUM Engine to run under the current load	The free memory is nearing the limit for the RUM Engine to run under the current load	The free memory is not sufficient for the RUM Engine to run under the current load
JMS Entry topic size	The number of messages in the <entity> queue	The number of messages in the queue is normal	The number of messages in the queue is above normal	The number of messages in the queue is abnormal
JMS Integration Entry topic size				
JMS Publisher topic size				
JMS Raw Entry topic size				
JMS Samples topic size				
JMS TCP Entry topic size				
JMS TCP Raw Entry topic size				
JMS Topology Topic size				
Location Configuration Validity	Displays the correctness of location configurations	Location configuration is OK	N/A	Location configuration is problematic with possible overlap of IP addresses or missing other locations. All data is discarded.
Login Maps Size per Name	The total number of login names mapped to sessions	Always	N/A	N/A

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Login Maps Size per Session	The total number of sessions mapped to login names	Always	N/A	N/A
Partition Manager	Click **Partition Manager** to see the entities that comprise the Partition Manager component.			
Publish configuration to module <module name> on host <IP address>	Status of the last attempt to publish the configuration to the RUM Engine internal modules	Configuration to module <module name> on host <IP address> successfully published	N/A	Error while trying to publish configuration to module <module name> on host <IP address>
Publisher Chunks in Memory	The number of sample chunks (not yet sent to BSM) stored in memory	N/A	N/A	N/A
Poor Request Network Captures Retrieved	The number of Poor request capture files retrieved by the RUM Engine	N/A	N/A	N/A
Poor Request Network Captures Thrown	The number of Poor request capture files thrown by the RUM Engine	N/A	N/A	N/A
Poor Requests with Network Captures	The number of Poor requests that have a network capture file	N/A	N/A	N/A
Publisher Chunks in Queue	The total number of sample chunks waiting to be sent to BSM	N/A	N/A	N/A
Resolver End User DNS Cache size	The size of the end user DNS cache	N/A	N/A	N/A
Resolver Ignored Sessions Cache Size	The size of the ignored sessions cache	Cache size is normal	N/A	Cache size has exceeded the permissible limit

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Resolver Server DNS Cache size	The size of the server DNS cache	N/A	N/A	N/A
Resolver Thrown Actions Because Empty Descriptor	The number of actions for which the template (generic) descriptor is empty or null	N/A	N/A	N/A
SessionManager Application Session Count	The total number of open application sessions	Always	N/A	N/A
SessionManager BB Session Count	The total number of open BB sessions	Always	N/A	N/A
SessionManager Opened Session Count	The total number of open sessions	Always	N/A	N/A
Snapshot Jobs Alive Count	The total number of open snapshot jobs waiting to be processed	RUM can process all the open snapshots	The number of open snapshots waiting to be processed is nearing the limit for RUM under the current load	RUM might not be able to process all the snapshots
Snapshot Jobs Submit Denials	The total number of submit requests for snapshot failures	Always	N/A	N/A
Snapshot Relevant Events	The total number of events that should trigger snapshot creation	Always	N/A	N/A
Snapshot Sessions Map Size	The total number of open sessions for which at least one snapshot was created	The number of current sessions is normal	The number of current sessions is nearing the permissible limit	The number of current sessions has exceeded the permissible limit
Statistics Total Aggregation Size	The number of aggregation buckets in memory	The number of aggregation buckets is normal	The number of aggregation buckets is nearing the permissible limit	The number of aggregation buckets has exceeded the permissible limit

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Statistics Total Messages Ignored	The number of entities filtered out by the statistics manager	Always	N/A	N/A
Topology Engine	Click **Topology Engine** to see the entities that comprise the Topology Engine component.			
Total application tiers with number of page names above threshold	The number of applications for which the total number of page names was exceeded and no more page names will be given	0	N/A	N/A
Total number of page names	The total number of pages (for all applications) that have been given names	< 50000	= 50000	> 50000

Samples to BSM Server

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Connection to BSM server	Status of the connection between the RUM Engine and the BSM Gateway Server for publishing samples	RUM is successfully sending samples to BSM	N/A	RUM has failed in sending data to BSM
Publisher burst state	Indication if any samples were delayed during the last attempt to publish data to BSM	All RUM samples are being sent to BSM. No samples are delayed	N/A	RUM is delaying samples so as not to overload BSM
Publisher Samples Created for <entity>	The number of <entity> samples created since the last RUM Engine restart	Always	N/A	N/A

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Publisher Samples Thrown	The total number of samples thrown	Always	N/A	N/A
Publisher Total Samples Created	The total number of samples created (for all <entities>) since the last RUM Engine restart	Always	N/A	N/A
Publisher Total Samples Sent	The total number of samples sent from the Publisher module of the RUM Engine to BSM since the last RUM Engine restart	Always	N/A	N/A

ATT

To access, click ATT in RUM Engine monitors.

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Number of times the interlacing events data exceeded its limit	The number of times that the interlacing events data structure exceeded the internal, default size	OK (the data structure never exceeded the internal, default size)	N/A	The data structure exceeded the internal default size
Number of times the open events data exceeded its limit	The number of times that the open events data structure exceeded the internal, default size	OK (the data structure never exceeded the internal, default size)	N/A	The data structure exceeded the internal default size
Size of event statistics data size	The size of the event statistics data structure	OK (less than the internal, default size)	N/A	Greater than the internal, default size
Size of interlacing events data size	The size of the interlacing events data structure	OK (less than the internal, default size)	N/A	Greater than the internal, default size

Data Access Layer

To access, click Data Access Layer in RUM Engine monitors.

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Average response time for <entity>	The amount of time taken to write the <entity> objects to the database	Response time of database is normal	Response time of database is high, which might indicate a database problem	Response time of database is very high, which might indicate a database problem
DAL Active	Whether the Data Access Layer is active or not. In some instances, when free disk space on the database server is running low, the Data Access Layer stops sending data to the database.	The Data Access Layer is active	N/A	The Data Access Layer is not active
Number of cache misses in <entity> lookup table cache	The number of queries to the <entity>'s cache for which data was not available, but should have been	N/A	N/A	N/A
Number of files in <entity> cache	The size of the cache for each <entity> type	There is no backlog	A backlog of objects to be sent to the database exists, which could indicate a database problem or a temporary load peak	A large backlog of objects to be sent to the database exists, which could indicate a database problem or a temporary load peak
Number of futile queries to <entity> lookup table cache	The number of queries to the <entity>'s cache for which data was not available	N/A	N/A	N/A
Number of <entity> objects sent	The number of <entity> objects sent to the database since startup	N/A	N/A	N/A

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Number of queries to <entity> lookup table cache	The total number of queries to the <entity>’s cache	N/A	N/A	N/A
Size of <entity> lookup table cache	The size of the <entity> lookup table in the memory cache	N/A	N/A	N/A

Partition Manager

To access, click Partition Manager in RUM Engine monitors.

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Average Task Execution Time	The average execution time of the scheduled task	Partition Manager average performance is normal	Partition Manager average task performance has exceeded the warning threshold	Partition Manager average performance has exceeded the error threshold and might cause locks in the database during execution
Last Task Execution Status	The status of the last executed task	Partition Manager is running normally	N/A	Partition Manager task failed during last execution
Max Task Execution Time	The maximum execution time of the scheduled task	Partition Manager task performance is normal	Partition Manager task performance has exceeded the warning threshold	Partition Manager task performance has exceeded the error threshold and might cause locks in the database during execution

Topology Engine

To access, click Topology Engine in RUM Engine monitors.

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Auto discovered pages accumulator size	The number of pages created by RUM, waiting to be sent to BSM	<= 500	N/A	> 500
Auto discovered pages sent set size	The number of create pages sent to BSM since the last RUM Engine restart	<= 1000	N/A	> 1000
Connection status to CMDB	Status of the connection to the Run-time Service Model (RTSM)	Connection OK	N/A	No connection
Discovery data is pending report	Tier discovery data is waiting to be delivered to BSM as it was not successfully delivered previously	No data pending	N/A	Data pending
IP accumulator permanently unresolved set size	The number of IP ranges sent to BSM, that the Location Manager could not resolve to a specific location	< 10,000	N/A	>= 10,000
IPs accumulator size	The number of IP ranges waiting to be sent to BSM for location matching	<= 5,000	N/A	> 5,000
Number of accumulated IP ranges	The accumulated data structure size of discovered IP ranges	N/A	N/A	N/A
Number of accumulated tiers	The accumulated data structure size of discovered tiers	N/A	N/A	N/A
Number of new accumulated IP ranges	The accumulated data structure size of new IP ranges	N/A	N/A	N/A
Reporters connection to BSM status	The status of the connection to BSM	Connection OK	N/A	No connection
Resolved Hosts cache size	The number of hosts to be reported to BSM for CI creation	<= 10,000	N/A	> 10,000

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
Resolved Software Elements - Application links cache size	The number of application and software element links reported to BSM	<= 10,000	N/A	> 10,000
Resolved Software Elements cache size	The number of software elements reported to BSM	<= 10,000	N/A	> 10,000
Resolved Subgroups cache size	The number of end-user subgroups reported to BSM	<= 30,000	N/A	> 30,000
Unresolved Hosts cache size	The number of hosts waiting to be reported to BSM	<= 1,000	N/A	> 1,000
Unresolved Software Elements - Application links cache size	The number of application and software element links waiting to be reported to BSM	<= 500	N/A	> 500
Unresolved Software Elements cache size	The number of software elements waiting to be reported to BSM	<= 1,000	N/A	> 1,000
Unresolved Subgroups cache size	The number of end-user subgroups waiting to be reported to BSM	<= 1,000	N/A	> 1,000

Missing Mirrored Data

To access, click Missing Mirrored Data in RUM Probe monitors.

Entity	Description	OK Status (Green)	Minor Status (Yellow)	Critical Status (Red)
<Application> Lost Requests	The number of lost requests to web servers per monitored application	N/A	N/A	N/A
<Application> Lost Responses	The number of lost responses from web servers per monitored application	N/A	N/A	N/A

Capture Log Files

You use this option to create a **.ZIP** file of the current status of RUM for support purposes.

Click **Capture** and specify the name and location of the file.

RUM Configuration and Settings

The **Configuration** drop-down menu on the RUM Engine web console menu bar includes the following options:

- **BSM Connection Settings.** Used to view and configure the connection parameters between RUM and BSM. For details, see "BSM Connection Settings" below.
- **Probe Management.** Used to configure communication settings with the RUM Probe. For details, see "Probe Management" on page 83.
- **Transaction Management Configuration.** Used to discover the paths through both hardware and software elements, including specific request content, of the pages included in a configured transaction. For details, see "RUM Transaction Flow Monitoring" on page 121.
- **TV Connection Settings.** Used to view and configure the connection parameters between RUM and TransactionVision. For details, see "TransactionVision Connection Settings" on page 101.
- **Advanced Settings.** Provides links to specific areas of the HP Real User Monitor JMX console for configuring parameters and settings for individual RUM modules. For details, see "Advanced Settings" on page 103.
- **Data Flow Probe Connection Settings.** Used to view and configure the connection parameters between RUM and HP Universal Discovery. For details, see "Data Flow Probe Connection Settings" on page 103.
- **System Info.** Provides general system information about RUM. For details, see "System Info" on page 104.

BSM Connection Settings

This page displays the current connection settings for the communication channel between RUM and BSM, which you can update.

If you change the configuration, click the **Save Configuration** button to save the configuration and update the RUM Engine.

The page contains the following panes:

- "RUM General Settings Pane" on the next page
- "Connection to BSM Pane" on the next page
- "Authentication Pane" on the next page
- "Proxy Pane" on page 82
- "SSL Pane" on page 82

RUM General Settings Pane

Field	Description
RUM Engine name	Configure a name for the RUM Engine. This name is registered in BSM and is used to identify the engine in RUM Administration.
RTSM - RUM integration user password	Set the password for the default RTSM-RUM integration user. The RUM Engine sends created CIs to the Run-time Service Model (RTSM), via the BSM Gateway Server. To enable the connection to the RTSM, a default user name (rum_integration_user) and password is used. If you change the password in the RTSM (for details, refer to your database administrator), you must also change it in the RUM Engine. **Note:** If the correct password is not configured (that is, the password configured in the RUM Engine is different to the password configured in the RTSM), RUM-related topology is not updated in the RTSM and you will not see all RUM data in End User Management reports.

Connection to BSM Pane

Field	Description
BSM Gateway Server host name	The IP address or host name of the machine on which the BSM Gateway Server is installed.
Port	The port number used to connect to the host machine on which the BSM Gateway Server is installed.
Protocol	The protocol used to connect to the host machine on which the BSM Gateway Server is installed. Select either http or https.

Note: If you are an HP Software-as-a-Service user, contact an HP Software Support representative to receive the host name or URL to enter.

Authentication Pane

Field	Description
Use authentication	Select the check box if authentication is required when connecting to the host machine on which the BSM Gateway Server is installed.
Authentication user name	If authentication is required, enter the user name to use.
Authentication password	If authentication is required, enter the password to use.
Authentication domain	If authentication is required, enter the applicable domain for the user.

For more information on using basic authentication in BSM, see "Using Basic Authentication in BSM" in the BSM Hardening Guide.

Proxy Pane

Field	Description
Use proxy	Select the check box if the RUM Engine connects to the BSM Gateway Server machine via a proxy server.
Proxy host	If the RUM Engine connects to the BSM Gateway Server machine via a proxy server, enter the IP address or host name of the proxy server.
Proxy port	If you connect to the BSM Gateway Server machine via a proxy server, enter the port number used to connect to the proxy server.
Use proxy authentication	Select the check box if authentication is required when connecting to the proxy server.
Proxy user name	If authentication is required when connecting to the proxy server, enter the user name to use.
Proxy password	If authentication is required when connecting to the proxy server, enter the password to use.
Proxy domain	If authentication is required when connecting to the proxy server, enter the applicable domain for the user.

For information on using a reverse proxy server with BSM, see "Using a Reverse Proxy in BSM" in the BSM Hardening Guide.

SSL Pane

Field	Description
Truststore path	The full path and file name of the keystore file containing the trusted root certificates. The keystore file must be either a java keystore file (JKS) or PKCS#12 type file. **Note:** Configure this field only if do not want to use the default JRE truststore (containing well known CA certificates).
Truststore type	The type of truststore file—JKS or PKCS#12.
Truststore password	The password for the truststore file.
Keystore path	The full path and file name of the keystore file containing the private keys and client certificate. The keystore file must be either a java keystore file (JKS) or PKCS#12 type file. **Note:** Configure this field only if you want to use client certificates.
Keystore type	The type of keystore file—JKS or PKCS#12.

Field	Description
Keystore password	The password for the keystore file.
Private key password	The password for the private key located in the keystore file.
Validate host names on server certificates	Select this check box to validate that the configured BSM Gateway Server host name matches the name in the server certificate.
Validate that the server certificates are trusted	Select this check box to validate that at least one of the certificates in the server certificate chain exists in the truststore (either in the configured truststore path, or in the default truststore).
Validate that the server certificates are not expired	Select this check box to validate that the certificate is current.

For information on configuring RUM and BSM to work with SSL, see "Using SSL in BSM" in the BSM Hardening Guide.

Probe Management

You use the Probe Management configuration option to create and administer the RUM Probes that are connected to the engine.

When you select the Probe Management option from the Configuration drop-down menu, the Probe Management page opens and displays a table with the following information for each probe:

Column	Description
Enabled	This value denotes whether the probe is enabled or not. A probe that is not enabled does not monitor RUM traffic. **Note:** Not all the configuration options are enabled for disabled probes.
Name	The name you configured for the probe.
Host Name	The host name of the machine on which the probe is installed.
Description	A free text description you configured for the probe.

Action Buttons

You use the actions buttons displayed above the table to configure a selected probe and to manage the table. You select a probe by clicking a row in the table. The following table lists and describes the available action buttons:

Icon	Description	For details, see ...
✱	**New Probe Configuration.** Opens the New Probe Configuration dialog box, where you configure a new probe for the engine.	"Probe Configuration Dialog Box" on the next page
✎	**Edit Probe Configuration.** Opens the Edit Probe Configuration dialog box, where you configure an existing probe for the engine.	"Probe Configuration Dialog Box" on the next page
✗	**Delete Probe Configuration.** Deletes a selected probe from the engine.	N/A
	Probe Traffic Discovery. Opens the Probe Traffic Discovery page, where you enable the probe to automatically discover the servers and domains being accessed by the traffic to which it is listening. **Note:** This button is not enabled for disabled probes.	"Probe Traffic Discovery" on page 88
☰	**Probe Information.** Displays general information about the selected probe in a new window. The information displayed shows the status of the probe, the operating system and version running on the probe, the last configuration time of the probe, and the last successful configuration time.	N/A
SSL	**SSL Keystore Management.** Opens the SSL Keystore Management page, where you manage the keys used by the probe to monitor SSL encrypted traffic. **Note:** This button is not enabled for disabled probes.	"SSL Keystore Management" on page 91
	Interfaces Configuration. Opens the Interfaces Configuration page, where you list and select a probe’s Ethernet devices used to monitor server traffic. **Note:** This button is not enabled for disabled probes.	"Interface Configurations" on page 93
	Server Filter Settings. Opens the Server Filter Settings page, where you list and configure the filters to be used for monitoring server traffic. **Note:** This button is not enabled for disabled probes.	"Server Filter Settings" on page 94
	SSH Console. Connects to a probe’s console using Secure Shell. **Note:** This button is enabled only for Linux installations of the RUM Probe.	"SSH Console" on page 96
⬇	**Probe Traffic Capture.** Opens the Probe Traffic Capture page where you instruct a RUM Probe to save the traffic it monitors to a file.	"Probe Traffic Capture" on page 96

Icon	Description	For details, see ...
SI	**Session ID Detection.** Opens the Session ID Detection page, where you instruct a RUM Probe to detect Session IDs in the traffic it monitors.	"Session ID Detection" on page 97
⟳	**Refresh.** Refreshes the list of probes in the table.	N/A
☰	**Reset columns width.** Resets the columns in the table to their default width.	N/A
▦	**Select Columns.** Selects the columns displayed in the table.	N/A

Probe Configuration Dialog Box

You use the Probe Configuration dialog box to configure a new probe for a RUM Engine, or to edit the settings of an existing probe. To access the Probe Configuration dialog box, click the **New Probe Configuration** button ✱ or the **Edit Probe Configuration** button ✎ on the Probe Management page. The Probe Configuration dialog box includes the following fields that you configure for a probe:

Probe Details Pane

Field	Description
Enabled	Select the check box to enable the probe, or clear the check box to disable the probe. **Note:** A probe that is not enabled does not monitor RUM traffic.
Name	The probe name. **Note:** This field is mandatory. **Syntax exceptions:** Cannot exceed 255 characters.
Description	A free text description of the probe. Cannot exceed 255 characters.

Connection to Probe Pane

Field	Description
Host	The IP address or host name of the machine on which the probe is installed. **Note:** This field is mandatory. **Syntax exceptions:** • Cannot exceed 255 characters. • Allowed characters are a-z, A-Z, 0-9, and - \ .] *.
Port	The port number used to connect to the host machine on which the probe is installed. **Default value:** 2020 **Syntax exceptions:** Cannot exceed 100 characters.
Protocol	The protocol used to connect to the host machine on which the probe is installed. Select either http or https.

Authentication Pane

Field	Description
Use authentication	Select the check box if authentication is required when connecting to the host machine on which the probe is installed.
Authentication user name	If authentication is required, enter the user name to use.
Authentication password	If authentication is required, enter the password to use.
Authentication domain	If authentication is required, enter the applicable domain for the user.

Proxy Pane

Field	Description
Use proxy	Select the check box if the RUM Engine connects to the probe machine via a proxy server.
Proxy host	If the RUM Engine connects to the probe machine via a proxy server, enter the IP address or host name of the proxy server.
Proxy port	If you connect to the probe machine via a proxy server, enter the port number used to connect to the proxy server.
Use proxy authentication	Select the check box if authentication is required when connecting to the proxy server.

Field	Description
Proxy user name	If authentication is required when connecting to the proxy server, enter the user name to use.
Proxy password	If authentication is required when connecting to the proxy server, enter the password to use.
Proxy domain	If authentication is required when connecting to the proxy server, enter the applicable domain for the user.

SSL Pane

Field	Description
Truststore path	The full path and file name of the keystore file containing the trusted root certificates. The keystore file must be either a java keystore file (JKS) or PKCS#12 type file. **Note:** Configure this field only if do not want to use the default JRE truststore (containing well known CA certificates).
Truststore type	The type of truststore file—JKS or PKCS#12.
Truststore password	The password for the truststore file.
Keystore path	The full path and file name of the keystore file containing the private keys and client certificate. The keystore file must be either a java keystore file (JKS) or PKCS#12 type file. **Note:** Configure this field only if you want to use client certificates.
Keystore type	The type of keystore file—JKS or PKCS#12.
Keystore password	The password for the keystore file.
Private key password	The password for the private key located in the keystore file.
Validate host names on server certificates	Select this check box to validate that the configured Probe host name matches the name in the server certificate.
Validate that the server certificates are trusted	Select this check box to validate that at least one of the certificates in the server certificate chain exists in the truststore (either in the configured truststore path, or in the default truststore).
Validate that the server certificates are not expired	Select this check box to validate that the certificate is current.

Probe Traffic Discovery

You use the Probe Traffic Discovery tool to instruct the RUM Probe to automatically detect and report the domains and servers that are accessed by the traffic to which it is listening. You can use the information obtained from the Probe Traffic Discovery tool to help you:

- Configure servers and applications to be monitored by RUM, in End User Management Administration. For task details, see "Getting Started with Real User Monitor" in the BSM Application Administration Guide.
- Determine the protocol types that are used in the system.
- Determine sizing and load balancing needs for RUM. For example, discover throughput for configured applications and ports.
- Troubleshoot RUM Probe issues by checking if and what the probe is monitoring. For example, check if traffic is discovered for a configured application.

When you click the **Probe Traffic Discovery** button in the Probe Management page, the Probe Traffic Discovery page opens and the Summary View tab is displayed by default. If probe traffic discovery is currently running its results are displayed, otherwise previously saved data (if it exists) is displayed. When you start a new probe traffic discovery, the new statistics are displayed and they are automatically saved, overwriting previously saved data, when you stop the discovery.

> **Note:** It is possible to run the Probe Traffic Discovery tool concurrently with regular probe monitoring.

This section includes the following topics:

- "Common Elements" below
- "Summary View Tab" on the next page
- "Domain View/Server View Tabs" on page 90

Common Elements

The following elements are common to all the tabs in the Probe Traffic Discovery page:

UI Element	Description
⏲	**Reset Discovery Statistics.** Resets and initializes probe traffic discovery statistics. **Note:** This button is available only when probe traffic discovery is running.
🔄	**Refresh.** Refreshes the data displayed on the Probe Traffic Discovery page with the most up to date statistics. **Note:** This button is available only when probe traffic discovery is running.

UI Element	Description
Server Type	You can filter the data displayed according to the type of servers. Select **Servers on Private IPs**, **Servers on Non-Private IPs**, or **Both** from the drop-down list in the **Server Type** filter. The data is redisplayed according to the records matching the search criteria. **Default value:** Both
<General statistics>	**Discovery start time.** The start time of a currently running traffic discovery.
	Sample period. The date and time that the displayed statistics were retrieved are displayed. For statistics loaded from a saved file, **Saved Results** is displayed next to the date and time.
	Peak total traffic. The peak amount of traffic transmitted to and from all the domains or servers included in the page, for all the discovered protocols.
	Peak pages/sec. The peak number of pages per second for all the domains or servers included in the page, for the http protocol.
Start Discovery	Click the **Start Discovery** button to start probe traffic discovery for the probe. Starting discovery automatically deletes any previously saved data. **Note:** The **Start Discovery** and **Stop Discovery** buttons are not enabled simultaneously. When one is enabled, the other is disabled.
Stop Discovery	Click the **Stop Discovery** button to stop probe traffic discovery for the probe and save the current data. **Note:** • The **Start Discovery** and **Stop Discovery** buttons are not enabled simultaneously. When one is enabled, the other is disabled. • When you click **Stop Discovery**, you are prompted to save the current statistics. Saving the statistics overwrites any previously saved data.

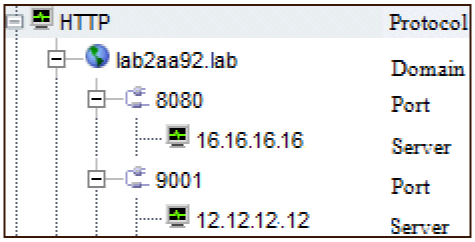
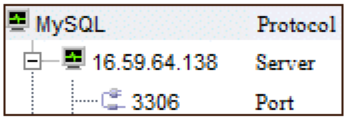
Summary View Tab

The Summary View tab displays a pie chart in which each slice represents a different, discovered protocol and the slice size is determined by the percentage of protocol throughput out of the total throughput for all the protocols. Click the slice representing the http protocol to display the Domain View tab, or click on any other slice to display the Server View tab. The Domain View or Server View tab opens with the selected protocol expanded in the hierarchical tree.

> **Note:** The pie chart includes a maximum of 20 slices for the protocols with the highest throughput. If there are more than 20 protocols to be displayed, the protocols with lower throughput are included in the **Others** slice, which also includes protocols and servers that have not yet been recognized.

Domain View/Server View Tabs

The Domain View and Server View tabs display the following information for each discovered protocol:

UI Element	Description
Search	You can filter the data displayed by searching for domains or servers that match a specific pattern or IP address. Enter the search pattern in the Search filter located at the top left of the page, and click **Search Domain** or **Search Server**. The data is redisplayed according to the records matching the search criteria. **Note:** • When using the search feature in the **Domain View** tab, you can enter alphanumeric characters, the asterisk (*) wild card character, and use partial strings for matching. The search filters domain names that include the search string. • In the **Server View** tab, you can enter only valid IP addresses in the search field. The search filters server IP addresses that exactly match the search string.
<Domain View protocol tree>	For each discovered protocol, the statistics are grouped by domain names (for http), or IP addresses (for other protocols). For each port in the domain, the IP address of each server that connected to the domain is listed. For example:  HTTP Protocol lab2aa92.lab Domain 8080 Port 16.16.16.16 Server 9001 Port 12.12.12.12 Server **Note:** This is the default view when you drill down from the Summary View pie chart for the http protocol.
<Server View protocol tree>	For each discovered protocol, the statistics are grouped by server IP addresses and for each server, by port. For example:  **Note:** This is the default view when you drill down from the Summary View pie chart for protocols other than http.
% Throughput	The percentage of throughput for a specific protocol out of the total throughput for all protocols.
Throughput	The total throughput to and from the domain or server, for a specific protocol.

UI Element	Description
Peak Traffic	The peak amount of traffic transmitted to and from the domain or server, for a specific protocol. Peak traffic is determined based on 30 second intervals.
Peak Pages/sec	The peak number of pages per second for the domain or server for http. **Note:** This is applicable for http only.
Compressed	Ticked if any of the traffic sent and received by the domain or server was compressed.
Encrypted	Ticked if any of the traffic sent and received by the domain or server was encrypted.
Server Info	The name of the server, if available.
More Details	Reserved for future use.

SSL Keystore Management

You use the SSL Keystore Management page to manage the keys used by a selected RUM Probe to monitor SSL encrypted traffic. To access the SSL Keystore Management page, click the **SSL Keystore Management** button on the Probe Management page. The Keystore Management page contains three panes – **SSL Keystore Administration**, **SSL Application Decryption Statistics**, and **SSL Server Decryption Statistics**. To refresh the information on this page, click the **Refresh** button .

Note:

- The RUM web console keystore import tool supports PEM, DER, PKCS8, and PKCS12 private key types, as well as Java Keystore. Other key types can be imported if they are converted to one of the supported types.
- The RUM Probe cannot decrypt traffic that uses Diffe Helman keys. If there is a high percentage of such traffic (which you can see in the **Decryption Failed (unsupported algorithm)** column in the "SSL Application Decryption Statistics Pane" on the next page) it is recommended that you configure the web server of the monitored server not to support the Diffe Helman protocol.

This section includes:

- "SSL Keystore Administration Pane" below
- "SSL Application Decryption Statistics Pane" on the next page
- "SSL Server Decryption Statistics Pane" on page 93

SSL Keystore Administration Pane

The SSL Keystore Administration pane displays a list of all the configured keys for the selected probe, and for each key shows the number of servers on which it was used to decipher traffic.

To add a key:

1. Click **Add Key**. The Keystore Management page opens.
2. Enter a logical name for the key you are adding.
3. Select the type of file from which to import the key you are adding (a key file or a keystore) and configure the applicable settings:

Key Type	Setting	Description
Import from Key File	**File**	The path and name of the file containing the private key. You can click **Browse** to navigate to the relevant file.
	Password	The password with which the key is encrypted, or null if the key is not encrypted.
Import from Keystore	**Keystore file**	The path and name of the keystore file. You can click **Browse** to navigate to the relevant file.
	Keystore password	The keystore password. **Note:** This field is mandatory.
	Private key alias	The alias of the specific key in the keystore. If no alias is configured, the first key in the keystore is used.
	Private key password	The password of the specific key in the keystore.

4. Click **Submit** to save the key and exit, or **Cancel** to exit without saving.

To delete a key:

1. Select the check box to the left of the keys you want to delete.
2. Click the **Delete** button ✖ at the bottom of the pane, or at the end of the row of the selected key.

   You can select all, clear all, or invert your selection using the **Select** buttons ☑ ☐ ⇄.

SSL Application Decryption Statistics Pane

The SSL Application Decryption Statistics pane displays the following information for each application for which encrypted traffic was monitored:

Column	Description
Application Name	The name of the application.
Decryption Successful	The percentage of successfully decrypted traffic for the application.

Column	Description
Decryption Failed (in parsing)	The percentage of unsuccessfully decrypted traffic for the application due to a failure in parsing, possibly due to packet loss. If you determine that packet loss is occurring, check your network settings and consider using a tap instead of port spanning for the RUM Probe.
Decryption Failed (no handshake)	The percentage of unsuccessfully decrypted traffic for the application due to an SSL handshake not being found. Possible causes are a non SSL connection, or the RUM Probe being stopped/started during an SSL handshake.
Decryption Failed (unsupported algorithm)	The percentage of unsuccessfully decrypted traffic for the application due to an unsupported algorithm. The SSL handshake algorithm used unsupported, temporary private keys (such as D-H, or RSA with Export restrictions on the key length). If you use an SSL accelerator, a possible solution is to move the RUM Probe behind it.
Decryption Failed (no matching key)	The percentage of unsuccessfully decrypted traffic for the application due to no suitable key being found for the decryption, possibly as a result of the web server key being replaced. Check the keys and if necessary, obtain and configure a new key for use.
Decryption Failed (cache timeout)	The percentage of unsuccessfully decrypted traffic for the application due to any of the above errors in connections from the same user, when decryption failed in the first connection in the session.

SSL Server Decryption Statistics Pane

The SSL Statistics pane displays the amount of encrypted traffic as a percentage of the entire traffic monitored from each server.

Interface Configurations

Use the Interfaces Configuration page to list and select a probe's Ethernet devices used to monitor server traffic. To access the Interfaces Configuration page, click the **Interfaces Configuration** button on the Probe Management page. For each Ethernet device, the following information is displayed:

UI Element	Description
Sniff	Check box to select the device to monitor server traffic.
Link Up	Whether the network interface is physically connected to a cable.
Name	The logical name of the Ethernet device.
Up	Whether the device is running or not.
Sniffable	Whether the device can be used to listen to Ethernet traffic.
Hardware	The hardware details of the device.

UI Element	Description
Driver	The name of the driver used for the device.
IP	The IP address assigned to the device, if any.
Interface Details	Click the **Interface Details** button for a device to display link, driver, other settings, and statistics information in a new window.

Note: For RUM Probes running on Windows, only the Name element is displayed.

To select a device to be used by the probe for monitoring server traffic, use one of the following options:

- Select the **Sniff** check box to the left of the device you want to use.
- Select the **Probe Auto Select** check box to configure the RUM Probe to listen to all available devices automatically.

  Note: This differs from selecting all the devices manually, as the RUM Probe only listens to available devices and not to all devices.

- Click **Restore to Current** to select the devices currently configured for monitoring.
- Click **Recommended Selection** to have the RUM Engine select the devices it considers to be the most suitable to use.

When you have made your selection, click **Save and Upload Configuration** to save the configuration and send it to the RUM Probe.

Note: You can select all, clear all, or invert your selection using the **Select** buttons .

Server Filter Settings

Note: Use server filters to manage probe clustering only. That is, when two or more probes receive the same traffic and you want to assign different parts of the traffic for each probe to monitor.

For traffic filtering, configure application location settings in End User Management Administration. For details, see "Real User Monitor Application Configuration Wizard" in the BSM Application Administration Guide.

If you have existing server filter settings that are used for regular server filtering, we recommend that you delete them and configure application location settings in End User Management Administration instead.

The RUM Probe filters the traffic that it monitors. By default, the filter is set to monitor all traffic from port 80. You can override the default filter by setting filters for specific IP addresses or ranges, and for specific ports that you want to monitor.

You use the Server Filter Settings page to list and configure the filters to be used for monitoring specific server traffic. To access the Server Filter Settings page, click the **Server Filter Settings** button on the Probe Management page. For each server range, the following information is displayed:

UI Element	Description
Servers	The range or mask of servers to be monitored.
Ports	The ports of the servers included in the range to be monitored.
Clients	By default, a filter applies for all clients accessing the servers.

To display the current server filters data, click **Reload Current Configuration** at the bottom of the page.

You can add new filters, and delete or edit existing filters. After adding, deleting, or changing a filter, click **Save and Upload Configuration** to save the configuration and send it to the RUM Probe.

Add a new filter

1. Click **New Definition**. The Edit Server Filter Settings page opens.
2. In the Edit Server Filter Settings page, enter the following:

Field	Description
Servers	Select the type of server filter you are adding and enter the required data. The following are the available options: ▪ **Single IP.** Enter a single IP address. ▪ **IP Range.** Enter the starting and ending IP addresses of the range. ▪ **IP Mask.** Enter the network address and applicable IP mask.
Ports	Select the type of port filter you are adding and enter the required data. The following are the available options: ▪ **Single Port.** Enter a single port number. ▪ **Port Range.** Enter the starting and ending port numbers of the range.

3. Click **Submit** to save the filter and exit, or **Cancel** to exit without saving.

Delete a filter

Click the **Delete** button in the row of the filter you want to delete.

Edit a filter

1. Click the **Edit** button in the row of the filter you want to edit. The Edit Server Filter Settings page opens.

2. In the Edit Server Filter Settings page, edit the information displayed. See above for an explanation of the filter's fields.

3. Click **Save** to save the filter and exit, or **Cancel** to exit without saving.

SSH Console

> **Note:** This section applies only to Linux installations of the RUM Probe.

You use SSH Console to connect to the RUM Probe's console using Secure Shell, which provides strong authentication and secure communications over insecure channels. To access SSH Console, click the **SSH Console** button on the Probe Management page.

The first time you access SSH Console, a wizard installs some required files on your machine. Accept the default settings, or change them as required. Each time you access SSH Console, accept the certificate displayed, and in the console window, enter the user and password you configured for the RUM Probe. You are now connected to the RUM Probe's console. (For information on configuring the probe, see "Probe Configuration Dialog Box" on page 85.)

In the RUM Probe console, you use regular Linux commands on the command line. There is also a menu providing assorted utilities for working in SSH Console. To access the menu, right-click the mouse while holding down the `Ctrl` key. One of the utilities is a convenient graphical user interface for SFTP, which you use to transfer files to and from the RUM Probe machine via secured FTP. To access the SFTP tool from the menu, select **Plugins > SFTP File Transfer**.

Probe Traffic Capture

You use the Probe Traffic Capture feature to instruct a RUM Probe to save the traffic it monitors to a file. This is useful for analysis and troubleshooting. To configure and start probe traffic capturing, click the **Probe Traffic Capture** button on the Probe Management page. The Probe Traffic Capture page opens and displays the following elements:

Element	Description
Capture file max size (MB)	Enter the maximum capture file size in megabytes. You can configure a file size of up to 100 MB. **Note:** Capturing is automatically stopped when either the configured file size or the configured time is reached.
Capture duration (seconds)	Enter the maximum time (in seconds) for capturing to run. You can configure a time of up to 3600 seconds. **Note:** Capturing is automatically stopped when either the configured file size or the configured time is reached.
Use client IP filter	Select this check box if you want to capture traffic for a specific range of clients.

Element	Description
Client IP filter from...to	If you select the **Use client IP filter** check box, enter the IP range for the clients whose traffic you want to capture.
Start Capture	Click the **Start Capture** button to start the probe traffic capture. The following elements are displayed: • **Time left.** The amount of remaining time that capturing will run. • **Current file size.** The current size of the capture file. • **Capture file location and name.** • **Stop Capture.** Click the **Stop Capture** button to stop probe traffic capturing when it is running. • Click the **Refresh** button ↻ to manually refresh the displayed **Time left** and **Current file size** data. **Note:** The **Time left** and **Current file size** data is refreshed automatically every ten seconds when capturing is running.

Session ID Detection

Use session ID detection to instruct the RUM Probe to detect session IDs in the traffic it monitors, for applications configured in End User Management Administration. For information on configuring applications in End User Management Administration, see "Real User Monitor Application Configuration Wizard" in the BSM Application Administration Guide.

This section includes the following topics:

- "Configuring Applications in End User Management Administration Using Traffic Discovery and Session ID Detection" below
- "Session ID Detection Page" on the next page
- "Session ID Detection Report" on the next page

Configuring Applications in End User Management Administration Using Traffic Discovery and Session ID Detection

To configure applications in End User Management Administration, you use traffic discovery and session ID detection in the following sequence:

1. Run traffic discovery to identify applications on monitored servers.
2. Configure the discovered applications in End User Management Administration, without session ID parameters.
3. Run session ID detection to identify the relevant session IDs for the applications.
4. Configure the session ID parameters for the applications in End User Management Administration.

Session ID Detection Page

When you click the **Session ID Detection** button on the Probe Management page, the Session ID Detection page opens. On the Session ID Detection page, the following elements are displayed, which you use to configure and run session ID detection for the selected probe:

UI Element	Description
Detection duration	The length of time, in minutes, that session ID detection should run, when started.
Detect for single IP	If you know that only a single session originates from a specific IP address, select this check box and enter the IP address in the adjacent field. This enhances session detection accuracy.
Last successful detection time	Shows the last date and time that the Session ID Detection tool was successfully run.
Status	The status of the session ID detection. Valid statuses are: • **Idle.** Session ID detection is not running. • **Running.** Displays the percentage of completed data collection and the remaining amount of time that session ID detection will run.
Start Detection	Click to start session ID detection.
Stop Detection	Click to stop session ID detection.
View Results	Click to view the Session ID Detection report for the probe. For user interface details, see "Session ID Detection Report" below. **Note:** You can only view the results of the current run, once it has stopped (that is, either it completed its full run, or you stopped it manually). If you click the **View Results** button while session ID detection is running, you see the results of the last completed session ID detection run.
🔄	**Refresh.** Refreshes the data displayed on the Session ID Detection page.

Session ID Detection Report

For each application configured for the probe in End User Management Administration, the Session ID Analysis report shows the following information:

UI Element	Description
Application Name	The application name, as defined in End User Management Administration. For applications not been defined in End User Management Administration, the application name is **Default Website**. For information on configuring applications in End User Management Administration, see "RUM Application Configuration Wizard" in the BSM Application Administration Guide.
Application Components	The total number of hits in the application.
Application Pages	The total number of pages in the application.
Application Clients	The total number of clients that accessed the application.
Application Connections	The total number of connections to the application.
All Session IDs Coverage	The percentage of hits in the application that contain a discovered session ID key.
Session ID Key	The session ID key name of the session ID discovered for the application.
Type	Where the session ID key is located – cookie, query, or cookie and query.
Regular Expression	The regular expression that uniquely defines the session ID key. The same regular expression should be used in the **Scan for** field in session identification advanced criteria, when configuring an application in End User Management Administration. For information on configuring applications in End User Management Administration, see "RUM Application Configuration Wizard" in the BSM Application Administration Guide.
Specific Session ID Coverage	The percentage of traffic collected for the application by the data collection process, containing the specific session ID key.
Specific Session ID Correctness	The probability that RUM gives the located key of being a real session ID key.

You can display data for a specific application only, display detailed information for a specific session ID key, and view raw data for a single end-user IP address.

To display data for a specific application only:

Select the application in the **Filter By Application Name** filter, located at the top-left of the report.

To display detailed information for a specific session ID key:

Click a specific key in the Session ID Key column. The Session ID Detection Detailed report is displayed in a new window, and shows the following information for the session ID key:

UI Element	Description
Session ID Properties	**Application Name.** The application name, as defined in End User Management Administration.
	Session ID Key. The session ID key name.
	Type. Where the session ID key is located – cookie, query, or cookie and query.
	Regular Expression. The regular expression that uniquely defines the session ID key. The same regular expression should be used in the Scan for field in session identification advanced criteria, when configuring an application in End User Management Administration.
	Object Retrieve Phrase. The phrase representing the specific objects to be retrieved from the regular expression. The same phrase should be used in the retrieve field in session identification advanced criteria, when configuring an application in End User Management Administration.
	Specific Session ID Coverage. The percentage of traffic collected for the application by the data collection process, containing the specific session ID key.
	Specific Session ID Correctness. The probability that RUM gives the located key of being a real session ID key.
	First Page Number. The page in which the session ID first appeared. **Note:** The first page number is shown only if you chose to collect raw data for a specific end-user IP address when starting session ID capturing.
Examples	Displays a few examples of the session ID key and the value located in the key.
Set Cookie Params	If the session ID key is located in a cookie, or in a cookie and query, the path and domain, which are optional parameters sent from the server when setting a cookie for the client, are displayed.
Reasons For Not Locating Session ID Keys in Collected Data	Displays the percentage of traffic collected by the data collection process, not containing the specific session ID key, and for which a reason can be given.
Reasons For Incomplete Session ID Correctness	The reasons why RUM gives the located key a probability of less than 100 percent of being a real session ID key.

To display raw data for a single end-user IP address:

Click **View Raw Data**. The **Session ID Detection Raw Data** report is displayed, and shows the following information for the end-user IP address:

UI Element	Description
#	A sequential number indicating the row number in the report.
URI	The URI of the page or component.
Page/Component	Indicates whether the data displayed in the row refers to a page or a component.
Referrer	For a page, the referrer is the calling page; for a component, the referrer is the page in which the component is included.
Client Port	The port number of the client's machine on which the data was collected.
Set Cookie	The cookie sent from the server to the client, containing the session ID key.
Cookies	The content of the cookie included in the URL POST parameters.
Query	The content of the query.

Note: The View Raw Data button is only enabled if raw data was collected for a single end-user IP address.

TransactionVision Connection Settings

This page displays the current connection settings for the communication channel between RUM and TransactionVision, which you can update. For details on viewing TransactionVision data from RUM reports, see "Viewing TransactionVision Data From End User Management Reports" in the BSM User Guide.

The TransactionVision Connection Settings page contains the following panes:

- "Events to TransactionVision Analyzer" below
- "Connection to TransactionVision Analyzer" below
- "Authentication Pane" on the next page
- "SSL Pane" on the next page

Events to TransactionVision Analyzer

Select the check box in this pane to configure RUM to send RUM events data to TransactionVision.

Connection to TransactionVision Analyzer

Configure the following TransactionVision server details:

Field	Description
Host	The IP address or host name of the TransactionVision server.
Port	The port number used to connect to the TransactionVision server.

Field	Description
Protocol	The protocol used to connect to the TransactionVision server. Select either http or https.

Authentication Pane

Configure the following authentication details:

Field	Description
Use authentication	Select the check box if authentication is required when connecting to the TransactionVision server.
Authentication user name	If authentication is required, enter the user name to use.
Authentication password	If authentication is required, enter the password to use.
Authentication domain	If authentication is required, enter the applicable domain for the user.

SSL Pane

Configure the following SSL details:

Field	Description
Truststore path	The full path and file name of the keystore file containing the trusted root certificates. The keystore file must be either a java keystore file (JKS) or PKCS#12 type file. **Note:** Configure this field only if do not want to use the default JRE truststore (containing well known CA certificates).
Truststore type	The type of truststore file—JKS or PKCS#12.
Truststore password	The password for the truststore file.
Keystore path	The full path and file name of the keystore file containing the private keys and client certificate. The keystore file must be either a java keystore file (JKS) or PKCS#12 type file. **Note:** Configure this field only if you want to use client certificates.
Keystore type	The type of keystore file—JKS or PKCS#12.
Keystore password	The password for the keystore file.

Field	Description
Private key password	The password for the private key located in the keystore file.
Validate host names on server certificates	Select this check box to validate that the configured TransactionVision host name matches the name in the server certificate.
Validate that the server certificates are trusted	Select this check box to validate that at least one of the certificates in the server certificate chain exists in the truststore (either in the configured truststore path, or in the default truststore).
Validate that the server certificates are not expired	Select this check box to validate that the certificate is current.

Advanced Settings

This option displays RUM modules and provides direct links to specific pages in the RUM JMX console for viewing and configuring the module settings. Each module listed can have any of the following links associated with it:

- **Main Module Page.** Links to general settings for the module name and status.
- **Configuration Page.** Links to settings for the configuration of the RUM module retrieved from BSM.
- **Settings Page.** Links to settings for the configuration of the RUM module in the RUM Engine.

For details on working with the JMX console, see "Using the JMX Console to Configure the RUM Engine" on page 113.

Data Flow Probe Connection Settings

This page displays the current connection settings for the communication channel between RUM and HP Universal Discovery, which you can update.

Overview

You can configure a RUM Engine to interact with Universal Discovery's Data Flow Probes. The RUM Engine gathers information from RUM Probes and passes the following information on to the Data Flow Probes:

- Discovered IPs, running software, and connection dependencies.
- Removed IPs and running software.

When a connection is established between a RUM Engine and Universal Discovery, the RUM Engine receives configuration details from Universal Discovery and passes them on to the RUM Probes. If you have configured specific filters for a probe:

- The RUM Probe monitors traffic according to its filters and from the monitored traffic, sends to Universal Discovery only data that is relevant according to the Universal Discovery configuration settings.

- The RUM Probe sends its filter settings to Universal Discovery, so that it knows what traffic the RUM Probe is monitoring.

Prerequisites

- RUM version 9.20 or later
- HP Universal CMDB version 10.00 or later

Configuration

To configure the connection between the RUM Engine and HP Universal Discovery, enter the following information:

Field	Description
Data Flow Probe host name	The IP address or host name of the Data Flow Probe to which the RUM Engine is to report.
Port	The port number through which the RUM Engine is to send data to the Data Flow Probe.
Protocol	The protocol used to connect to the Data Flow Probe.

Note:

- Leave Authentication, Proxy, and SSL settings empty.
- If you change the configuration, click the **Save Configuration** button to save the configuration and update the RUM Engine.
- For details on configuring Data Flow Probes, refer to the HP Universal CMDB documentation.

System Info

This option shows general system information about RUM, which is displayed in the following panes:

- **RUM Server - General.** Includes the host name, host IP address, total memory, and the number of available processors for the RUM server.
- **RUM Server - OS.** Includes the name and version of the operating system of the RUM server.
- **RUM Database - General.** Includes the host name and port number of the RUM database, as well as the name of the database schema.

RUM Diagnostics Tools

The **Tools** drop-down menu on the RUM Engine web console menu bar includes the following tools:

- **Monitoring Configuration Information.** Displays general configuration data of the applications, end users, pages, probes, transactions, and engine that have been configured for monitoring by RUM in End User Management Administration. For details, see "Monitoring

Configuration Information" on the next page.

- **JMX Console.** Provides a link to the RUM JMX console for configuring RUM parameters, such as URL correlation parameters. For details, see "JMX Console" on page 111. (For details on URL correlation, see "Correlating Collected Data with Configured Pages" in the BSM Application Administration Guide.)
- **IP Translator.** Used to convert between the internal number used by the engine to represent an IP address and the actual IP address it represents. For details, see "IP Translator" on page 111.
- **Time Converter.** Used to convert a date and time to an internal number used by the engine machine to represent this value. You can also convert the number used by the engine machine to the date and time it represents. For details, see "Time Converter" on page 111.
- **Page Name Cache.** Used to manage the Page Name cache of meaningful page names and to delete such names that are no longer relevant. For details, see "Page Name Cache" on page 111.

Monitoring Configuration Information

The Engine Configuration page displays general configuration data of the applications, end-users, events, pages, probes, transactions, and engine that have been configured for monitoring by RUM in End User Management Administration.

Click the **Sync All Configuration** button, located at the top of the Engine Configuration page, to force the RUM Engine to reload the RUM configuration from BSM.

You display the data type you want to see by selecting it from the drop-down menu located at the top left corner of the page and clicking **Generate**.

This section includes the following topics:

- "Applications" below
- "End Users" on the next page
- "Events" on the next page
- "Pages" on page 107
- "Probes" on page 108
- "Transactions" on page 109
- "Engine Settings" on page 110
- "Transaction Snapshot Mode" on page 110

Applications

When you select applications as the data type to be displayed, the following information about the configured applications is displayed:

Column	Description
ID	An internal ID number allocated by BSM.
Is Application enabled	True or False – as configured in End User Management Administration.
Name	The name of the application as configured in End User Management Administration.
Type	The application type as configured in End User Management Administration.
Probes which monitor the application	The IP addresses and names of the probes configured in End User Management Administration to monitor the application.

You can filter the data displayed on the **Name** column. The filter is case sensitive.

For information on configuring applications for monitoring, see "RUM Application Configuration Wizard" in the BSM Application Administration Guide.

End Users

When you select end users as the data type to be displayed, the following information about the configured end users is displayed:

Column	Description
ID	An internal ID number allocated by BSM.
Is End User enabled	True or False – as configured in End User Management Administration.
Name	The name of the end-user group as configured in End User Management Administration.
Description	The description of the end-user group as configured in End User Management Administration.
Is Monitored (for collection)	True or False – use host name resolution as configured in End User Management Administration.

You can filter the data displayed on the **Name** column. The filter is case sensitive.

For information on configuring end-user groups for monitoring, see "Add End User Group with RUM Configuration Dialog Box" in the BSM Application Administration Guide.

Events

When you select events as the data type to be displayed, the following information about the configured events is displayed:

Column	Description
ID	An internal ID number allocated by BSM.
Is Event enabled	True or False – as configured in End User Management Administration.
Name	The name of the event as configured in End User Management Administration.
Event type	The event type as configured in End User Management Administration.
Report As Error	True or False – as configured in End User Management Administration.
Create Snapshot	True or False – as configured in End User Management Administration.
Collection Session Snapshot	True or False – as configured in End User Management Administration.

You can filter the data displayed on the **Name** column. The filter is case sensitive.

For information on configuring events for monitoring, see "RUM Administration User Interface" in the BSM Application Administration Guide.

Pages

When you select pages as the data type to be displayed, the following information about the configured pages is displayed:

Column	Description
Page ID	An internal ID number allocated by BSM.
Is Page Enabled	True or False – as configured in End User Management Administration.
Page Name	The name of the page as configured in End User Management Administration.
Application	The name of the application in which the page is included.
Description	The description of the page as configured in End User Management Administration.
Monitored Type	The monitoring condition as configured in End User Management Administration. The possible conditions are: 1 = Always 2 = Never 3 = Only as part of a transaction

Column	Description
Page Type	Currently not used
Page Time Threshold	The page time threshold, in milliseconds, as configured for the page in End User Management Administration.
Server Time Threshold	The server time threshold, in milliseconds, as configured for the page in End User Management Administration.
Availability Threshold	The availability threshold, in percent, configured for the page in End User Management Administration.
Timeout	The amount of time, in milliseconds, after which the page is considered to have timed out, as configured for the page in End User Management Administration.
Page URL	The URL of the page as configured in End User Management Administration.

You can filter the data displayed on the **Page Name** column. The filter is case sensitive.

For information on configuring pages for monitoring, see "Action Dialog Box" in the BSM Application Administration Guide.

Probes

When you select probes as the data type to be displayed, the following information about the configured probes is displayed:

Column	Description
ID	An internal ID number allocated by BSM.
Is probe enabled	True or False – as configured in End User Management Administration.
IP	The IP address of the probe as configured in End User Management Administration.
Login username	The user name for logging in to the probe as configured in End User Management Administration.
Name	The name of the probe as configured in End User Management Administration.
Description	The description of the probe as configured in End User Management Administration.

You can filter the data displayed on the **Name** column. The filter is case sensitive.

For information on configuring probes for monitoring, see "Installing RUM" in the Real User Monitor Installation and Upgrade Guide.

Transactions

When you select transactions as the data type to be displayed, the following information about the configured transactions is displayed:

Column	Description
Trx ID	An internal ID number allocated by BSM.
Is Trx Enabled	True or False – as configured in End User Management Administration.
Trx Name	The name of the transaction as configured in End User Management Administration.
Application	The name of the application in which the transaction is included.
Description	The description of the transaction as configured in End User Management Administration.
Transaction report page	The name of the page which, if reached, causes the transaction to be reported as unavailable, for transaction errors or timeouts within a session.
Refresh behavior	The page instance that is measured in case of a refresh, as configured in End User Management Administration. The possible instances are: 0 = First page 1 = Last page
Timeout	The amount of time, in milliseconds, of inactivity since the last page download in a transaction, that causes the transaction to time out, as configured for the transaction in End User Management Administration.
Gross Time Threshold	The total transaction time threshold (download time + think time), in milliseconds, as configured for the transaction in End User Management Administration.
Net Time Threshold	The net transaction time threshold, in milliseconds, for the pages included in the transaction, as configured in End User Management Administration.
Server Time Threshold	The server time threshold, in milliseconds, as configured for the transaction in End User Management Administration.
Availability Threshold	The availability threshold, in percent, as configured for the transaction in End User Management Administration.
Trx pages	The names of the pages included in the transaction, as configured in End User Management Administration.

You can filter the data displayed on the **Trx Name** column. The filter is case sensitive.

For information on configuring transactions for monitoring, see "Business Transaction RUM Configuration Page" in the BSM Application Administration Guide.

Engine Settings

When you select engine settings as the data type to be displayed, the following information about the configured engine is displayed:

Column	Description
Engine Name	Name of the engine as configured in End User Management Administration.
Profile ID	Internal BSM profile ID.
Profile Name	Internal BSM profile name.
Engine ID	Internal BSM engine ID.
Customer Name	Always default client.
Snapshot on Error Enabled	True or False – as configured in End User Management Administration.
Snapshot page number	Number of pages for which to collect snapshot on error, as configured in End User Management Administration.
Is monitoring default application	The applications that are monitored by the engine, as configured in End User Management Administration. 0 = configured applications only 1 = all applications
Default Application Name	Name of default application (for all applications not configured in End User Management Administration).
Default HTTP Port	Default http port of engine machine.
Default HTTPS Port	Default https port of engine machine.
Default Application ID	Internal BSM application ID.

Transaction Snapshot Mode

When you select transaction snapshot mode as the data type to be displayed, the following information about the transaction snapshot mode is displayed:

Column	Description
Name	The application name.
ID	Internal BSM application ID.
Snapshot mode on	True or False – as configured in End User Management Administration.

JMX Console

This option provides a link to the RUM JMX console, which you use to view and configure RUM parameters, for example, URL correlation parameters. For details on configuring URL correlation parameters, see "Correlating Collected Data with Configured Pages" in the BSM Application Administration Guide. For details on working with the JMX console, see "Using the JMX Console to Configure the RUM Engine" on page 113.

IP Translator

You use the IP Translator tool to convert an IP address into different formats. The formats to which the IP data is translated are:

- **Host name.** The name of the machine to which the IP address is assigned.
- **Signed integer.** An internal, signed number used in RUM data samples.
- **Unsigned integer.** An internal, unsigned number used in RUM data samples.
- **Dotted-format IP address.** The standard, dotted-decimal notation for the IP address.

You select one of the formats and enter the source data you want to convert to the other formats, or you select the **Resolve Engine host** option to use the IP address of the current RUM Engine machine as the source data.

Click **Submit** to translate the source data to all the other formats.

Time Converter

You use the Time Converter tool to convert a time into different formats. The formats to which the time is converted are:

- The number of milliseconds since January 1, 1970 – an internal number used by the RUM Engine.
- Time in Greenwich Mean Time.
- Time in the time zone set for the RUM Engine machine.

You select one of the formats and enter the source data you want to convert to the other formats, or you select the **Current time** option to use the current time as the source data for conversion.

Click **Submit** to convert the source data to all the other formats.

Page Name Cache

You use the Page Name Cache tool to display applications and the meaningful page names that have been created for pages included in the application. You can delete meaningful page names that are no longer relevant (for example, if you have changed the meaningful page name rules for an application so that new and different meaningful page names are created) and thereby reduce the amount of data stored in the RUM database. For details on configuring meaningful names, see "Configuring Meaningful Page Names" on page 129.

This section includes the following topics:

- "Application Selection Page" below
- "Application Cached Page Names Page" below

Application Selection Page

When you select the Page Name Cache tool, the Application Selection page opens, listing all the applications that you configured for the RUM Engine in End User Management Administration. For information on configuring applications in End User Management Administration, see "Real User Monitor Application Configuration Wizard" in the BSM Application Administration Guide.

For each application, you can perform the following actions:

- Click the **Delete** button to delete all the meaningful page names for the application.
- Click the **Drilldown** button to display the Application Cached Page Names page (for details, see "Application Cached Page Names Page" below) on which you can see all the meaningful page names for the application and delete them selectively.

> **Note:** The buttons are disabled for applications that do not have any meaningful page names assigned to them.

Application Cached Page Names Page

You access the Application Cached Page Names page by clicking the **Drilldown** button in the Application Selection page. The Application Cached Page Names page lists all the meaningful page names that have been created for an application. To delete pages, select the check box next to the pages you want to delete and click the **Delete** button .

> **Note:** You can select all page names, clear all page names, or invert your selection using the **Select** buttons .

Click **Back** at the top of the page to return to the Application Selection page.

From either the Application Selection page or the Application Cached Page Names page, click the **Refresh** button to redisplay the pages.

Chapter 10

Using the JMX Console to Configure the RUM Engine

You configure RUM Engine settings via the JMX console.

> **Note:** You also use the web console to configure the engine, monitor system health, and use a number of diagnostic tools. For details, see "Using the RUM Web Console" on page 48.

This chapter includes the following topics:

- "Using the RUM JMX Console" below
- "URL Correlation Parameters" on page 118

Using the RUM JMX Console

You use the RUM Engine JMX console to view and configure RUM settings.

This section includes the following topics:

- "Accessing the JMX Console" below
- "Setting URL Correlation Parameters" on the next page
- "Configuring RUM Aggregation" on the next page
- "Configuring RUM Reporting" on page 116
- "Configuring the Samples Rate" on page 117
- "Configuring the Amount of Unsent Sample Data to Store in RUM" on page 117

Accessing the JMX Console

Via the JMX console, you can view and configure RUM parameters, view statistics for RUM modules and services, and view and configure JBoss components.

Once you start the RUM Engine after installation, you can access the RUM Engine JMX console by launching the RUM Engine web console and choosing **JMX Console** from the Tools drop-down menu. To access a specific area of the JMX console for an individual RUM module, select **Advanced Settings** from the **Configuration** drop-down menu in the RUM Engine web console and then click the links for the module you want to view. For details on the RUM Engine web console, see "Using the RUM Web Console" on page 48.

When you access the JMX console, you are prompted for a user name and password. Enter the JMX console authentication credentials (if you do not have these credentials, contact your system administrator).

> **Note:** You can access the RUM Engine JMX console from a different machine by launching a web browser and typing the following: `http://<HP Real User Monitor engine machine name>:8180/jmx-console`

> **Caution:** Changing any of the JMX configuration settings can cause RUM to malfunction. We recommend that you do not change any of these settings.

Setting URL Correlation Parameters

You can configure a number of parameters used by RUM when correlating recorded URLs with URLs you have configured for monitoring. For details on URL correlation, see "Correlating Collected Data with Configured Pages" in the BSM Application Administration Guide. For details on configuring URLs for monitoring, see "Real User Monitor Application Configuration Wizard" in the BSM Application Administration Guide.

Some of the URL correlation parameters are set using the RUM JMX console. For details on changing URL correlation parameters via the RUM JMX console, see "Setting URL Correlation Parameters Via the JMX Console" on page 118.

Configuring RUM Aggregation

RUM pre-aggregates a number of the data samples it sends to BSM. For details on BSM aggregation, see "Data Aggregation" in the BSM Application Administration Guide. For details on RUM pre-aggregation, see "Aggregating Real User Monitor Data" in the BSM User Guide.

You can change the RUM default aggregation periods via the JMX console.

This section includes the following topics:

- "Pre-aggregated Data Sample Types" below
- "Changing Default Aggregation Periods" on the next page

Pre-aggregated Data Sample Types

The following table shows the data sample types that are pre-aggregated by RUM, the JMX service in which they are configured, their attribute and parameter names, and the default aggregation time period:

Data Sample Type	JMX Console Rum.modules Service Name	Attribute in JMX Service	Parameter Name	Default Aggregation Period in Milliseconds
Action	StatisticsMgrConf	Properties	aggregator.actions.interval	300,000
Slow End User			aggregator.domains.interval	300,000
Missing Component			aggregator.MissingComponents.interval	300,000
Slow Action			aggregator.SlowActions.interval	300,000
Slow Location			aggregator.slowlocations.interval	300,000
Top Location			aggregator.toplocations.interval	360,000
Top End User			aggregator.TopDomains.interval	360,000
Top Action			aggregator.TopActions.interval	360,000
Most Error Action			aggregator.actionerrorevent.interval	300,000
Application Statistics			aggregator.applications.interval	300,000
Transaction			aggregator.transaction.interval	300,000
TCP Application Statistics			aggregator.tcpapplications.interval	300,000
Undefined End User (Domain)			aggregator.domains.interval	300,000

Changing Default Aggregation Periods

You can change the default aggregation periods using the JMX console.

To change the RUM default aggregation periods via the JMX console:

1. Access the JMX console by choosing JMX Console from the Tools drop-down menu in the RUM web console, or by using the following URL in your web browser:

   ```
   http://<HP Real User Monitor engine machine name>:8180/jmx-console
   ```

   When prompted, enter the JMX console authentication credentials (if you do not have these credentials, contact your system administrator).

2. In the JMX Agent View, scroll down to the **RUM.modules** section and click the applicable service (**service=StatisticsMgrConf**).

3. Change the aggregation period as required. To change parameter values in the **Properties** attribute, enter the parameter name and the aggregation period (in milliseconds) you want to change under the commented lines (the lines beginning with #) in the format:

   ```
   attribute name=aggregation period
   ```

   For example, to change the aggregation period of the Action sample type to 10 minutes, enter:

   ```
   aggregator.actions.interval=600000
   ```

4. Click the **Apply Changes** button to save the change.

5. Activate the change by clicking the **Invoke** button for the **deployConfiguration** operation.

Caution: Changing the default aggregation periods can significantly affect the amount of data sent by RUM to BSM. We recommend that you do not change the default aggregation periods.

Configuring RUM Reporting

By default, RUM reports data to BSM for all end users, both those configured in end-user groups in End User Management Administration and those who are not configured. (For details on configuring end users in End User Management Administration, see "Add End User Group with Real User Monitor Configuration Dialog Box" in the BSM Application Administration Guide.) You can configure RUM to report data only for configured end users.

BSM includes a list of predefined end-user names and domains to give meaningful names to end users in RUM reports. If you configure RUM to report data only for configured end users, data for end users in the predefined list are not reported to BSM. For details of RUM reports, see "End User Management Reports Overview" in the BSM User Guide.

To configure RUM to report data for configured end users only:

1. Access the JMX console by choosing **JMX Console** from the Tools drop-down menu in the RUM web console, or by using the following URL in your web browser:

   ```
   http://<HP Real User Monitor engine machine name>:8180/jmx-console
   ```

   When prompted, enter the JMX console authentication credentials (if you do not have these credentials, contact your system administrator).

2. In the JMX Agent View, scroll down to the **RUM.modules** section and click **service=StatisticsMgrConf**.

3. In the **ShouldReportUndefinedDomains** parameter, change the value to **false**.
4. Click the **Apply Changes** button to save the change.
5. Click the **Invoke** button for the **deployConfiguration** operation to activate the change.

Configuring the Samples Rate

The maximum burst rate controls the number of samples per second that the RUM Engine can send to BSM. The default setting is 150. You can increase the maximum burst rate to allow more samples to be sent per second, provided that BSM is capable of handling the increased number. You can see the state of the flow of samples between RUM and BSM by looking at the **Publisher burst state** in RUM system health. For details on RUM system health, see "Monitoring the Health of RUM Components" on page 53.

To configure the maximum burst rate:

1. Access the JMX console by choosing **JMX Console** from the Tools drop-down menu in the RUM web console, or by using the following URL in your web browser:

   ```
   http://<HP Real User Monitor engine machine name>:8180/jmx-console
   ```

   When prompted, enter the JMX console authentication credentials (if you do not have these credentials, contact your system administrator).
2. In the JMX Agent View, scroll down to the **RUM.modules** section and click **service=PublisherSettings**.
3. In the **BurstControlMaxSamples** parameter, change the value to the maximum number of samples required.
4. Click the **Apply Changes** button to save the change.
5. Click the **Invoke** button for the **applyAttributeChanges** operation to activate the change.

Configuring the Amount of Unsent Sample Data to Store in RUM

By default, 1000 chunks of samples data are stored in RUM for sending to BSM. You can increase the number of chunks of data stored (providing you have sufficient disk space) to avoid data loss when BSM cannot receive data from RUM. For example, you might want to increase the amount of data stored by RUM during a planned downtime in BSM. Bear in mind that when a lot of data has been stored in RUM, it can take a long time for all of it to be sent to BSM, which might cause a delay in seeing real time data. If you increase the number of data chunks to store, you should reset it to the original number once BSM is running and all the stored data has been transmitted to it.

To increase the maximum number of data chunks stored:

1. Access the JMX console by choosing **JMX Console** from the Tools drop-down menu in the RUM web console, or by using the following URL in your web browser:

   ```
   http://<HP Real User Monitor engine machine name>:8180/jmx-console
   ```

   When prompted, enter the JMX console authentication credentials (if you do not have these credentials, contact your system administrator).

2. In the JMX Agent View, scroll down to the **RUM.modules** section and click **service=PublisherSettings**.
3. In the **MaxChunksInQueue** parameter, change the value to the maximum number of chunks required.
4. Click the **Apply Changes** button to save the change.
5. Click the **Invoke** button for the **applyAttributeChanges** operation to activate the change.

URL Correlation Parameters

After the RUM Engine has been installed and started, you can configure a number of parameters to determine how RUM correlates recorded URLs with web pages you have configured for monitoring in End User Management Administration.

This section includes the following topics:

- "Setting URL Correlation Parameters Via the JMX Console" below
- "Correlating Session ID Parameters" on the next page

Setting URL Correlation Parameters Via the JMX Console

You can change the default setting of a number of parameters used by RUM when correlating recorded URLs with URLs you have configured for monitoring. For details on URL correlation, see "Correlating Collected Data with Configured Pages" in the BSM Application Administration Guide. For details on configuring URLs for monitoring, see "Real User Monitor Application Configuration Wizard" in the BSM Application Administration Guide.

You can configure the following parameters for URL correlation in the JMX console:

- **adaptIndexurl.** By default, RUM considers URLs with a suffix of **index.html** (and other suffixes that are configured in the urlIndexStrings parameter) to be same as the root URL. For example, `http://www.hp.com/index.html` is considered to be the same as `http://www.hp.com/`. To instruct RUM to consider all suffixes as being different from the root URL, change this parameter to **False**.
- **urlIndexStrings.** URL suffixes configured in this parameter are considered to be the same as the root URL, if the **adaptIndexurl** parameter is set to True. For example, if the suffix **index.html** is configured, then `http://www.hp.com/index.html` is considered to be the same as `http://www.hp.com/`. By default, the suffix **index.html** is configured in this parameter. To add additional suffixes, add them to the string separated by a semicolon (;). The last suffix in the string must also be followed by a semicolon. For example, `/;/index.html;/index.aspx;`.

> **Note:** For the **urlIndexStrings** parameter to be active, the **adaptIndexurl** parameter must be set to **True**.
>
> The index strings in the urlIndexStrings parameter are considered as being identical for all URLs. For example, if `/;/index.html;` is configured in the **urlIndexStrings** parameter then `http://www.hp.com/` and `http://www.hp.com/index.html` are considered

> as being identical, `http://www.hp-int.com/` and `http://www.hp-int.com/index.html` are considered as being identical, and so forth.
>
> Changing the **urlIndexStrings** parameter requires the RUM Engine Resolver to be restarted. For details, see "To restart the RUM Engine Resolver" below.

- **adaptCaseSensitive.** By default, RUM URL correlation is case-insensitive, so that a recorded URL such as `http://www.hp.com/rumEnginePage.html` is correlated with the configured URL `http://www.hp.com/rumenginepage.html`. To instruct RUM to use case-sensitive URL correlation (for all but the host and protocol parts of a URL), you set this parameter to **False**.
- **basicAuthentication.** By default, RUM ignores basic authentication when performing URL correlation. For example, the recorded URL `http://bob:my_password@www.hp.com` is correlated with the configured URL `http://www.hp.com`. To instruct RUM to consider basic authentication when performing URL correlation, you set this parameter to **False**.

To change the default setting of a URL correlation parameter in the JMX console

1. Access the JMX console by choosing JMX Console from the Tools drop-down menu in the RUM web console, or by using the following URL in your web browser:

   ```
   http://<HP Real User Monitor engine machine name>:8180/jmx-console
   ```

   When prompted, enter the JMX console authentication credentials (if you do not have these credentials, contact your system administrator).
2. In the JMX Agent View, scroll down to the **RUM.modules** section and click **service=ResolverURLMConfig**.
3. In the relevant parameter, change the setting to the required value.
4. Click the **Apply Changes** button.

To restart the RUM Engine Resolver

1. Access the JMX console by choosing JMX Console from the Tools drop-down menu in the RUM web console, or by using the following URL in your web browser:

   ```
   http://<HP Real User Monitor engine machine name>:8180/jmx-console
   ```

   When prompted, enter the JMX console authentication credentials (if you do not have these credentials, contact your system administrator).
2. In the JMX Agent View, scroll down to the **RUM.modules** section and click **service=Resolver**.
3. Scroll down to the **restart** operation and click **Invoke**.

Correlating Session ID Parameters

You can configure specific parameters in recorded URLs to be ignored by RUM when correlating recorded URLs with URLs you have configured for monitoring in End User Management Administration. For details on URL correlation, see "Correlating Collected Data with Configured Pages" in the BSM Application Administration Guide. For details on configuring URLs for monitoring, see "RUM Application Configuration Wizard" in the BSM Application Administration Guide.

If you set a parameter to be ignored by RUM, and the parameter is included in a recorded URL, RUM replaces the contents of that parameter with an asterisk (*). For example, if you set RUM to ignore the **BV_SessionID** and **BV_EngineID** parameters in the following URL:

```
http://www.hp.com/~anand/Ticket_Confirm.jsp?BV_SessionID=@@@@181205763
0.1043567934@@@@&BV_EngineID=cccdadchgidfmlmcefecehidfhfdffk.0&value=0
000144976
```

The URL is translated as follows:

```
http://www.hp.com/~anand/Ticket_Confirm.jsp?BV_SessionID=*&BV_EngineID
=*&value=0000144976
```

The parameters to be ignored are defined per application server.

To configure session ID parameters to be ignored

1. Open the **<HP Real User Monitor root directory>\conf\configurationmanager\Application_Server_Types_configuration.xml** file in a text editor.
2. Locate the application server type for which you are configuring the parameters to be ignored. This appears in the format <AppServer name="app_server_name">, where app_server_name is the name of the application server type. For example, for a Broadvision application server, the entry is:

   <AppServer name="BroadVision">
3. Under the application server name, in the section beginning with the **<DiscardParameters>** tag, is a list of the most common session ID parameters for that application server. You can add and delete parameters to create a list of all the parameters you want RUM to ignore during correlation. Parameters are entered in the format <parameter>parameter_name</parameter>, where parameter_name is the name of the parameter. For example, for a parameter called BV_EngineID, the entry is.

   <parameter>BV_EngineID</parameter>
4. If you want RUM to consider the parameters you enter as a regular expression instead of a string (which is the default), you add **type="regEx"** to the **<DiscardParameters>** tag. For example, **<DiscardParameters type="regEx">**
5. Under the application server name, in the line:

   <attribute name="enabled">false</attribute>

   change **false** to **true**.
6. Save the file and exit the editor.

Chapter 11

RUM Transaction Flow Monitoring

You use RUM transaction flow monitoring to discover the paths through both hardware and software elements, including specific request content, of the pages included in a configured transaction.

This chapter includes the following topics:

- "RUM Transaction Flow Monitoring Overview" below
- "RUM Transaction Flow Monitoring User Interface" on the next page

RUM Transaction Flow Monitoring Overview

RUM transaction flow monitoring enables you to run an algorithm for a specific RUM transaction that you configured in End User Management Administration, that tracks and records the progress of the transaction's configured pages through servers, the specific software elements running on the servers, and the specific requests sent to the running software elements.

Using the discovered data, RUM transaction flow monitoring creates a topology flow map of the transaction showing the different hardware and software elements, and also determines action descriptions of commonly repeated patterns in the transaction pages' requests (for example, the same SQL query in which only a specific parameter value may vary in each page request). The discovered data enables you to better understand transactions and helps highlight potential problem areas. For user interface details on configuring RUM transactions, see "Business Transaction RUM Configuration Page" in the BSM Application Administration Guide.

Note: Intermediate pages in a transaction are not tracked by RUM transaction flow monitoring.

In the RUM transaction flow monitoring user interface you can view transaction topology flow maps and can also view and edit the discovered action descriptions. For user interface details, see "RUM Transaction Flow Monitoring User Interface" on the next page. To access RUM transaction flow monitoring, in the RUM web console, select **Configuration > Transaction Management Configuration**. For details on accessing the RUM web console, see "Accessing the RUM Engine Web Console" on page 48.

The data discovered by RUM transaction flow monitoring is sent to BSM, where it is used by Transaction Management as one of multiple data sources for the Aggregated Topology page. The Aggregated Topology is a flow map for a particular BusinessTransaction CI, as well as its associated performance data, from point to point in the flow. RUM transaction flow monitoring contributes to the performance data by supplying metrics based on end user response times. For details, see "Transaction Topology" in the BSM User Guide.

RUM Transaction Flow Monitoring User Interface

To access RUM transaction flow monitoring, in the RUM web console, select **Configuration > Transaction Management Configuration**. For details on accessing the RUM web console, see "Accessing the RUM Engine Web Console" on page 48.

The RUM transaction flow monitoring user interface consists of the following three panes:

- **Enterprise Components.** Includes a tree of the business applications and their transactions that you configured in End User Management Administration, a time frame selector for filtering the data displayed in the Main View pane, and control buttons for starting and stopping the tracking algorithm. For user interface details, see "Enterprise Components Pane" below.
- **Component Properties/Graph Overview.** Includes the following two tabs:
    - **Component Properties.** Displays details of a specific object selected in the topology flow map in the Main View pane.
    - **Graph Overview.** Displays a condensed version of the topology flow map displayed in the Main View pane.

  For user interface details, see "Components Properties/Graph Overview Pane" on the next page.
- **Topology View.** Displays the topology flow map or table for a selected transaction. For user interface details, see "Topology View Pane" on page 124.

Enterprise Components Pane

The Enterprise Components pane includes a tree of the business applications and their transactions that you configured in EUM Administration, as well as a time frame filter for selecting the data displayed in the Main View pane and control buttons for starting and stopping the tracking algorithm.

User interface elements are described below:

UI Element	Description
⟳	**Refresh.** Refreshes the display in the Main View pane.
▶	**Start Algorithm.** Starts the RUM transaction flow monitoring discovery algorithm for the selected transaction in the tree.
■	**Stop Algorithm.** Stops the RUM transaction flow monitoring discovery algorithm for the selected transaction in the tree.
<Time frame>	Select the type of time period for which to display data in the Main View pane—variable or fixed. Configure the actual time frame settings in the **Time Frame** element.
Component Tree	A hierarchical tree of the applications to which the RUM Engine is assigned, and their configured transactions.

UI Element	Description
Time Frame	The time frame settings for which data is displayed in the Main View pane. Configure the following settings: • **Fixed time frame:** ▪ **From.** Select the starting date and time ▪ **To.** Select the ending date and time • **Variable time frame:** ▪ **Last.** Select the number of <Time units> prior to the current date and time from which to start displaying data. ▪ **<Time units>.** Select seconds, minutes, hours, or days. **Note:** The starting and ending dates and times are updated and displayed according to the selections you make.

Components Properties/Graph Overview Pane

This pane displays details of a specific object (server or communication channel) selected in the Topology View pane, or a condensed version of the topology flow map displayed in the Topology View pane, according to the selected tab. The name of the pane changes according to both the selected tab and the object selected in the topology flow map in the Main View pane. The valid names are:

- **Server Component Properties.** When the Component Properties tab is selected and a server in the topology flow map is selected.
- **Communication Channel Properties.** When the Component Properties tab is selected and a communication channel in the topology flow map is selected.
- **Graph Overview.** When the Graph Overview tab is selected.

Component Properties Tab

User interface elements are described below:

UI Element	Description
🔄	**Refresh.** Refreshes the data displayed in the table.
Attribute	The name of the attributes of the selected object in the topology flow map.
Value	The value of the attributes of the selected object in the topology flow map.

Graph Overview Tab

This tab displays a condensed version of the topology flow map in the Main View pane.

Topology View Pane

This pane displays the topology flow map for a selected transaction, which you can view either as a graph or as a table (pattern tree).

This section includes the following topics:

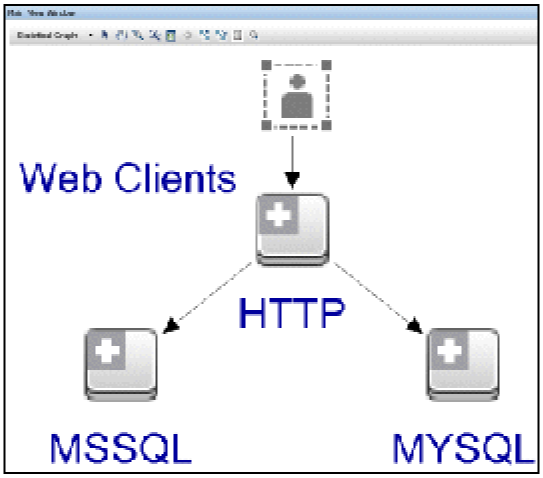
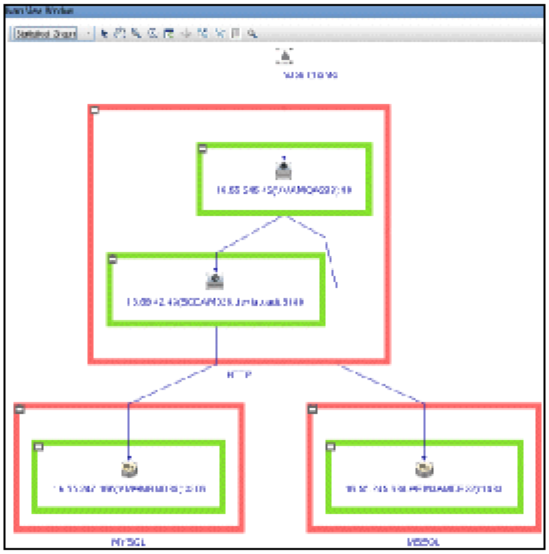
- "Topology Map - Statistical Graph" below
- "Topology Map - Pattern Tree" on page 126
- "Select Server Dialog Box" on page 127
- "Action Description Statistics Dialog Box" on page 127
- "Add Transaction Pattern Element Dialog Box" on page 128

Topology Map - Statistical Graph

This tab displays a selected transaction's topology flow map as a graph.

User interface elements are described below:

UI Element	Description
↖	**Select.** Enables selecting a component in the topology flow map. **Note:** This button is selected by default on entering the topology flow map.
✋	**Pan.** Pans the topology flow map. You pan by holding down the left click button on your pointer. Drag the pointer in the required direction.
🔍	**Interactive Zoom.** Zooms on a specific area of the topology flow map. Click in the topology flow map and drag the cursor to the top or left to decrease the zoom level, or drag to the bottom or right to increase the zoom level.
🔍	**Marquee Zoom.** Zooms on a selected area of the topology flow map. You select an area by moving your pointer while holding down the left click button. When the area is selected, you release the left click button to zoom on that area.
⛶	**Fit Screen.** Fits all the flow map components into the visible area.
⌖	**Navigate Communication Channel.** Enables navigating between components of the topology flow map. You click the Navigation Communication Channel button and then click a line connecting two components or subcomponents. The cursor navigates to the endpoint component.

UI Element	Description
	Collapse All. Collapses the nodes of the topology flow map. When collapsed, each object in the topology flow map represents a different type of entity such as web clients, a running software element, a protocol type, and so forth. **Note:** This is the default setting when you enter the topology flow map. **Example:** 
	Expand All. Expands the objects of the topology flow map. When expanded, each entity object opens to display its included objects such as servers, client machines, requests, and so forth. **Example:** 
	Properties Dialog Box. Opens the Graph Properties dialog box, where you can configure the default layout properties for the graph.

UI Element	Description
<Display mode>	Select a display mode from the following options: - **Statistical Graph.** Displays the topology flow map as a graph. **Note:** This is the default display mode. - **Pattern Tree.** Displays the topology flow map as a table. For user interface details, see "Topology Map - Pattern Tree" below.
<Topology flow map>	In the topology flow map, you can do the following: - Click an object to select it. The selected object's attributes and values are displayed in the Component Properties tab of the Properties/Graph View pane. For user interface details, see "Component Properties Tab" on page 123. - Double-click a communication channel line to open the Action Description Statistics dialog box, where you can view the discovered action descriptions. For user interface details, see "Action Description Statistics Dialog Box" on the next page. - Hold the cursor over an object to display a tooltip with additional information.

Topology Map - Pattern Tree

This pane displays the topology flow map as a table.

User interface elements are described below:

UI Element	Description
➕	**Add Transaction Pattern Element.** Opens the Add Transaction Pattern Element dialog box, where you can manually add a pattern rule to the selected topology. For user interface details, see "Add Transaction Pattern Element Dialog Box" on page 128.
❌	**Remove Transaction Pattern Element.** Deletes a selected pattern rule from the selected topology.
<Display mode>	Select a display mode from the following options: - **Statistical Graph.** Displays the topology flow map as a graph. For user interface details, see "Topology Map - Statistical Graph" on page 124. **Note:** This is the default display mode. - **Pattern Tree.** Displays the topology flow map as a table.
Name	A hierarchical tree of the servers included in the topology flow map. The hierarchy of servers is in the order in which they are accessed and each server contains as its children in the tree, the servers it accesses.
Component Type	The communication protocol by which the server is accessed.

UI Element	Description
Action	The type of action detected in the request. For example, an SQL query, a service, or a URL.

Select Server Dialog Box

The Select Server dialog box displays a table of all the servers included in the topology flow map in the Topology View pane. To access the Select Server dialog box, click the **ellipsis** button ... for **Action Description** in the **Add Transaction Pattern Element** dialog box.

User interface elements are described below:

UI Element	Description
Host	The host name of the server and the port number used to access it.
IP	The IP address of the server.
Type	The type of software element running on the server.

Action Description Statistics Dialog Box

The Action Description Statistics dialog box displays a table of action descriptions discovered for a selected communications channel. To access the Action Description Statistics dialog box, click a connecting point in a communications channel in the topology flow map.

User interface elements are described below:

UI Element	Description
Name	The action description name.
Pattern	The action description pattern. That is, the common shared pattern. For example, if the same SQL query was discovered in different page requests, but for each request a specific parameter value was different, the discovered pattern is the SQL query including the parameter name, but without a parameter value.
# Hits	The number of pattern hits (for example, page hits, SQL query hits, and so forth).
Hits/Sec	The number of pattern hits per second.
Load	The total amount of traffic generated by the pattern hits.
Avg. Time	The average time of the pattern hits (that is, the total time divided by the total number of hits).

Add Transaction Pattern Element Dialog Box

The Add Transaction Pattern Element dialog box enables you to manually add a transaction pattern to a selected topology flow. To access the Add Transaction Pattern Element dialog box, click the **Add Transaction Element** button + in the **Pattern Tree** display mode of a topology flow map.

User interface elements are described below:

UI Element	Description
Source Server	The source server for which you are adding the transaction pattern. This is the server you selected in the pattern tree.
Destination Server	The destination server for which you are adding the transaction pattern. Click the ellipsis button ... to select the source element from the **Select Server** dialog box. For user interface details, see "Select Server Dialog Box" on the previous page.
Action Description	The action description you are adding to the transaction pattern rule. Click the ellipsis button ... to select the transaction pattern from the **Action Descriptions** dialog box.

Chapter 12

RUM Engine File Configuration

Some of the settings used by the RUM Engine are made in various files that you can edit.

This chapter includes the following topics:

- "Configuring Meaningful Page Names" below
- "Unifying Frames" on page 149
- "Configuring User Name Translation" on page 151

Configuring Meaningful Page Names

You can configure RUM to change the URLs of recorded pages that are not configured in End User Management Administration to more meaningful names for use in RUM reports. For information on configuring pages for monitoring, see "Action Dialog Box" in the BSM Application Administration Guide. For information on RUM reports, see "End User Management Reports Overview" in the BSM User Guide.

This section includes the following topics:

- "About Meaningful Page Names" below
- "Formatting Tags" on the next page
- "Rule Tags" on page 138
- "Sample XML File" on page 141
- "Validating Meaningful Name XML Files" on page 146
- "Adding and Deleting Meaningful Name XML Files" on page 147
- "Changing Meaningful Name XML Files" on page 147
- "Viewing Meaningful Page Statistics" on page 148

About Meaningful Page Names

For each application configured in End User Management Administration, you can create an XML file to be used to give meaningful names to pages that are recorded as part of the application, but that are not configured as pages in End User Management Administration. For information on configuring applications for monitoring, see "RUM Application Configuration Wizard" in the BSM Application Administration Guide. For information on configuring pages for monitoring, see "Action Dialog Box" in the BSM Application Administration Guide.

If an XML file has been created and an application linked to it, when a page that is not configured in End User Management Administration is recorded as part of the application, the page’s URL is compared to the rules in the XML file. If matches are found, the page is given a new name for use in RUM reports. If no matches are found, or if no XML file has been created and linked to the application, the page's URL as recorded is used in RUM reports. For information on RUM reports, see "End User Management Reports Overview" in the BSM User Guide.

The XML file must be created in the **\<RUM root directory>\conf\resolver\meaningful_pages** directory on the RUM Engine machine. For convenience, we recommend that the file name is the same as the application name. For example, an XML file created for an application called **myapplication** is:

```
\<HP Real User Monitor root directory>\conf\resolver\meaningful_pages\
myapplication.xml
```

> **Note:** RUM includes two default XML files for the PeopleSoft 8.1 and Siebel 7.5 applications.

The XML file contains the following main sections:

- **Formatting.** Contains the formatting commands for changing a URL into a meaningful name.
- **Rules.** Contains the rules that determine whether or not a page's URL is changed to a meaningful name.

> **Tip:** We recommend that you create the rules before the formats.

Formatting Tags

The first main section in the XML file is the formatting section, which contains the XML tags that are used to format parts of a page's URL, which are then used to create a meaningful name for the page.

> **Note:** All parts of a page's URL are converted by RUM to lower case for matching and formatting.

The following formatting tags can be used. For the XML schema to be validated (for details, see "Validating Meaningful Name XML Files" on page 146), the tags must appear in the XML file in the order in which they are listed below:

- "URL Decoder" on the next page
- "Rename" on the next page
- "Substring" on the next page
- "ExtractStrToStr" on page 132
- "ExtractIndexToStr" on page 133
- "ExtractStrToCount" on page 134
- "Insert" on page 135
- "ChangeCase" on page 136
- "Remove" on page 137
- "RemoveNonAlpha" on page 137

- "Replace" on page 137
- "Alias" on page 138

URL Decoder

The URLDecoder tag is used to decode a source string using a specified decoder.

Syntax	<URLDecoder Name=**"Command_Name"** EncodingScheme=**"Scheme"**/>
Explanation	**Command_Name.** The name of the Substring formatting tag that can be used in Rule tags. **Scheme.** The decoding scheme to be used.
Example	<URLDecoder Name="DecodeUTF-8" EncodingScheme="UTF-8"/> When the DecodeUTF-8 formatting command is referenced in a rule, the string is decoded using the UTF-8 decoding scheme.
Note	If the URLDeocder tag is used, but no encoding scheme is specified, the UTF-8 scheme is used by default.

Rename

The Rename tag is used to replace the entire contents of a source string.

Syntax	<Rename Name=**"Command_Name"** NewName=**"Rename_String"**/>
Explanation	**Command_Name.** The name of the Rename formatting tag that can be used in Rule tags. **Rename_String.** The string to be substituted for the source string.
Example	<Rename Name="RenameToABC123" String="HP" When the **RenameToABC123** formatting command is referenced in a rule, the entire source string is renamed to **HP**.

Substring

The Substring tag is used to extract a sub string from the source string.

Syntax	<SubString Name=**"Command_Name"** BeginIndex=**"Start_Char_Index"** Count=**"Length"**/>

Explanation	**Command_Name.** The name of the Substring formatting tag that can be used in Rule tags. **Start_Char_Index.** The position in the source string of the starting character of the substring to be extracted. The first position in the source string is the zero index. **Length.** The number of characters from the Start_Char to be extracted. If the number used is greater than the number of characters from the Start_Char to the end of the source string, the entire string from the Start_Char to the end of the source string is extracted.
Example	<Substring Name="ExtractTenToTwelve" BeginIndex="10" Count="3"/> When the **ExtractTenToTwelve** formatting command is referenced in a rule, the tenth, eleventh, and twelfth characters of the source string are extracted.

ExtractStrToStr

The ExtractStrToStr tag is used to extract a string between two given strings from the source string.

Syntax	<ExtractStrToStr Name=**"Command_Name"**
	fromString=**"Start_String"**
	fromInclude=**"Include_Start_String"**
	fromOccurrences=**"Occurrences_Start_String"**
	toString=**"End_String"**
	toInclude=**"Include_End_String"**
	toOccurrences=**"Occurrences_End_String"**/>

Explanation	**Command_Name.** The name of the ExtractStrToStr formatting tag that can be used in Rule tags. **Start_String.** The starting string from which the required string is to be extracted. **Include_Start_String.** Whether to include the starting string as part of the extracted string. Valid options are: • **True.** Include the starting string as part of the extracted string. This is the default used if nothing is specified. • **False.** Do not include the starting string as part of the extracted string. **Occurrences_Start_String.** The occurrence number of the starting string at which to start the extraction of the required string. Valid options are **1-100** or **last**. **End_String.** The ending string up to which the required string is to be extracted. **Include_End_String.** Whether to include the ending string as part of the extracted string. Valid options are: • **True.** Include the ending string as part of the extracted string. This is the default used if nothing is specified. • **False.** Do not include the ending string as part of the extracted string. **Occurrences_End_String.** The occurrence number of the ending string at which to end the extraction of the required string. Valid options are **1-100** or **last**.
Example	<ExtractStrToStr Name="ExtractBetweenABCandXYZ" fromString="ABC" fromInclude="true" fromOccurrences="2" toString="XYZ" toInclude="false" toOccurrences="1"/> When the **ExtractBetweenABCandXYZ** formatting command is referenced in a rule, the string between the second occurrence of **ABC** and the first occurrence of **XYZ** in the source string is extracted. The starting string of **ABC** is also included at the beginning of the extracted string.

ExtractIndexToStr

The ExtractIndexToStr tag is used to extract a string between a given starting position and a given ending string in the source string.

Syntax	<ExtractIndexToStr Name=**"Command_Name"** fromIndex=**"Start_Char_Index"** toString=**"End_String"** toInclude=**"Include_End_String"** toOccurrences=**"Occurrences_End_String"**/>

Explanation	**Command_Name.** The name of the ExtractIndexToStr formatting tag that can be used in Rule tags. **Start_Char_Index.** The character number from which to start extracting the required string. The first position in the source string is the zero index. **End_String.** The ending string up to which the required string is to be extracted. **Include_End_String.** Whether to include the ending string as part of the extracted string. Valid options are: • **True.** Include the ending string as part of the extracted string. This is the default used if nothing is specified. • **False.** Do not include the ending string as part of the extracted string. **Occurrences_End_String.** The occurrence number of the ending string at which to end the extraction of the required string. Valid options are **1-100** or **last**.
Example	<ExtractIndexToStr Name="ExtractBetween3andXYZ" fromIndex="3" toString="XYZ" toInclude="false" toOccurrences="1"/> When the **ExtractBetween3andXYZ** formatting command is referenced in a rule, the string between the third index of the source string and the first occurrence of **XYZ** in the source string is extracted.

ExtractStrToCount

The ExtractStrToCount tag is used to extract a string of a specified number of characters starting at a given string in the source string.

Syntax	<ExtractStrToCount Name=**"Command_Name"**
	fromString=**"Start_String"**
	fromInclude=**"Include_Start_String"**
	fromOccurrences=**"Occurrences_Start_String"**
	count=**"Length"** />

Explanation	**Command_Name.** The name of the ExtractStrToCount formatting tag that can be used in Rule tags. **Start_String.** The starting string from which the required string is to be extracted. **Include_Start_String.** Whether to include the starting string as part of the extracted string. Valid options are: • **True.** Include the starting string as part of the extracted string. This is the default used if nothing is specified. • **False.** Do not include the starting string as part of the extracted string. **Occurrences_Start_String.** The occurrence number of the starting string at which to start the extraction of the required string. Valid options are **1-100** or **last**. **Length.** The number of characters from the Start_String to be extracted. If the number used is greater than the number of characters from the Start_String to the end of the source string, the entire string from the Start_String to the end of the source string is extracted.
Example	<ExtractStrToCount Name="ExtractBetweenABCfor5" fromString="ABC" fromInclude="false" fromOccurrences="1" count="5"/> When the **ExtractBetweenABCfor5** formatting command is referenced in a rule, a string comprising the five characters after the first occurrence of the string ABC in the source string is extracted.

Insert

The Insert tag is used to insert a string into a source string at a specified position.

Syntax	<Insert Name=**"Command_Name"** String=**"Insert_String"** ToIndex=**"Start_Char_Index"** CountFromBeginning=**"Direction"**/>

Explanation	**Command_Name.** The name of the Insert formatting tag that can be used in Rule tags. **Insert_String.** The string to be inserted in the source string. **Start_Char_Index.** The character number at which to insert the Insert_String in the source string. The first position in the source string is the zero index. **Direction.** Whether to start counting the Start_Char index position from the start of the source string (that is, from left to right) or from the end of the source string (that is, from right to left). The valid options are: • **True.** Start counting the Start_Char index position from the start of the source string (that is, from left to right). This is the default used if no direction is specified. • **False.** Start counting the Start_Char index position from the end of the source string (that is, from right to left).
Example	<Insert Name="InsertABCAfterOrder" String="ABC" ToIndex="5"/> When the **InsertABCAfterOrder** formatting command is referenced in a rule, the string **ABC** is inserted in the source string, starting at the fifth index (that is, the letter **A** becomes the fifth character in the source string).

ChangeCase

The ChangeCase tag is used to change the case of a string.

Syntax	<ChangeCase Name=**"Command_Name"** Type="Case_Type" BeginIndex=**"Start_Char_Index"** Count=**"Length"**/>
Explanation	**Command_Name.** The name of the ChangeCase formatting tag that can be used in Rule tags. **Case_Type.** The type of conversion to be carried out. The valid options are: • **UpperCase.** Lower case to upper case. This is the default if no type is specified. • **LowerCase.** Upper case to lower case. • **OpposisteCase.** Switches the case of characters. **Start_Char_Index.** The position in the source string of the starting character to be converted The first position in the source string is the zero index. **Length.** The number of characters from the Start_Char to be converted.
Example	<ChangeCase Name="UpperCaseFirstChar" Type="UpperCase" BeginIndex="0" Count="1"/> When the **UpperCaseFirstChar** formatting command is referenced in a rule, the first character of the source string is converted to upper case.

Note	If **Length** is not specified, the ChangeCase conversion is carried out from the **Start_Char** to the end of the source string.

Remove

The Remove tag is used to remove all occurrences of a specified string from a source string.

Syntax	<Remove Name=**"Command_Name"** String=**"Remove_String"**/>
Explanation	**Command_Name.** The name of the Remove formatting tag that can be used in Rule tags. **Remove_String.** The string to be removed from the source string.
Example	<Remove Name="Removeabc" String="abc"/> When the **Removeabc** formatting command is referenced in a rule, the string **abc** is removed from the source string.

RemoveNonAlpha

The RemoveNonAlpha tag is used to remove all non-alpha characters from a source string.

Syntax	<RemoveNonAlpha Name=**"Command_Name"**>
Explanation	**Command_Name.** The name of the RemoveNonAlpha formatting tag that can be used in Rule tags.
Example	<Remove Name="RemoveAllNonAlpha"/> When the **RemoveAllNonAlpha** formatting command is referenced in a rule, all non-alpha characters are removed from the source string.

Replace

The Replace tag is used to replace all occurrences of a sub string within a source string.

Syntax	<Replace Name=**"Command_Name"** Old="Old_String" New=**"New_String"**/>
Explanation	**Command_Name.** The name of the Replace formatting tag that can be used in Rule tags. **Old_String.** The sub string within the source string to be replaced. **New_String.** The string that replaces Old_String.
Example	<Replace Name="ReplaceabcWithXYZ" Old="abc" New="XYZ"/> When the **ReplaceabcWithXYZ** formatting command is referenced in a rule, all occurrences of **abc** in the source string are replaced with **XYZ**.

Alias

The Alias tag is used to replace all occurrences of an alphanumeric sub string within a string with an assigned alias.

Syntax	<Alias Name=**"Command_Name"**> <Pair Name=**"Source_String"** Alias=**"Assigned_Alias"**/> </Alias>
Explanation	**Command_Name.** The name of the Alias formatting tag that can be used in Rule tags. **Source_String.** The alphanumeric string to which you are assigning an alias. **Assigned_Alias.** The alias you are assigning to replace the Source_String.
Example	<Alias Name="RelateLettersToCategory"> <Pair Name="fi" Alias="Fish"/> </Alias> When the **RelateLettersToCategory** formatting command is referenced in a rule, all occurrences of the string **fi** are replaced with the alias **Fish**.
Note	You can include multiple **Pair** tags within the same Alias tag. Each Alias replacement is carried out on the output string from the previous Alias replacement – that is, there is only one output string at the end.

Rule Tags

The second main section in the XML file is the rules section, which contains the logic for assigning a meaningful name to a page. The rules section is responsible for matching a page to a single rule and then using the formatting tags included in the rule to assign a meaningful name to the page. Matching is carried out on the different parts of the URL—URL protocol, URL path, URL host, and parameters (both the GET and POST parameters of a page).

Rules are prioritized, so that if a page's URL matches more than one rule, the rule that has the highest priority is the single rule that is applied to the page.

The rules section uses a default string delimiter of a space (" "), but you can specify a different delimiter by including it in the **Rules** tag that begins the rules section. For example, to set a default delimiter of a right, square bracket: `<Rules DefaultDelimiter="]">`

Individual rules can use a different delimiter than the general default, if specified within the specific rule.

Rules format

Rules are written in the following format:

```
<Rule Priority="Priority" Name="Rule_Name">
       <Path Name="URL_Path">
       <Host Name="URL_Host">
       <Protocol Type="URL_Protocol">
       <Parameters>
               <Param Key="Param_Name" Value="Param_Value">
            <Formatter Index="Index_Number">Format_Name1</Formatter>
            <Formatter Index="Index_Number">Format_Name2        For
mat_Name3</Formatter>
            <Formatter Index="Index_Number"></Formatter>
          </Param>
       </Parameters>
</Rule>
```

where:

- **Priority.** The priority in which the rule should be applied. If more than one rule matches the source string, the rule with the highest priority is the one that is applied. 0 is the highest priority, 1 is the second, and so forth.

  If more than one rule has the same priority, the last one that appears in the XML file is the rule that is applied.

  Tip: When assigning priorities to rules, you can use increments greater than 1. For example, you can assign priorities of 10, 20, 30, and so forth. This allows flexibility for inserting new rules at a later time.

- **Rule_Name.** The name of the rule.
- **URL_Path.** The URL path that is required for the rule to be applied.
- **URL_Host.** The URL host that is required for the rule to be applied. This option does not support the use of a wildcard.
- **URL_Protocol.** The URL protocol that is required for the rule to be applied. This option does not support the use of a wildcard.
- **Param_Name.** The key (name) of a parameter in the URL that is required for the rule to be applied.
- **Param_Value.** The value in the Param_Name parameter that is required for the rule to be applied. Use "" to denote an empty parameter value.
- **Index_Number.** The position that the formatted string occupies in the meaningful name to be created.
- **Format_Name.** The name of the format to be used on the selected string to format it into a string that is used as part of the created meaningful name for a page. The format name must be one of the formats defined in the formatting section of the XML file (for details, see "Formatting Tags" on page 130). If no format name is specified, no formatting is applied to the input string, resulting in an identical output string that is used as part of the created meaningful name for a page.

Note: URL_Path, URL_Host, URL_Protocol, Param_Name, and Param_Value are always in lower case.

The following points apply to rules:

- Not all parts of a rule need to exist, but at least one rule should be defined and it should contain a **Formatter** tag.
- If a **Formatter** tag is placed directly under a **Param** tag, the formatting is carried out on the parameter value. If a **Formatter** tag is placed directly under a **Path** tag, the formatting is carried out on the URL path.
- If an asterisk (*****) or question mark (**?**) character is included in a URL path, parameter name, or parameter value, you can specify whether to treat the character as a literal (that is, purely as an asterisk or question mark), or to treat it as a wildcard character. By default, the character is treated as a literal. To treat the character as a wildcard character, you add the setting **CompareMethod="WildCard"** at the end of the rule tag in which the character appears. For example:

  ```
  <Param Key="myparam" Value="*" CompareMethod="WildCard">
  ```

  To use an asterisk or question mark character as a literal within a wildcard value, precede the character with a backslash (\). For example, the wildcard value **my\*str*** matches the value **my*str123**, but does not match the value **my123str123**.

  > **Note:**
  >
  > - The asterisk wildcard represents any combination of characters, whereas the question mark wildcard represents a single character only.
  > - Using the wildcard comparison on page parameters creates significant overhead on the RUM Engine and should be used only when absolutely necessary.

- You can apply multiple format names to a Path or Param tag. If the format names are placed in individual Formatter tags one under the other, each format name is applied to the original path or parameter value and each format name produces its own output for inclusion in the meaningful name. If the format names are included in the same Formatter tag, each format name is applied to the resulting value from the previous format name and only one result is created for inclusion in the meaningful name.

Example of multiple formatting commands in separate Formatter tags:

```
<Path Name="/mypath/home">
       <Formatter Index="1">Format_Name1</Formatter>
       <Formatter Index="2">Format_Name2</Formatter>
       <Formatter Index="3">Format_Name3</Formatter>
</Path>
```

Each of the format names is applied to the path **/mypath/home**.

Example of multiple formatting commands in the same Formatter tag:

```
<Path Name="/mypath/home">
        <Formatter Index="1">Format_Name1 Format_Name2</Formatter>
</Path>
```

Format_Name1 is applied to the path **/mypath/home**; Format_Name2 is applied to the output from Format_Name1.

Sample XML File

The following examples show an XML file with formatting and rule tags defined, and various examples of URLs and the meaningful names created for them based on the formatting and rule tags in the sample XML file:

- "XML File" below
- "Examples of Meaningful Names for URL" on page 145

XML File

```
  <?xml version="1.0" ?>
- <Meaningful_Pages xmlns:xsi="http://www.w3.org/2001/XMLSchema-instan
ce" xsi:noNamespaceSchemaLocation="./meaningfulpages.xsd">
- <Formating>
  <Rename Name="RenameToWelcome" NewName="Welcome" />
  <Rename Name="RenameToSignIn" NewName="Sign In" />
  <Rename Name="RenameToStoreEntrance" NewName="Store Entrance" />
  <Rename Name="RenameToEditAccount" NewName="Edit Account" />
  <Rename Name="RenameToProduct" NewName="Product" />
  <Rename Name="RenameToCheckOut" NewName="Check Out" />
  <Rename Name="RenameToOrderSubmitted" NewName="Order Submitted" />
  <Rename Name="RenameToSignOut" NewName="Signed Out" />
  <SubString Name="ExtractTwoFirstLetters" BeginIndex="0" Count="2" />
  <SubString Name="ExtractItem" BeginIndex="20" Count="4" />
  <SubString Name="ExtractUpdate" BeginIndex="16" Count="6" />
  <SubString Name="ExtractCart" BeginIndex="22" Count="4" />
  <SubString Name="ExtractQuantities" BeginIndex="26" Count="10" />
  <Insert Name="AppendCategory" String="Category" ToIndex="0" />
  <Insert Name="AppendAddItemPrefix" String="Add Item" ToIndex="0" />
  <Insert Name="AppendToCartSuffix" String="to Cart" ToIndex="0" Count
FromBeginning="false" />
  <Insert Name="AppendRemoveItemPrefix" String="Remove Item" ToIndex="
0" />
  <Insert Name="AppendFromCartSuffix" String="from Cart" ToIndex="0" C
ountFromBeginning="false" />
  <Insert Name="InsertSpaceAfterOrder" String="" ToIndex="5" />
  <Insert Name="InsertSpaceAfterConfirm" String="" ToIndex="7" />
  <Insert Name="InsertNotAfterOrder" String="Not" ToIndex="6" />
  <ChangeCase Name="UpperCaseFirstChar" Type="UpperCase" BeginIndex="
0" Count="1" />
  <ChangeCase Name="UpperCaseAll" Type="UpperCase" BeginIndex="0" />
  <ChangeCase Name="UpperCaseSixthLetter" Type="UpperCase" BeginIndex=
"6" Count="1" />
  <ChangeCase Name="UpperCaseEigthLetter" Type="UpperCase" BeginIndex=
"8" Count="1" />
  <Remove Name="RemoveNew" String="/jpetstore/shop/new" />
  <Remove Name="RemoveSHTML" String=".shtml" />
  <Replace Name="ReplaceNewWithConfirm" Old="/jpetstore/shop/new" New=
"Confirm" />
- <Alias Name="RelateLettersToCategory">
  <Pair Name="FI" Alias="Fish" />
  <Pair Name="K9" Alias="Dogs" />
  <Pair Name="RP" Alias="Reptiles" />
  <Pair Name="FL" Alias="Cats" />
  <Pair Name="AV" Alias="Birds" />
  </Alias>
- <Alias Name="RelateProductIdToProductName">
  <Pair Name="FI-FW-01" Alias="'Koi'" />
  <Pair Name="FI-FW-02" Alias="'Goldfish'" />
  <Pair Name="FI-SW-01" Alias="'Angelfish'" />
  <Pair Name="FI-SW-02" Alias="'Tiger Shark'" />
  <Pair Name="K9-BD-01" Alias="'Bulldog'" />
  <Pair Name="K9-CW-01" Alias="'Chihuahua'" />
  <Pair Name="K9-DL-01" Alias="'Dalmation'" />
  <Pair Name="K9-PO-02" Alias="'Poodle'" />
  <Pair Name="K9-RT-01" Alias="'Golden Retriever'" />
  <Pair Name="K9-RT-02" Alias="'Labrador Retriever'" />
  <Pair Name="RP-LI-02" Alias="'Iguana'" />
  <Pair Name="RP-SN-01" Alias="'Rattlesnake'" />
  <Pair Name="FL-DLH-02" Alias="'Persian'" />
  <Pair Name="FL-DSH-01" Alias="'Manx'" />
  <Pair Name="AV-CB-01" Alias="'Amazon Parrot'" />
  <Pair Name="AV-SB-02" Alias="'Finch'" />
  </Alias>
- <Alias Name="RelateItemNameToItemDesc">
  <Pair Name="EST-28" Alias="'Adult Female Golden Retriever'" />
  <Pair Name="EST-27" Alias="'Adult Female Chihuahua'" />
  <Pair Name="EST-26" Alias="'Adult Male Chihuahua'" />
  <Pair Name="EST-25" Alias="'Adult Female Labrador Retriever'" />
  <Pair Name="EST-24" Alias="'Adult Male Labrador Retriever'" />
  <Pair Name="EST-23" Alias="'Adult Female Labrador Retriever'" />
  <Pair Name="EST-22" Alias="'Adult Male Labrador Retriever'" />
  <Pair Name="EST-21" Alias="'Adult Female Goldfish'" />
  <Pair Name="EST-20" Alias="'Adult Male Goldfish'" />
  <Pair Name="EST-19" Alias="'Adult Male Finch'" />
  <Pair Name="EST-18" Alias="'Adult Male Amazon Parrot'" />
  <Pair Name="EST-17" Alias="'Adult Male Persian'" />
  <Pair Name="EST-16" Alias="'Adult Female Persian'" />
  <Pair Name="EST-15" Alias="'With tail Manx'" />
  <Pair Name="EST-14" Alias="'Tailless Manx'" />
  <Pair Name="EST-13" Alias="'Green Adult Iguana'" />
  <Pair Name="EST-12" Alias="'Rattleless Rattlesnake'" />
  <Pair Name="EST-11" Alias="'Venomless Rattlesnake'" />
  <Pair Name="EST-10" Alias="'Spotted Adult Female Dalmation'" />
  <Pair Name="EST-9" Alias="'Spotless Male Puppy Dalmation'" />
  <Pair Name="EST-8" Alias="'Male Puppy Poodle'" />
  <Pair Name="EST-7" Alias="'Female Puppy Bulldog'" />
  <Pair Name="EST-6" Alias="'Male Adult Bulldog'" />
  <Pair Name="EST-5" Alias="'Spotless Koi'" />
  <Pair Name="EST-4" Alias="'Spotted Koi'" />
  <Pair Name="EST-3" Alias="'Toothless Tiger Shark'" />
  <Pair Name="EST-2" Alias="'Small Angelfish'" />
  <Pair Name="EST-1" Alias="'Large Angelfish'" />
  </Alias>
  </Formating>
- <Rules DefaultDelimiter="">
- <Rule Priority="0" Name="Welcome">
- <Path Name="/jpetstore/">
  <Formatter Index="1">RenameToWelcome</Formatter>
  </Path>
  </Rule>
- <Rule Priority="1" Name="Welcome">
- <Path Name="/jpetstore/index.html">
  <Formatter Index="1">RenameToWelcome</Formatter>
  </Path>
  </Rule>
- <Rule Priority="2" Name="Sign In">
- <Path Name="/jpetstore/shop/signonForm.shtml">
  <Formatter Index="1">RenameToSignIn</Formatter>
  </Path>
  </Rule>
- <Rule Priority="3" Name="Store Entrance">
- <Path Name="/jpetstore/shop/signon.shtml">
  <Formatter Index="1">RenameToStoreEntrance</Formatter>
  </Path>
  </Rule>
- <Rule Priority="4" Name="Category [any]">
  <Path Name="/jpetstore/shop/viewCategory.shtml" />
- <Parameters>
- <Param Key="categoryId" Value="*" CompareMethod="WildCard">
  <Formatter Index="1">UpperCaseAll AppendCategory</Formatter>
  </Param>
  </Parameters>
  </Rule>
- <Rule Priority="5" Name="Edit Account">
- <Path Name="/jpetstore/shop/editAccountForm.shtml">
  <Formatter Index="1">RenameToEditAccount</Formatter>
  </Path>
  </Rule>
- <Rule Priority="6" Name="Any Product [product]">
  <Path Name="/jpetstore/shop/v*Product.shtml" CompareMethod="WildCar
d" />
- <Parameters>
- <Param Key="productId" Value="*" CompareMethod="WildCard">
  <Formatter Index="1">ExtractTwoFirstLetters RelateLettersToCategory<
/Formatter>
```

```
  <Formatter Index="2">RenameToProduct</Formatter>
  <Formatter Index="3">RelateProductIdToProductName</Formatter>
  </Param>
  </Parameters>
  </Rule>
- <Rule Priority="7" Name="Item [any]">
- <Path Name="/jpetstore/shop/viewItem.shtml">
  <Formatter Index="1">ExtractItem UpperCaseFirstChar</Formatter>
  </Path>
- <Parameters>
- <Param Key="itemId" Value="*" CompareMethod="WildCard">
  <Formatter Index="2">RelateItemNameToItemDesc</Formatter>
  </Param>
  </Parameters>
  </Rule>
- <Rule Priority="8" Name="Add Item [any] To Cart">
  <Path Name="/jpetstore/shop/addItemToCart.shtml" />
- <Parameters>
- <Param Key="workingItemId" Value="*" CompareMethod="WildCard">
  <Formatter Index="1">RelateItemNameToItemDesc AppendAddItemPrefix Ap
pendToCartSuffix</Formatter>
  </Param>
  </Parameters>
  </Rule>
- <Rule Priority="9" Name="Update Cart">
- <Path Name="/jpetstore/shop/updateCartQuantities.shtml">
  <Formatter Index="1">ExtractUpdate UpperCaseFirstChar</Formatter>
  <Formatter Index="2">ExtractCart UpperCaseFirstChar</Formatter>
  <Formatter Index="3">ExtractQuantities UpperCaseFirstChar</Formatte
r>
  </Path>
  </Rule>
- <Rule Priority="10" Name="Remove Item [any] From Cart">
  <Path Name="/jpetstore/shop/removeItemFromCart.shtml" />
- <Parameters>
- <Param Key="workingItemId" Value="*" CompareMethod="WildCard">
  <Formatter Index="1">RelateItemNameToItemDesc AppendRemoveItemPrefix
AppendFromCartSuffix</Formatter>
  </Param>
  </Parameters>
  </Rule>
- <Rule Priority="11" Name="Check Out">
- <Path Name="/jpetstore/shop/checkout.shtml">
  <Formatter Index="1">RenameToCheckOut</Formatter>
  </Path>
  </Rule>
- <Rule Priority="12" Name="Order Form">
- <Path Name="/jpetstore/shop/newOrderForm.shtml">
  <Formatter Index="1">RemoveNew InsertSpaceAfterOrder RemoveSHTML Upp
erCaseFirstChar UpperCaseSixthLetter</Formatter>
```

```
  </Path>
  </Rule>
- <Rule Priority="13" Name="Order Submitted">
- <Path Name="/jpetstore/shop/newOrder.shtml">
  <Formatter Index="1">RenameToOrderSubmitted</Formatter>
  </Path>
- <Parameters>
  <Param Key="confirmed" Value="true" />
  </Parameters>
  </Rule>
- <Rule Priority="14" Name="Order Not Submitted">
- <Path Name="/jpetstore/shop/newOrder.shtml">
  <Formatter Index="1">RenameToOrderSubmitted InsertNotAfterOrder</For
matter>
  </Path>
- <Parameters>
  <Param Key="confirmed" Value="false" />
  </Parameters>
  </Rule>
- <Rule Priority="15" Name="Confirm Order">
- <Path Name="/jpetstore/shop/newOrder.shtml">
  <Formatter Index="1">ReplaceNewWithConfirm InsertSpaceAfterConfirm R
emoveSHTML UpperCaseEigthLetter</Formatter>
  </Path>
  </Rule>
- <Rule Priority="16" Name="Sign Out">
- <Path Name="/jpetstore/shop/signoff.shtml">
  <Formatter Index="1">RenameToSignOut</Formatter>
  </Path>
  </Rule>
  </Rules>
  </Meaningful_Pages>
```

Examples of Meaningful Names for URL

URL	Meaningful Name
http://pluto:8080/jpetstore/	Welcome
http://pluto:8080/jpetstore/index.html	Welcome
http://pluto:8080/jpetstore/shop/signonForm.shtml	Sign In
http://pluto:8080/jpetstore/shop/signon.shtml	Store Entrance
http://pluto:8080/jpetstore/shop/viewCategory.shtml?categoryId=CATS	Category CATS
http://pluto:8080/jpetstore/shop/editAccountForm.shtml	Edit Account

URL	Meaningful Name
http://pluto:8080/jpetstore/shop/viewProduct.shtml?productId=FI-FW-01	Fish Product 'Koi' (FI=Fish, K9=Dogs, RP=Reptiles, FL=Cats, AV=Birds)
http://pluto:8080/jpetstore/shop/viewItem.shtml?itemId=EST-4	Item 'Spotted Koi'
http://pluto:8080/jpetstore/shop/addItemToCart.shtml?workingItemId=EST-6	Add Item 'Male Adult Bulldog' to Cart
http://pluto:8080/jpetstore/shop/updateCartQuantities.shtml	Update Cart Quantities
http://pluto:8080/jpetstore/shop/removeIteFromCart.shtml?workingItemId=EST-6	Remove Item 'Male Adult Bulldog' from Cart
http://pluto:8080/jpetstore/shop/checkout.shtml	Check Out
http://pluto:8080/jpetstore/shop/newOrderForm.shtml	Order Form
http://pluto:8080/jpetstore/shop/newOrder.shtml	Confirm Order
http://pluto:8080/jpetstore/shop/newOrder.shtml?confirmed=true	Order Submitted
http://pluto:8080/jpetstore/shop/newOrder.shtml?confirmed=false	Order Not Submitted
http://pluto:8080/jpetstore/shop/signoff.shtml	Signed Out

Validating Meaningful Name XML Files

You can validate a meaningful name XML file against a predefined XML schema to ensure that the structure and format of the file are valid. The validation is made using the xerces-j 2.8.0 XML parser.

The schema file against which the XML file is validated is:

```
\<RUM root directory>\conf\resolver\meaningfulpages.xsd
```

To validate a meaningful XML file:

1. Insert the following line at the beginning of the XML file:

   ```
   <Meaningful_Pages xmlns:xsi="http://www.w3.org/2001/XMLSchema-insta
   nce" xsi:noNamespaceSchemaLocation="./meaningfulpages.xsd"
   ```

   > **Note:** If this line is omitted from the XML file and the validation is run, a message that the validation was successful is displayed, but no validation is actually done.

2. Access the JMX console by choosing **JMX Console** from the Configuration drop-down menu in the RUM web console, or by using the following URL in your web browser:

   ```
   http://<RUM Engine machine name>:8180/jmx-console
   ```

   When prompted, enter the JMX Console authentication credentials (if you do not have these credentials, contact your system administrator).

3. In the JMX Agent View, scroll down to the **RUM.modules** section and click **service=ResolverMeaningfulPagesConfig**.

4. In the **validateConfiguration** option, enter the full name of the XML file you want to validate and click **Invoke**. The XML file is validated against the predefined schema file.

5. Any errors encountered are displayed, or a message that the validation was successful is displayed.

   > **Note:** The Formatting tags must be included in the XML file in a specific order (for details, see "Formatting Tags" on page 130). If the Formatting tags are not in the correct order, a validation error message is displayed, but no indication of the order mismatch is given.

Adding and Deleting Meaningful Name XML Files

If you add or delete a meaningful name XML file in an application in End User Management Administration and would like to apply the change immediately, you can force RUM to reread the End User Management Administration configuration. In the RUM Engine web console, synchronize configuration data by selecting **Tools > Monitoring Configuration Information > Sync All Configuration**. For details, see "Monitoring Configuration Information" on page 105.

(For information on configuring applications for monitoring, see "RUM Application Configuration Wizard" in the BSM Application Administration Guide.)

Changing Meaningful Name XML Files

If you change the content of an existing meaningful page XML file that is used by an application, you must force RUM to reload the configuration for the specific application. For information on configuring applications for monitoring, see "RUM Application Configuration Wizard" in the BSM Application Administration Guide.

To force RUM to reload the configuration for an application:

1. Access the JMX console by choosing **JMX Console** from the Configuration drop-down menu in the RUM web console, or by using the following URL in your web browser:

   ```
   http://<RUM Engine machine name>:8180/jmx-console
   ```

   When prompted, enter the JMX Console authentication credentials (if you do not have these credentials, contact your system administrator).

2. In the JMX Agent View, scroll down to the **RUM.modules** section and click **service=ResolverMeaningfulPagesConfig**.

3. In the **reloadConfiguration** option, enter the application name (as defined in End User Management Administration) by which the XML file is being used and click **Invoke**. The application's configuration is reloaded in RUM.

   > **Note:** To reload the configuration for all applications, click **Invoke** for the **reloadCurrentConfigurations** option.

Viewing Meaningful Page Statistics

You can view a table showing statistical information for each application that uses a meaningful page XML file.

To view meaningful page statistics:

1. Access the JMX console by choosing **JMX Console** from the Configuration drop-down menu in the RUM web console, or by using the following URL in your web browser:

   ```
   http://<RUM Engine machine name>:8180/jmx-console
   ```

   When prompted, enter the JMX Console authentication credentials (if you do not have these credentials, contact your system administrator).

2. In the JMX Agent View, scroll down to the **RUM.modules** section and click **service=ResolverMeaningfulPagesConfig**.

3. In the **viewStatistics** option, click **Invoke**. The Meaningful Pages Statistics table opens, showing the following data:

UI Element	Description
Application name	The name of the application as defined in End User Management Administration. (For details on configuring applications in End User Management Administration, see "RUM Application Configuration Wizard" in the BSM Application Administration Guide.)
Configuration file name	The name of the meaningful page XML file used by the application.
Published pages	The total number of pages monitored in the application published to the meaningful pages module.

UI Element	Description
Successful pages	The total number of pages that were successfully processed by the meaningful pages module.
Unmatched pages	The total number of pages successfully processed by the meaningful pages module, but for which no meaningful name was assigned as no match was found.
Failed pages	The total number of pages that were not successfully processed by the meaningful pages module.

Unifying Frames

By default, the RUM Probe reports each frame as a separate page for statistical purposes. However, when replaying a session in the Session Analyzer report, the pages of some frames are listed as sub components of other pages in the hierarchal tree and are displayed accordingly.

RUM uses a default configuration that contains the rules for determining if a page is considered as a parent or a child page. You can change the default settings and can also create new settings for specific pages.

You configure frames to be unified by RUM in the frame_unification.xml file on the RUM Engine machine.

To change the default settings for frame unification

1. Edit the `<RUM root directory>\conf\configurationmanager\frame_unification.xml` file on the RUM Engine machine.

2. Locate the **DefaultPage** entry, which is as follows:

```
<DefaultPage>
  <TimeoutMS>500</TimeoutMS>
  <InnerFrames maxInnerFrames="-1" />
  <CanBeInnerFrame>true</CanBeInnerFrame>
  <MatchInnerFramesReferrer>true</MatchInnerFramesReferrer>
</DefaultPage>
```

3. Change the settings for your system, where:

   - **TimeoutMS.** The amount of time it takes a frame to load after the previous frame has finished loading. Within this time, if the frame matches the other parameters, such as the referring URL, it is considered as a child of the previous frame, otherwise it is considered as a parent frame.

   - **InnerFrames maxInnerFrame.** The maximum number of children that a parent frame can contain. Use **-1** for an unlimited number.

   - **CanBeInnerFrame.** Set to **true** to enable frames to be considered as children. Set to **false** to consider all frames as parents, unless specific page settings have been defined which are applicable to a frame.

   - **MatchInnerFramesReferrer.** Set to **true** to allow child frames to be matched to parent frames by URLs (if specific page settings have been configured), or **false** to use only the TimeoutMS setting to create child pages.

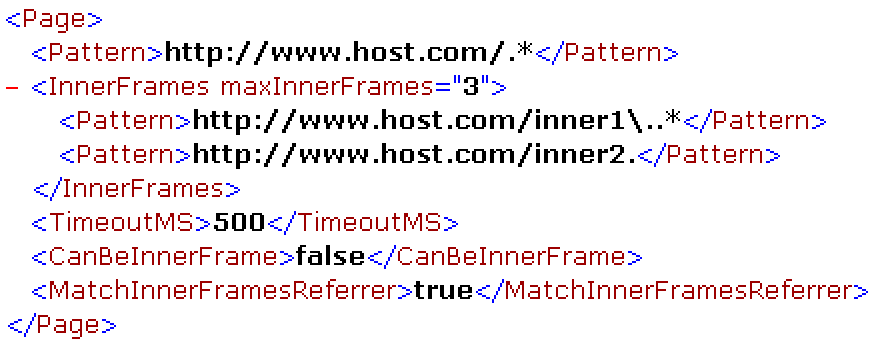
4. Save the file and exit.

> **Note:** There can be only one **DefaultPage** entry.

To create frame unification settings for specific pages

1. Edit the `<RUM root directory>\conf\configurationmanager\frame_unification.xml` file on the RUM Engine machine.

2. After the **DefaultPage** entry, create a new **Page** section in the following format:



```
<Page>
  <Pattern>http://www.host.com/.*</Pattern>
- <InnerFrames maxInnerFrames="3">
    <Pattern>http://www.host.com/inner1\..*</Pattern>
    <Pattern>http://www.host.com/inner2.</Pattern>
  </InnerFrames>
  <TimeoutMS>500</TimeoutMS>
  <CanBeInnerFrame>false</CanBeInnerFrame>
  <MatchInnerFramesReferrer>true</MatchInnerFramesReferrer>
</Page>
```

where:

- **Pattern.** A regular expression for the URL pattern to be matched when RUM determines if a frame is to be considered as a parent or child. The first **Pattern** setting at the top of the section determines if the rule is applicable for the frame being matched and is also used as the parent pattern for any matching children. Subsequent **Pattern** settings, within **InnerFrames**, are used to determine if the frame can be considered as a child.
- **InnerFrames maxInnerFrame.** The maximum number of children that the parent frame can contain. Use **-1** for an unlimited number.
- **TimeoutMS.** The amount of time it takes a frame to load after the previous frame has finished loading. Within this time, the frame is considered as a child of the parent frame that matches the first **Pattern** setting, otherwise it is considered as a parent frame itself.
- **CanBeInnerFrame.** Set to **true** to enable a frame whose URL matches the first **Pattern** setting to be considered as a child, or **false** to consider all frames that match the first **Pattern** setting as parents.
- **MatchInnerFramesReferrer.** Set to **true** to allow child frames to be matched to the parent frame by the URLs configured in the **Pattern** settings, or **false** to use only the TimeoutMS setting to create child pages.

3. Repeat step 2 to create additional page settings as required.

4. Save the file and exit.

> **Note:**
>
> - If a page's URL matches the Pattern of more than one Page definition, the first matching Page definition in the file is applied.
> - Missing parameters in a Page definition section inherit the DefaultPage setting for that parameter.

Configuring User Name Translation

When configuring a web or SOAP application in BSM (in EUM Administration) for monitoring by RUM, you can configure an application to use a user name translation file if you want RUM to translate a user's login name or IP address located in monitored data to a real name for use in EUM reports.

To enable user name translation for an application in BSM, edit the application in End User Management Administration and in the **General** tab **> User Name Detection** area, select the **Correlate end user names and display aliases** check box.

> **Tip:** We recommend that before changing the **UserNameResolver.xml** file in the procedures below, you back up the original file.

To configure the RUM Engine to translate detected login names to real names

1. In the RUM Engine, ensure that the following values (which are the default settings) are configured in the **conf\resolver\UserNameResolver.xml** file:

   ```
       <Resolver name="CSVLoginUserNameResolver">

   <class>com.mercury.rum.engine.resolver.usernames.resolvers.CSVLogin
   UserNameResolver</class>
           <parameters>
               <param name="file">${rum.home}/conf/resolver/UserLoginN
   ames.csv</param>
   ```

2. Edit the **<RUM Engine root directory>\conf\resolver\UserLoginNames.csv** file and enter user login names in the first column and the corresponding real names in the second column.
3. Save the file.
4. If you made changes to the **conf\resolver\UserNameResolver.xml** file, restart the RUM Engine.

To configure the RUM Engine to translate detected IP addresses to real names

1. In the RUM Engine, ensure that the following values are configured in the **conf\resolver\UserNameResolver.xml** file:

```
    <Resolver name="CSVIPUserNameResolver">

<class>com.mercury.rum.engine.resolver.usernames.resolvers.CSVIPUse
rNameResolver</class>
        <parameters>
            <param name="file">${rum.home}/conf/resolver/ip2Names.c
sv</param>
```

2. Edit (or create if it does not exist) the **<RUM Engine root directory>\conf\resolver\ip2Names.csv** file and enter IP addresses in the first column and the corresponding real names in the second column.
3. Save the file.
4. If you made changes to the **conf\resolver\UserNameResolver.xml** file, restart the RUM Engine.

Chapter 13

Configuring the RUM Sniffer Probe

You can configure the RUM Sniffer Probe by changing the default settings and adding additional configuration settings.

This chapter includes the following topics:

Changing the Protocol for Accessing the RUM Probe

The default protocol used for accessing the RUM Probe is HTTPS with a client certificate. In the RUM Engine web console, you can manually configure the protocol used to access the RUM Probe. For details, see "Probe Configuration Dialog Box" on page 85.

Configuring the RUM Probe for I18N

By default, RUM uses the UTF-8 character set when monitoring data. To enable RUM to support non Unicode encodings, you can configure the RUM Probe to use a different character set.

To change the character set used by the RUM Probe when monitoring data:

In the **<RUM root directory>\conf\configurationmanager\Beatbox_Default_Const_Configuration.xml** file on the RUM Engine, under the **[global]** section, add the following lines:

```
enable_i18n <false/true>
contant_charset_search_len <length>
charset <name>
```

where:

- **<false/true>.** Set to **true** to enable RUM to support I18N by using character sets other than UTF-8. The default setting is **false**.
- **<length>.** The number of bytes in the page content in which RUM searches for a character set. By default, RUM does not search the page content for a character set and only searches the page header. The maximum permissible length is 1024 characters.

- **<name>.** The default character set to use, if RUM does not locate a character set in either the page header or content. Valid character sets are those that are by default supported by the ICU library.

The following example shows the additional lines added to the **[global]** section in the **<RUM root directory>\conf\configurationmanager\Beatbox_Default_Const_Configuration.xml** file on the RUM Engine:

```
<static_global_params>
<![CDATA[
[global]
max_field_length 2048
collect_server_stats false
collect_website_stats false
enable_i18n true
contant_charset_search_len 1024
]]>
```

Changing the Header in Which to Locate Client IP Addresses

By default, RUM tries to locate client IP addresses using the **X-Foward-For** header. If client IP addresses are located in a different header (for example, in a custom header) you can configure RUM to use that header when trying to locate client IP addresses.

To change the header used by the RUM Probe when locating client IP addresses:

1. In the **<RUM root directory>\conf\configurationmanager\Beatbox_Default_Const_Configuration.xml** file on the RUM Engine, under the **[global]** section, add the following line:

   forwarded_for_header `<HEADER_NAME>`

   where `<HEADER_NAME>` is the name of the new header to use for locating client IP addresses.

2. In the RUM Engine web console, synchronize configuration data by selecting **Tools > Monitoring Configuration Data > Sync All Configuration**. For details, see "Monitoring Configuration Information" on page 105.

Creating Default Configuration and Properties Files for a Specific Probe

The RUM Engine uses the same, default, static configuration file and properties file for all the probes attached to it. You can create individual, static configuration and properties files for a specific probe, so that it will be configured with specific settings, instead of the general, default ones.

To create a default configuration file for a specific probe

1. On the RUM Engine, in the **<RUM root directory>\conf\configurationmanager** directory, make a copy of the **Beatbox_Default_Const_Configuration.xml** file.

2. Rename the copy of the file, substituting **Default** with the name of the probe as configured in RUM. For example:

   ```
   Beatbox_123.4.5.67_Const_Configuration.xml
   ```

3. Edit the file as required with the configuration settings for the specific probe.

To create a default properties file for a specific probe

1. On the RUM Engine, in the **<RUM root directory>\conf\probes** directory, make a copy of the probe.default.properties file.
2. Rename the copy of the file, substituting **default** with the name of the probe as configured in RUM. For example:

   ```
   probe.123.4.5.67.properties
   ```

3. Edit the file as required with the properties for the specific probe.

Configuring the RUM Probe to Support Multiprotocol Label Switching (MPLS)

By default, the RUM Probe does not support MPLS.

To enable MPLS support:

1. Edit the **<RUM root directory>\conf\configurationmanager\Beatbox_Default_Const_Configuration.xml** file on the RUM Engine.
2. Under the **[collector]** section, add the following line:

   ```
   mpls_levels 0
   ```

   Setting the level to `0`, instead of to a specific number, configures the probe to calculate the number of MPLS levels needed for the monitored traffic automatically.

3. Save the file.

Chapter 14

Administering the MySQL Database

For RUM to work, it must be connected to a MySQL database that has been created and started.

This chapter includes the following topics:

- "Overview of the MySQL Database" below
- "Creating and Connecting to the MySQL Database" below
- "Starting and Stopping the MySQL Database" on the next page
- "Maintaining the MySQL Database" on the next page

Overview of the MySQL Database

The MySQL database is the RUM's data repository. The data that is stored in the MySQL database is data that is either not forwarded at all to BSM, or that is only sent on request.

Data that is not forwarded at all to BSM is RUM configuration data. Data that is sent to BSM on request is open session data and session click-stream data (data and snapshots of pages included in sessions). Click-stream data accounts for the majority of the data stored in the MySQL database.

The MySQL database can be installed on the same machine as the RUM Engine or on its own machine. For system requirements for the MySQL database, see "Reviewing System Requirements" in the Real User Monitor Installation and Upgrade Guide.

Creating and Connecting to the MySQL Database

The RUM Engine MySQL database is created during the RUM Engine installation process, if that option is selected. When the MySQL database is created during the installation process, the RUM Engine is connected to it, and the MySQL database is started automatically. The MySQL database to which the RUM Engine is connected must be started for the RUM Engine to work.

You can create a new MySQL database schema and connect the RUM Engine to it, or connect the RUM Engine to a different, existing MySQL database completely, if required.

> **Note:** The RUM Engine can only be connected to one MySQL database.

To create schemas and connect to MySQL databases on an RUM Windows installation:

On the machine on which the RUM Engine is installed, select **Start > Programs > HP Real User Monitor > Administration > RUM Configuration Tool**. The RUM Configuration tool starts. For details on working with the RUM Configuration tool, see "RUM Configuration Wizard" in the Real User Monitor Installation and Upgrade Guide.

Starting and Stopping the MySQL Database

When the MySQL database is created during RUM installation, it is started automatically as part of the process. You can start and stop the MySQL database manually if required.

To start the MySQL database:

On the machine on which the RUM Engine is installed, select **Start > Programs > HP Real User Monitor > Administration > Database > Start Real User Monitor Database**.

To stop the MySQL database:

On the machine on which the RUM Engine is installed, select **Start > Programs > HP Real User Monitor > Administration > Database > Stop Real User Monitor Database**.

Maintaining the MySQL Database

For details on maintaining the MySQL database, including strategies and procedures for backing up and restoring the database, refer to the Database Administration chapter in the MySQL Reference Manual on the MySQL web site (http://dev.mysql.com/doc/#manual).

Purging MySQL Binary Log Files

The MySQL binary log contains all statements that updated data in the MySQL database.

The purpose of the binary log is to help update the database to the most current status during a restore operation, as it contains all updates made since the last backup. For details on MySQL binary log files and restoring databases, refer to the Database Administration chapter in the MySQL Reference Manual on the MySQL web site (http://dev.mysql.com/doc/#manual).

RUM purges the MySQL binary log files on a daily basis, by deleting all the log files older than five days. You can change the default number of days for which to keep the MySQL binary log files.

To change the default number of days for which to keep MySQL binary log files:

1. Access the JMX console by choosing **JMX Console** from the Configuration drop-down menu in the RUM web console, or by using the following URL in your web browser:

   ```
   http://<RUM Engine machine name>:8180/jmx-console
   ```

   When prompted, enter the JMX Console authentication credentials (if you do not have these credentials, contact your system administrator).

2. In the JMX Agent View, scroll down to the **RUM.modules** section and click **service=MaintenanceDBConfigurationJMX**.

3. In the **MySQLBinaryLogsDaysCount** parameter, change the setting to the required number of days.

4. Click the **Apply Changes** button.

Purging MySQL Real User Monitor Data

The data stored in the MySQL database is raw data used by Real User Monitor reports to present session clickstreams and snapshots, and to enable queries for various report filters. The data is sent to HP Business Service Management on request.

Raw data is kept in the MySQL database for a default period of 14 days, after which it is automatically purged from the database. The amount of time raw data is stored in the MySQL database can be changed to any number of days between 7 and 100.

To change the period of time that raw data is stored in the database:

1. Edit the **<RUM root directory>\conf\partitionmanager\pm_tables_config.xml** file on the RUM Engine machine.
2. Change the setting **<archiveDuration units="DAYS" qty="14"/>** from 14 to the required number of days.
3. Save the file.

Note: By increasing the number of days for which session click-stream data is stored, you may significantly increase the size of the database, which may necessitate additional disk capacity.

Chapter 15

Hardening RUM

You can harden the RUM platform so that it can be part of a secure architecture, and can therefore meet the challenge of dealing with security threats to which it could potentially be exposed.

This chapter includes the following topics:

- "Hardening the RUM Sniffer Probe" below
- "Securing Connections to the RUM Engine" on page 163

Note: For details on securing connections between RUM and BSM, see the BSM Hardening Guide.

Hardening the RUM Sniffer Probe

You can harden the RUM Sniffer Probe by changing users and creating passwords for them, disabling non-SSH access, limiting the SSH version that can be used, and by securing the http connection to the probe.

This section includes the following topics:

- "Changing the Probe's User and Password" below
- "Limiting Access to the Probe" on the next page
- "Limiting the SSH Version" on the next page
- "Securing the HTTP Connection to the Probe" on the next page

Changing the Probe's User and Password

Note: This section applies to the RUM Probe only when it is installed on a Linux system.

When the RUM Probe is installed, a user called **rum_probe** is automatically created, which has access to the probe channels only. This user does not have a password and you should configure one for it.

By default, the RUM Probe is run under the **root** user. It is recommended to run the probe process under the **rum_probe** user, or another specially created user, rather than the **root** user.

To change the user that runs the probe process

1. Log on to the probe as the **root** user.
2. Change the user running the probe process by executing the command:

```
rp_user.pl <USER>
```

where `<USER>` is the name of the user with which you want to run the probe process.

To configure a password for a user

1. Log on to the probe as the **root** user.
2. Define a password for the user by executing the command:

   ```
   passwd <USER>
   ```

   where `<USER>` is the name of the user for which you are defining the password. For example, to configure a password for the **rum_probe** user, execute the command:

   ```
   passwd rum_probe
   ```

3. Follow the on-screen prompts.

Limiting Access to the Probe

The RUM Engine connects to the RUM Probe via the probe's web console. It is recommended to limit access to the RUM Probe by disabling access to other, unnecessary services according to you organization's security policies.

Limiting the SSH Version

Note: This section applies to the RUM Probe only when it is installed on a Linux system.

By default, Linux accepts both SSH 1 and SSH 2 connections. To increase security, it is recommended to configure Linux to accept SSH 2 connections only.

To configure Linux to accept SSH 2 connections only:

On the RUM Probe machine, edit the **/etc/ssh/sshd_config** file and change the line:

```
#Protocol 2,1
to
Protocol 2
```

Securing the HTTP Connection to the Probe

You can secure the http connection to the probe by using https connections.

In RUM version 7.0 and later, the RUM Engine by default connects to the probe via an https connection, using default sever and client certificates. In some instances (for example, after upgrading an earlier version of RUM) it might be necessary to manually configure RUM to use https.

This section describes how to manually set an https connection to the probe, as well as how to replace the default, generic, server and client certificates that are included in the probe.

Note: On Windows installations of the probe, the **/etc/rum_probe** directory is located in the RUM Probe root directory.

To manually set an https connection to the probe

1. Log on to the probe machine and edit the **/etc/rum_probe/rpsecurity.conf** file.
2. Uncomment, edit or add the following line:

   ```
   use_ssl  true
   ```

3. Restart the probe:
   - For Linux installations use the command **/etc/init.d/rum_probe-capture restart**
   - For Windows installations select **Start > Programs > HP Real User Monitor > Administration > Probe > Start RUMProbe**.
4. On the engine machine, edit the **\<RUM root directory>\conf\probes\probe.<PROBE IP>.properties** file, where `<PROBE IP>` is the IP address of the probe machine for which you are configuring basic authentication. If this file does not exist, create it.
5. Uncomment, edit or add the following line:

   ```
   connection.http.ssl=true
   ```

6. Force an update of the probe configuration by accessing the RUM web console and selecting **Tools > Monitoring Configuration Information > Sync All Configuration**. For details on working with the RUM web console, see "Using the RUM Web Console" on page 48.

To replace the default server certificate

1. Convert the new server certificate and private key to PEM (base64) format, unencrypted (that is, without a password) and copy them to the probe machine.
2. Log on to the probe machine and edit the **/etc/rum_probe/rpsecurity.conf** file.
3. Uncomment, edit or add the following lines:

   ```
   ssl_key <PRIVATE_KEY_FILE>

   ssl_cert <SERVER_CERTIFICATE>
   ```

   Note: The certificate and private key can be included in the same file. In such cases, both lines should refer to that file.

4. Restart the probe:
   - For Linux installations use the command **/etc/init.d/rum_probe-capture restart**
   - For Windows installations select **Start > Programs > HP Real User Monitor > Administration > Probe > Start RUMProbe**.
5. Copy the server certificate (without the private key) to the engine machine.
6. Import the certificate into a new or existing keystore with the command:

   ```
   \<RUM root directory>\JRE\bin\keytool -import -alias rum_probe_cert
   -keystore <KEYSTORE_FILE> -file <CERTIFICATE_FILE>
   ```

   Note: The RUM Engine should be configured to trust the imported certificate.

7. Edit the **\<RUM root directory>\conf\probes\probe.<PROBE IP>.properties** file. If this file does not exist, create it.

8. Uncomment, edit or add the following lines:

   ```
   connection.http.ssl.truststore.file=<KEYSTORE_FILE>
   ```

   ```
   connection.http.ssl.truststore.password=<KEYSTORE_PASSWORD>
   ```

9. Force an update of the probe configuration by accessing the RUM web console and selecting **Tools > Monitoring Configuration Information > Sync All Configuration**. For details on working with the RUM web console, see "Using the RUM Web Console" on page 48.

To replace the default client certificate

1. On the engine machine, generate a new private key and certificate into a new, or existing keystore with the command:

   ```
   \<RUM root directory>\JRE\bin\keytool -genkey -alias rum_probe_clie
   nt_cert -keyalg RSA -keystore <KEYSTORE_FILE>
   ```

2. Enter the details of the certificate and when prompted, approve them.

   > **Note:** If you choose a different password for the private key than the keystore password you must also specify this password when configuring the engine to use the keystore (see no. 3).

3. Edit the **\<RUM root directory>\conf\probes\probe.<PROBE IP>.properties** file. If this file does not exist, create it.

4. Uncomment, edit or add the following lines:

   ```
   connection.http.ssl.keystore.file=<KEYSTORE_FILE >
   ```

   ```
   connection.http.ssl.keystore.password=<KEYSTORE PASSWORD>
   ```

   If you chose a different password for the private key in step 2, edit or add the following line:

   ```
   connection.http.ssl.keystore.PrivateKeypassword=<KEY PASSWORD>
   ```

5. Export the client certificate with the command:

   ```
   \<RUM root directory>\JRE\bin\keytool -export -rfc -alias rum_prob
   e_client_cert -keystore <KEYSTORE_FILE> -file <CERTIFICATE_FILE>
   ```

6. Copy the certificate file to the probe machine

7. Log on to the probe and edit the **/etc/rum_probe/rpsecurity.conf** file

8. Uncomment, edit or add the following line:

   ```
   ssl_ca_file <CLIENT_CERTIFICATE_FILE>
   ```

9. Restart the probe:

   - For Linux installations use the command **/etc/init.d/rum_probe-capture restart**
   - For Windows installations select **Start > Programs > HP Real User Monitor > Administration > Probe > Start RUMProbe**.

10. Force an update of the probe configuration by accessing the RUM web console and selecting **Tools > Monitoring Configuration Information > Sync All Configuration**. For details on working with the RUM web console, see "Using the RUM Web Console" on page 48.

Securing Connections to the RUM Engine

You can access RUM Engine by different http access points, for the following purposes:

- RUM web console
- RUM JMX console
- RUM Gateway/Proxy Server (for BSM and the replay applet)

You can secure access to the RUM Engine by using authentication and https connections.

This section includes the following topics:

- "Using Authentication" below
- "Using HTTPS" below

Using Authentication

All http access points on the RUM Engine are protected via authentication mechanisms. The two main authentication mechanisms used are:

- **User and password protection.** Used for access to the RUM Engine web and JMX consoles.
- **Basic authentication.** Used for all other access points to the RUM Engine.

You can add users for access to the web console and change passwords for users to access both the web and JMX consoles. For details on adding, changing, and deleting users to access the web console, and changing their passwords, see "Using the RUM Web Console" on page 48.

To change the password for a user to access the JMX console:

1. On the engine machine, edit the **\<RUM root directory>\EJBContainer\server\mercury\conf\users.xml** file.
2. In the appropriate line, enter the new password in the **password** parameter.
3. Ensure that the **encryptedPassword** parameter is blank and the **Roles** parameter value is **RUMAdmin**.
4. Save the file and restart the engine.

Using HTTPS

When you configure the RUM Engine to work with https, all connections to the engine are affected. This means that HP Business Service Management must also be configured to communicate with the RUM Engine using https. For details on hardening HP Business Service Management, including creating, configuring, and trusting client and server certificates, see the BSM Hardening Guide.

In BSM, when viewing session details in RUM reports, you can view snapshots of pages and replay a session. By default, the Session Replay applet retrieves data from the RUM Engine via the BSM Gateway Server, but can be configured to retrieve data directly from the RUM Engine (for details, see "Determining How the RUM Snapshot Applet Retrieves Snapshots" in the BSM User Guide). If the Session Replay applet is configured to retrieve data directly from the RUM Engine and the RUM Engine is configured to require a client certificate, you must copy and import the necessary certificate on the client machine running the Session Replay applet.

To copy and import a client certificate on a machine running the Session Replay applet:

1. Export the certificate from the keystore on the RUM Engine with the command:

   ```
   \<RUM root directory>\JRE\bin\keytool -export -rfc -alias rum_client_cert -keystore <KEYSTORE_FILE> -file <CERTIFICATE_FILE>
   ```

2. For each client machine on which the Session Replay applet is run:

   a. Copy the certificate exported in step 1 to the client machine.

   b. Import the certificate to the default BSM truststore with the command:

      ```
      <Latest JRE home>\bin\keytool -import -alias rum_client_cert -keystore > -keystore <Latest JRE home>\JRE\lib\security\cacerts" -file <CERTIFICATE_FILE>
      ```

   c. Restart the browser.

> **Note:** We recommend that you configure the Session Replay applet to retrieve data from the RUM Engine via the BSM Gateway Server, when the RUM Engine is configured to require a client certificate.

Chapter 16

Deploying RUM in a SiteMinder Environment

You use the RUM SiteMinder identity adapter to work with the SiteMinder Web Agent that enables retrieving the USER’s attributes from the SiteMinder Server Policy Server.

This chapter includes the following topics:

Overview

> **Note:** This chapter describes the configuration of Internet Information Server (IIS) 6.0 for Windows 2003 only. (While neither Apache Server nor IIS 7.0 configurations are included, they are supported and are conceptually the same.)

This chapter is intended for system administrators experienced in the configuration and maintenance of the following components:

- IIS
- SiteMinder Policy Server
- SiteMinder Web Agent
- RUM Engine

Refer to the relevant RUM and SiteMinder documentation as necessary.

This section also includes the following topics:

Prerequisites

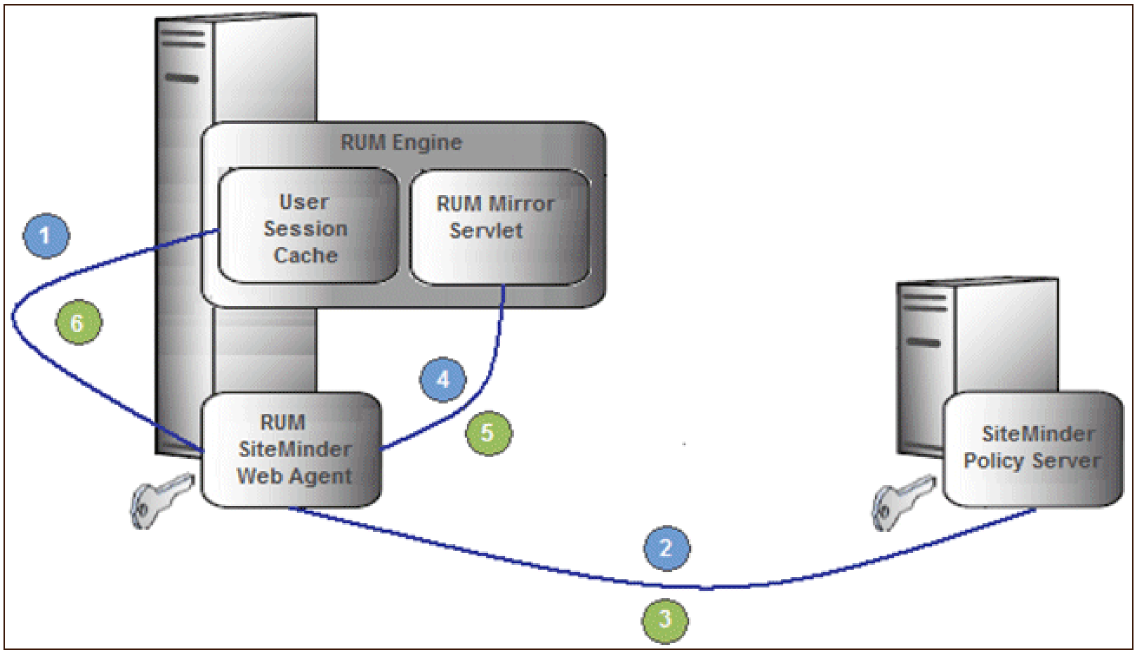
The following are prerequisite for the RUM–SiteMinder integration:

- The RUM Engine and SiteMinder Web Agent must be installed on the same machine.
- RUM version 9.12 or later.

- IIS.

System Flow

The following diagram illustrates the flow between the RUM Engine, the RUM SiteMinder Web Agent, and the SiteMinder Policy Server.



Processing Steps:

1. The User Session Cache component sends a request with an SMSESSION cookie to the RUM Mirror Servlet for retrieving the USER name (through the RUM SiteMinder Web Agent).
2. The RUM SiteMinder Web Agent intercepts the request and requests the USER data from the SiteMinder Policy Server (relies on the SMSESSION cookie).
3. The SiteMinder Policy Server validates the SMSESSION cookie and sends the Server Policy Response object with USER data.
4. The RUM SiteMinder Web Agent transfers the Server Policy Response object with USER data to a RUM Mirror Servlet.
5. The RUM Mirror Servlet extracts the USER data and sends a response with USER Name back to the User Session Cache component through the RUM SiteMinder Web Agent.
6. The RUM SiteMinder Web Agent redirects the response back to the User Session Cache component.

Configuring the SiteMinder Policy Server

This section describes the following steps for configuring the SiteMinder Policy Server:

- "Create an Agent" on the next page
- "Create the Agent Conf Object" on the next page

- "Create the Authentication Scheme" on the next page
- "Configure the Domain" on the next page

Create an Agent

To create an agent, use the SiteMinder Administration console to add the RUM Web Agent to the Policy Server.

1. Right-click **Agents** and select **Create Agent**. The SiteMinder Agent dialog box opens.
2. In the **Name** field, enter the hostname of the machine on which the RUM SiteMinder Web Agent is installed. If you are not using the standard, default port **80**, you must also specify the port number after the name (separated by a colon). By default, the RUM Engine’s mirror servlet uses port number **8181**, so you enter the name as:

   ```
   <agent_host_machine>:8181
   ```

   > **Note:** If you change the port value in this dialog box, you must also change the port value in other places. For details, see "Changing the Configuration of the TCP Port" on page 177.

3. For the Description, enter **RUM SM Web Agent**.
4. For the Agent Type, select **Web Agent**.
5. Click **OK**.

Create the Agent Conf Object

Use the SiteMinder Administration console to create the Agent Conf Object to the Policy Server.

1. In the left pane of the SiteMinder Administration console, click **AgentContObjects**.
2. In the right pane, right-click **IISDefaultSettings** and select **Duplicate Configuration Object** from the menu. The SiteMinder Agent Configuration Object dialog box opens.
3. For the Name, enter the hostname of the machine on which the **RUM SiteMinder Web Agent** is installed.
4. For the Description, enter **RUM SM Web Agent**.
5. Edit the **#DefaultAgentName** configuration value:
   a. Select the **#DefaultAgentName** configuration value.
   b. Click **Edit**. The Edit Parameter dialog box opens.
   c. Select the **Plain** radio button.
   d. For the Parameter Name, enter **DefaultAgentName**.
   e. For the Value, enter the agent name exactly as it appears in the SiteMinder Agent Properties dialog box.

   f. Click **OK**.

6. Click **OK**.

Create the Authentication Scheme

In the SiteMinder Administration console, add the Authentication Scheme to the Policy Server.

1. Right-click **Authentication Schemes** and select **Create Authentication Scheme**. The SiteMinder Authentication Scheme dialog box opens.
2. For the Name, enter **RUM Scheme**.
3. For the Description, enter **RUM SM Web Agent**.
4. For the Authentication Scheme Type, select **HTML Form Template**.
5. In the Scheme tab, for the Web Server Name enter the hostname of the machine on which the Web Agent performs authentication.
6. Click **OK**.

Configure the Domain

To configure the domain, perform the following steps:

- "Create the Realm" below
- "Create the Response" on the next page
- "Create the Rules" on the next page
- "Configure the Policy" on page 170

Create the Realm

In the SiteMinder Administration console, open the domain of the monitored application as provided by your SiteMinder contact.

1. In the left pane of the SiteMinder Administration console, right-click **Domain**.
2. In the right pane, right-click the relevant domain and select **Properties of Domain** from the menu. The SiteMinder Domain dialog box opens.
3. Select the **Realms** tab.
4. Click **Create**. The SiteMinder Realm dialog box opens.
5. For the Name, enter **RUM Mirror Servlet**.
6. For the Resource Filter, enter **/iam/mirror**.
7. Click **Lookup** to search for and select the agent’s hostname.
8. For the Authentication Schema, select the **RUM Authentication Schema** created previously.
9. For the Default Resource Protection, select **Protected**.
10. Click **OK** (in the SiteMinder Realm dialog box).
11. Click **OK** (in the SiteMinder Domain dialog box).

Create the Response

In the SiteMinder Administration console, open the domain of the monitored application as provided by your SiteMinder contact.

1. In the left pane of the SiteMinder Administration console, right-click **Domain**.
2. In the right pane, right-click the relevant domain and select **Create Response** from the menu. The SiteMinder Response dialog box opens.
3. For the Name, enter **RUM Response**.
4. For the Agent, select **Web Agent**.
5. Click **Create**. The SiteMinder Response Attribute Editor opens.
    a. For the Attribute, select **WebAgent-HTTP-Header-Variable**.
    b. For the Attribute Kind, select **User Attribute**.
    c. For the Variable Name, enter **RUM_SM_USER**.

    > **Note:** If you change the Variable Name value, you must also change the value of the **requestHeaderUserNameParamName** tag in the **HPRUM\conf\configurationmanager\configuration\IAM_config.xml** file.

    d. Set the Attribute Name as the name of the LDAP attribute that holds the user name value.

    > **Note:** The Attribute name depends on your specific LDAP implementation. (For example, the **uid** attribute for Sun One LDAP.)

    e. Click **OK** (in the SiteMinder Response Attribute Editor).
6. Click **OK** (in the SiteMinder Response dialog box).

Create the Rules

1. Create the RUM SMA Authentication rule for the RUM Mirror Servlet realm.
    a. In the left pane of the SiteMinder Administration console, right-click the **RUM Mirror Servlet** realm and select **Create Rule under Realm** from the menu. The SiteMinder Rule dialog box opens.
    b. For the Name, enter **RUM SMA Authentication Rule**.
    c. For the Action, select **Authentication events**.
    d. In the Action drop-down list, select **onAuthAccept**.
    e. Click **OK**.
2. Create the RUM SMA Web Action rule for the RUM Mirror Servlet realm.
    a. In the left pane of the SiteMinder Administration console, right-click the **RUM Mirror Servlet** realm and select **Create Rule under Realm** from the menu. The SiteMinder Rule dialog box opens.
    b. For the Name, enter **RUM SMA Web Action Rule**.

c. For the resource, enter an asterisk (*****).

d. For the Action, select **Web Agent actions**.

e. In the Action list, select **Get**, **Post**, and **Put**.

f. Click **OK**.

Configure the Policy

In the SiteMinder Administration console, edit the policy of the domain.

> **Note:** If there is more than one policy, you must add the rule and response to each of them.

1. In the left pane of the SiteMinder Administration console, click **Policies**.
2. In the right pane, right-click the relevant policy and select **Properties of Policy** from the menu. The SiteMinder Policy dialog box opens.
3. Select the **Rules** tab.
4. Click **Add/Remove Rules**. The Rule Items dialog box opens.
5. Move the **RUM SMA Web Rule** and the **RUM MA Authentication Rule** from Available Members to Current Members.
6. Click **OK**.
7. In the Rules tab of the SiteMinder Policy dialog box, select the **RUM SMA Authentication Rule**.
8. Click **Set Response**. The Set Response dialog box opens.
9. Select **RUM Response**.
10. Click **OK** (in the Set Response dialog box).
11. Click **OK** (in the SiteMinder Policy dialog box).

Installing and Configuring the SiteMinder Web Agent

This section describes how to install and configure the SiteMinder Web Agent and includes the following topics:

- "Prerequisites" below
- "Installing the SiteMinder Web Agent" on the next page
- "Configuring the SiteMinder Web Agent" on the next page

Prerequisites

Ensure the following prerequisites before installing the SiteMinder Web Agent:

- The Web Server is installed.
- You have an account with Administrative privileges for your Web Server.

- The Policy Server is configured.
- You have an appropriate version of the Web Agent setup file.
- The setup file is compatible with the host's operating system.

Installing the SiteMinder Web Agent

To install the SiteMinder Web Agent:

1. If necessary, extract all the files from the ZIP file provided by SiteMinder.
2. Start the Web Agent executable.

   For example: `nete-wa-6qmr6-win64.exe`
3. The CA SiteMinder Web Agent Introduction screen appears. Click **Next**.
4. On the License Agreement screen, scroll down and select **I accept the terms of the License Agreement**, and then click **Next**.
5. On the Important Information screen, click **Next**.
6. On the Choose Install Location screen, accept the default location for installing the Web Agent, or click **Choose** to select a different location. Click **Next**.
7. On the Choose Shortcut Folder screen, click **Next**.
8. On the Pre-Installation Summary screen, click **Install**.
9. On the Install Complete screen, select **Yes, I would like to configure the Agent now** and click **Next**.

Configuring the SiteMinder Web Agent

To configure the SiteMinder Web Agent:

1. On the Host Registration screen, select **Yes, I would like to do Host Registration now**, but do not select the Enable PKCS11 DLL Cryptographic Hardware check box. Click **Next**.
2. On the Admin Registration screen, type the SiteMinder administrator name and password provided by your SiteMinder contact. Do **not** select the Enable Shared Secret Rollover check box. Click **Next**.
3. On the Trusted Host Name and Configuration Object screen, type the trusted hostname and Host Conf Object provided by your SiteMinder contact. Click **Next**.
4. On the Policy Server IP Address screen, type the SiteMinder Policy Server IP address provided by your SiteMinder contact and click **Add**. Click **Next**.
5. On the Host Configuration file location screen, accept the default file name and location and click **Next**.
6. On the Select Web Server(s) screen, select the Web server that you want to configure as a Web Agent and click **Next**.
7. On the Agent Configuration Object screen, enter the Agent Conf Object provided by the SiteMinder contact and click **Next**. (For details, see "Create the Agent Conf Object" on page 167)
8. On the Self Registration screen, select **No, I don't want to configure Self Registration**.

Click **Next**.

9. On the Web Server Configuration Summary screen, click **Install**. The Web Agent configuration process starts and when completed, the Configuration Complete screen is displayed.

10. Click **Done** to complete the configuration process.

Configuring the Web Server

This section describes how configure the Web Server and includes the following topics:

- "Configuring IIS to Work with RUM" below
- "Configuring IIS to Work with the SiteMinder Web Agent" on page 175

Configuring IIS to Work with RUM

To configure IIS to work with RUM:

1. Download the ISAPI redirector server plug-in **isapi_redirect.dll**, which is available at:

   - Win32 i386

     http://www.apache.org/dist/tomcat/tomcat-connectors/jk/binaries/windows/tomcat-connectors-1.2.37-windows-i386-iis.zip

   - Win64 x86

     http://www.apache.org/dist/tomcat/tomcat-connectors/jk/binaries/windows/tomcat-connectors-1.2.37-windows-x86_64-iis.zip

   - AMD64

     http://archive.apache.org/dist/tomcat/tomcat-connectors/jk/binaries/win64/jk-1.2.31/amd64/isapi_redirect-1.2.31.dll

2. Unzip the zip file and copy the isapi_redirect.dll file to the /bin/IIS directory in your RUM Engine installation.

   For example: `C:\HPRUM\bin\IIS\isapi_redirect.dll`

   > **Caution:** If you are installing on a WinNT or Win2k system, make sure IIS runs with a user that can access this directory.

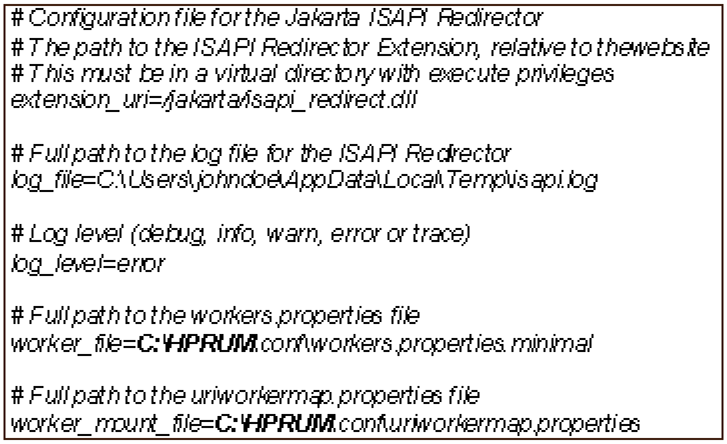
3. Open the **/bin/IIS/isapi_redirect.properties** file that contains the configuration settings for the redirector plug-in file.

4. Change **%LOG_DIR%** to the full path of any directory that is not under the RUM home directory.

   > **Caution:** Placing the log file in the RUM home directory may cause an automatic uninstallation of the RUM Engine and interference with the re-installation process.

5. Change **%HPRUM%** to the full path of the installation directory of your RUM Engine.

For example: `C:\HPRUM\bin\IIS\isapi_redirect.properties`



```
# Configuration file for the Jakarta ISAPI Redirector
# The path to the ISAPI Redirector Extension, relative to the website
# This must be in a virtual directory with execute privileges
extension_uri=/jakarta/isapi_redirect.dll

# Full path to the log file for the ISAPI Redirector
log_file=C:\Users\johndoe\AppData\Local\Temp\isapi.log

# Log level (debug, info, warn, error or trace)
log_level=error

# Full path to the workers.properties file
worker_file=C:\HPRUM\conf\workers.properties.minimal

# Full path to the uriworkermap.properties file
worker_mount_file=C:\HPRUM\conf\uriworkermap.properties
```

6. Save your changes.

7. Open Internet Information Services (IIS) Manager. You must be logged on as a member of the Administrators group on the local computer to perform the following procedures, or you must have been delegated the appropriate authority.

   To open IIS Manager at a command prompt:

   a. On the Start menu, click **Run**.

   b. In the Open dialog box, type **inetmgr** and then click **OK**.

      For more information, see http://msdn.microsoft.com/en-us/library/bb763170.aspx.

8. Using the IIS management console, set TCP port **8181** to **Default Web Site**. This port is used for accessing the mirror servlet from the RUM Engine.

   > **Note:** If you change the port value in this dialog box, you must also change the port value in other places. For details, see "Changing the Configuration of the TCP Port" on page 177.

   a. Right-click the Default Web Site and select **Properties** from the menu. The Default Web Site Properties dialog box opens.

   b. On the Web Site tab, click **Advanced** to open the Advanced Web Site Identification dialog box.

   c. Select the current line with port 80 and click **Edit** to open the Add/Edit Web Site Identification dialog box.

   d. Select the (All Unassigned) IP address option and set the TCP port to **8181**. Click **OK**. The new configuration appears in the **Multiple identities for this Web site** list in the Advanced Web Site Identification dialog box.

9. Using the IIS management console, add a new virtual directory to Default Web Site. The name of the virtual directory **must** be **jakarta**. Its physical path should be the directory in which you placed **isapi_redirect.dll** (for example, C:\HPRUM\bin\IIS). While creating this new virtual directory, assign execute permission to it.

Right-click the Default Web Site and select **New>Virtual Directory** from the menu. The Virtual Directory Creation Wizard opens. In the wizard:

- Enter **jakarta** as an alias of the virtual directory.
- Add a path to the directory that contains **isapi_redirect.dll** (for example, C:\HPRUM\bin\IIS).
- Assign execute permission.

> **Caution:** The name of the virtual directory must be **jakarta**.

10. Using the IIS management console, grant access to the jakarta resource from the local machine only.

    a. In the left pane, right-click **jakarta** and select **Properties** from the menu.

    b. Select the **Directory Security** tab.

    c. In the **IP address and domain restrictions** panel, click **Edit**. The IP Address and Domain Name Restrictions dialog box opens.

    - Select **Denied Access**.
    - Click **Add**.
    - Select **Single computer**.
    - Enter the **IP address** of the machine on which the RUM SiteMinder Web Agent is installed.
    - Click **OK**.

    d. Click **OK**.

11. Using the IIS management console, add **isapi_redirect.dll** as a filter in Default Web Site (DWS). The name of the filter should reflect its task (uses the name tomcat) and its executable must be C:\HPRUM\bin\IIS\isapi_redirect.dll.

    a. In the left pane, right-click **Default Web Site** and select **Properties**. The Default Web Site Properties dialog box opens.

    b. Select the **ISAPI Filters** tab and click **Add**. The Add/Edit Filter Properties dialog box opens.

    c. Enter **tomcat** as the filter name

    d. Add the full path to the **isapi_redirect.dll** as the executable field (for example, C:\HPRUM\bin\IIS\isapi_redirect.dll).

    e. Click **OK**.

    > **Note:** At this stage, the status of the added filter is inactive.

12. Using the IIS management console, add the jakarta ISAPI Redirector to the Web Service Extensions.

   a. In the left pane, right-click **Web Service Extensions** and select **Add a new Web Service extension**. The New Web Service Extension dialog box opens.

   b. Enter **tomcat** as the Extension Name

   c. Add the full path to the **isapi_redirect.dll** to the required files. (for example, C:\HPRUM\bin\IIS\isapi_redirect.dll)

   d. Select the **Set extension status to Allowed** check box.

   e. Click **OK**.

13. Restart the IIS Web Server.

    a. On the Start menu, click **Run**.

    b. In the Open dialog box, type **IISReset** and then click **OK**.

Configuring IIS to Work with the SiteMinder Web Agent

To configure IIS to work with the SiteMinder Web Agent:

1. Open the IIS management console.

2. In the left pane, ensure that the **siteminderagent** virtual directory has been added under the Default Web Site.

3. Check the status of the ISAPI filter for SiteMinder:

   a. In the left pane, right-click **Web Sites** and select **Properties**. The Web Sites Properties dialog box opens.

   b. Select the **ISAPI Filters** tab.

   c. The status of SiteMinder Web Agent must be green.

4. In the IIS management console, add the **ISAPI6 SiteMinder WEbAgent service** to the Web Service Extensions:

   a. In the left pane, right-click **Web Service Extensions** and select **Add a new Web Service extension** from the menu. The New Web Service Extension dialog box opens.

   b. Enter **ISAPI6 WEbAgent** as the Extension Name.

   c. Add the full path to the **netegrity\webagent\bin\ISAPI6WebAgent.dll** to the required files (for example, C:\Program Files\netegrity\webagent\bin\ISAPI6WebAgent.dll).

   d. Select the **Set extension status to Allowed** check box.

   e. Click **OK**.

5. In the IIS management console, add the **SM PW** service to the Web Service Extensions:

   a. In the left pane, right-click **Web Service Extensions** and select **Add a new Web Service extension** from the menu. The New Web Service Extension dialog box opens.

   b. Enter **SM PW** Services as the Extension Name.

   c. Add the full path to the **netegrity\webagent\pw\smpwservicescgi.exe** to the required files (for example, C:\Program Files\netegrity\webagent\pw\smpwservicescgi.exe).

   d. Select the **Set extension status to Allowed** check box.

   e. Click **OK**.

6. In the IIS management console, add the **SM PW Default** service to the Web Service Extensions:

   a. In the left pane, right-click **Web Service Extensions** and select **Add a new Web Service extension** from the menu. The New Web Service Extension dialog box opens.

   b. Enter **SM PW Default Services** as the Extension Name.

   c. Add the full path to the **netegrity\webagent\pw_default\smpwservicescgi.exe** to the required files (for example, C:\Program Files\netegrity\webagent\pw_default\smpwservicescgi.exe).

   d. Select the **Set extension status to Allowed** check box.

   e. Click **OK**.

7. In the IIS management console, allow all unknown CGI and ISAPI Extensions:

   a. In the left pane, select **Web Service Extensions**.

   b. In the right pane:

      - Select **All Unknown CGI Extensions**.
      - Click **Allow**.
      - Select **All Unknown ISAPI Extensions**.
      - Click **Allow**.

8. Enable the SiteMinder Web Agent:

   a. Edit the **netegrity/webagent/bin/IIS/WebAgent.conf** file (for example, C:\Program Files\netegrity\webagent\bin\IIS\ WebAgent.conf).

   b. Change NO to YES in the **EnableWebAgent** field.

9. Restart IIS.

10. Check that SiteMinder is running by selecting **Start > Administrative Tools > Event Viewer**.

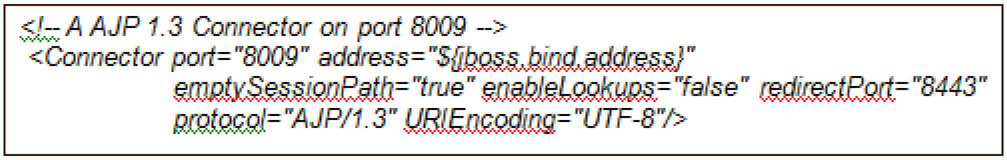
Configuring the RUM Engine

This section describes how to configure the RUM Engine:

1. Open the **\EJBContainer\server\mercury\deploy\jbossweb-tomcat50.sar\server.xml** file in a text editor.

   For example: `C:\HPRUM\EJBContainer\server\mercury\deploy\jbossweb-tomcat50.sar\server.xml`

2. Enable the AJP entry by uncommenting it (by default it is commented out).



```
<!-- A AJP 1.3 Connector on port 8009 -->
 <Connector port="8009" address="${jboss.bind.address}"
            emptySessionPath="true" enableLookups="false" redirectPort="8443"
            protocol="AJP/1.3" URIEncoding="UTF-8"/>
```

3. Save your changes.

4. Open the **\conf\configurationmanager\Beatbox_Default_Const_Configuration.xml** file in a text editor.

   For example: `C:\HPRUM\ conf\configurationmanager\Beatbox_Default_ Const_Configuration.xml`

5. Change the value of **max_log_field_length** from `2048` (the default value) to `10240`.

   For example: `max_log_field_length 10240`

6. Save your changes.

7. Restart the RUM Engine.

Changing the Configuration of the TCP Port

The deployment of SiteMinder resources (Policy Web agent and RUM Engine mirror servlet) is configured by default to use TCP port **8181**. If you want to change the configured port value, you must also set the port value in the following:

- **Policy server:**
  - Change the **Web agent** name in the SiteMinder Agent dialog box to include the port value. For details, see "Create an Agent" on page 167.
  - Change the **DefaultAgentName** parameter value in the SiteMinder Agent Configuration Object dialog box to the agent's name. For details, see "Create the Agent Conf Object" on page 167.
- **IIS:** Change the **TCP Port** parameter in the Default Web Site Properties dialog box in the IIS Manager. For details, see "Configuring IIS to Work with RUM" on page 172.
- **RUM Engine:** Change the **http_settings > port** XML tag in the **HPRUM\conf\configurationmanager\configuration\IAM_config.xml** file.

Testing and Troubleshooting

This section describes various testing and troubleshooting procedures for the following:

- "RUM Engine" on the next page
- "SiteMinder Web Agent" on the next page
- "Mirror Servlet" on page 179

RUM Engine

Note: Before carrying out the following procedures, the SiteMinder Agent must be disabled.

1. Invoke the URL **http://localhost:8180/rumwebconsole**. If the Login page of the RUM Engine is not displayed, check that the RUM Engine is running.
2. Invoke the URL **http://localhost:8181/iam/mirror**. If an Error page is displayed, check if the status of the ISAPI Filter on the Default Web Site is green.
   a. Right-click **Default Web Site** and select **Properties**. The Default Web Site Properties dialog box opens.
   b. Select the **ISAPI Filters** tab.
   c. If the status is red, check the Application Event Log for the W3SVC-WP. To open the Event Viewer, select **Start > Administrative Tools > Event Viewer**.
      - Make sure you use an **isapi_redirect.dll** that is compatible with for the host's operating system.
      - Make sure IIS runs with a user that can access the C:\HPRUM\bin\IIS directory.
   d. If the status is green, examine the last line in the IIS server log file, located in SYSTEM32/LogFiles/W3SVC1. Take the appropriate action according to the error code in the last line:

Error Code	Action
404	Make sure you entered the URL correctly.
505	○ Make sure the virtual directory created is called **jakarta**. ○ Make sure that the **extension_uri** setting is correct. ○ Check the **workers.properties** file and make sure the port setting for **worker.ajp13w.port** is the same as the port specified in the **server.xml** for the Apache AJP13 support.
202 or **403**	Make sure you have checked **Execute Access** for the jakarta virtual directory in the Advanced Options of the Personal Web Manager.

SiteMinder Web Agent

Invoke the URL **http://localhost:8181/iam/mirror**. The SiteMinder Login Page should be displayed. If an Error page is displayed:

1. **Enable logging.** In the SiteMinder Administration console, right-click your Agent Conf Object and select **Properties of Configuration Object**. The SiteMinder Agent Configuration Object dialog box opens.

a. Select **LogFileName**.

b. Click **Edit**.

c. Enter the full log file path as the value (for example, C:\Users\johndoe\AppData\Local\Temp\siteminder.log).

> **Caution:** Placing the log file in the RUM home directory may cause an automatic uninstallation of the RUM Engine and interference with the re-installation process.

d. Click **OK**.

e. Select **Logfile**.

f. Click **Edit**.

g. Enter **yes** as the value.

h. Click **OK**.

> **Note:** No restart is required.

2. **Check Error in the Event Viewer.** Make sure that the **HostConfigFile** parameter in the **WebAgent.conf** file has the path to the host configuration file.

For example:

```
C:\Program Files\netegrity\webagent\bin\IIS\WebAgent.conf

HostConfigFile="C:\Program Files\netegrity\
webagent\config\SmHost.conf.bk1"
```

Mirror Servlet

To check that the mirror servlet is alive and operating correctly with the SiteMinder Web agent, invoke the following URL: **http://localhost:8181/iam/mirror?IDENTITY_PARAM_USER_NAME=RUM_SM_USER**

The **IDENTITY_PARAM_USER_NAME** parameter indicates the header name that is returned at the Web agent's response and that contains the logged-in user name. The header name **RUM_SM_USER** is the same value that was defined in the policy server. For details, see "Create the Response" on page 169.

The result on the page will be the user name that was entered in the login page, followed by the prefix **IAM_UID=**. For example, `IAM_UID=JohnSmith`.

If this result is not accepted:

1. Verify that **RUM_SM_USER** is the configured value in the Policy server.
2. Test and troubleshooting the RUM Engine. For details, see "RUM Engine" on the previous page.

3. Test and troubleshooting the SiteMinder Web Agent. For details, see "SiteMinder Web Agent" on the previous page.

Chapter 17

RUM Data Export

Data export enables you to extract requested raw data from RUM and provide it to users. You can then use this data to create your own reports, giving you different views than those provided in the standard End User Management reports in BSM. Another benefit of exporting data is that you are not dependent on the RUM purging cycle and can save the exported data for as long as you need.

This chapter includes the following topics:

Enable Data Export

To enable data export, you create and configure an XML file in the **\<RUM root directory>\conf\datapublisher\consumers** directory. This file contains settings such as what data you want extracted, how it should be formatted, where it should be saved, when to close and save a data file and open a new one, and so forth. For details on the XML file, see "Data Export XML File" on the next page.

You can create multiple XML files so that different data can be extracted for different consumers. For convenience, it is recommended that each file name is the same as the relevant consumer name.

A template XML file called **consumer-template.xml** is located in the **\<RUM root directory>\conf\datapublisher** directory. You can copy and edit this file and then save it in the **\<RUM root directory>\conf\datapublisher\consumers** directory.

While a background process checks if configuration files have been changed, you can force an immediate update by synchronizing the configuration in the RUM web console (select **Tools > Monitoring Configuration Data > Sync All Configuration**).

How Data is Exported

When the RUM Engine is started, it checks to see if there are data export configuration XML files in the **\<RUM root directory>\conf\datapublisher\consumers** directory. For each XML file found, the RUM Engine creates a directory for the configured consumer in the configured output directory, and in the consumer’s directory creates further sub-directories for each configured channel type. For example, the following directories are created for a consumer called **XYZ**, with a configured output directory of **C:\MyDataPublishing\DpOutput** and with configured channel types of **Page** and **Transaction**:

- `C:\MyDataPublishing\DpOutput\XYZ\Page`
- `C:\MyDataPublishing\DpOutput\XYZ\Transaction`

> **Note:**
>
> - RUM must have read and write (RW) permissions for the configured output directory.
> - The output directory can be a local or remote directory.

Files are opened in the relevant directories and data is saved to them according to the configuration in the XML file. Data is continuously saved to the files.

A file is closed when it reaches a certain size, or a specific timeout is encountered. You configure the maximum file size and/or timeout in the XML file. When a file is closed, a new file is automatically opened when new data is received. File names are made up of the consumer name, channel type, and the time in milliseconds that the file was created (for example, `XYZ_PAGE_12345678`).

You can also limit the output directories by size, or by the number of files in them. When the maximum size or the maximum number of files is reached, no more new files will be opened. You must manually manage the output directories and files to ensure that you have enough space.

To stop the export of data, remove the XML files from the **\<RUM root directory>\conf\datapublisher\consumers** directory. Removing the XML file for a specific consumer stops the export of data for that consumer only.

Data Export XML File

This section describes the elements and attributes used in the data export configuration XML file.

A template XML file called **consumer-template.xml** is located in the **\<RUM root directory>\conf\datapublisher** directory.

Elements Table

Element	Description	Attribute For details, see "Attributes Table" below
consumer	Initial element in block containing all the data export configuration.	• name • disable
consumerDescription	Optional consumer description.	

Element	Description	Attribute For details, see "Attributes Table" below
collector	Initial element for configuration of a specific collector. **Note:** You can configure only one collector for data export.	
formats	Initial element for configuring the format for common data types for all exported data.	
DOUBLE	Format for double precision numbers. **Default value:** `<DOUBLE>{#.000}</DOUBLE>`	
DATE	Format for dates. **Default value:** `<DATE>{MM-dd-yyyy hh:mm:ss:SS}</DATE>`	
channels	Initial element for configuring what data to export.	
channel	Initial element for configuring a specific type of data for export. **Note:** • For each channel type, you configure separate fields and field elements. • If you declare a channel type, but do not declare any fields for that type, all fields are exported by default.	type
fields	The initial element for configuring the specific fields to export for each channel type. **Note:** For details on the available fields for each channel type, see "Valid Channel Types and Fields" on page 184.	
field	Specific data field to export for the configured channel type.	• name • title
publisher	Configuration for the actual export of the data.	
type	The type of output in which to export the data. **Note:** The only valid option is **FILE**.	

Element	Description	Attribute For details, see "Attributes Table" below
outputDirectory	The directory path in which to save the output files. **Caution:** Do not locate the output directory on the same disk used by the MySQL database.	
maxDirectorySizeMb	The maximum size of the output directory. After this limit is reached, no more output files are saved.	
maxFilesInDirectory	The maximum number of saved output files that can exist in the output directory. After this limit is reached, no more output files are saved until old files are removed.	
maxFileSizeMb	The maximum size for the open data export file. After this limit is reached, the file is closed and saved and a new file is opened when new data is received.	
timeoutInSec	The maximum timeout that triggers the closing of the data export file. After this limit is reached, the file is closed and saved and a new file is opened when new data is received.	
publisherFileType	The exported data file type. **Note:** The only valid option is CSV.	
readyFileExtension	The extension to add to the output file when it is closed and saved.	
useHeaders	If set to **true**, a line of field headers (or alternate names if configured) is added to the saved output file.	
fieldDelimiter	The delimiter to use for separating fields in the output file.	
newLineDelimiter	The delimiter between records (lines) in a file. Valid options are: • WINDOW • UNIX • MAC	
useZip	If set to **true**, the output file is zipped.	

Element	Description	Attribute For details, see "Attributes Table" below
comment	The sign to use to denote a comment in the output file. **Note:** This is limited to a single character.	

Attributes Table

Attribute	Parent Element	Description	Example
name	consumer	The consumer name for whom data is exported. **Note:** • The consumer name is also used in the exported data file name. • The consumer name must be unique within all the configured XML files.	<consumer name="consumer_XYZ">
disable	consumer	When set to **true**, data publishing for the consumer is disabled. **Default value:** false	<consumer name="consumer_XYZ" disable="false">
type	channel	The type of data to export. Valid options are: • **Page** • **Session** • **Transaction**	<channel type="Page">
name	field	The name of the field to be exported. **Note:** For details on the available fields for each channel type, see "Valid Channel Types and Fields" below.	<field name="x-end-user-id" title="x-end-user-id" />
title	field	An alternate title for the field name. **Note:** For details on the available fields for each channel type, see "Valid Channel Types and Fields" below.	<field name="x-end-user-id" title="x-end-user-id" />

Valid Channel Types and Fields

The tables in the following topics list the valid fields for each channel for which you can export data:

- "Page" below
- "Transaction" on page 189
- "Session" on page 191

Page

Field Name	Type	Units	Description
all-login-names	string		Login name of end user
c-browser-name	string		Describes the web browser used by the visitor
c-host-id	object		The BSM host ID associated with client
c-host-name	string		The host name associated with client
c-os-name	string		Describes the operating system used by the visitor
cs-app-bytes	int	byte	The number of bytes received by the software element
cs-version	string		HTTP version used for the action
referrer	string		Entire raw referrer string sent in the action
s-host-id	object		The BSM server ID
s-host-name	string		The server name
s-sw-element-id	object		The BSM software element ID
s-sw-element-name	string		The software element name
sc-app-bytes	int	byte	The number of bytes sent by the software element
sc-server-firstbut-time-ms	long	ms	Time taken for the server to process the request
sc-status	int		Status or code sent by the server in response to the action
server-time-threshold-ms	long	ms	Server time threshold for the action
timestamp	date	date	Action start time
x-action-descriptor	string		Descriptor for given action
x-action-download-threshold-time-ms	long	ms	Download time threshold for the action
x-action-download-time-ms	long	ms	Total download of the action, from the beginning of the first request until the end of the last request

Field Name	Type	Units	Description
x-action-external-time-ms	long	ms	Sum totaling the gaps of time within loading of a page during which there are no components being transferred
x-action-id	long		The internal ID of the action
x-action-name	string		The configured name of the action
x-action-requests	int		Total number of component requests for this action
x-application-id	object		The BSM application ID number
x-application-name	string		The BSM application name
x-application-tier-id	object		The BSM application tier ID number
x-available	boolean		Indicates if the action was available
x-cancelled	boolean		Page request that was prematurely interrupted
x-classify	boolean		Indicates that the page was classified
x-connect-time-ms	long	ms	Time taken for the client and server to initialize a TCP connection
x-end-user-id	object		The BSM end-user group ID
x-end-user-packet-latency-time-threshold-ms	long	ms	End user packet latency threshold
x-end-user-subnet-id	object		The BSM end-user subnet ID
x-end-user-username	string		The BSM end-user group name
x-errors-events-num	int		Total number of application error events on page
x-event-id1	int		The event ID that has occurred within a particular visitor session on the action
x-event-id2	int		The event ID that has occurred within a particular visitor session on the action
x-event-id3	int		The event ID that has occurred within a particular visitor session on the action
x-geo-ip-num	string		IP Address
x-geo-net-end-num	string		Last IP Address of the client's network block
x-geo-net-start-num	string		First IP Address of the client's network block
x-host-parameterization	string		The host name

Field Name	Type	Units	Description
x-info-event-num	int		Total number of information (non error) events on page
x-is-backend-tier	boolean		Indicates if the action belongs to back-end tier
x-is-encrypted	boolean		Indicates if the action was encrypted
x-is-over-server-time-threshold	boolean		Indicates if the action was over server time threshold
x-location-id	object		The BSM end-user location ID
x-location-name	string		The BSM end-user location name
x-location-packet-latency-time-threshold-ms	long	ms	Location packet latency threshold
x-location-parent-id1	object		The BSM location ID
x-location-parent-id2	object		The BSM location ID
x-location-parent-id3	object		The BSM location ID
x-location-parent-id4	object		The BSM location ID
x-location-parent-id5	object		The BSM location ID
x-location-parent-name1	string		The BSM location name
x-location-parent-name2	string		The BSM location name
x-location-parent-name3	string		The BSM location name
x-location-parent-name4	string		The BSM location name
x-location-parent-name5	string		The BSM location name
x-network-time-ms		ms	Network time
x-packet-latency-time-threshold-ms	long	ms	Packet latency threshold
x-page-title	string		Title of the web page, which is normally displayed along the top of a visitor's web browser window
x-parent-action-seq-id	int		This field is used to correlate frames of the frame sets or other dependent pages

Field Name	Type	Units	Description
x-performance-event-num	int		Total number of performance (non error) events on page
x-retransmission-time-ms	long	ms	Time spent on retransmitting packets
x-rum-probe-id	int		Internal ID of the RUM Probe
x-server-time-ms	long	ms	Time taken for the server to respond to the request
x-server-time-to-firstbuf-threshold-ms	long	ms	Time to first buffer threshold for the action
x-session-action-seq	int		Number of action views (such as page views) associated with the session
x-session-application-id	string		The internal ID of the session application
x-session-id	string		Universally unique identifier (UUID) automatically assigned to each unique visitor session
x-session-property-tag1	string		The application session property was tagged by RUM
x-session-property-tag2	string		The application session property was tagged by RUM
x-session-property-tag3	string		The application session property was tagged by RUM
x-session-property-tag4	string		The application session property was tagged by RUM
x-session-property-tag5	string		The application session property was tagged by RUM
x-session-start-time	date	date	The session start time
x-ssl-time-ms	long	ms	Time taken for the client and server to initialize an SSL connection
x-total-packets	int		Total number of packets in the request and response
x-uri-parameterization	string		The URI
x-url-extracted-data	string		The URL extracted data
x-url-host	string		Name of the host requested by the client
x-url-http-method	string		HTTP request method used
x-url-port	int		HTTP request port
x-url-post-data	string		Query string data sent by a POST request

Field Name	Type	Units	Description
x-url-protocol	string		Identifier of the protocol
x-url-query-original	string		Query string data sent by a GET request
x-url-query-parameterization	string		URL query string data sent by a GET request
x-url-uri	string		URI string data sent by a GET request

Transaction

Field Name	Type	Units	Description
all-login-names	string		Login name of end user
c-browser-name	string		Web browser used by the visitor
c-host-id	object		The BSM host ID associated with client
c-host-name	string		The host name associated with client
c-os-name	string		Operating system used by the visitor
c-session-start	date	date	Session start time
c-transaction-client-time-ms	long	ms	Time of total processing time between components
c-transaction-gross-download-time-ms	long	ms	Gross download time
c-transaction-net-download-time-ms	long	ms	Net download time
s-host-id	object		The BSM server ID
s-host-name	string		The BSM server name
s-sw-element-id	object		The BSM software element ID
s-sw-element-name	string		The software element name
s-transaction-server-firstbuf-time-ms	long	ms	Time taken for the server to process the transaction
s-transaction-server-time-ms	long	ms	Time taken for the server to respond to the transaction
timestamp	date	ms	Transaction start time
x-application-id	object		The BSM application ID number

Field Name	Type	Units	Description
x-application-name	string		The BSM application name
x-application-tier-id	object		The BSM application tier ID number
x-end-user-id	object		The BSM end-user group ID
x-end-user-subnet-id	object		The BSM end-user subnet ID
x-end-user-user-name	string		The BSM end-user group name
x-geo-ip-num	string		IP Address
x-geo-net-end-num	string		Last IP Address of the client's network block
x-geo-net-start-num	string		First IP Address of the client's network block
x-is-backend-tier	boolean		Indicates if the action belongs to back end tier
x-is-transaction-available	boolean		Indicates if the transaction was available
x-is-transaction-complete	boolean		Indicates if the transaction was completed
x-location-id	object		The BSM end-user location ID
x-location-name	string		The BSM end-user location name
x-location-parent-id1	object		The BSM location ID
x-location-parent-id2	object		The BSM location ID
x-location-parent-id3	object		The BSM location ID
x-location-parent-id4	object		The BSM location ID
x-location-parent-id5	object		The BSM location ID
x-location-parent-name1	string		The BSM location name
x-location-parent-name2	string		The BSM location name
x-location-parent-name3	string		The BSM location name
x-location-parent-name4	string		The BSM location name
x-location-parent-name5	string		The BSM location name
x-rum-probe-id	int		Internal ID of the RUM Probe
x-session-application-id	string		Internal ID of the session application
x-session-id	string		Universally unique identifier (UUID) automatically assigned to each unique visitor session

Field Name	Type	Units	Description
x-threshold-offset-percent			The location threshold offset in percent
x-transaction-bytes	long		Total number of bytes sent and received for the transaction
x-transaction-components	int		Number of components associated with the transaction
x-transaction-connect-time-ms	long	ms	Time taken for the client and server to initialize a TCP connection
x-transaction-errors-events-num	int		Total number of application error events associated with the transaction
x-transaction-id	object		The BSM transaction ID
x-transaction-info-events-num	int		Total number of information (non error) events on transaction
x-transaction-name	string		The BSM transaction name
x-transaction-network-time-ms	long	ms	Network time
x-transaction-performance-events-num	int		Total number of performance (non error) events on transaction
x-transaction-retransmission-time-ms	long	ms	Time spent on retransmitting packets
x-transaction-ssl-time-ms	long	ms	Time taken for the client and server to initialize an SSL connection

Session

Field Name	Type	Units	Description
all-login-names	string		Login name of end user
c-browser-name	string		Web browser used by the visitor
c-host-id	object		The BSM host ID associated with client
c-host-name	string		The host name associated with client
c-os-name	string		Operating system used by the visitor
cs-session-bytes	long	byte	Total number of bytes received for the session
s-host-id	object		The BSM server ID

Field Name	Type	Units	Description
s-host-name	string		The server name
s-sw-element-id	object		The BSM software element ID
s-sw-element-name	string		The software element name
sc-session-bytes	long	byte	Total number of bytes sent for the session
timestamp	date	date	Session start time
x-application-id	object		The BSM application ID number
x-application-name	string		The BSM application name
x-application-tier-id	int		The internal ID of the tier
x-avg-download-time-ms	long	ms	Average download time for all actions associated with the session
x-end-user-id	object		The BSM end-user group ID
x-end-user-subnet-id	object		The BSM end-user subnet ID
x-end-user-username	string		The BSM end-user group name
x-expected-actions-count	int		Expected number of action hits associated with the session
x-geo-ip-num	string		IP Address
x-geo-net-end-num	string		Last IP Address of the client's network block
x-geo-net-start-num	string		First IP Address of the client's network block
x-is-backend-tier	boolean		Indicates the session associated with a back-end tier
x-is-session-available	boolean		Indicates if the session was available
x-is-session-ssl	boolean		Indicates that the session was over SSL connection
x-location-id	object		The BSM end-user location ID
x-location-name	string		The BSM end-user location name
x-location-parent-id1	object		The BSM location ID
x-location-parent-id2	object		The BSM location ID
x-location-parent-id3	object		The BSM location ID
x-location-parent-id4	object		The BSM location ID
x-location-parent-id5	object		The BSM location ID

Field Name	Type	Units	Description
x-location-parent-name1	string		The BSM location name
x-location-parent-name2	string		The BSM location name
x-location-parent-name3	string		The BSM location name
x-location-parent-name4	string		The BSM location name
x-location-parent-name5	string		The BSM location name
x-rum-probe-id	int		Internal ID of the RUM Probe
x-session-application-id	string		The internal ID of the session application
x-session-duration-ms	long	ms	Duration time of the session
x-session-dwell-time-ms	long	ms	Session's total dwell time, or the total number of milliseconds the visitor spent looking at pages during the current session
x-session-error-events-num	int		Total number of application error events associated with the session
x-session-failed-actions	long		Number of failed actions on the session
x-session-id	string		This is a universally unique identifier (UUID) automatically assigned to each unique visitor session
x-session-info-events-num	int		The total number of information (non error) events associated with the session
x-session-last-page	date	date	Time of last page associated with the session
x-session-latency-time-ms	long	ms	Total session latency
x-session-packets	long		Total number of packets sent and received for the session
x-session-pageviews-num	int		Number of page views associated with the session

Field Name	Type	Units	Description
x-session-performance-events-num	int		The total number of performance (non error) events associated with the session
x-session-property-tag1	string		The application session property was tagged by RUM
x-session-property-tag2	string		The application session property was tagged by RUM
x-session-property-tag3	string		The application session property was tagged by RUM
x-session-property-tag4	string		The application session property was tagged by RUM
x-session-property-tag5	string		The application session property was tagged by RUM
x-session-referrer	string		Entire raw referrer string sent in the session's first request
x-session-requests-num	int		Number of hits or HTTP requests associated with the session
x-total-download-time-for-available-actions-ms	long	ms	Total download time of available action associated with the session
x-total-download-time-for-unavailable-actions-ms	long	ms	Total download time of unavailable action associated with the session

Part 4

Supporting Specific Protocols

Chapter 18

Parsing Supported Protocols

Parsing supported protocols are protocols on which RUM can carry out deep analysis, thus providing detailed data about monitored applications for use in End User Management reports.

RUM supports the following protocols for parsing:

HTTP Protocols

- HTTP/S
- SOAP

Database Protocols

- IBM DB2
- Microsoft SQL Server
- MySQL Database Server
- Oracle DB (Thin JDBC Client)

Application Servers

- Citrix XenApp
- IBM WebSphere MQ
- Oracle Forms NCA
- SAPGUI

Mail Protocols

- IMAP (Internet Message Access Protocol)
- POP3 (Post Office Protocol)
- SMTP (Simple Mail Transfer Protocol)

Generically Supported Protocols

- DNS – Generic UDP
- Flash/ActionScript AMF – HTTP Based
- Microsoft Terminals Services (RDP) – Generic Streaming TCP
- RMI Registry – Generic TCP
- SSH – Generic Streaming TCP

Others

- FTP (File Transfer Protocol)

- ISO 8583 (financial transaction card originated messages for Visa and Mastercard)
- LDAP (Lightweight Directory Access Protocol)

Chapter 19

Monitoring Citrix with RUM

You can use RUM’s HTTP RUM agent to monitor Citrix traffic.

This chapter includes the following topics:

- "Overview of Citrix Monitoring with RUM" below
- "Overview of the RUM HTTP Agent" on page 200
- "Installing the RUM HTTP Agent" on page 201
- "Configurations for Working with the RUM HTTP Agent" on page 201
- "Advanced Configuration" on page 202
- "Using the RUM HTTP Agent with Terminal Services" on page 203

Overview of Citrix Monitoring with RUM

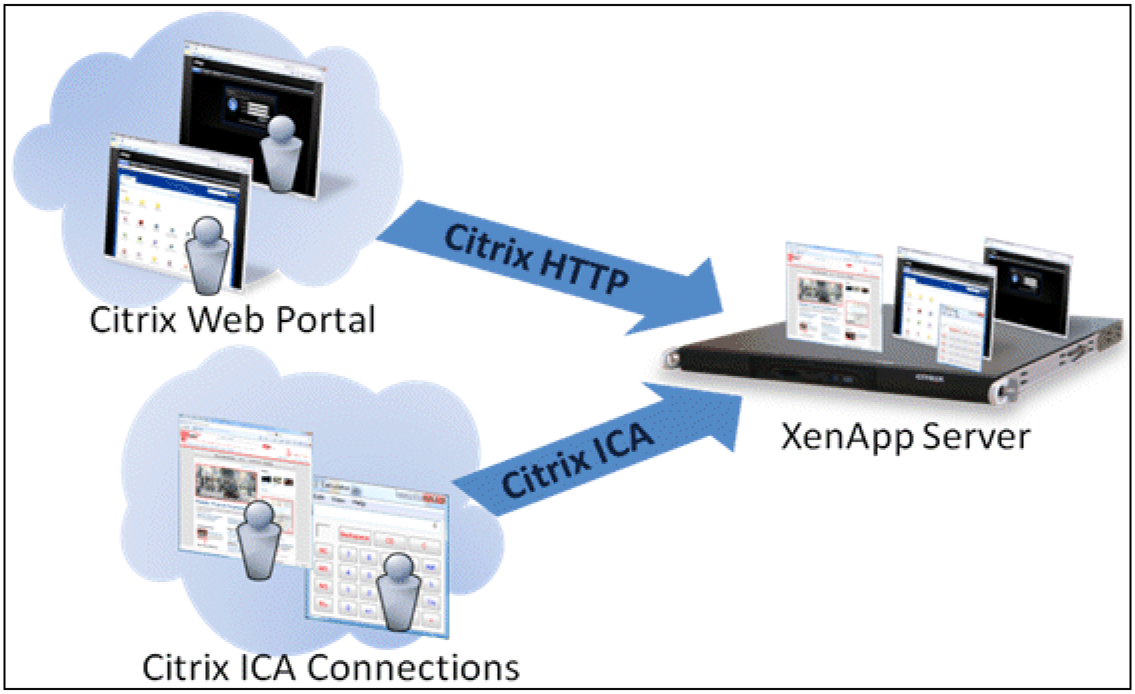
End users can connect to a Citrix XenApp server via a web portal or a direct ICA connection. When multiple users connect to the same XenApp server, requests sent from the XenApp server all originate from the same client, regardless of the originating end user.

This section includes:

- "Monitoring Traffic Between End Users and a XenApp Server" below
- "Monitoring Outgoing Traffic from a XenApp Server" on the next page

Monitoring Traffic Between End Users and a XenApp Server

The following diagram shows typical traffic between end users and a Citrix XenApp server:



An end user starts by opening a Citrix web portal and selecting one of the published applications. An ICA session is created, in which the selected application runs on the XenApp server, and the user uses the application remotely.

Alternatively, a user can create an ICA connection directly, without going through a web portal.

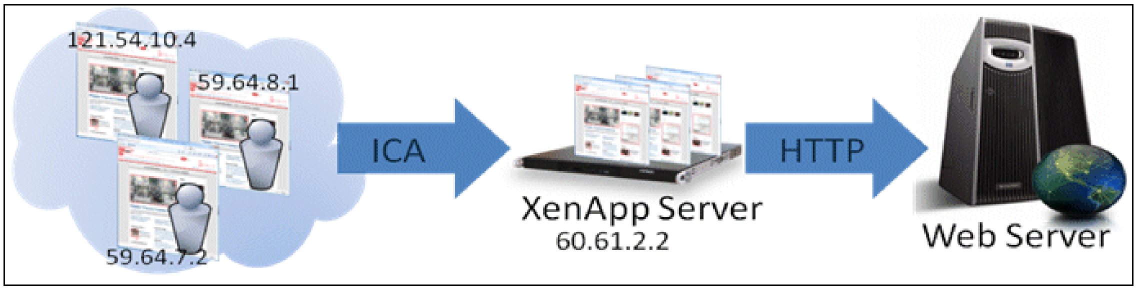
To monitor this traffic with RUM 9.x or later, no agent installation is required. You simply configure the following applications in BSM, using specific templates:

- The web application, using the **General Web Application** template.
- The XenApp application, using the **Citrix ICA** template.
- The Login application, using the **Citrix Http** template.

For user interface details on creating RUM applications in BSM, see "RUM Application Configuration Wizard" in the BSM Application Administration Guide.

Monitoring Outgoing Traffic from a XenApp Server

The following diagram shows multiple users connected to the same XenApp server, each running an instance of the Internet Explorer browser to connect to a web server. In this scenario, all connections opened to the web server originate from the same client, which is the XenApp server.



When monitoring the web server with RUM, it is desirable to see the real end users as the clients, rather than having a single client combining all the traffic. To achieve such functionality, you must install the RUM HTTP Agent on the XenApp server.

The following table shows the difference between RUM reports when the RUM HTTP Agent is, or is not, installed on the XenApp server:

	Without RUM HTTP Agent		With RUM HTTP Agent	
Request URL	**Client IP**	**User Name**	**Client IP**	**User Name**
/index.html	60.61.2.2	-	121.54.10.4	John
/index.html	60.61.2.2	-	59.64.8.1	Rosetta
/search?q=agent	60.61.2.2	-	121.54.10.4	John
/checkout.jsp	60.61.2.2	-	59.64.8.1	Rosetta
/index.html	60.61.2.2	-	59.64.7.2	Steve
/view?item=agent	60.61.2.2	-	121.54.10.5	Peter

Overview of the RUM HTTP Agent

You use the RUM HTTP Agent to monitor traffic from a XenApp server for the initiating end user.

This section includes:

- "Supported Environments" below
- "Supported Applications" below
- "How the RUM HTTP Agent Works" on the next page

Supported Environments

The RUM HTTP Agent can be installed on the following environments:

- Windows 2003 Server or later (32 and 64 bit versions)
- XenApp server 4.5 or later (installed on Windows 2003 Server or later)

Supported Applications

The RUM HTTP Agent monitors traffic for the following applications:

- Internet Explorer 6
- Internet Explorer 7
- Internet Explorer 8
- Mozilla Firefox 2
- Mozilla Firefox 3

In addition to the above applications, the RUM HTTP Agent can support a wide range of software based on Microsoft's WebBrowser ActiveX component.

How the RUM HTTP Agent Works

The RUM HTTP Agent tags outgoing HTTP traffic with the IP address and user name of the real end user (connected to the XenApp server). This information is added to the **UserAgent** HTTP header.

Installing the RUM HTTP Agent

The setup file for installing the RUM HTTP Agent depends on your operating system. The following setup files are available:

- HPRumHttpAgent_v-<Version number>_win32.msi—for 32bit systems
- HPRumHttpAgent_v-<Version number>_win64.msi—for 64bit systems

The RUM HTTP Agent Setup file can be accessed from the RUM installation package.

To install the RUM HTTP Agent:

1. Save the relevant setup file to the machine on which you want to install the RUM HTTP Agent.
2. Run the setup program by double clicking the downloaded file.
3. Follow the online instructions. (During the installation, you are prompted to select the program location.)

Note: The RUM HTTP Agent delivers digitally signed DLL files.

Configurations for Working with the RUM HTTP Agent

You must configure user name detection in the applications you want monitored using the RUM HTTP Agent. Additionally, you can configure RUM to use the IP of the real user connected to a XenApp server as the client IP in the web application.

This section includes:

- "To configure user name detection in applications" below
- "To configure Real User Monitor to use the IP of the real user connected to a XenApp server as the client IP in the web application" on the next page

To configure user name detection in applications

1. In End User Management Administration in BSM, configure a new application or edit an existing application.
2. Select **Real User Monitor > General** and in the **Real User Monitor Application General** page, expand the **User Name Detection** area.
3. Click the **New User Name Detection** button. The **User Name Detection** dialog box opens in a new window.

4. In the **User Name Detection** dialog box, configure the following:

Field	Value
Search in	HTTP Header
Header name	User-Agent
Extract text:	
Between	RUM_USER_NAME
and	;

5. Click **OK** to save the configuration changes.

> **Note:** The web application may require users to log on when opening the application in the web browser. In such cases, you should decide whether you prefer configuring the user name for the web application as the Citrix user name, or as the web application's user name. In either case, you may consider configuring the other user name (Citrix or web application) as a Session Property.

To configure Real User Monitor to use the IP of the real user connected to a XenApp server as the client IP in the web application

1. On the RUM Engine, edit the file:

```
<HPRUM>\conf\configurationmanager\Beatbox_Default_Const_Configurati
on.xml
```

2. Add the following line at the end of the **[Global]** section:

```
forwarded_for_header User-Agent .*RUM_CLIENT_ADDRESS=IPV4\\*([^;]*)
;.* $1
```

3. Save the file.

4. In the RUM Engine web console, synchronize configuration data by selecting **Tools > Monitoring Configuration Information > Sync All Configuration**. For details, see "Monitoring Configuration Information" on page 105.

Advanced Configuration

You configure advanced settings by editing the **<All users Application Data path>\HP\RumHttpAgent\settings\RumHttpAgent.cfg** file on the Citrix XenApp server on which the RUM HTTP Agent is installed.

(For example, `C:\Documents and Settings\All Users\Application Data\HP\RumHttpAgent\settings\RumHttpAgent.cfg`.)

This section includes the following topics:

To disable the RUM HTTP Agent

In the **[common]** section of the file, change the **disable** parameter value to **true**. The change takes effect for new IE and Firefox browser instances.

To disable the RUM HTTP Agent for a specific browser type

In the **[IE]** or **[Firefox]** section of the file, change the **disable** parameter value to true. The change takes effect for new instances of the specific browser.

To turn on logging

In the **[common]** section of the file, change the **enableLog** parameter value to **true**.

Log files are located in the <COMMONAPPDATA>\HP\RumHttpAgent\logs directory, where < COMMONAPPDATA> is the file system directory that contains application data for all users. (This directory differs between operating systems. For example, in Windows 7 it is C:\ProgramData, and for Windows XP it is C:\Documents and Settings\All Users\Application Data.)

Using the RUM HTTP Agent with Terminal Services

The RUM HTTP Agent can be used with Terminal Sessions in a similar way as with Citrix. If an end user is browsing a web application via a Remote Desktop connection, the RUM HTTP Agent can be used to extract the real client’s IP address and user name when monitoring the web traffic with RUM.