# **HP Service Virtualization**

For the Windows ® operating system

Software Version: 3.00

HP Service Virtualization User Guide

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# Welcome to HP Service Virtualization

Welcome to Service Virtualization, HP's tool for simulating services during testing.

HP Service Virtualization software allows developers and testers access to limited or unavailable services in a simulated environment. This helps application teams lower costs and reduce testing times by finding defects earlier in the application life cycle when they are easier, faster, and less expensive to fix. It helps improve quality by enabling quality assurance (QA) teams to test what otherwise could not be tested. It also helps isolate problems that are based on dependencies between services in composite applications. This helps significantly reduce delays and manage the costs and complexity of composite application development and testing.

This section includes:

Service Virtualization Documentation	12
How This Guide is Organized	12
Торіс Турез	13

## **Service Virtualization Documentation**

Service Virtualization includes the following documentation:

Name	Description
HP Service Virtualization Online Help	Available from the Service Virtualization user interface by clicking in the window and pressing F1 or clicking the <b>Help</b> button.
Printer Friendly Documentation	Online books can be viewed and printed using Adobe Reader, which can be downloaded from the Adobe Web site. To access, click www.adobe.com.
HP Service Virtualization User Guide	Accessed from the Start menu:
	All Programs > HP Service Virtualization > <designer server=""> 3.00 &gt; Documentation &gt; User Guide</designer>
HP Service Virtualization	Accessed from the Start menu:
Installation Guide	All Programs > HP Service Virtualization > <designer server=""> 3.00 &gt; Documentation &gt; Installation Guide</designer>
HP Service Virtualization Open	Accessed from the Start menu:
License Agreements	All Programs > HP Service Virtualization > <designer server=""> 3.00 &gt; Documentation &gt; Legal Guide</designer>
HP Service Virtualization Management Help	Available from the Service Virtualization Management interface by clicking <b>Help &gt; Help Center</b> .

# How This Guide is Organized

This guide contains the following chapters:

Name	Description
<b>Chapter 1</b> "Service Virtualization at a Glance" on page 20	Describes how to start working in Service Virtualization.
<b>Chapter 2</b> "Service Virtualization Agents" on page 43	Describes how to install and work with Service Virtualization agents.
Chapter 3 "Virtual Services" on page 78	Describes how to create and configure virtual services.

Name	Description
Chapter 4 "Simulation" on page 110	Describes how to run and monitor simulations using virtual services.
Chapter 5 "Service Virtualization Management" on page 120	Describes how to use the Service Virtualization Management interface to view and control services on different servers.
Chapter 6 "Simulation Modeling" on page 124	Describes how to use data and performance simulation models.
<b>Chapter 7</b> "Composite Application Topology" on page 212	Describes how to use the topology interface to model composite applications.
Chapter 8 "Security" on page 224	Describes how to define security settings.
<b>Chapter 9</b> "HP Test Automation Tools Integration" on page 240	Describes Unified Functional Testing, Service Test, LoadRunner, and Performance Center integrations.
<b>Chapter 10</b> "HP Application Lifecycle Management (ALM) Integration" on page 245	Describes how Service Virtualization integrates with HP ALM.
Chapter 11 "Version Control Support" on page 252	Describes how to work with virtualization projects stored in an SVN repository.
Chapter 12 "Troubleshooting" on page 255	Provides suggestions for dealing with some issues that may arise.

# **Topic Types**

The content in the documentation is organized by topics. Three main topic types are in use: **Concepts**, **Tasks**, and **Reference**.

Торіс Туре	Description	Usage
Concepts	Background, descriptive, or conceptual information.	Learn general information about what a feature does.

Торіс Туре	Description	Usage
Tasks	<ul> <li>Instructional Tasks. Step-by-step guidance to help you work with the application and accomplish your goals.</li> <li>Task steps can be with or without numbering:</li> <li>Numbered steps. Tasks that are performed by following each step in capacity order.</li> </ul>	<ul> <li>Learn about the overall workflow of a task.</li> <li>Follow the steps listed in a numbered task to complete a task.</li> <li>Perform independent operations by completing</li> </ul>
	<ul> <li>Non-numbered steps. A list of self- contained operations that you can perform in any order.</li> </ul>	steps in a non-numbered task.
	<b>Use-case Scenario Tasks</b> . Examples of how to perform a task for a specific situation.	Learn how a task could be performed in a realistic scenario.
Reference	<b>General Reference</b> . Detailed lists and explanations of reference-oriented material.	Look up a specific piece of reference information relevant to a particular context.
	<b>User Interface Reference</b> . Specialized reference topics that describe a particular user interface in detail. Selecting Help on this page from the Help menu in the product generally opens the user interface topics.	Look up specific information about what to enter or how to use one or more specific user interface elements, such as a window, dialog box, or wizard.
Troubleshooting and Limitations	<b>Troubleshooting and Limitations</b> . Specialized reference topics that describe commonly encountered problems and their solutions, and list limitations of a feature or product area.	Increase your awareness of important issues before working with a feature, or if you encounter usability problems in the software.

## What's New in Service Virtualization

This What's New provides an overview of the features that were introduced or enhanced in HP Service Virtualization.

This section includes:

- "What's New in Service Virtualization 3.00" below
- "What's New in Service Virtualization 2.32" on next page
- "What's New in Service Virtualization 2.30" on page 17

### What's New in Service Virtualization 3.00

### Enhanced Protocol Support

SAP is the new family of protocols added to the continually growing Service Virtualization supported protocol set. SAP protocol support enables the virtualization of your SAP® server that communicates with 3rd party SAP servers using SAP RFC/IDOC.

For details, see "How to Configure the SAP RFC/IDOC Agent" on page 51.

### Virtual Service Management

The new web-based Service Virtualization Management interface enables you to control virtual services deployed on any Service Virtualization Server, right from you browser. Installation of the Service Virtualization Designer is not required. You can manage existing services or deploy new services from a project stored in either the file system, or in HP Application Lifecycle Management (ALM).

For details on Service Virtualization Management, see "Service Virtualization Management Overview" on page 121.

#### Integration with HP Application Lifecycle Management

The integration of Service Virtualization with HP Application Lifecycle Management (ALM) enables you to store and collaborate on projects in the ALM repository.

Leverage the ALM repository for project collaboration between integrated products. For example, you can create a virtualization project in the Service Virtualization Designer, save it in ALM, and open it in HP LoadRunner or HP UFT/Service Test.

Virtualization projects are stored as test resources in an ALM project. Both version control enabled and non-version control enabled ALM projects are supported for this integration.

For details, see "HP Application Lifecycle Management (ALM) Integration" on page 245.

#### Simulation Modeling Enhancements

• **Data Masking.** Protect your sensitive data with Data Masking. Configure part of a message to be masked, using either the hash algorithm or by replacing part of the value. Sensitive data are

then never stored in Service Virtualization.

- **Sequential Number Generator.** The Sequential Number Generator simulation function can now be configured to produce zero or non-zero prefixed numbers with a nearly unlimited length.
- Random Number Generator. Generates unique random values. Using this function's formatting capabilities, which are similar to the Sequential Number Generator, you can generate, for example, different ID or key variations.
- **Substring function.** The new Substring simulation function enables you to copy values between parts of the message, similar to the Copy from function, with additional formatting options for the substring.
- **Post-Response Service Call Activity.** Enables you to issue a SOAP call during simulation, after the response is returned. This supports numerous integration scenarios, in which the service delivers the response outside the usual request-response channel by an active call of the client's SOAP endpoint.

For details, see "Simulation Modeling" on page 124.

### Security additions

A new WS-Security signature scheme without a timestamp has been added to the supported WS-Security profiles.

### **Administration Updates**

- License Management. Each Service Virtualization Designer now requires a valid license. Service Virtualization 3.00 integrates with the HP Autopass License Server, enabling you to organize and manage your product licenses and client users. For details, see "Service Virtualization Designer Licensing" on page 22.
- Server Access Control. Previously, server access was limited based on membership in the Service Virtualization Users Windows user group. Service Virtualization 3.00 introduces 3 new user groups, providing increased granularity of permissions, based on user roles. You can grant or deny access to various levels of viewing and managing services and Service Virtualization agents. For details, see the *HP Service Virtualization Installation Guide*.

### What's New in Service Virtualization 2.32

### **Enhanced Protocol Support**

- **SOAP Service Description Learning.** You can now create SOAP virtual services without supplying a WSDL file. When you place the virtual service in Learning mode, Service Virtualization learns about the real service structure, and automatically updates the virtual service.
- **COBOL over WebSphere MQ.** Service Virtualization now supports services that send COBOL messages over WebSphere MQ.

• WebSphere MQ Agent Enhancement. The Service Virtualization WebSphere MQ agent is now able to connect to MQ queue managers using an SSL connection. For details, see "WebSphere MQ Agent Settings" on page 71.

### Functional and Technical Improvements

• **SVN support.** Collaboration is now easier with the introduction of SVN support. You can check out and manage virtualization projects from an SVN repository directly from the Service Virtualization Designer. The standard SVN options for working with the project, such as Commit and Update, are available inside the Designer.

For details, see "Version Control Support" on page 252.

### **Performance Improvements**

HP Service Virtualization 2.32 delivers significant performance improvements. There is now a substantial decrease in the following:

- Simulation response time
- Learning time
- Database size
- Project size

### What's New in Service Virtualization 2.30

### **JDBC Protocol Support**

• You can now virtualize database connections that are using JDBC<sup>™</sup>. Replicate the test environment by using Service Virtualization to create a subset of a large test data set that is suitable for your test. Take a snapshot of the test ata and reset it to the initial state each time the test is run. Replicate the logic of backend services that are implemented as stored procedures.

For details, see "How to Configure the JDBC Agent" on page 47.

### **Simulation Modeling Enhancement**

• Session Identification. Service Virtualization is now able to identify calls originating from the same session, based on default session identifiers. Service Virtualization uses this information to create different tracks based on learned data, and uses the tracks to create different sessions during simulation. You can customize this process by selecting a protocol header (metadata) or an element in the body of a message to use as the session identifier.

For details, see "Session ID Definition Wizard" on page 197.

### **Test Data Management Additions**

• Learned Data Export. You can export learned data to an external data file, enabling you to conduct data driven testing using the same data that Service Virtualization has recorded from real service activity. You can configure synchronization to automatically update exported data after each learning session.

For details, see "Import/Export Data Dialog Box" on page 180.

• Service First Data Driving. Previously, to import data, you needed to manually bind all the external data file columns of an often complex schema to the data model columns. Now, Service Virtualization can create the file structure for you, and bind the columns. Then you can easily enter data into the new external data file. Copy the original file created by Service Virtualization to use for different types of data, replacing the original with another as it suits your testing needs.

For details, see "New Data Driven Rule Dialog Box" on page 179.

### **Functional and Technical Improvements**

#### • Multiple Agent Instances

You can now create multiple instances of a Service Virtualization agent, enabling you to use several JMS message busses or IBM WebSphere MQ servers at the same time. You can also create multiple virtual services for the same real service using different HTTP(S) Proxy agents.

For details, see "How to Configure Agents" on page 44.

#### Endpoint Connection Test

The new **Test Endpoints** functionality verifies that your new HTTP endpoint is not in conflict with another existing endpoint. It also checks that JMS or IBM WebShere MQ queues or topics are properly pre-configured on the target message bus server.

#### • Topology Diagram

When creating or configuring a virtual service, the **Service Endpoint Topology** diagram displays the relationships between the client application, the virtual service, and the real service. The diagram includes the actual configuration information of the endpoints and the Service Virtualization agent, and shows the flow of requests and responses between the different system components.

#### Import Multiple Messages

You can import multiple protocol messages simultaneously, speeding up the data model design process. Specify multiple files to import to add request and/or response data to your data model.

For details, see "Import Request/Response Message Dialog Box" on page 176.

### Localization

The HP Service Virtualization Designer is available in 10 additional languages: Japanese, French, Simplified Chinese, German, Russian, Spanish, Dutch, Italian, Brazilian Portuguese, and Korean.

# Chapter 1

# Service Virtualization at a Glance

This chapter includes:

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How to Use Service Virtualization	24
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How to Manage Service virtualization Servers	26
How to Access a Secured Service Virtualization Server	27
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## **Service Virtualization Overview**

HP Service Virtualization provides a framework for creating virtual services for use in testing your applications under development.

You can create virtual services to simulate the behavior of services with limited access, such as unavailable or expensive services. Service Virtualization places a virtual service between the client application (application under test) and the real service to which you require access. Once you create virtual services to simulate the real services that you require, you reconfigure your client applications to use the virtual services, instead of the real services.

Service Virtualization also enables you to:

- **Design virtual services.** Add data to your virtual service by importing messages, adding external data sources, or by manually entering data.
- Learn service behavior. Record real service behavior to assist you in creating a virtual service to mimic the behavior of the real service.
- **Customize simulation models.** You can create and manipulate data and performance models for use in your virtual services.
- **Create visual models.** Model composite applications by creating a visual map of the services and the relationships between them.
- Integrate. Integrate with HP test automation tools.

### Service Virtualization Components

Service Virtualization consists of the following applications:

- **Designer.** A client application enabling you to create virtual services, and run simulations of real service behavior. The Service Virtualization Designer The Designer is used for design and validation of virtual services within the same desktop environment, and includes an embedded server for hosting virtual services.
- **Server.** (*Optional.*) A standalone server application which hosts the running of virtual services. The Service Virtualization Server is optimized for performance, can contain many more services than the Designer, and can be accessed by multiple Designers.

For details on configuring the Service Virtualization Server, see the *HP Service Virtualization Installation Guide*.

For details on working with the Service Virtualization Server, see "How to Manage Service Virtualization Servers" on page 26.

• Management Interface. (Optional.) A web application enabling you to view and manage all services from Service Virtualization configured servers, without opening the Designer or individual projects. The Service Virtualization Management is installed by default when you

install the Service Virtualization Server.

For more details, see "Service Virtualization Management" on page 120.

For details on starting the Service Virtualization components, see "How to Start Service Virtualization" on next page.

### Getting Started with Service Virtualization

Getting started	<ul> <li>When you start the Service Virtualization Designer, the application opens, displaying the Start Page, with links to common procedures and sample projects. For user interface details, see "Start Page" on page 29.</li> <li>To get started working with Service Virtualization, see "How to Use Service Virtualization" on page 24.</li> </ul>
Main Service Virtualization view	When you open a virtualization project, the main Service Virtualization window opens. For user interface details, see "Service Virtualization Main Window" on page 33.
Main menus	For a description of the main menu options available in Service Virtualization, see "Service Virtualization Main Menus" on page 34.

## **Service Virtualization Designer Licensing**

The Service Virtualization Designer is installed with a 30-day trial license. To continue working with the Designer, you must install a license from HP.

You can obtain HP licenses through the HP Software Licensing Portal.

To migrate a license after installing a new version of the Service Virtualization Designer, visit the HP Software License Manager.

Note: After the evaluation period, the Designer will no longer work, but your data is preserved.

The following types of licenses are available:

- Evaluation license. A 30-day trial license that may be provided by HP.
- Seat license. For use for a single machine running the Service Virtualization Designer.
- Concurrent license. Multiple users share a pool of licenses managed by HP Autopass License Server.
- **Commuter license.** A temporary license you obtain from the license server that enables the Designer to work offline. You can then continue to work in the Designer when you have limited or no access to the license server.

#### Note:

- Concurrent and commuter licenses require access to the HP Autopass License Server. For details on installing the HP Autopass License Server, see the HP Service Virtualization Installation Guide.
- For details on installing a license, see "How to Install a Service Virtualization Designer License" on page 26.

## How to Start Service Virtualization

This section explains how to start the Service Virtualization applications. For more details on each component, see "Service Virtualization Overview" on page 21.

Service Virtualization Designer	From the Windows Start menu, select <b>All Programs &gt; HP Service</b> Virtualization > Designer 3.00 > HP Service Virtualization Designer.
Service Virtualization Server	<ul> <li>Do one of the following:</li> <li>Start the Server as a Windows service: From the Windows Start menu, select All Programs &gt; HP Service Virtualization &gt; Server 3.00 &gt; Server - Start Service.</li> <li>Start the Server as a standalone console application: From the Windows Start menu, select All Programs &gt; HP Service Virtualization &gt; Server 3.00 &gt; Server 3.00 &gt; Server</li> </ul>
	<ul> <li>Sou &gt; Service Virtualization Server</li> <li>For details on working with the Service Virtualization Server, see "How to Manage Service Virtualization Servers" on page 26.</li> <li>Note: The Service Virtualization Server can be configured as either secured or unsecured. To prevent unauthorized access, it may be configured as secured. For additional details and configuration information on the Service Virtualization Server, see the HP Service Virtualization Server section of the <i>HP Service Virtualization Installation Guide</i>.</li> <li>For details on accessing a secured Service Virtualization Server, see "How to Access a Secured Service Virtualization Server" on page 27.</li> </ul>

Service Virtualization Management	To start the Service Virtualization Management service:
	1. Prerequisite: Make sure that the Service Virtualization Server is running.
	<ol> <li>On the Service Virtualization Server machine, from the Windows Start menu, select All Programs &gt; HP Service Virtualization &gt; Server 3.00 &gt; Management Interface - Start Service.</li> </ol>
	To access the Service Virtualization Management interface:
	Open a browser window and enter one of the following URLs:
	The Service Virtualization Management URL:
	https:// <service hostname="" ip="" or="" server="" virtualization="">:<service management="" port="" virtualization=""></service></service>
	By default, the Service Virtualization Management port is 6086.
	The Service Virtualization Server URL:
	<service hostname="" ip="" or="" server="" virtualization="">:<http https="" number="" port="">/management</http></service>
	For more details on Service Virtualization network ports, see the <i>HP Service Virtualization Installation Guide</i> .
	For more details on Service Virtualization Management, see "Service Virtualization Management Overview" on page 121.

## How to Use Service Virtualization

This task describes the overall Service Virtualization workflow.

### 1. Start the Service Virtualization components

Service Virtualization includes a Designer with an embedded server, an optional standalone server, and a management interface.

For details on these components, see "Service Virtualization Overview" on page 21.

For details on starting the components, see "How to Start Service Virtualization" on previous page.

#### 2. Install a Service Virtualization Designer license

The Designer is installed with a 30-day evaluation license. To continue working with the

Designer, you must obtain and install a valid license from HP.

For details on installing the Designer license, see "How to Install a Service Virtualization Designer License" on the facing page.

### 3. Configure Service Virtualization agents

Configure the protocol-specific agents that handle communication between clients and real or virtual services. For task details, see "How to Configure Agents" on page 44.

### 4. Optional: Model composite applications

Create a visual map of the services in your composite applications, and the relationships between them. Group services into larger composites, mark service types, and display the service calls between them. For task details, see "How to Model Composite Applications" on page 213.

### 5. Create virtual services

Create virtual services to simulate real services with limited access or that are unavailable. For task details, see "How to Create a Virtual Service" on page 85.

### 6. Configure virtual services

Set up your virtual services to create a simulation for your testing purposes. Configure security, logging, protocol, and server settings to meet your needs. For task details, see "How to Configure Virtual Services" on page 86.

#### 7. Configure clients

Reconfigure your client applications to use the virtual services instead of the real services. Service Virtualization enables you to manipulate virtual services to get different results.

#### 8. Learn service behavior

Record the behavior of the real service in order to learn its requests and responses. For task details, see "How to Run Simulations" on page 111.

#### 9. Run simulations

Use virtual services to simulate real services during your testing process. For task details, see "How to Run Simulations" on page 111.

#### 10. Review and monitor services

Monitor services during learning and simulation sessions. For details, see "How to Run Simulations" on page 111.

### 11. Design and configure simulation models

Create and customize data and performance models to meet your needs. Learn real service behavior, create customized rules for virtual service behavior, add service calls, and add external data sources. For task details, see "How to Manage Simulation Models" on page 133.

### 12. Optional: Integrate with HP Test Automation tools

Integrate Service Virtualization with HP test automation tools. For details, see "HP Test Automation Tools Integration" on page 240.

### How to Install a Service Virtualization Designer License

This task describes how to install a license for the Service Virtualization Designer.

To learn more, see "Service Virtualization Designer Licensing" on page 22.

- 1. From the Help menu, select License Management.
- 2. Select a license type. For user interface details, see "License Installation Wizard Selection Page" on page 37.
- 3. Install the license. For user interface details, see "License Installation Wizard Installation Pages" on page 39.

### How to Manage Service Virtualization Servers

This task describes how to use Service Virtualization Servers for your virtual services.

For details on starting a Service Virtualization Server, see "How to Start Service Virtualization" on page 23.

### View, add, or delete Servers

The Servers page displays all configured Service Virtualization Servers.

From the main menu, select **Tools > Options**. Click the **Servers** tab.

When you add a Server, it is added to the list of available Servers, enabling you to select this Server when you create a new Service Virtualization project.

### View Server status

The Servers page displays status information for each Service Virtualization Server.

From the main menu, select **Tools > Options**. Click the **Servers** tab.

#### **Change Servers**

Move the virtual services in the open project to a different server.

From the main menu, select **Project > Change Server**.

### Connect to a Server with a different user

If you are working with a secured Service Virtualization Server, your access may be limited based on permissions assigned to your user. For details, see the "How to Access a Secured Service Virtualization Server" below.

To connect to a server with a different user, from the main menu, select **Tools > Options**, and click the **Servers** tab. Right-click a server and select **Connect using different credentials**.

## How to Access a Secured Service Virtualization Server

When the HP Service Virtualization Designer contacts a secured Service Virtualization Server for the first time, it requests user input in order to establish a secured communication channel.

You can determine whether the Service Virtualization Server is secured based on its URL. The URL of an unsecured server begins with **http**, whereas the URL of the secured server begins with **https**. For example, the URL of a secured server might be

https://mymachine.com:6085/management. In addition, the port of the secured server is different from that of the unsecured server.

#### Note:

• When you are working with a secured Service Virtualization Server, the actions available to you and the information displayed in the Service Virtualization Designer vary, based on your user access permissions. For example, a user who is not assigned to any of the Service Virtualization user groups cannot view any agent data or any services deployed on the server.

For details on the Service Virtualization user groups, see the *HP Service Virtualization Installation Guide*.

You can reconnect to a server with a different user. From the main menu, select Tools > Options, and click the Servers tab. Right-click a server and select Connect using different credentials.

#### To access a secured Service Virtualization Server:

1. When the HP Service Virtualization Designer contacts a secured Service Virtualization server for the first time, the following dialog box opens:

🗱 HP Service Virtualization Designer
The certificate of the server <b>localhost:6085</b> is not trusted
Do you want to accept the certificate anyway?
Trust the certificate permanently
<u>Y</u> es <u>N</u> o

Select **Trust the certificate permanently** to prevent the Designer from prompting you again.

2. Click **Yes** to accept the certificate. The following dialog box opens:

🔐 HP Service Virt	ualization Designer
Enter credent	ials to authenticate the server <b>localhost:6085</b> :
<u>U</u> sername:	username
Password:	••••••
Remember of	redentials
	OK Cancel

Enter credentials to connect to the Service Virtualization Server. For details on credential validation and user authentication, see the *HP Service Virtualization Installation Guide*.

### Service Virtualization User Interface

This section includes:

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Service Virtualization Main Window	33
Service Virtualization Main Menus	34
License Installation Wizard	37

## Start Page

This page includes links to your most recently opened projects, links to common procedures, and a tab for the installed sample projects.

Start Page		⇒ ×
() Service Vir	rtualization	
Recent Projects  Vitualization Project  Simulation Vitualization Project  Simulation Visualization Project  Simulation	Get Started       Sample Projects         Iteam Existing Service       Vitualize on existing service and learn its behavior.         Image: Service of the service.       Design Virtual Service         Image: Design Virtual Service of the service of the service of the service.       Discover Services	
	Decover services suitable for virtualization called from your tested client application.	
Show page on startup		

To access	When you open Service Virtualization, the Start Page opens by default.
	To open the page manually, from the View menu, select <b>Start Page</b> .
Relevant tasks	"How to Create a Virtual Service" on page 85
See also	"Service Virtualization Overview" on page 21
	"Service Virtualization Main Window" on page 33
	"Service Virtualization Main Menus" on page 34

### General

<b>UI Element</b>	Description
<b>Recent Projects</b>	Displays links to the most recently opened projects.
Get Started page	Displays links to common procedures. For details, see Get Started Page below.
Sample Projects page	Displays links to the demo projects, installed with Service Virtualization. For details, see Sample Projects Page below.
Close page after project load	Closes the Start Page when you open a project.

<b>UI Element</b>	Description
Show page on startup	Displays the Start Page each time you start Service Virtualization.

### Get Started Page

This page provides links to several common procedures you perform in Service Virtualization.

<b>UI Element</b>	Description
Learn Existing Service	Enables you to virtualize an existing service and learn its behavior.
	Creates new virtualization project and a virtual service, and then places the new service in Learning mode.
	For user interface details, see "Virtual Service Editor" on page 104.
Design Virtual	Enables you to design a virtual service and define its behavior.
Service	Creates new virtualization project and a virtual service, and opens the Data Model Editor.
	For user interface details, see "Data Model Editor" on page 163.
Discover Services	Enables you to discover services suitable for virtualization in your application under test.
	Creates a new virtualization project, and opens the Service Discovery dialog box, enabling you to find all services used by an application.
	For user interface details, see "Service Discovery Dialog Box" on page 222.
Data Driven Simulation	Enables you to virtualize a service and define its behavior using data from an external source.
	Creates a new virtualization project and a virtual service with an external data rule, and then opens the Data Model Editor.
	For user interface details, see "Data Model Editor" on page 163.
Composite Application Testing	Enables you to describe the topology of a composite application, and virtualize services with limited access.
	Creates a new virtualization project and a topology, and opens the Topology editor.
	For user interface details, see "Topology Editor" on page 217.
Service Administration	Enables you to view all services from configured servers, without opening individual projects.
	For user interface details, see "Service Administration" on page 117.

### Sample Projects Page

Service Virtualization application demos are installed as an option during the Service Virtualization Designer installation process. Each sample project has an accompanying Readme file in PDF format, which provides additional information on working with the sample project. The sample project folders are located, by default, in **Your Documents folder>\HP Service Virtualization\Demos**.

The following demos are included:

UI Element	Description
Claim Processing JDBC Demo	This demo shows a composite application consisting of JDBC services.
Claim Processing Demo	This demo shows the simulation of a backend SOAP service with limited accessibility in a simple composite application. The service can optionally use HTTP authentication (see demo readme).
Claim Processing REST Demo	This demo shows a composite application consisting of 2 REST services using JSON and XML data formats.
Claim Processing Faults Demo	The simulation of a backend SOAP service with limited accessibility in a simple composite application. The simulated service returns either regular response or one of 3 different SOAP faults.
Claim Processing Security Demo	This demo shows a composite application consisting of 2 SOAP services. It allows demonstrating how to record and simulate the behavior of one of the SOAP services. Both services authenticate each other using X509 certificates.
Claim Processing Standalone Server Demo	This demo shows a composite application consisting of 2 SOAP services. It allows demonstrating how to record and simulate the behavior of one of the SOAP services on a standalone server.
Claim Approval JMS Demo	This demo shows a composite application consisting of 3 SOAP services. It allows demonstrating how to record and simulate the behavior of two SOAP services. Demo is similar to the Claim processing service simulation demo. One XML over JMS service (TIBCO EMS approval service) has been added to the topology here and is being simulated, too.
Claim Approval WebSphere MQ Demo	This demo shows a composite application consisting of 3 SOAP services. It allows demonstrating how to record and simulate the behavior of two SOAP services. The demo is similar to the Claim Processing service virtualization demo. One XML over WebSphere MQ service (WebSphere MQ approval service) has been added to the topology here, and is being simulated, too.

UI Element	Description
IBM IMS Transaction Manager Phonebook Demo	This demo shows virtualization of the Phonebook IMS Transaction Manager application. The client is using IBM IMS Connect API to communicate with IMS TM over TCP/IP.
Request Tracking Service Activity Demo	This demo shows a composite application consisting of 4 SOAP services. It allows demonstrating how to record and simulate the behavior of two SOAP services. In addition, activity can be demonstrated by calling the third SOAP service from a simulated service.
ShoppingCart - No Sessions Demo	This demo shows virtualization of stateful shopping cart service, where only one client is using the stateful service.
ShoppingCart - Sessions by Clients Demo	This demo shows virtualization of stateful shopping cart service, where multiple concurrent clients are using the stateful service and private session is generated for each client.
ShoppingCart - Sessions by Orders	This demo shows virtualization of stateful shopping cart service, where multiple concurrent clients are using the stateful service and sessions are generated per each shopping order. The checkout operation finishing shopping order destroys the client session (the next operation creates a new one).
Test Data Management - Import Data Demo	This demo shows the virtualization of a backend SOAP service with simulation data imported from an external data file.
Test Data Management - Export Data Demo	This demo shows the virtualization of a backend SOAP service with the export of learned data to an external data file.

### Service Virtualization Main Window

🌃 Shopping Sessions - HP Se	rvice Virtualization Designer
File New Project Tools Window H	elp
🕸 🔀 🗟 🎒 🧿	
rtualization Explorer 🛛 🔻 🛪	Shopping Cart 🗸
Construction of the second of the secon	Shopping Cart What service created from service ShoppingCart located at http://locahosti.8109/ServiceSimulation/Demo/ShoppingCartService/ShoppingCartService
	Stand-By Are neargost received         Simulation Models         Case hold:         Case hol
* Shopping Cart Configuratio     Shopping Cart Data Model     Shopping Cart Performance N     Offline	Add   Edt   Delete   Duplicate Add   Edt   Delete   Duplicate
<ul> <li>Service description - Shoppin</li> <li>(http://www.example.on)</li> </ul>	Wrtud Service:         http://IMACHINE.r2200(ShoppingCart         Appril:         HTTP Safeway           Read Service:         http://icathoct.8108/ServiceSimulation(Dem/ShoppingCartService         Configure           SCAP Version:         11.2         Edit         Edit
	Message Lagging:
Virtualizati 🎵 Tools	Protocol: SOAP over HTTP/HTTPS Operations: additem, checkup, removeillem
untime View	* 1
Al  Virtual Service Status	Messages (Unique) Data Model Performance Model Project Server
Learn 🔽 🕞 Simulate 🛛 🖓 Sim	U (U) Robit Service Maximal Performance Shopping Sessions Embedded Server     More Actions
Problem List Runtime View	

To access	Use one of the following:
	• From the File menu, select <b>Open Project/Solution</b> .
	• From the Start Page, under Recent Projects, select a project to open.
Important information	To display panes that are not displayed by default, click the <b>View</b> menu and select a pane.
Relevant tasks	"How to Use Service Virtualization" on page 24
See also	"Service Virtualization Overview" on page 21
	"Service Virtualization Main Menus" on the facing page

The Service Virtualization Designer window contains the following key elements (unlabeled elements are shown in angle brackets):

<b>UI Element</b>	Description
<main display pane&gt;</main 	Displays all open virtualization entities.
<lower pane&gt;</lower 	Displays the Problem List or the Runtime View. For details, see "Problem List" on page 116 and "Runtime View" on page 115.
<side bar=""></side>	Displays links to Virtualization Explorer, Project pane, and Tools pane, when they are pinned.

<b>UI Element</b>	Description
<main menus and buttons&gt;</main 	For command and button descriptions, see "Service Virtualization Main Menus" below.
Virtualization Explorer	Located in the left pane of the window, displays the virtualization entities in your open project in a hierarchical tree structure. For details, see "Virtualization Explorer" on page 102.
Project pane	Located in the left pane of the window, displays the list of files included in your open project. To rename a project, right-click the project name and select <b>Rename Project</b> .
Tools pane	Located in the left pane of the window, displays items that you can add to your topology. For details, see "Topology Editor" on page 217. Also used when editing an XML schema. For details, see "Service Description Editor" on page 195.
Runtime View	Located in the lower pane of the window, displays the virtual services included in your open project. For details, see "Runtime View" on page 115.
Problem List	Located in the lower pane of the window, displays problems that occur during the application or server run. For details, see "Problem List" on page 116.

### **Service Virtualization Main Menus**

This section describes the main menu options available in Service Virtualization.

To access	The main menu is available from all Service Virtualization views.
Relevant tasks	"How to Use Service Virtualization" on page 24
See also	"Service Virtualization Overview" on page 21
	"Service Virtualization Main Window" on previous page

User interface elements are described below.

<b>UI Element</b>	Description
File > Checkout	Enables you to check out a project or solution from SVN. For details, see "Version Control Support" on page 252.
File > Close File	Closes the currently active project window.
File > Close Project/Solution	Closes the open project.

UI Element	Description
File > Export Project	Enables you to save your project as a file in the file system. The file is saved with the default file extension <b>.vproja</b> .
File > New > Topology	Opens the Summary of New Topology dialog box, enabling you to create a new topology. For details, see "Summary of New Topology Dialog Box" on page 217.
	Note: Available in an open project.
File > New > Virtual Service	Launches the new virtual service wizard. For details, see "Create New Virtual Service Wizard" on page 91.
	Note: Available in an open project.
File > New > Virtual Service from Template	Opens the Choose Template for Virtual Service dialog box, enabling you to create a new virtual service based on an existing template. For details, see "How to Create a Virtual Service" on page 85.
	Note: Available in an open project.
File > New > Virtualization Project	Enables you to create a new virtualization project. For details, see "Summary of Virtualization Project Dialog Box" on page 90.
File > Open Project/Solution	Opens your file system browser, enabling you to select a virtualization project to open.
File > Recent Projects	Displays list of recently opened projects, enabling you to select a project to open.
	Select Clear recent project list to delete the list.
File > Reload File	Not in use.
File > Reload Solution	Reloads solution from file system.
File > Save	Saves changes made in the editor window in which you are currently working.
File > Save All	Saves changes made in all open editor windows.

<b>UI Element</b>	Description
File > Save Project As	Makes a copy of the open project, and saves it with a new name.
View > Problem List	Displays the Problem List in the bottom pane of the Service Virtualization window. For details, see "Problem List" on page 116.
View > Projects	Opens the Projects pane, displaying the files included in the open project.
View > Runtime View	Displays the Runtime View in the bottom pane of the Service Virtualization window. For details, see "Runtime View" on page 115.
View > Service Administration	Displays the Service Administration window. For details, see "Service Administration" on page 117.
View > Start Page	Opens the Service Virtualization Start Page. For details, see "Start Page" on page 29.
View > Task List	Opens the Task List pane. For details, see "Topology Editor" on page 217.
View > Tools	Opens the Tools pane, displaying a toolbox of items for the Topology editor, and also for the XML and XML schema editor.
View > Tools > Files	Opens the Files pane, displaying your local file system in a browser.
View > Tools > Search Results	Not in use.
View > Tools > XPath Query	Not in use.
Project > Open Folder in Explorer	Opens the open project's folder in your file system browser, displaying the files included in the project.
Project > Change Server	Opens the Change Server for <open project=""> Project dialog box, enabling you to redeploy virtual services in the current project to another server.</open>
Tools > Clear Project Cache	Clears project cache and reloads the project. If an error occurs, for example, if you are unable to open one of the Service Virtualization editors, it is recommended to try using this option.
Tools > Options	Opens the Options dialog box.
	• To configure Service Virtualization agents, click the <b>Agents</b> tab.
	• To view, add, or delete servers, click the <b>Servers</b> tab.
<b>UI Element</b>	Description
---------------------------------------	--
Tools > Refresh Sample Projects	Opens the Refresh Sample Project dialog box, enabling you to delete the current contents of the sample project folder and reload new copies of the sample virtualization projects.
	<b>Note:</b> When you refresh the sample project folder, all custom changes made in this folder are lost.
ALM > ALM Connection	Enables you to define settings for connecting to HP Application Lifecycle Management (ALM). For details on integrating with HP ALM, see "HP Application Lifecycle Management (ALM) Integration" on page 245.
ALM > Check Out	Opens the Check Out dialog box, enabling you to check out a virtualization project that is stored in an ALM version controlled project.
ALM > Undo Check Out	Discards any changes you made in the checked out project, and opens the last checked in version in read-only mode.
ALM > Check In	Opens the Check In dialog box, enabling you to check in your changes to ALM.
ALM > Version History	Displays details of all versions of the open project.
Window > Close All Documents	Closes all open project windows.
Window > Next Window	Moves to the next open window in your project.
Window > Previous Window	Moves to the previous open window in your project.

## **License Installation Wizard**

This section includes:

License Installation Wizard - Selection Page	37
License Installation Wizard - Installation Pages	39

### License Installation Wizard - Selection Page

This wizard page enables you to:

- select a Service Virtualization Designer license to install
- view currently installed licenses

HP Service Virtualization Designer License Installation			? 💌				
Choose the t	Choose the type of license you want to work with				Ô		
Evaluation Continuation	Evaluation License (19 days left) Continue working with an Evaluation license.						
© Concur Obtain	rrent Licer a license f	<b>nse</b> from your oganizatio	on's license server.				
Seat Li Install a	<b>cense</b> a license u	sing a license key or	file.				
Comm Get or	Commuter License     Get or return a commuter license						
Licenses o	urrently i	nstalled					
Status	Locked	Туре	Expiration Date	Capacity			
1	<b>1</b>	Permanent		1			
						Next >	Cancel

To access	From the Help menu, select License Management.
Wizard map	License Installation Wizard - Selection Page > "License Installation Wizard - Installation Pages" on next page
Important information	If you do not yet have a license, the wizard guides you how to obtain one.
Relevant tasks	"How to Install a Service Virtualization Designer License" on page 26
See also	"Service Virtualization Designer Licensing" on page 22

This section includes:

- "License Types" below
- "Currently Installed Licenses " on next page

User interface elements are described below:

#### **License Types**

<b>UI Element</b>	Description
Evaluation License	Use a 30-day trial license that may have been provided to you by HP.
	Displays remaining days until license expiration.
Concurrent License	Obtain a license from the HP Autopass License Server.
	Multiple users share a pool of licenses stored on a license server. The license is linked to the machine's IP address.

<b>UI Element</b>	Description
Seat License	Obtain and install a permanent license for your Designer machine.
	For use for a single machine running the Service Virtualization Designer.
	The license is linked to the machine's Host ID, a unique number generated by Service Virtualization, and bound to the machine's hardware.
Commuter License	A temporary license provided by the License Server that enables the Designer to work offline.
	Request a commuter license when you will have limited or no access to the license server, and cannot check out a license. A commuter license is valid for 14 days.

#### **Currently Installed Licenses**

<b>UI Element</b>	Description
Status	• X Invalid. The license has expired, or the license and host IDs do not match.
	• 🔺 To be expired. The license will expire on the expiration date listed.
	• Valid. The license is active.
Locked	The license is linked to a specific client (Designer) machine.
Туре	<b>Instant On.</b> The temporary license that is installed when you install the Service Virtualization Designer.
	Evaluation. A 30-day trial license is installed.
	Floating. A concurrent license is installed.
	Permanent. A seat license is installed.
	Commuter. A commuter license is installed.
Expiration Date	Displays the date on which the license will expire.
	<b>Note:</b> When a <b>floating license</b> expires, it is automatically renewed if you are still working in the Designer.
Capacity	Quantity of available licenses.

## License Installation Wizard - Installation Pages

These wizard pages enable you to:

- request a floating or commuter license from the license server
- request a new seat license from HP
- install a license
- return a commuter license to the license server

Important information	<ul> <li>See the relevant section below for the type of license you want to install.</li> <li>Concurrent and commuter licenses require access to the HP Autopass License Server. For details on installing the HP Autopass License Server, see the HP Service Virtualization Installation Guide.</li> </ul>
Wizard map	"License Installation Wizard - Selection Page" on page 37 > License Installation Wizard - Installation Page
Relevant tasks	"How to Install a Service Virtualization Designer License" on page 26
See also	"Service Virtualization Designer Licensing" on page 22

This section includes:

- "Concurrent License Installation" below
- "Seat License Installation" on next page
- "Commuter License Installation" on next page

User interface elements are described below:

#### **Concurrent License Installation**

The concurrent license page includes the following options:

UI Element	Description
Host	The host name or IP address of the HP Autopass License Server.
Port	The communications port of the license server. Default value: 5814
Change Server	Enter the host and port details of a different server, and click <b>Change Server</b> to connect to the new server.

UI Element	Description
Get Floating License	Retrieves a license from the license server. Concurrent licenses are valid for a period of 15 minutes, after which they are automatically renewed. If you are using a concurrent license model and have access to a license server, a license is automatically checked out each time you open the Designer. When you close the Designer, the concurrent license is returned to the license server.
Return Floating License	If you no longer need the license, you can return it to the license server. Alternatively, closing the Designer returns the license to the server.

#### Seat License Installation

The seat license page includes the following options:

UI Element	Description
Obtain a new Seat license	Click the <b>HP Licensing for Software</b> link to connect to HP, and sign in to request a license.
Host ID	Record this detail. It is required when you submit a request for a new seat license. Click <b>Copy to Clipboard</b> to copy the Host ID.
Install your Seat license	Select an installation option. Browse to select a license file, or enter a license key.
Next	Opens the License File Content page. Select a license to install.

#### **Commuter License Installation**

The commuter license page includes the following options:

UI Element	Description			
Host	The host name or IP address of the HP Autopass License Server.			
Port	The communications port of the license server.			
Change Server	Enter the host and port details of a different server, and click <b>Change Server</b> to connect to the new server.			
Online Operations: (For use when you have access to the license server)				
Get Commuter License	Request a license from the license server that you can use offline for a specific number of days.			

UI Element	Description
Recover Commuter License	Download a new copy of your commuter license if the license was lost.
Return Commuter License	Returns the commuter license to the license server when you no longer need it.
Offline Operatio	ns: (For use when you cannot access the license server.)
Create a File to Get Commuter License	Generates a license input file used for requesting a new commuter license. You can send the file to a user with access to the license server. A license server user can then check out a license, and send it back to you.
Install Commuter License	Installs the license from the license file.
Create a File to Return Commuter License	Generates a license file that contains the license information, in order to return a commuter license to the license server. You can then send the file to a user with access to the license server.

## Chapter 2

## **Service Virtualization Agents**

#### This chapter includes:

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How to Configure Agents	44
Agents User Interface	.59

## **Service Virtualization Agents Overview**

This chapter provides instructions on configuring Service Virtualization Agents. Agents handle communication between a client and a real or virtual service. Each agent handles communication specific to the transport and message protocols you are using. You must configure the Service Virtualization agent for each protocol your services are using.

The Service Virtualization agents must be configured on each server (embedded or standalone) on which the services are deployed. You can add multiple instances of an agent to the same server, configuring each one differently.

**Note:** Not all agents are installed by default. For details on installing an agent manually, see the relevant help section on the agent you require.

For task details on configuring the Service Virtualization agents, see "How to Configure Agents" below.

## How to Configure Agents

This task describes how to configure Service Virtualization agents. There are several preconfigured agent instances with default configurations. You can use these instances, modify them, or define new instances.

- This task is part of a higher-level task. For details, see "How to Use Service Virtualization" on page 24.
- To learn more about Service Virtualization Agents, see "Service Virtualization Agents Overview" above.

#### To configure an agent:

- 1. From the main menu, select **Tools > Options** and click the **Agents** page.
- 2. In the left pane, expand the server to display the available agents and configurations.
- 3. Select the agent you want to configure, and fill in the properties.
- 4. To add another configuration of an agent, click **Add**. The new configuration is added and you can modify its settings.

For user interface details, see "Agents Page" on page 60.

This section also includes:

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## How to Configure the HTTP/HTTPS Gateway Agents

This task describes how to configure the Service Virtualization HTTP/HTTPS gateway agents.

The HTTP/HTTPS Gateway Agents serve to virtualize HTTP communication. A virtual HTTP endpoint is created to mediate between a client and a real service HTTP endpoint. During the learning process, real communication is forwarded to a real service HTTP endpoint and the communication is recorded.



#### 1. Configure the agent settings

From the main menu, select **Tools > Options**. On the Agents Page, select **HTTP Gateway** or **HTTPS Gateway**. For user interface details, see "HTTP/HTTPS Gateway Agent Settings" on page 60.

#### 2. Forward unknown endpoint requests

If you are not able to reconfigure clients on a service basis (i.e. changing the endpoint of each service to a virtual service), and all of your HTTP(S) services reside on a single host, you can use the **Forwarded to Host** option on the Agents Page.

Example:

The client is calling several backend services:

http://esb.demo.hp.com:8080/BackendServices/MemberAccounts

http://esb.demo.hp.com:8080/BackendServices/ExchangeRate

http://esb.demo.hp.com:8080/BackendServices/Approval

You are only virtualizing the MemberAccounts service but are only able to reconfigure the application to use another host for all services rather than changing the endpoint of just the one MemberAccounts service in the application.

You reconfigure your application to use the SV Server HTTP Gateway at:

http://svserver.hp.com:7200 instead of http://esb.demo.hp.com:8080

The application will access backend services at these endpoints:

http://svserver.hp.com:7200/BackendServices/MemberAccounts

http://svserver.hp.com:7200/BackendServices/ExchangeRate

http://svserver.hp.com:7200/BackendServices/Approval

You create the MemberAccounts service so this functions but the other services would be inaccessible for the application until you virtualized all of them.

To avoid the virtualization of all backend services set the DEFAULT TARGET HOST to

http://esb.demo.hp.com:8080

Now all requests to non-virtualized services are forwarded to the http://esb.demo.hp.com:8080 host and are reaching the real services you do not intend to virtualize now.

**Note:** The **Forwarded to Host** field can contain a base URL in several formats: the host, optional port, and optional base path, i.e.: http://esb.demo.hp.com, http://esb.demo.hp.com:8080

#### 3. Perform additional configuration for the HTTPS Gateway Agent

a. If you are using the HTTPS Gateway Agent, you must assign a certificate to a port used for listening.

Generate a certificate with a private key (if you don't have one), import the certificate to either a current user's personal store (for an embedded server) or to a local machine's personal store (for a standalone server). Grant access to the private key to the current user (for an embedded server) or to the account running the standalone server.

• To configure HTTP ports and to install a self-signed SSL certificate, use the Service Virtualization tool configureHttpAgent.bat. For instructions, see the section on how to install a self-signed certificate in the *HP Service Virtualization Installation Guide*.

- To install a custom certificate, use the Service Virtualization tool addCustomCertificate.bat. For instructions, see the section on how to install a custom certificate in the HP Service Virtualization Installation Guide.
- b. To set proxy agent configuration properties, see "How to Configure the HTTP(S) Proxy Agent" below.

## How to Configure the HTTP(S) Proxy Agent

This task describes how to configure the Service Virtualization HTTP(S) proxy agent.

The HTTP(S) Proxy Agent serves to virtualize HTTP and HTTPS communication. No endpoint is created, and an HTTP(S) proxy is used to receive and forward client communication to a real service HTTP or HTTPS endpoint.

#### 1. Configure the agent settings

The HTTP(S) proxy agent dynamically generates certificates for requested hosts on the fly. The certificates are signed by the configured certificate authority (CA). Configure the CA certificate and private key in the HTTP(S) Proxy agent configuration.

From the main menu, select **Tools > Options**. On the Agents Page, select **HTTP(S) Proxy**. For user interface details, see the "HTTP(S) Proxy Agent Settings" on page 62.

#### 2. Configure the client

The client must trust certificates signed using a configured CA or the communication may fail due to rejection by the client.

## How to Configure the JDBC Agent

This task describes how to configure the JDBC agent. The JDBC agent is used to virtualize both J2EE and J2SE applications that are using JDBC<sup>™</sup> API to access persistent storage.

The JDBC agent consists of two components:

- **JDBC agent.** You configure the JDBC agent in Service Virtualization. The agent listens for requests from the JDBC driver.
- JDBC driver. You install the JDBC driver in your application under test. The driver communicates remotely with the JDBC agent in Service Virtualization. It intercepts each JDBC API call and depending on the current service mode, forwards the traffic accordingly. If the virtual service is in either Standby or Learning mode, the driver forwards the traffic to the actual JDBC driver. If the virtual service is in Simulating mode, the virtual service simulates the API response.

The JDBC driver is uniquely generated according to the configuration of the JDBC agent and agent host that you define in Service Virtualization. The driver is invoked only if either a virtualization JDBC connection string is used (J2SE), or if the virtual data source is explicitly created and used by the application (J2EE). If a non-virtualization connection string or data

source is used, the virtualization JDBC driver is inactive and has no impact on the application under test.

#### 1. Prerequisites

The following types of integration scenarios are supported:

- A J2SE application using JDBC 3.0 or 4.0/4.1 API.
- A Java<sup>™</sup> based application deployed on a J2EE application server (J2EE version 1.4 or later).

#### 2. Configure the agent settings

From the main Service Virtualization menu, select **Tools > Options**. On the Agents Page, select JDBC Agent. For user interface details, see the "JDBC Agent Settings" on page 64.

#### 3. Reconfigure a standard J2SE application

To reconfigure a typical Java Standard Edition (J2SE) application for JDBC API virtualization:

- a. Make sure you have configured the agent settings correctly.
- b. Download the JDBC driver. On the Agents Page, click **Download JDBC driver for this** configuration.
- c. Deploy the driver in the application class path.
- d. Create an **SQL over JDBC** virtual service, and use the actual JDBC connection string as the Virtual Service Real Connection String.
- e. Reconfigure the application under test to use virtual endpoint. If you are working with JDBC version 3.0, you must also update the JDBC driver class name to the virtualization driver class name. The virtual driver class name is com.hp.sv.jdbc.agent.jdbc3.VirtualDriver.

#### 4. Reconfigure a standard J2EE application

To reconfigure a typical Java Enterprise Edition (J2EE) application, or a J2SE application using JDBC data sources, for JDBC API virtualization:

- a. Make sure you have configured the agent settings correctly.
- b. Download the JDBC driver. On the Agents Page, click **Download JDBC driver for this** configuration.
- c. Create an additional J2EE data source using the newly created virtual JDBC driver. See the J2EE application server documentation for more details.
- d. Reconfigure the application under test to use the newly created data source.

e. Create an **SQL over JDBC** virtual service, and use the name of the newly created data source as the Real Connection String.

## How to Configure the JMS Generic Agent

This task describes how to configure the Service Virtualization Generic JMS agent.

The Generic JMS Agent serves to virtualize JMS communication in any JMS provider (IBM® WebSphere® MQ, Weblogic, JBoss, ...). It uses general JMS API and JNDI to lookup and work with JMS resources (context factories, connection factories, queues, topics). It loads Java JVM (Java Virtual Machine) with JMS provider libraries required for JMS communication in process.

**Note:** The Generic JMS Agent only supports JMS BytesMessage and TextMessage according to the SOAP over JMS specifications.



#### 1. Prerequisites

The Generic JMS Agent uses a standard JMS API with JNDI lookups. You must first configure an environment with JMS resources.

- a. **Configure JMS.** Create virtual destination(s) in JMS server (Webpshere MQ, Weblogic, JBoss, ...)
  - i. Create a Virtual Request destination.
  - ii. If you want to use a permanent **ReplyTo** destination, create a Virtual Reply destination. If not, a temporary **ReplyTo** destination is used.
- b. **Configure JNDI.** Configure JNDI mapping for virtual destinations enable the agent to lookup destinations in JNDI.

- i. Configure mapping for the Virtual Request destination.
- ii. If a permanent **ReplyTo** destination is used, configure mapping for the Virtual Reply destination.

#### 2. Configure the agent settings

From the main menu, select **Tools > Options**. On the Agents Page, select **JMS**. For user interface details, see the "JMS Generic Agent Settings" on page 66.

Examples of Generic JMS Agent configuration

#### Agent configuration for WebLogic 10.3

- JNDI URL: t3://czvm58.devlab.ad:7001/
- Context Factory: weblogic.jndi.WLInitialContextFactory
- Class Path:

C:\Temp\WL103\wIthint3client.jar

**Note:** The above sample used WebLogic Thin T3 Client. In case of issues, please use other Weblogic Client libraries (e.g. "WebLogic Full Client" using "wlfullclient.jar"). See chapter 2 of "Overview of Stand-alone Clients" in your "Oracle® Fusion Middleware Programming Stand-alone Clients for Oracle WebLogic Server 11g Release 1" documentation for more details.

#### Agent configuration for MQ-7.0.1.3 on WAS-6.1.0

- JNDI URL: corbaloc::czvm24.devlab.ad:2809/NameServiceServerRoot
- JNDI URL: corbaloc::czvm24.devlab.ad:2809/NameServiceServerRoot
- JNDI URL: corbaloc::czvm24.devlab.ad:2809/NameServiceServerRoot

C:\Temp\WAS6\com.ibm.mq.jar;

C:\Temp\WAS6\com.ibm.mq.jmqi.jar;

C:\Temp\WAS6\com.ibm.mqjms.jar;

C:\Temp\WAS6\com.ibm.ws.admin.client\_6.1.0.jar;

C:\Temp\WAS6\com.ibm.ws.runtime\_6.1.0.jar;

C:\Temp\WAS6\connector.jar;

C:\Temp\WAS6\dhbcore.jar;

C:\Temp\WAS6\fscontext.jar;

- C:\Temp\WAS6\ibmorb.jar;
- C:\Temp\WAS6\jms.jar;
- C:\Temp\WAS6\jndi.jar;
- C:\Temp\WAS6\Idap.jar;
- C:\Temp\WAS6\providerutil.jar

#### Agent configuration for JBoss 6.0

- JNDI URL: jnp://[machine-name]:1099/
- Context Factory: org.jnp.interfaces.NamingContextFactory
- Class Path:
  - C:\Temp\JBAS6\concurrent.jar;
  - C:\Temp\JBAS6\hornetq-core-client.jar;
  - C:\Temp\JBAS6\hornetq-jms-client.jar;
  - C:\Temp\JBAS6\jboss-client.jar;
  - C:\Temp\JBAS6\jboss-ejb3-core-client.jar;
  - C:\Temp\JBAS6\jboss-ejb3-ext-api.jar;
  - C:\Temp\JBAS6\jboss-jms-api\_1.1\_spec.jar;
  - C:\Temp\JBAS6\jboss-logging.jar;
  - C:\Temp\JBAS6\jnp-client.jar;
  - C:\Temp\JBAS6\netty.jar

## How to Configure the SAP RFC/IDOC Agent

This task describes how to configure the SAP RFC/IDOC agent. The SAP RFC/IDOC Agent handles communication between a SAP® or SAP NetWeaver® Process Integration (PI) system, and a real or virtual SAP service.

#### 1. Prerequisites

Make sure that the following are configured on each Service Virtualization Designer or Service Virtualization standalone server machine on which you are using the SAP RFC/IDOC Agent:

#### a. SAP .Net Connector 3.0.10.0.

During installation of the connector, there is an option to install dlls to the GAC. You can select this option, or you can choose to copy the dlls manually to the Service Virtualization installation directory's **\bin** folder after installation.

#### b. SAP GUI.

Alternatively, if you do not have SAP GUI installed, you can do the following:

i. Update the Windows services file, located in %WinDir%\System32\drivers\etc.

Add the following two lines, replacing *xx* with your SAP system number:

sapdpxx 32xx/tcp

sapgwxx 33xx/tcp

ii. Copy the appropriate SAP librfc32.dll for your system into the Windows folder, as follows:

#### On a 32-bit operating system:

If the Service Virtualization Designer or the 32-bit Service Virtualization Server are installed, copy the 32-bit librfc32.dll into the Windows\System32 folder.

#### On a 64-bit operating system:

If the Service Virtualization Designer or the 32-bit Service Virtualization Server are installed, copy the 32-bit librfc32.dll into the Windows\SysWOW64 folder.

If the 64-bit Service Virtualization Server is installed, copy the 64-bit librfc32.dll into the Windows\System32 folder.

#### 2. Configure the agent settings

From the main menu, select **Tools > Options**. On the Agents Page, select **SAP RFC/IDOC**. For user interface details, see the "Agents Page" on page 60.

3. Reconfigure the client to point to the virtual service

**For a SAP Server:** If your source SAP system is a SAP Server, you must reconfigure the SAP RFC destination to point to the virtual service.

- a. On the SAP server, navigate to transaction **sm59**. Locate and delete the original destination.
- b. Under TCP/IP Connections, create a new destination and configure the following:

- **RFC destination.** Assign the same name as the original destination.
- Registered Server Program. Select this option, and enter the Program ID. The value you assign to Program ID must be identical to the Program ID entered in the virtual service's properties in Service Virtualization.
- **Gateway Options.** Enter the SAP **Gateway Host** and **Gateway Service Name** These values must be identical to the values entered in the Service Virtualization Agents page.
- c. Click **Connection Test** to test your configuration. Your virtual service must be deployed to carry out this test.

For SAP PI : If your source SAP system is SAP PI, you must reconfigure the communication channel.

In SAP PI Integration Builder, navigate to the appropriate RFC receiver communication channel, and configure the following:

- RFC Server Type. Select External RFC Server.
- Application Server (Gateway). Enter the SAP Gateway Host (the PI System). The value must be identical to the value entered in the Service Virtualization Agents page.
- Application Server Service (Gateway). Enter the SAP Gateway Service Name. The value must be identical to the values entered in the Service Virtualization Agents page.
- **Program ID.** The value you assign must be identical to the Program ID entered in the virtual service's properties in Service Virtualization.

## How to Configure the IBM IMS TM Agent

This task describes how to configure the IBM IMS TM agent. The IBM IMS TM Agent is used to virtualize IBM IMS Transaction Manager (TM) services that are exposed using the IMS Connect protocol over a TCP/IP network.

The IBM IMS TM agent is used as an IMS TM gateway. The clients communicate directly with the agent. Then the agent either forwards the traffic to the actual IMS TM during pass-through (Standby mode) or recording (Learning mode), or simulates the response. The communication is always forwarded to IMS TM if it does not belong to any of the deployed services. For more details, see "How to Create a Virtual Service" on page 85.

#### 1. Prerequisites

The following types of integration scenarios are supported:

- A client using IMS Connect API.
- A client using IMS TM Resource Adapter (managed and unmanaged).

#### 2. Configure the agent settings

From the main menu, select **Tools > Options**. On the Agents Page, select IBM IMS TM and click **Add**. Define settings for the new configuration. For user interface details, see the "IBM IMS TM Agent Settings" on page 69.

## How to Configure the WebSphere MQ Agent

This task describes how to configure the WebSphere MQ Agent.

The WebSphere MQ Agent uses the IBM WebSphere MQ Client internally. This enables you to use all diagnostic tools and logs provided by the client if you need to investigate any issues with WebSphere MQ communication between HP Service Virtualization and the IBM WebSphere MQ Server.



#### 1. Prerequisites

The WebSphere MQ Agent is not installed by default. The agent is dependent on the IBM WebSphere MQ Client 7.0.1.6 or later (amqmdnet.dll library with version 1.0.0.3 and its dependencies). The IBM WebSphere MQ Client full installation places the required library in the Global Assembly Cache (GAC), making the agent available. If you install the client while the Service Virtualization Server or Designer is running, you must restart the application prior to enabling the agent.

The WebSphere MQ Agent uses the IBM WebSphere MQ Client internally. This enables you to use all diagnostic tools and logs provided by the client if you need to investigate any issues with WebSphere MQ communication between HP Service Virtualization and the IBM WebSphere MQ Server.

To download the **WebSphere MQ version 7.0 Client**, see http://www-01.ibm.com/support/docview.wss?uid=swg24019253.

To download the **WebSphere MQ version 7.5 Client**, see .http://www-01.ibm.com/support/docview.wss?uid=swg24032744.

Note: An individual IBM ID is required for the downloads.

#### 2. Configure the agent settings

From the main menu, select **Tools > Options**. On the Agents Page, select **WebSphere MQ**. For user interface details, see the "WebSphere MQ Agent Settings" on page 71.

#### 3. Optional: Perform additional global configuration

You can configure additional settings using the Service Virtualization configuration files.

- a. Open the appropriate file:
  - Standalone Server configuration file:

%[INSTALLLOCATION]%\Server\bin\HP.SV.StandaloneServer.exe.config

• Designer configuration file:

%[INSTALLLOCATION]%\Designer\bin\VirtualServiceDesigner.exe.config

 b. You can define the following element in the appSettings section of the configuration files. This configuration element sets up global behavior for processing WebSphere MQ messages.

<add key="MQAgent.DefaultCharacterSet" value="0"/>

Configures the default character set for simulated XML responses. Use this configuration if the character set is not recorded as message metadata. If the value is set to 0 the character set is not set.

#### Agent limitations

0

- The WebSphere MQ Agent instance can only use queues from a single Queue manager.
- The WebSphere MQ Agent instance can only use a single TCP channel to connect to the Queue manager.
- CCSID configuration in the WebSphere MQ Agent instance requires an application restart.
- CCSID configuration is global for whole the application. There cannot be two agents with different CCSIDs.
- The WebSphere MQ Agent is not able to automatically reconnect when a TCP connection to the WebSphere MQ Server is lost. Each service using the agent must be restarted. Alternately,

restart the whole application.

# How to Configure the TIBCO EMS Non Intrusive Agent

The TIBCO EMS Non Intrusive Agent serves to virtualize JMS communication in TIBCO Enterprise Message Service ™ (TIBCO EMS). No endpoint is created and a client application does not require reconfiguration. The agent listens to system topics where all communication can be monitored. When the service is switched to Simulating mode, it manipulates the service JMS account permissions in the JMS bus (EMS) to forbid a real service from receiving client communication. Administrator account credentials in TIBCO EMS are required.



#### 1. Prerequisites

The TIBCO EMS Non Intrusive agent is not installed by default and if required, must be installed manually. The agent requires 2 DLL libraries that are not supplied with the product: Tibco.EMS.dll and Tibco.EMS.Admin.dll. These libraries are supplied with the installation of TIBCO Enterprise Message Service ™ (EMS), located in the bin directory in the EMS

installation folder. The typical default location is c:\tibco\ems\6.0\bin\.

After copying the libraries to the directory, you must restart the application.

#### 2. Configure the agent settings

From the main menu, select **Tools > Options**. On the Agents Page, select **TIBCO EMS Non Intrusive**. For user interface details, see the "TIBCO EMS Agent Settings" on page 74.

## How to Forward HTTP Agent Communication Through an HTTP Proxy

This task explains how to forward HTTP/HTTPS communication between the HTTP Gateway/HTTPS Gateway/HTTP(S) Proxy agents and a real service through an additional proxy (proxy chaining).

To enable proxy chaining, perform following steps:

- 1. From the main menu, select **Tools > Options**. On the Agents Page, select one of the following:
  - HTTP Gateway
  - HTTP(S) Proxy
  - HTTPS Gateway

For user interface details, see the "Agents Page" on page 60.

- 2. Select the **Use another proxy server to communicate with real services** option, and click **Settings**.
- 3. In the Proxy Settings Dialog Box, configure the settings. For user interface details, see "Proxy Settings Dialog Box" on page 76.

# How to Configure Windows Firewall and HTTP Settings

This task describes how to update Windows Firewall and HTTP Settings.

If you change the HTTP or HTTPS agent port, you may need to configure Windows Firewall and HTTP settings.

Note: This does not apply to port changes in the HTTP(S) Proxy agent.

You may need to configure the following:

- HTTP settings. If UAC is enabled, you must allow the new agent port.
- **Windows Firewall.** If Windows Firewall is enabled, you must add a Windows Firewall inbound rule for the new agent port.

Windows Firewall and HTTP settings for the default HTTP(S) agent ports are configured during the initial installation of Service Virtualization.

**Caution:** The port selected for the HTTP(S) agent must not be used by any other application and it must not be blocked by a firewall.

#### If UAC is enabled

If UAC is enabled, or you do not have local administrator privileges, you must obtain permission to listen on the port. Use the command line interface with elevated privileges, such as administrator, and perform one of the following:

- Use the configureHttpAgent.bat tool, provided by Service Virtualization. For instructions, see the section on how to configure HTTP ports in the *HP Service Virtualization Installation Guide*.
- Manually run the following command. The following example is for HTTP port 9000, granting permission to all users on the current machine:
  - Windows Server 2008 and Windows 7.

netsh http add urlacl http://+:9000/ "sddl=D:(A;;GX;;;WD)"

• Windows XP and Windows Server 2003.

See the prerequisites in the installation guide for httpcfg tool installation. Then run the following:

httpcfg set urlacl -u http://+:9000/ -a "D:(A;;GX;;;WD)"

You need to run this command only once for each port. The registration remains in the system until it is removed.

#### If Windows Firewall is enabled

If Windows Firewall is enabled, you must add the firewall inbound rules to allow HTTP communication between a remote host and Service Virtualization. To add these exceptions, use the command line interface with elevated privileges, such as administrator, and do one of the following:

- Use the configureHttpAgent.bat tool, provided by Service Virtualization. For instructions, see the section on how to configure HTTP ports in the *HP Service Virtualization Installation Guide*.
- Manually add the inbound rules for an HTTP Proxy port exception. The following example adds firewall exceptions for HTTP port 9000 for all applications:

netsh firewall add portopening TCP 9000 "Port 9000 HTTP Proxy" ENABLE netsh firewall add portopening UDP 9000 "Port 9000 HTTP Proxy" ENABLE

## **Agents User Interface**

This section includes:

Agents Page	60
Proxy Settings Dialog Box	76

## **Agents Page**

This section includes:

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HTTP(S) Proxy Agent Settings	62
JDBC Agent Settings	64
JMS Generic Agent Settings	66
SAP RFC/IDOC Agent Settings	68
IBM IMS TM Agent Settings	69
WebSphere MQ Agent Settings	71
TIBCO EMS Agent Settings	74

## HTTP/HTTPS Gateway Agent Settings

This dialog box enables you to configure the Service Virtualization HTTP/HTTPS Gateway Agent. The agent handles communication between a client and a real or virtual service.

🚰 Options					?	×
General	T Text Editor	Agents	) Servers			
Embedde     Embedde     Impedde     I	ed Server (S) Gateway TTP Gateway TTPS Gateway		HTTP Agent on	n Embedded Server		•
▲ WHIP WHI	(3) Proxy TTP(S) Proxy DBC Generic Ioss JMS (Not Runr beo JMS (Not Runr feblogic JMS (Not I febSphere JMS (Not MS TM Sphere MQ	E ning) ning) Runr t Ru	Agent State: Is Enabled: Name: Use SSL: Port: Timeout:	Running  HTTP Gateway  7200  60000	Test Configuration	E
Add   Delete   [	trusive WebSphere	• MC +	External URI: Unknown End	point Requests:	OK Cance	

To access	1. From the main menu, select <b>Tools &gt; Options</b> .
	2. Click Agents.
	3. Under HTTP(S) Gateway, select a configuration.
Important information	• For additional important configuration information, see the task "How to Configure the HTTP/HTTPS Gateway Agents" on page 45.
	You can define multiple configurations for each agent.

Relevant tasks	<ul> <li>"How to Configure Agents" on page 44</li> <li>"How to Forward HTTP Agent Communication Through an HTTP Proxy" on page 57</li> </ul>
See also	"Service Virtualization Agents Overview" on page 44

<b>UI Element</b>	Description
<left pane=""></left>	Displays the server configured for your project.
	Expand the server to display the available agents and configurations.
Add	Enables you to define additional configurations of the agent.
Delete	Deletes the selected configuration.
Duplicate	Creates an additional configuration of the agent by copying the selected configuration. You can then modify the configuration settings.
	<b>Note:</b> By default, the configuration is created with a sequential unoccupied port number.
Agent State	The current status of the agent. Values include Running, Not Running.
Test Configuration link	Tests the configuration based on the settings you select. If Service Virtualization identifies any problems in your configuration, the details are displayed.
Is Enabled	Turns the agent on and off.
Name	Enter a name for the configuration or accept the default name.
Use SSL	Enables SSL over TCP/IP. If enabled, you must provide certificate file and password details.
Certificate File	The path to the server side certificate file, in P12 format, that is to be used by the gateway agent during SSL authentication.
	The certificate is used as the server certificate on listening port if the <b>Use SSL</b> option is enabled.
	If this field is left empty and the <b>Use SSL</b> option is selected, then the agent will use the certificate bound to the specified port in Windows.
Certificate Password	The password used to access the certificate file specified above.
Port	The port of the Service Virtualization Server used by the agent to deploy virtual services.

<b>UI Element</b>	Description
Timeout	The period of time the agent waits before stopping attempts to communicate with the real service.
External URI	The URI under which the agent is visible to client applications. This is used, for example when the machine is behind a firewall and the client can see only the firewall which forwards all requests to the agent. It may be left empty.
Unknown Endpoint	Determines how to respond to requests when there is no service deployed that matches the URL path provided.
Requests	Includes the following options:
	• Return HTTP 404 Error.
	• Forwarded to Host: Requests are forwarded to the specified URL path.
	Use this option if you are not able to reconfigure clients on a service basis (i.e. by changing the endpoint of each service to a virtual service), and all of your HTTP(S) services reside on a single host.
Use another proxy server to communicate with real services	Enables you to configure proxy chaining. You can forward the HTTP(S) communication between the HTTP(S) Gateway agent and the real service through an additional proxy. If it is not set, the system default proxy server is used.
	Click <b>Settings</b> to open the Proxy Settings dialog box. For details, see "Proxy Settings Dialog Box" on page 76.

## HTTP(S) Proxy Agent Settings

This dialog box enables you to configure the Service Virtualization HTTP(S) Proxy Agent. The agent handles communication between a client and a real or virtual service.

🚟 Options				?	×
General Text Edito	r Agents	2 Servers			
Embedded Server     The Embedded Server     The Embedded Server     The Embedded Server     HTTP(S) Gateway     HTTPS Gateway     HTTPS Gateway     HTTPS Gateway	у	TTP Agent on Embedde	d Server		^
HTTP(S) Proxy     IDBC		Agent State:	Running	Test Configuration	E
JDBC	E	Is Enabled:			
JMS Generic JBoss JMS (Not	t Running)	Name:	HTTP(S) Proxy		
Tibco JMS (Nor Weblogic JMS)	t Running) (Not Runr	Host:	localhost		
WebSphere JM IBM IMS TM	IS (Not Ru	Timeout:	60000		
WebSphere MQ Intrusive WebSphere MQ	inhere MC H	TTP Proxy Settings			
A PRI Tiben EMC	• •	Port:	7201		
Add   Delete   Duplicate	н	TTPS Proxy Settings			-
				OK Cancel	

To access	1. From the main menu, select <b>Tools &gt; Options</b> .
	2. Click Agents.
	3. Under HTTP(S) Proxy, select a configuration.
Important information	• For additional important configuration information, see the task "How to Configure the HTTP(S) Proxy Agent" on page 47.
	• In case of Java based clients running on JDK 6 or later, and in the case of self- signed certificates, it may be necessary to add the "- Dsun.security.ssl.allowUnsafeRenegotiation=true" startup parameter or the client may reject communication with the HTTPS Agent. For more details, see http://java.sun.com/javase/javaseforbusiness/docs/TLSReadme.html.
	You can define multiple configurations for each agent.
Relevant tasks	<ul> <li>"How to Configure Agents" on page 44</li> <li>"How to Forward HTTP Agent Communication Through an HTTP Proxy." on</li> </ul>
	page 57
See also	"Service Virtualization Agents Overview" on page 44

UI Element	Description
<left pane=""></left>	Displays the server configured for your project.
	Expand the server to display the available agents and configurations.
Add	Enables you to define additional configurations of the agent.
Delete	Deletes the selected configuration.
Duplicate	Creates an additional configuration of the agent by copying the selected configuration. You can then modify the configuration settings.
	<b>Note:</b> By default, the configuration is created with a sequential unoccupied port number.
Agent State	The current status of the agent. Values include <b>Running</b> , <b>Not Running</b> .
Test Configuration link	Tests the configuration based on the settings you select. If Service Virtualization identifies any problems in your configuration, the details are displayed.
Is Enabled	Turns the agent on and off.

UI Element	Description
Name	Enter a name for the configuration or accept the default name.
Host	The name by which the agent is visible to client applications. It may be left empty.
Timeout	The period of time the agent waits before stopping attempts to communicate with the real service.
HTTP Proxy Settings	<b>Port</b> : the port for HTTP communication.
HTTPS Proxy Settings	<b>Port</b> : the port for HTTPS communication.
CA Certificate File	The Certification Authority certificate file used to generate host certificates.
Private Key	The private key for the certificate file.
Password	The password for the private key.
	Select <b>Show Password</b> to display the password in this dialog box.
Use another proxy server to communicate with real services	Enables you to configure proxy chaining. You can forward the HTTP (S) communication between the HTTP(S) Proxy agent and the real service through an additional proxy.
	Click <b>Settings</b> to open the Proxy Settings dialog box. For details, see "Proxy Settings Dialog Box" on page 76.

## JDBC Agent Settings

This dialog box enables you to configure the Service Virtualization JDBC Agent. The agent handles communication between a client and a real or virtual service.

🚟 Options				?(	×
Т		1			
General Text E	ditor Agents	Servers			
Embedded Server     Trip(5) Gatew     FITP Gate     HTTPS Gat     HTTPS Gat	vay way eway	JDBC Agent on Embed	dded Server		*
P HTTP(S) P	roxy	Agent State:	Running	Test Configuration	
▲ ☐ JDBC	E	Is Enabled:	<b>V</b>		E
JBoss JMS	(Not Running) (Not Running)	Name:	JDBC		
Weblogic J WebSphere	MS (Not Runr e JMS (Not Ru	Host:	localhost		
IBM IMS TM	Q	Port:	999		
IP Intrusive W	/ebSphere MC	Actual JDBC Driver Class Name:		Ŧ	
Add   Delete   Duplicate		- · · · · ·	Incr		-
				OK Cancel	

To access	1. From the main menu, select <b>Tools &gt; Options</b> .		
	2. Click Agents.		
	3. Under <b>JDBC</b> , select a configuration.		
Important information	• For additional important configuration information, see the task "How to Configure the JDBC Agent" on page 47.		
	You can define multiple configurations for each agent.		
Relevant tasks	<ul><li>You can define multiple configurations for each agent.</li><li>"How to Configure Agents" on page 44</li></ul>		
Relevant tasks	<ul> <li>You can define multiple configurations for each agent.</li> <li>"How to Configure Agents" on page 44</li> <li>"How to Forward HTTP Agent Communication Through an HTTP Proxy" on page 57</li> </ul>		

UI Element	Description		
<left pane=""></left>	Displays the server configured for your project.		
	Expand the server to display the available agents and configurations.		
Add	Enables you to define additional configurations of the agent.		
Delete	Deletes the selected configuration.		
Duplicate	Creates an additional configuration of the agent by copying the selected configuration. You can then modify the configuration settings.		
	<b>Note:</b> By default, the configuration is created with a sequential unoccupied port number.		
Agent State	The current status of the agent. Values include Running, Not Running.		
Test Configuration link	Tests the configuration based on the settings you select. If Service Virtualization identifies any problems in your configuration, the details are displayed.		
Is Enabled	Turns the selected configuration of the agent on and off.		
Name	Enter a name for the configuration or accept the default name.		
Host/Port	The machine and port on which the JDBC agent is listening. Required for communication with the JDBC driver installed on the application under test.		

UI Element	Description
Actual JDBC Driver Class	The fully qualified class name of the actual driver used in the application under test. Enter the name or select one from the list.
Nume	Available only when you select JDBC Version 3.0.
Deployment Type	The environment in which your application under test is running.
	• If your application under test is deployed on a J2EE application server, select the appropriate version from the drop-down list.
	• For a Java standard edition application, select <b>J2SE</b> .
JDBC Version	The JDBC version used by the application under test.
	Available only when you select <b>J2SE</b> in the <b>Deployment Type</b> field.
Create JDBC driver for	Creates the JDBC driver specific to your configuration. Specify a location for saving the files.
this configuration	If you change configuration settings, you must create a new driver.

## JMS Generic Agent Settings

This dialog box enables you to configure the Service Virtualization JMS Generic Agent. The agent handles communication between a client and a real or virtual service.

🚰 Options		8	×
<b>T</b>	) 🧕		
General Text Editor Agen	ts Servers		
Embedded Server     Embedded Server     ThTP(S) Gateway     HTTP Gateway     HTTPS Gateway     HTTPS Gateway     HTTPS Gateway	Generic JMS Agen	t on Embedded Server	*
IP HTTP(S) Proxy	Agent State:	Not Running Test Configuration	
▲ 🔯 JDBC 🗉	Is Enabled:		
<ul> <li>JMS Generic</li> <li>JBoss JMS (Not Running)</li> </ul>	Name:	JBoss JMS	III
🥵 Tibco JMS (Not Running) 😰 Weblogic JMS (Not Runn	JNDI URL:	jnp://localhost:1099	
IBM IMS TM	Context Factory:	org.jnp.interfaces.NamingContextFactory	
<ul> <li>WebSphere MQ</li> <li>Intrusive WebSphere MQ</li> </ul>	Class Path:	$c:\temp\lib\jms\JBoss600\concurrent.jar;c:\temp\lib\jms\JB$	
	Username:		
Add   Delete   Duplicate	Password:		Ŧ
		OK Cancel	

To access	1. From the main menu, select <b>Tools &gt; Options</b> .
	2. Click Agents.
	3. Under <b>JMS Generic</b> , select a configuration.

Important information	<ul> <li>For additional important configuration information, see the task "How to Configure the JMS Generic Agent" on page 49.</li> <li>There are several instances of the JMS Generic agent pre-configured for connecting to the JMS of common Java application servers.</li> </ul>
	You can define multiple configurations for each agent.
Relevant tasks	<ul> <li>"How to Configure Agents" on page 44</li> <li>"How to Forward HTTP Agent Communication Through an HTTP Proxy" on page 57</li> </ul>
See also	"Service Virtualization Agents Overview" on page 44

<b>UI Element</b>	Description
<left pane=""></left>	Displays the server configured for your project.
	Expand the server to display the available agents and configurations.
Add	Enables you to define additional configurations of the agent.
Delete	Deletes the selected configuration.
Duplicate	Creates an additional configuration of the agent by copying the selected configuration. You can then modify the configuration settings.
	<b>Note:</b> By default, the configuration is created with a sequential unoccupied port number.
Agent State	The current status of the agent. Values include <b>Running</b> , <b>Not Running</b> .
Test Configuration link	Tests the configuration based on the settings you select. If Service Virtualization identifies any problems in your configuration, the details are displayed.
Is Enabled	Turns the agent on and off.
Name	Enter a name for the configuration or accept the default name.
JNDI URL	The URL where the JNDI provider and the JNDI context with JMS resources is located.
Context Factory	The provider specific context factory.

<b>UI Element</b>	Description
Class Path	The class path with all necessary JMS provider specific libraries for JMS implementation.
	<b>Note:</b> To ensure maximum compatibility, use the same JMS/J2EE jar libraries for the agent class path that are in use by the client application. If not possible, follow your application server documentation for selection of the correct J2EE/JMS libraries.
Username/Password	Optional credentials for the JNDI provider/registry.
	Select Show Password to display the password in this dialog box.

## SAP RFC/IDOC Agent Settings

This dialog box enables you to configure the Service Virtualization SAP RFC/IDOC Agent. The agent handles communication between a SAP® or SAP NetWeaver® Process Integration (PI) system, and a real or virtual SAP service.

🚰 Options		? 💌
Coptions Construction Construc	Servers  SAP RFC/IDOC Agent on Embedded Server  Agent State: Running Is Enabled Name: New SAP RFC/IDOC Gateway Host: localhost Gateway Service Name: sapgw00	Test Configuration
TIECO EMS Non Intrusiv     TIECO EMS Non Intrusiv     Add   Delete   Duplicate	*	OK Cancel

To access	1. From the main menu, select <b>Tools &gt; Options</b> .		
	2. Click Agents.		
	3. Under <b>SAP RFC/IDOC</b> , select a configuration.		
Important information	• For additional important configuration information, see the task "How to Configure the SAP RFC/IDOC Agent" on page 51.		
	You can define multiple configurations for each agent.		
Relevant tasks	<ul> <li>You can define multiple configurations for each agent.</li> <li>"How to Configure Agents" on page 44</li> <li>"How to Econward HTTP Agent Communication Through an HTTP Proxy" on</li> </ul>		
Relevant tasks	<ul> <li>You can define multiple configurations for each agent.</li> <li>"How to Configure Agents" on page 44</li> <li>"How to Forward HTTP Agent Communication Through an HTTP Proxy" on page 57</li> </ul>		

<b>UI Element</b>	Description		
<left pane=""></left>	Displays the server configured for your project.		
	Expand the server to display the available agents and configurations.		
Add	Enables you to define additional configurations of the agent.		
Delete	Deletes the selected configuration.		
Duplicate	Creates an additional configuration of the agent by copying the selected configuration. You can then modify the configuration settings.		
	<b>Note:</b> By default, the configuration is created with a sequential unoccupied port number.		
Agent State	The current status of the agent. Values include Running, Not Running.		
Test Configuration link	Tests the configuration based on the settings you select. If Service Virtualization identifies any problems in your configuration, the details are displayed.		
Is Enabled	Turns the agent on and off. To enable the agent, the prerequisites must first be met.		
Name	Enter a name for the configuration or accept the default name.		
Gateway Host	The IP address or host name of the SAP gateway.		
	Alternatively, you may need to enter the SAP Router String for communication through the SAP firewall.		
Gateway Service Name	The SAP gateway service name.		

## IBM IMS TM Agent Settings

This dialog box enables you to configure the Service Virtualization IBM IMS TM Agent. The agent handles communication between a client and a real or virtual service.

🚰 Options			6	
		1		
General Text Editor Ag	gents	Servers		
A 🚺 Embedded Server	1			*
A 🔯 HTTP(S) Gateway	IE	BM IMS TM Agent on E	mbedded Server	
HITP Gateway HITPS Gateway HITPS Gateway HITPS Prove	0	🕽 To apply changes, som	e manual steps are needed, see <u>Help</u>	
P HTTP(S) Proxy		Agent State:	Not Running Test Configuration	n
▲ 🔯 JDBC		Is Enabled:		=
▲ 📷 JMS Generic				- 11
Tibco JMS (Not Running) Disco JMS (Not Running)		Name:	New IBM INS TH	
Weblogic JMS (Not Runr		Host:		
IBM IMS TM		Dert	17000	
😰 New IBM IMS TM (Not R		Port.	17000	
WebSphere MQ     The Interview WebSphere MC		Remote Host:		
< >				
Add   Delete   Duplicate		Remote Port:	7000	Ŧ
			OK Car	icel

To access	1. From the main menu, select <b>Tools &gt; Options</b> .		
	2. Click Agents.		
	3. Select <b>IBM IMS TM</b> and click <b>Add</b> to define a new configuration. Alternatively, select an existing configuration.		
Important information	• For additional important configuration information, see the task "How to Configure the IBM IMS TM Agent" on page 53.		
	• You can define multiple configurations for each agent.		
Relevant	"How to Configure Agents" on page 44		
lashs	<ul> <li>"How to Forward HTTP Agent Communication Through an HTTP Proxy" on page 57</li> </ul>		
See also	"Service Virtualization Agents Overview" on page 44		

<b>UI Element</b>	Description
<left pane=""></left>	Displays the server configured for your project.
	Expand the server to display the available agents and configurations.
Add	Enables you to define additional configurations of the agent.
Delete	Deletes the selected configuration.

<b>UI Element</b>	Description		
Duplicate	Creates an additional configuration of the agent by copying the selected configuration. You can then modify the configuration settings.		
	<b>Note:</b> By default, the configuration is created with a sequential unoccupied port number.		
Agent State	The current status of the agent. Values include Running, Not Running.		
Test Configuration link	Tests the configuration based on the settings you select. If Service Virtualization identifies any problems in your configuration, the details are displayed.		
Is Enabled	Turns the agent on and off.		
Name	Enter a name for the configuration or accept the default name.		
Host	The hostname of the interface on which the agent is listening.		
Port	The port on the local machine on which the agent is listening.		
Remote Host	The hostname or IP address of the IMS TM server.		
Remote Port	The remote port of the IMS TM server.		
Code Page	The character set as defined on the IMS TM server. Used to interpret both requests and responses.		
Use SSL	Enables SSL over TCP/IP. If enabled, you must provide certificate file and password details.		
Certificate File	The server side P12/PFX certificate file used by the IBM IMS TM Agent during SSL authentication.		
Certificate Password	The password used to access the certificate file specified above.		

## WebSphere MQ Agent Settings

This dialog box enables you to configure the Service Virtualization WebSphere MQ Agent. The agent handles communication between a client and a real or virtual service.

🚟 Options					? 💌
	Т		1		
General	Text Editor	Agents	Servers		
	TTP(S) Proxy HTTP(S) Proxy HTTP(S) Proxy 3C IDBC	*	WebSphere MQ Agent on	Embedded Server	<u>^</u>
ML 🖬 🖌	S Generic JBoss JMS (Not Ru Tibco JMS (Not Ru	nning) nning)	Agent State: Is Enabled:	Not Running	est Configuration
4 🔂 IBN	Weblogic JMS (No WebSphere JMS (N / IMS TM	t Runr Not Ru <sub>⋿</sub>	Name:	Intrusive WebSphere MQ	
🖉 🖌	New IBM IMS TM ( bSphere MO	Not R	Queue Manager Name:	QueueManager	
🖉 🖉 Tib	Intrusive WebSphe co EMS	ere MC	Channel Name:	channel	
Docalho	TIBCO EMS Non In st:6080 (Not Runni	trusive	Host:	localhost	
4	"	+	Port:	1417	
Add   Delete	Duplicate		COSTD	437	
					X Cancel

To access	1. From the main menu, select <b>Tools &gt; Options</b> .
	2. Click Agents.
	3. Under <b>WebSphere MQ</b> , select a configuration.
Important information	• For additional important configuration information, see the task "How to Configure the WebSphere MQ Agent" on page 54.
	• The WebSphere MQ Agent is not able to automatically reconnect when a TCP connection to the WebSphere MQ Server is lost. Each service using the agent must be restarted. Alternately, restart the whole application.
	• You can define multiple configurations for each agent.
Relevant	"How to Configure Agents" on page 44
lasks	<ul> <li>"How to Forward HTTP Agent Communication Through an HTTP Proxy" on page 57</li> </ul>
See also	"Service Virtualization Agents Overview" on page 44

UI Element	Description
<left pane=""></left>	Displays the server configured for your project. Expand the server to display the available agents and configurations.
Add	Enables you to define additional configurations of the agent.
Delete	Deletes the selected configuration.
<b>UI Element</b>	Description
----------------------------	---
Duplicate	Creates an additional configuration of the agent by copying the selected configuration. You can then modify the configuration settings.
	<b>Note:</b> By default, the configuration is created with a sequential unoccupied port number.
Agent State	The current status of the agent. Values include <b>Running</b> , <b>Not Running</b> .
Test Configuration link	Tests the configuration based on the settings you select. If Service Virtualization identifies any problems in your configuration, the details are displayed.
Is Enabled	Turns the agent on and off. To enable the agent, the prerequisites must first be met.
Name	Enter a name for the configuration or accept the default name.
Queue Manager	The name of the queue manager for the agent to connect to.
Name	<b>Note:</b> The WebSphere MQ Agent instance can only use queues from a single Queue manager.
Channel Name	The name of the TCP channel for the agent to use to connect to the Queue Manager.
	<b>Note:</b> The WebSphere MQ Agent instance can only use a single TCP channel to connect to the Queue Manager.
Host	The name of the server hosting the queue manager.
Port	The TCP port where the channel listens for client connections.
CCSID	The character set used by the host.
	Note:
	CCSID configuration in the WebSphere MQ Agent instance requires that you restart the application.
	CCSID configuration is global for whole the application. There cannot be two agents with different CCSIDs.
Username/Password	The username and password for connecting to the queue manager.
SSL: CipherSpec	The algorithm used for secure SSL communication.
	Enter a value or select a value from the list. The CipherSpec value must be the same as the value specified in the WebSphere MQ channel configuration.

<b>UI Element</b>	Description
SSL: Key Repository	The path of the WebSphere MQ SSL key repository, which contains the WebSphere MQ Queue Manager certificate. If you are using mutual authentication, it also contains the certificate and private key of the Service Virtualization MQ agent.
	Enter the path to the WebSphere MQ key database file (.kdb), but without the file extension. This file is similar to the file specified in the key repository parameter in WebSphere MQ Queue Manager configuration.
Message Context Mode	<ul> <li>Options for accessing the MQ queue.</li> <li>None.</li> <li>Set Identity. Corresponds to the MQC.MQOO_SET_IDENTITY_ CONTEXT property.</li> <li>Set All. Corresponds to the MQC.MQOO_SET_ALL_CONTEXT property.</li> </ul>
Strip XML Declarations	Removes XML declarations ( xml ) from text messages before processing in Service Virtualization. Text messages are in Unicode.
Use UTF Methods	Service Virtualization considers MQ text messages as created by the WriteUTF() method instead of the WriteString() method. When using an XML service, the message can be either transferred as a string (with a specified character set) or as binary data (UTF). By default, the agent reads and writes messages as a string. Select this option to use binary messages with UTF content instead.

### **TIBCO EMS Agent Settings**

This dialog box enables you to configure the Service Virtualization TIBCO EMS Agent. The agent handles communication between a client and a real or virtual service.

🚰 Options				<b>?</b> ]	×
	Т		<u> </u>		
General	Text Editor	Agents	Server	s	
▲ C HTTP(S) W HTT ▲ C JDBC W JDBC	Proxy Proxy P(S) Proxy	^	TIBCO EMS No	on Intrusive Agent on Embedded Server	*
🔺 📷 JMS Ger	neric		Agent State:	Not Running Test Configuration	
JBos	s JMS (Not Runnin	g)			
Woh	o JMS (Not Runnin Jogic IMS (Not Pur	g) ppinc	Is Enabled:		
Web	Sohere IMS (Not Ru	lunni	Name:	TIBCO EMS Non Intrusive	_
A 🔯 IBM IMS	STM	E			=
😰 New	IBM IMS TM (Not	Runr	Host:	localhost	
🔺 🔯 WebSpł	nere MQ				
🕼 🕼 Intru	isive WebSphere N	IQ (N	Server Port:	7222	
	VIS O EMS Non Intrusi	ve (N	Ucername	admin	
localhost:60	80 (Not Running)	*	osemanie.	aunin	
4	"	- F	Password:		
Add   Delete	Duplicate			Show Password	-
				OK Cancel	

To access	<ol> <li>From the main menu, select <b>Tools &gt; Options</b>.</li> </ol>
	2. Click Agents.
	3. Under <b>TIBCO EMS</b> , select a configuration.
Important information	<ul> <li>For additional important configuration information, see the task "How to Configure the TIBCO EMS Non Intrusive Agent" on page 56.</li> <li>You can define multiple configurations for each agent.</li> </ul>
Relevant tasks	<ul> <li>"How to Configure Agents" on page 44</li> <li>"How to Forward HTTP Agent Communication Through an HTTP Proxy" on page 57</li> </ul>
See also	"Service Virtualization Agents Overview" on page 44

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

UI Element	Description
<left pane=""></left>	Displays the server configured for your project.
	Expand the server to display the available agents and configurations.
Add	Enables you to define additional configurations of the agent.
Delete	Deletes the selected configuration.
Duplicate	Creates an additional configuration of the agent by copying the selected configuration. You can then modify the configuration settings.
	<b>Note:</b> By default, the configuration is created with a sequential unoccupied port number.
A mant Ctata	
Agent State	The current status of the agent. Values include <b>Running</b> , <b>Not Running</b> .
Test Configuration	The current status of the agent. Values include <b>Running</b> , <b>Not</b> <b>Running</b> . Tests the configuration based on the settings you select. If Service Virtualization identifies any problems in your configuration, the details are displayed.
Test Configuration link Is Enabled	The current status of the agent. Values include <b>Running</b> , <b>Not</b> <b>Running</b> . Tests the configuration based on the settings you select. If Service Virtualization identifies any problems in your configuration, the details are displayed. Turns the agent on and off. To enable the agent, the prerequisites must first be met.
Agent State Test Configuration link Is Enabled Name	The current status of the agent. Values include <b>Running</b> , <b>Not</b> <b>Running</b> . Tests the configuration based on the settings you select. If Service Virtualization identifies any problems in your configuration, the details are displayed. Turns the agent on and off. To enable the agent, the prerequisites must first be met. Enter a name for the configuration or accept the default name.
Agent State Test Configuration link Is Enabled Name Host	The current status of the agent. Values include <b>Running</b> , <b>Not</b> <b>Running</b> . Tests the configuration based on the settings you select. If Service Virtualization identifies any problems in your configuration, the details are displayed. Turns the agent on and off. To enable the agent, the prerequisites must first be met. Enter a name for the configuration or accept the default name. The host where EMS is running.

UI Element	Description
Username/Password	The username and password for an EMS account with appropriate privileges to change permissions on destinations and on the JMS server (admin account required).

## **Proxy Settings Dialog Box**

This dialog box enables you to configure proxy chaining. You can forward HTTP/HTTPS communication between the HTTP Gateway/HTTPS Gateway/HTTP(S) Proxy agents and a real service through an additional proxy.

🍓 Proxy Settings	?	×
Provy Host	Port: 0	
TTOXY TOSt.	l loit b	
Credentials:	None	
	O Current User	
	O Custom Credentials	
	Username:	
	Password: Show Password	
Do not use pro	xy server for address beginning with:	
Use "Enter" ke	v or semicolon (:) to separate entries	
Bypass pro	xy server for local addresses	
	ОК	

To access	<ol> <li>From the main menu, select <b>Tools &gt; Options</b>. On the Agents Page, select one of the following:</li> </ol>
	<ul> <li>HTTP Gateway</li> </ul>
	<ul> <li>HTTP(S) Proxy</li> </ul>
	<ul> <li>HTTPS Gateway</li> </ul>
	2. Select the <b>Use another proxy server to communicate with real services</b> option, and click <b>Settings</b> .
Relevant tasks	"How to Forward HTTP Agent Communication Through an HTTP Proxy" on page 57

User interface elements are described below:

UI Element	Description
Proxy Host	Address or hostname of proxy machine.
Port	Port number on host machine.
Credentials	<ul> <li>Authentication credentials. Authentication is automatically detected, and supports BASIC, DIGEST, NTLM, and Negotiate authentication types.</li> <li>Includes the following options: <ul> <li>None. No username and password are used for proxy authentication.</li> </ul> </li> <li>Current User. The username and password of the current Windows user are provided by Windows and integrated authentication is used.</li> <li>Note: Only NTLM and Negotiate authentication are supported.</li> <li>Custom Credentials. Enter a username and password to use for authentication.</li> </ul>
Do not use proxy server for address beginning with	The list of addresses for which the proxy will not be used. Separate addresses with semicolons or place on new lines.
Bypass proxy server for local addresses	The proxy is not used when accessing local addresses (IPv4 and IPv6 loopback and current machine hostname).

# **Chapter 3**

## **Virtual Services**

This chapter includes:

Virtual Service Overview	79
How to Create a Virtual Service	85
How to Configure Virtual Services	. 86
How to Manage Virtualization Projects	. 88
Virtual Services User Interface	89

## **Virtual Service Overview**

Service Virtualization places a virtual service between the client application (application under test) and the real service you want to simulate.

To simulate the behavior of the real service, you create a virtual service and configure it to meet your needs. After you design your virtual service, you reconfigure your client application to use this virtual service **endpoint**, in place of the real service.

You create virtual services by importing an existing service description document, or by creating a new service based on one of the Service Virtualization supported protocols.

You can also create **service templates**. After creating a service, you can save it as a template in order to reuse the service in multiple testing environments, or reuse the service's configuration, custom functions, data, and views.

For task details, see "How to Create a Virtual Service" on page 85.

You configure your virtual service by designing data and performance models to simulate real service behavior. You can record real service activity, and use it to create these models, or manually customize the models. For task details, see "How to Configure Virtual Services" on page 86.

The basis of organizing your virtual service is the virtualization **project**. The virtualization project includes your virtual services, the simulation models you use to simulate real service behavior, and other configuration entities you can customize to meet your needs. For details, see "Virtualization Projects" on the facing page.

After you create virtual services, you manage them by manipulating virtual service **modes**. The modes include Learning, Standby, and Simulating. For details, see "Simulation" on page 110.

This section also includes:

Virtualization Projects	80
Virtual Service Types	80
Service Descriptions	

## **Virtualization Projects**

The basis of organization within Service Virtualization is the virtualization project.

The virtualization project includes your virtual services, the simulation models you use to simulate real service behavior, and other configuration entities you can customize to meet your needs.

You view your project structure in the Virtualization Explorer. For details, see "Virtualization Explorer" on page 102.

When you create a project, it is created within a **solution**. A solution is a container for one or more projects that you want to maintain as a group. You can view your project and solution in the **Projects** pane.

#### Updating your projects

Projects created in earlier versions of HP Service Virtualization are fully compatible with Service Virtualization 3.00. When opening a project created in a previous version of Service Virtualization, a pop up window displays, informing you that the project contains resources in an older format. Click **Yes** to confirm that you want to update your existing project.

#### Group related services

You may want to keep a group of related virtual services together in a single project. However, if there are too many services in a single project, they may be difficult to manage. The recommended limit is approximately 20 virtual services per project. In this case, it is recommended to create an additional project.

#### Add projects to a solution

You can add new or existing projects to an existing solution. One advantage to having multiple projects within one solution is that you can manage all the services within the Runtime view. The Runtime view provides an overview of the communication through the virtual services during Learning or Simulation sessions.

For task details, see "How to Manage Virtualization Projects" on page 88.

## **Virtual Service Types**

This section provides information on creating various types of virtual services.

#### Note:

• For the full list of supported protocols and versions, refer to the support matrix on the HP Software Support site at: http://h20230.www2.hp.com/sc/support\_matrices.jsp, or contact support.

 When you create a new virtual service, you specify a transport protocol and a message protocol that the service will use. For details on creating virtual services, see "How to Create a Virtual Service" on page 85.

This section includes:

- "XML and Binary Services" below
- "SOAP Services" below
- "REST Services" below
- "IBM IMS TM Virtual Services" below
- "COBOL over IBM CICS TS HTTP Services" on the facing page
- "SQL Services" on page 83

#### XML and Binary Services

If you have an existing XML or binary service, it can be added to your virtualization project. If you do not have an existing XML or binary service, you can create one. If the service is of an unknown type, creating a binary service is the best solution. If Service Virtualization cannot understand the message format, it can record it in binary format, although it is not able to fully recognize the structure.

#### SOAP Services

You can create SOAP services in the following ways:

- Import WSDL documents directly into Service Virtualization to describe SOAP services. To later update a SOAP service description, you can load a new service description document.
- Create a new service without importing a service description. You can then place the virtual service in Learning mode to record real service behavior.

#### **REST Services**

REST services do not use imported service description documents in Service Virtualization. After you create a REST service, you can record real service behavior to learn the structure of the service.

#### **IBM IMS TM Virtual Services**

Depending on the client transport and message level protocol, there are multiple options for virtualizing IBM<sup>®</sup> Information Management System Transaction Manager (IMS<sup>™</sup> TM) services.

The following is an overview of protocols with full message structure parsing. Each requires a COBOL copybook.

- 1. COBOL payload over IBM IMS TM Resource Adapter
  - a. The client is J2EE application using IBM IMS TM Resource Adapter to access IMS TM.
  - b. The payload are COBOL messages based on known COBOL copybooks.
  - c. The virtual service is created based on one or more of the following: TPipe name, Client ID, Datastore Name, Transaction Code.
- 2. COBOL payload over IBM IMS Connect API protocol
  - a. The client is J2SE application using IBM IMS Connect Java API to access IMS TM.
  - b. The payload are COBOL messages based on known COBOL copybooks.
  - c. The virtual service is created based on one or more of the following: LTerm name, Client ID, Datastore Name, Transaction Code.

If full message structure parsing is not required, or if the COBOL copybook is not available, the following protocols provide the best alternatives. Note that the payload is a binary object and not structured.

- 1. Binary messages over IMS
  - a. Any client type using IMS TM over a TCP/IP network.
  - b. Any payload type.
  - c. The virtual service is created based on one or more of the following: TPipe name, Client ID, Datastore Name, Transaction Code.
- 2. Binary messages over WebSphere MQ
  - a. The client is using IMS-MQ bridge to access IMS TM.
  - b. Any payload type.

### COBOL over IBM CICS TS HTTP Services

If the client communicates with the service using COBOL messages over HTTP transport, such as IBM CICS Transaction Server web-aware applications for example, you can use the following protocols for service simulation. Both HTTP Proxy and HTTP Gateway agent types are supported.

- 1. COBOL messages over IBM CICS TS HTTP
  - a. The client is any application using COBOL messages based on known COBOL copybook (s).
  - b. The virtual service is created based on HTTP URI path.
  - c. The message is fully structured.

- 2. Binary messages over HTTP
  - a. The client is any application using any messages (including COBOL).
  - b. The virtual service is created based on HTTP URI path.
  - c. The message is not structured. Only HTTP headers are shown.

COBOL services over IBM CICS TS HTTP transport usually use two encodings – one encoding for the HTTP protocol and the other for the COBOL messages. Service Virtualization expects the HTTP transport to be encoded using US-ASCII. However, the exact COBOL message encoding may be selected during virtual service creation.

### SQL Services

You can create virtual SQL services for working with JDBC.

When you configure the Service Virtualization JDBC agent to work with JDBC services, you enter parameters for the specific target environment in which you are working. Service Virtualization then configures a unique agent for your system.

## **Service Descriptions**

In order to virtualize a service, Service Virtualization needs to know what the service does and what endpoints it uses.

You can provide this information in several ways:

- Learning. When you place a virtual service in Learning mode, Service Virtualization learns about the real service structure, and automatically updates the virtual service. If there are additional changes that you want to make, you can then edit the service description manually. Service description learning is available for XML, REST, SOAP, and SQL services.
- Import service description documents. Service Virtualization provides an import wizard that analyzes the content of the document, and enables you to associate it with a particular virtualized service.
- **Configure a service description.** You can the add operations and URI spaces, import and edit XML schemas, and configure other components of your services. For example, REST services do not use imported service description documents. After you create a REST service, you can record real service behavior to learn the structure of the service. You can then edit the service description in Service Virtualization.

### **Importing Service Description Documents**

You can import the following service description document types into Service Virtualization:

• WSDL

Web-Service Definition Language documents are the most common way to describe SOAP services. They often contain references to other WSDLs and XSDs that must be available in the referenced locations in order to import them and correctly describe the services they define.

• XSD

XML Schema documents may also describe XML services. They often contain references to additional XML Schema Definitions (XSDs) that must be available in the referenced locations in order to import them and correctly describe the services they define.

#### COBOL Copybook

COBOL copybook documents describe input and output message structure for legacy mainframe applications.

For task details, see "How to Create a Virtual Service" on next page.

#### **Configuring Service Descriptions**

You can edit a service description within Service Virtualization. You can configure the following components:

**Note:** To update a SOAP service description, you can also load a new service description document. You can edit HTTP metadata, and set session identifiers within Service Virtualization, which are not part of the service's WSDL document.

- **Operations and URI spaces.** For an XML service, you can add new operations. For REST services, you can create more URI spaces in which to place the data. This enables you to split your data into smaller groups according to the URI path of the resources.
- **Metadata.** Metadata are parameters that contain some protocol-specific information such as time stamps, correlation information, or status codes. They are part of the protocol message, but external to the message body, such as URL parameters, or HTTP headers. You can edit this metadata in Service Virtualization

Some types of metadata, such as HTTP Headers, are not required for tested applications; they may be important for the protocol, but the application does not require them and they are not learned for purposes of virtualization. By default they are disabled in the request but it is possible to enable them and edit the data for use in a simulation. Metadata such as URI Parameters are generally used by tested applications and are enabled by default.

- XML schemas. For XML, REST, or SOAP services. You can add, edit, or remove XML schemas.
- Session identifiers. To perform stateful simulation, you need to be able to identify requests that reflect the same source. For example, you may want to identify all requests coming from a single browser session. Service Virtualization uses this information to create different tracks based on learned data, and uses the tracks to create different sessions during simulation.

Service Virtualization assigns default session identifiers based on the service's protocol, which you can then modify.

- Data formats. You can add or remove request and response data formats. You add a new data
  format to your service description by copying from an existing URI space (in a REST service), or
  by creating a new format.
- **Data masking.** To hide sensitive data, you can scramble specific data elements. For example, there may be sensitive data that you are not permitted to store to disk. You can configure the elements for data masking, so that data recorded during Learning is masked and cannot be viewed in the data model.

For task details, see "How to Edit a Service Description" on page 159.

## How to Create a Virtual Service

This task describes how to create a virtual service. For additional details on specific service types, see "Virtual Service Types" on page 80.

- This task is part of a higher-level task. For details, see "How to Use Service Virtualization" on page 24.
- To learn more about virtual services, see "Virtual Service Overview" on page 79.

#### 1. Optional: Create a new project

When you select a task from the Get Started page, these tasks first create a new virtualization project and then a new virtual service. For user interface details, see "Start Page" on page 29.

For details on how to manually create a new virtualization project, see "How to Manage Virtualization Projects" on page 88.

#### 2. Open an existing project

Select one of the following:

- On the Start Page, under **Recent Projects**, select a project.
- From the main menu, select **File > Open Project/Solution**.

**Note:** Projects created in earlier versions of HP Service Virtualization are fully compatible with Service Virtualization 3.00.

When opening a project created in a previous version of Service Virtualization, a pop up window displays, informing you that the project contains resources in an older format. Click **Yes** to confirm that you want to update your existing project.

For more information on virtualization projects, see "Virtualization Projects" on page 80.

#### 3. Launch the new virtual service wizard

In an existing project, select one of the following:

- From the main menu, select **File > New > Virtual Service**.
- In the Virtualization Explorer, right-click a virtualization entity and select Add > Virtual Service.

For user interface details, see "Create New Virtual Service Wizard" on page 91.

#### 4. Optional: Create a template service

- a. To save a service as a template: In the Virtualization Explorer, right-click the service and select **Save as Template**.
- b. To create a new service from a template: From the main menu, select File > New
   > Virtual Service from Template.

## How to Configure Virtual Services

This task describes how to configure your virtual service to meet your needs.

- This task is part of a higher-level task. For details, see "How to Use Service Virtualization" on page 24.
- To learn more about configuring virtual services, see "Virtual Service Overview" on page 79.

This task includes the following steps:

- "Select simulation models" below
- "Configure virtual service endpoints" on next page
- "Configure Service Virtualization agents" on next page
- "Enable message logging" on next page
- "Edit the service description" on next page
- "Set security options" on next page
- "Change servers" on next page

#### Select simulation models

In the Virtual Service Editor, select existing data and performance models to use with your virtual service, or add new models.

For task details on simulation models, see "How to Manage Simulation Models" on page 133.

#### **Configure virtual service endpoints**

You can modify real and virtual service endpoint information that you provided when creating the virtual service. In the Virtual Service Editor, under Service Configuration, click **Edit** to open the Edit Endpoints dialog box.

In the Edit Endpoints dialog box, you can click **Show Endpoint Topology** to display a diagram of your service endpoint configuration.

#### **Configure Service Virtualization agents**

You can modify agent information that you selected when creating the virtual service. In the Virtual Service Editor, under Service Configuration, click **Configure**. The Agents page opens.

For user interface details, see "Agents Page" on page 60.

#### Enable message logging

To enable logging, in the Virtual Service Editor, under Service Configuration, select **Message Logging**.

For more details, see "Virtual Service Editor" on page 104.

#### Edit the service description

You can modify the service description associated with your virtual service. Depending on the service type, you can do the following:

- add/remove operations/URI spaces
- edit request/response metadata
- add/remove/edit XML schemas
- add/remove data formats
- define session identifiers

For task details, see "How to Edit a Service Description" on page 159.

For user interface details, see "Service Description Editor" on page 195.

#### Set security options

In the Virtual Service Editor, under Security Settings, define authentication credentials and message security.

Note: This may be required before you can connect to the real service.

For task details, see "How to Set Security" on page 226.

#### Change servers

You can redeploy the virtual services in your project to a different server, if required.

From the main menu, select **Project > Change Server** to open the Change Server for <current project> Project dialog box.

Alternatively, in the Virtualization Explorer, right-click the project tree and select Change Server.

## How to Manage Virtualization Projects

This task describes how to create and manage virtualization projects.

To learn more about Service Virtualization projects, see "Virtualization Projects" on page 80.

#### Create a new project

Select one of the following:

- Select a task from the Get Started page. These tasks first create a new virtualization project and then a new virtual service. For user interface details, see "Start Page" on page 29.
- Create a new virtualization project. From the main menu, select File > New > Virtualization Project. For user interface details, see "Summary of Virtualization Project Dialog Box" on page 90.

#### Add projects to an existing solution

You can add new or existing projects to a solution.

- 1. From the main menu, select **View > Projects** to display the Projects pane.
- 2. Right-click the solution name and select one of the following:
  - a. Add > New Virtualization Project
  - b. Add > Existing Project

#### Open a project

To open a project, select one of the following:

• On the Start Page, under Recent Projects, select a project.

**Tip:** Hover over a project name to see the full path to the saved project.

 From the main menu, select File > Open Project/Solution. By default, projects are stored in the following location in the file system: <Your Documents folder>\HP Service Virtualization\Projects.

#### Change the default project location

From the main menu, select **Tools > Options > General** tab. Then select **Projects and Solutions**.

### Close a project

From the main menu, select **File > Close Project/Solution**.

#### **View server information**

In the Virtualization Explorer, expand a project. The server is displayed as the last item in the tree. Click the server to display its details in the lower pane.

#### Move virtual services to a different server

The virtual services in your project are deployed on the Service Virtualization server specified for the project. To change the server, in the Virtualization Explorer, expand a project. Right-click the server and select **Change Server**. Alternatively, from the main menu, select **Project > Change Server**. For user interface details, see "Change Server Dialog Box" on page 108.

## **Virtual Services User Interface**

This section includes:

Summary of Virtualization Project Dialog Box	90
Create New Virtual Service Wizard	91
Endpoint Validation Dialog Box	102
Virtualization Explorer	102
Virtual Service Editor	104
Edit Endpoints Dialog Box	108
Change Server Dialog Box	108

## Summary of Virtualization Project Dialog Box

This dialog box enables you to create a new virtualization project.



To access	From the main menu, select <b>File &gt; New &gt; Virtualization Project</b> .
Relevant tasks	"How to Use Service Virtualization" on page 24
See also	"Service Virtualization Overview" on page 21

User interface elements are described below:

UI Element	Description
Project	Displays the default name for the project you are creating.
Path	Displays the default location in the file system where the project is created.
Server	Displays the default server to be used with the new project. All services in the project are deployed on this server.
Change	<ul> <li>Opens the Change Project dialog box, enabling you to modify the following details:</li> <li>Project. Enter a name for the project or accept the default name.</li> <li>Path. Enter a path for the project or accept the default path.</li> <li>Server. Select the server on which to deploy the virtual service.</li> <li>You can select the Designer's embedded server, or a standalone Service Virtualization Server. For details on adding Service Virtualization Servers, see "How to Manage Service Virtualization Servers" on page 26.</li> </ul>
Create	Creates the new project according to your specified settings.

## **Create New Virtual Service Wizard**

This wizard enables you to create a new virtual service.

To access	<ul> <li>To launch the new virtual service wizard, in an existing project, select one of the following:</li> <li>From the main menu, select File &gt; New &gt; Virtual Service.</li> <li>In the Virtualization Explorer, right-click a virtualization entity and select Add &gt;</li> </ul>
	Virtual Service.
Wizard	This wizard contains:
тар	"Import Real Service Description Page" below > "Choose Service Protocol Page" on the facing page > "Service Properties Page" on page 94 > "Summary of Virtualization Page" on page 100
Important information	• If you are creating a new virtual service from the Get Started page, a new virtualization project is created for the service.
	• For additional details on specific service types, see "Virtual Service Types" on page 80.
Relevant tasks	"How to Create a Virtual Service" on page 85
See also	"Virtual Service Overview" on page 79
	"Service Descriptions" on page 83

### Import Real Service Description Page

This wizard page enables you to import service description documents.

Wimport Real Service Description	? ×
Specify locations of service description for real service. You can use different formats to describe service, for example WSDL, XSD, Cobol Copybook. Continue with "Start".	
Service description:     Enter Url, semicolon separated paths or use Browse button     To I don't have a service description	
Start > Ca	incel

Important information	General information about this wizard is available here: "Create New Virtual Service Wizard" on previous page
	• For additional details on specific service types, see "Virtual Service Types" on page 80.
	• This page also enables you to import a service description in order to add service call activity in the Data Model.
Wizard	The create new virtual service wizard contains:
map	"Import Real Service Description Page" on previous page > "Choose Service Protocol Page" below > "Service Properties Page" on page 94 > "Summary of Virtualization Page" on page 100
See also	"Virtual Service Overview" on page 79
	"Service Descriptions" on page 83

User interface elements are described below:

UI Element	Description
Service description	Enables you to import a WSDL, XML schema, or COBOL copybook document. Enter the path to your service description file, or click <b>Browse</b> to navigate to the file location.
	<b>Note:</b> If the WSDL describes multiple services or a single service specifying multiple ports, select one from the list of available ports in the dialog box that opens.
I don't have a service description	Enables you to create a virtual service without using an existing service description.
	<b>REST services:</b> Select this option when creating a REST service. REST services do not use imported service description documents. After you create a REST service, you can record real service behavior to learn the structure of the service.

### Choose Service Protocol Page

This wizard page enables you to select protocols for your new virtual service.



Important information	General information about this wizard is available here: "Create New Virtual Service Wizard" on page 91
	<ul> <li>For additional details on specific service types, see virtual service types on page 80.</li> </ul>
Wizard map	The create new virtual service wizard contains: "Import Real Service Description Page" on page 91 > "Choose Service Protocol Page" on previous page > "Service Properties Page" on the facing page > "Summary of Virtualization Page" on page 100
See also	"Virtual Service Overview" on page 79

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

<b>UI Element</b>	Description
<filter text<br="">box&gt;</filter>	Enter text to filter the available protocols.
Filter by	To filter the protocol list, select protocols from the message and transport protocol drop-down lists.
<list of<br="">protocols&gt;</list>	Select a protocol configuration for your new virtual service.

### Message Type Page

This wizard page enables you to define the structure of input and output messages, when working with a COBOL copybook.

🌃 Message Type	? ×
Select message type.	÷
• Create messages specifying input and output elements	
Input Message Type:	
Output Message Type:	
O Create multisegmented messages	
< Back Next > C	ancel

Important information	<ul> <li>General information about this wizard is available here: "Create New Virtual Service Wizard" on page 91</li> </ul>
	• This wizard page is available only if you chose to import a COBOL copybook for the service description.
	• For additional details on specific service types, see "Virtual Service Types" on page 80.
Wizard map	The create new virtual service wizard contains: "Import Real Service Description Page" on page 91 > "Choose Service Protocol Page" on page 92 > "Service Properties Page" below > "Summary of Virtualization Page" on page 100
See also	"Virtual Service Overview" on page 79

User interface elements are described below:

UI Element	Description
Create messages specifying input and	Displays the message types available for input and output, as defined in your COBOL copybook.
output elements	Only one COBOL structure may be assigned as the input message, and another as the output message.
Create multisegmented messages	A multi-segmented message is composed of multiple COBOL structures. Each COBOL structure may occur one or more times in a segmented message.
	Note: Not all IMS protocols support this feature.

### Service Properties Page

This wizard page enables you to define protocol-specific properties for your virtual service.

🚟 Service Properti	es	? X
Protocol specific service	properties.	÷.
Virtual Service Destination Name:	1	
Reply To:		
Real Service		
Destination Name:		
Reply To:		
Connection Factory:		
Show Endpoint Topology	Y Test Endpoint	
	< Back Next > Car	icel

Important information	General information about this wizard is available here: "Create New Virtual Service Wizard" on page 91
	• The properties available on the page depend on the protocols you select for the new service on the Choose Service Protocol page.
	• After the virtual service is created, you can edit these properties. In the Virtual Service Editor, under Service Configuration, click <b>Edit</b> to open the Edit Endpoints dialog box.
	• For additional details on specific service types, see "Virtual Service Types" on page 80.
Wizard	The create new virtual service wizard contains:
map	"Import Real Service Description Page" on page 91 > "Choose Service Protocol Page" on page 92 > "Service Properties Page" on previous page > "Summary of Virtualization Page" on page 100
See also	"Virtual Service Overview" on page 79

This section includes:

- General
- HTTP
- IBM IMS TM
- IBM CICS TS HTTP
- JDBC
- JMS
- SAP RFC/IDOC

- TIBCO EMS
- WebSphere MQ

User interface elements are described below:

#### General

Show Endpoint Topology	Displays a diagram of your service endpoint configuration.
Test Endpoints	Checks that the endpoints are configured correctly.
Ignore WS Addressing	WS-Addressing headers are not processed by Service Virtualization.
	Available for SOAP services over HTTP, JMS, and Tibco EMS.

### HTTP

Define the real service endpoints.

Property	Description	
Endpoints	Enter the real service endpoint (URL).	
	To enter multiple endpoints, separate them by a space, comma, semicolon, or type each endpoint on a new line.	
	<b>Note:</b> When using the HTTP or HTTPS Gateway agent, the virtual service may have only one specified endpoint.	

### **IBM IMS TM**

Define the real service properties. Values are case-sensitive and should be provided by your IMS TM System Administrator or Operator.

Property	Description
Client ID	Identification of the client for services with dedicated persistent socket connections. For shareable persistent socket connections, leave this value undefined.
Transaction Code	The alphanumeric code used to invoke IMS message processing program.
TPipe Name	The transactional pipe (TPipe) value, used to maintain a logical association between client and service. The OTMA TPipe name is similar to the IMS Connect logical terminal (LTerm) name.

Property	Description
LTerm Name	<b>Logical Terminal Name.</b> The IMS logical association between client and service. Similar to OTMA TPipe name.
Datastore ID	The service datastore name (IMS Destination ID).
Any value	Clear this option to define a filter for the corresponding property. If you enter a specific value for a property, only messages matching the specified value are processed during Learning and Simulation sessions.

### **IBM CICS TS HTTP**

Define virtual and real service properties.

Property	Description
Virtual Ser	vice Parameters:
Path	The relative URI that defines on which URI path the virtual service is to be deployed.
Real Service Properties:	
Endpoint	The relative or absolute endpoint, depending on the agent type, that defines where the actual COBOL service is listening. For details, see "Virtual Service Types" on page 80.
Encoding	COBOL content encoding.

### JDBC

Define the real service properties.

Property	Description
Connection String	Define <b>one</b> of the following:
	• The JDBC Connection string used in the application under test. This is used primary when working with J2SE applications.
	• The JNDI datasource name used by the application under test. This is used only if the application is deployed on a J2EE application server.

#### JMS

Define virtual and real service properties.

Property	Description	
Virtual Servio	ce Properties:	
Destination Name	The JNDI destination name where the virtual service expects to receive requests.	
Reply To	The JNDI destination name where the virtual service will send responses. If the client provides a ReplyTo JMS property, you can leave this field empty.	
Real Service Properties:		
Destination Name	The JNDI destination name where the real service expects to receive requests.	
Reply To	The JNDI destination name where the real service sends responses. If this field is left empty, Service Virtualization creates a temporary destination for receiving responses from the real service, and sets the ReplyTo JMS property in the request to point to that temporary destination.	
Connection Factory	The JNDI name of the connection factory.	

### SAP RFC/IDOC

Define real and virtual service properties.

Property	Description	
Virtual Service Properties:		
Program ID	The ID assigned to the RFC destination defined on the SAP or PI server.	
PI RFC/IDOC Adapter	Indicates you are working with a SAP PI RFC adapter.	
Unicode	If you are using a SAP PI RFC/IDOC adapter, you must select this option if unicode is configured in SAP PI.	

Property	Description
PI Summary File	If you are using a SAP PI RFC/IDOC adapter, you must provide a PI summary file.
	<ol> <li>Export design objects. In the SAP PI Enterprise Service Builder, export the iDOCs and RFC design objects for the relevant software component, and then save the summary to create a PI summary file.</li> </ol>
	2. Add credentials to the summary file. Add the user name and password of a user with rights to log on to the real SAP service. For example, add the following lines:
	User= <username> Password=<password></password></username>
Real SAP Server Connection Properties:	
Client ID	The SAP client ID.
Host	The IP address or host name of the SAP server.
System Number	The SAP system number.

### **TIBCO EMS**

Define the real service properties.

Since Service Virtualization records messages on TIBCO EMS non-intrusively, all parameters in the configuration are related only to the real service. When the virtual service mode is switched to Simulating mode, the real service is automatically disconnected from TIBCO EMS and is replaced by Service Virtualization.

There is no response destination name as the response destination is always read from request properties.

Property	Description
Destination Name	Name of destination where requests are sent.
Destination Type	Type of destination where requests are sent.

### WebSphere MQ

Define virtual and real service properties.

Virtual Service Properties:

Property	Description		
Destination Name	Name of queue where the virtual service expects requests.		
Reply To	Name of queue where the virtual service will send responses. If the client provides a ReplyToQueue message property, you can leave this field empty.		
Real Service	Real Service Properties:		
Destination Name	Name of queue where the real service expects requests.		
Reply To	Name of queue where the real service sends responses. If this field is left empty, Service Virtualizationcreates a temporary queue for receiving responses from the real service, and sets the ReplyToQueue message property in the request to point to that temporary destination. Note that WebSphere MQ must be configured so that Service Virtualization has permission to create temporary queues.		
Destination Type	Type of destination where the real service expects requests. Only <b>Queue</b> destination type is supported.		

### Summary of Virtualization Page

This wizard page enables you to review your information. You can confirm or change details of the real service, virtual service, or project.



Important information	<ul> <li>General information about this wizard is available here: "Create New Virtual Service Wizard" on page 91</li> </ul>
	• If you are creating a new virtual service from the Get Started page, a new virtualization project is created for the service. Click <b>Change</b> to modify project name, path, or server.
	• For additional details on specific service types, see "Virtual Service Types" on page 80.
Wizard map	The create new virtual service wizard contains: "Import Real Service Description Page" on page 91 > "Choose Service Protocol Page" on page 92 > "Service Properties Page" on page 94 > "Summary of Virtualization Page" on previous page
See also	"Virtual Service Overview" on page 79

User interface elements are described below:

UI Element	Description
Virtual Service	Displays details of the virtual service you are creating.
Real Service	Displays the parameters you defined for the real service.
Project	If you are creating a new virtual service from the Get Started page, a new virtualization project is created for the service. Click <b>Change</b> to modify the following details:
	• <b>Project.</b> Enter a name for the project or accept the default name.
	• Path. Enter a path for the project or accept the default path.
	• Server. Select the server on which to deploy the virtual service.
	You can select the Designer's embedded server, or a standalone Service Virtualization Server. For details on adding Service Virtualization Servers, see "How to Manage Service Virtualization Servers" on page 26.
Change	Opens a dialog box for the selected component, enabling you to modify settings for your virtual service or real service.
	When you are also creating a new project, you can also edit the project settings.
Virtualize	Creates a new virtual service.

## **Endpoint Validation Dialog Box**

This dialog box provides information in the event that endpoint validation fails.



To access	When creating a new virtual service, or editing the endpoints for an existing service, this dialog box opens automatically if endpoint validation fails for any endpoint.
Important information	The buttons displayed in this dialog box vary depending on the protocol you are using.
Relevant tasks	"How to Create a Virtual Service" on page 85
See also	For details on defining the protocol-specific properties for your endpoints, see "Service Properties Page" on page 94.

User interface elements are described below:

UI Element	Description
Use Suggested	Uses the address suggested by the Service Virtualization agent, displayed in the dialog box.
Add New Agent	Opens the Agents Page and creates a new configuration of the agent. For user interface details, see "Agents Page" on page 60.

## Virtualization Explorer

The Virtualization Explorer displays the logical structure of your virtualization projects. It shows the virtualization entities in your project, such as services, models, and topologies, in their hierarchical structure. It also displays information on the server associated with your project.



To access	The Virtualization Explorer is initially displayed, by default, on the sidebar or in the left pane of the Service Virtualization window.
	If not visible on the sidebar or in the left pane, from the main menu, select <b>View</b> > <b>Virtualization Explorer</b> .
Important information	Right-click virtualization entities in the project tree to view additional options.

User interface elements are described below:

UI Element	Description
project tree	<ul> <li>Displays the virtualization entities in your open project.</li> <li>Select an entity in the tree to display its details in the lower pane.</li> <li>Double-click an entity to open it in the main display pane.</li> <li>Right-click an entity to view additional options.</li> </ul>
	<b>Tip:</b> Each virtualization entity is represented by a different icon. In addition, the icons change to reflect current statuses. For example, a virtual service icon indicates the service's current mode, such as <b>Learning</b> , and a server icon indicates the server's current status, such as <b>Online</b> .

## **Virtual Service Editor**

The Virtual Service Editor enables you to control the mode of the virtual service and the models currently in use, configure the endpoints, and configure security settings.

Member Accounts		<b>⇒</b> ×
Member Accounts Vitual service created from service "MemberAccounts" loc MemberAccountsService	ated at http://localhost:8101/ServiceSimula	tion/Demo/MemberAccountsService/
Image: Stand-By No messages received       Image: Stand-By No messages received         Image: Stand-By No messages received       Image: Stand-By No messages received         Image: Stand-By No messages received       Image: Stand-By No messages received         Image: Stand-By No messages received       Image: Stand-By No messages received         Image: Stand-By No messages received       Image: Stand-By No messages received         Image: Stand-By No messages received       Image: Stand-By No messages received         Image: Stand-By No messages received       Image: Stand-By No messages received         Image: Stand-By No messages received       Image: Stand-By No messages received         Image: Stand-By No messages received       Image: Stand-By No messages received         Image: Stand-By No messages received       Image: Stand-By No messages received         Image: Stand-By No messages received       Image: Stand-By No messages received         Image: Stand-By No messages received       Image: Stand-By No messages received         Image: Stand-By No messages received       Image: Stand-By No messages received         Image: Stand-By No messages received       Image: Stand-By No messages received         Image: Stand-By No messages received       Image: Stand-By No messages received         Image: Stand-By No messages received       Image: Stand-By No messages received         Image: Stand-By No messages received	Simulation Models Data Model: Data Model None	Performance Model: Performance Model None Offine
	Add   Edit   Delete   Duplicate	Add   Edit   Delete   Duplicate
Virtual Service: http:// SERVER: 7200/MemberAccounts     Read Service: http:// Jocaffostsitol/ServiceSimulation/D     SOAP Version: 1.1     Edit     Message Logging: ① To see logged messages; click h     Service Description	Agent: HT D[MemberAccountsService Co nere.	TP Gateway vrfigure
Protocol: SOAP over H11PH11PS Operations: getMemberDetail, getMemberPlan, memberSearch Edik   Update From File	h	
Security Settings		
<ol> <li>You can create and edit user identities in Credential Store, E</li> </ol>	Edit Credential Store	
Message Security Enable: Mode: Real Service Identity: Virtual Service Identity: () Specify if you do not have priva Advanced Settings	v v ste key for real service.	

To access	In the Virtualization Explorer, double-click the virtual service you want to view or edit.
Important information	Some changes you make to the service may require that you restart the service.
Relevant tasks	"How to Configure Virtual Services" on page 86
See also	<ul><li>"Virtual Service Overview" on page 79</li><li>"Service Virtualization Main Menus" on page 34</li></ul>

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

#### General

<b>UI Element</b>	Description
<virtual service<br="">name and description&gt;</virtual>	The name and description of the Virtual Service. Click to edit.

UI Element	Description
<status area=""></status>	Located in the upper-left part of the window, indicates the following:
	The current mode of the service: Learning, Simulation, Standby or Offline.
	• The data and performance models currently in use.
● Learn 🔻	Puts the selected service into Learning Mode. Any communication through the Virtual Service is added to the Simulation Model in this mode.
	Use the drop down arrow to select which models to update:
	Data & Performance (default)
	Data Model
	Performance Model
Simulate	Starts the simulation according to the simulation models selected in the Virtual Service Editor.
	If the service was in Learning mode, Service Virtualization first finishes the learning session and adds any data learned in the session to the Simulation Model.
<b>QQ</b> Stop  ▼	Puts the service into Standby Mode with the option of maintaining or disposing of learned data.
(i) Info	Opens the Runtime Report to display current information about the service.

### Simulation Models area

Manage the models associated with the virtual service.

UI Element	Description
Data Model	Select a data model to use with the service.
	<b>None.</b> Enables you to pass messages to the real service and receive responses, while still simulating performance according to the selected Performance Model.
Performance Model	Select a performance model to use with the service.
	None. Causes the virtual service to respond as quickly as possible.
	Offline. Simulates the unavailability of the service.

UI Element	Description
Add	Opens the Add New Simulation Model dialog box, enabling you to add a new data or performance model.
Edit	Opens the selected data or performance model in the relevant editor. For more details, see "Data Model Editor" on page 163 or "Performance Model Editor" on page 192.
Delete	Deletes the selected model.
Duplicate	Opens the Add New Simulation Model dialog box, enabling you to create a copy of the selected data or performance model.

### Service Configuration area

View or edit details of the real and virtual services, protocol, and agent currently in use.

UI Element	Description	
Edit	Opens the Edit Endpoints dialog box, enabling you to edit real and virtual service information. For details, see "Edit Endpoints Dialog Box" on page 108.	
Configure	Opens the Agents page in the Options dialog box, enabling you to configure the agent used by the virtual service. For details, see "Agents Page" on page 60.	
Message Logging	Enables logging. The messages are stored on disk in the Designer log directory %APPDATA%\Hewlett-Packard\VirtualServiceDesigner\logs, in the following sub- directories:	
	• Embedded server: msg-embedded\[Virtual Service Name]	
	• Standalone server: msg-standalone \ [Virtual Service Name] on the standalone server itself.	
	Each message is stored in a single file named [Message Order Number]-[Message Id].	

### Service Description area

Displays the service description and any metadata associated with the service.

UI Element	Description
Edit	Opens the Service Description Editor, enabling you to add new operations to the service, or update metadata. For details, see "Service Description Editor" on page 195.
	<b>Note:</b> Editing the service description is not supported for some protocols.
Update From File	Opens the Update Service Description dialog box, enabling you to replace the service description file.
	Note: Available only for SOAP services.

### Security Settings area

This area enables you to view and edit security settings.

UI Element	Description	
Edit Credential Store	Opens the Edit Credential Store dialog box, enabling you to create and edit user identities. For details, see "Edit Credential Store Dialog Box" on page 237.	
Enabled	Turns message security on or off.	
Mode	Default supported message security modes. For details, see "How to Set Message Security" on page 227.	
Real Service Identity	The identity of the real service, its certificate, is stored in the Credential Store. This setting is used if a service uses a certificate for message security. The public key of the certificate is used to encrypt messages sent to the real service.	
Virtual Service Identity	<ul> <li>The identity of the virtual service, its certificate, is stored in the Credential Store.</li> <li>If the Real Service Identity contains the certificate with a private key, this setting does not need to be configured. In this scenario, the Real Service Identity is also used as the identity of the virtual service.</li> <li>If the Real Service Identity contains only a certificate without a private key, this setting must be configured to provide the identity of the virtual service. The configured identity must contain a certificate with a private key, as the service requires the private key to decrypt the messages coming from the client.</li> <li>Clients must trust the certificate used as the identity of the virtual service.</li> </ul>	
Advanced Settings	Opens the Advanced Message Security Settings dialog box. For details, see "Advanced Message Security Settings Dialog Box" on page 238.	

## **Edit Endpoints Dialog Box**

This dialog box enables you to edit the real and virtual service endpoints configured for your virtual service.

🚟 Edit Endpoints	? 🗙
Virtual Service: Agent: Path:	HTTP Gateway
Real Service: Endpoint: Ignore WS Addressing:	http://localhost:8108/ServiceSimulation/Den
Show Endpoint Topology	<u>Test Endpoint</u>
	OK Cancel

**To access** In the Virtual Service Editor, under Service Configuration, click **Edit**.

User interface elements are described below:

<b>UI Element</b>	Description
Virtual/Real Service	For details on Service Virtualization agent properties, see "Agents Page" on page 60.
	For details on protocol-specific endpoint properties, see "Service Properties Page" on page 94.
Show Endpoint Topology	Displays a diagram of your service endpoint configuration.
Test Endpoints	Checks that your endpoint is configured correctly.
Ignore WS Addressing	WS-Addressing headers are not processed by Service Virtualization.
/ laai oooniig	Available for SOAP services over HTTP, JMS, and Tibco EMS.

## **Change Server Dialog Box**

These pages enable you to move the virtual services in a project to a different server.
move virtual ver or enter l	services from MemberAccounts Virtualization Project 1 project to another sever, you have to choose hostname for new server.	Q
Runtime		
Server:		T
	① E.g. http://localhost:6080/, https://localhost:6085/, localhost:6080 or localhost	
To specify det	tails from moving the virtual services click <b>Next</b> .	
	< Previous Next > C	ancel
hange Se	rver for MemberAccounts Virtualization Project 1 Project	_
thange Se ecify agents f	rver for MemberAccounts Virtualization Project 1 Project	. D
thange Se ecify agents f	rver for MemberAccounts Virtualization Project 1 Project	. III - (Ĉ
<b>:hange Se</b> ecify agents fr <b>Binary Com</b> Agent [	rver for MemberAccounts Virtualization Project 1 Project	. D
Change Se ecify agents fr Binary Com Agent [ 	rver for MemberAccounts Virtualization Project 1 Project         for virtual services to move them to MemberAccounts Virtualization Project 1 server.         Service (Binary messages over HTTP)         HTTP(S) Proxy         lanage Agents   Duplicate Original Configuration	-I=I
Change Se ecify agents f Binary Com Agent [ MemberAco	rver for MemberAccounts Virtualization Project 1 Project         ior virtual services to move them to MemberAccounts Virtualization Project 1 server.         Service (Binary messages over HTTP)         HTTP(S) Proxy         lanage Agents   Duplicate Original Configuration         ounts (SOAP over HTTP/HTTPS)	- []
Change Se ecify agents f Binary Com Agent [ MemberAcc Agent [	rver for MemberAccounts Virtualization Project 1 Project         ior virtual services to move them to MemberAccounts Virtualization Project 1 server.         Service (Binary messages over HTTP)         HTTP(S) Proxy         Lanage Agents   Duplicate Original Configuration         oounts (SOAP over HTTP/HTTPS)         HTTP Gateway	. <b>.</b>
ihange Se ecify agents h Binary Com Agent [ MemberAcc Agent [ Agent [	rver for MemberAccounts Virtualization Project 1 Project         for virtual services to move them to MemberAccounts Virtualization Project 1 server.         Service (Binary messages over HTTP)         HTTP(S) Proxy         lanage Agents   Duplicate Original Configuration         ounts (SOAP over HTTP/HTTPS)         HTTP Gateway         Ianage Agents   Duplicate Original Configuration	. <b>D</b>
thange Se ecify agents h Binary Com Agent [ MemberAcc Agent [ MemberAcc	rver for MemberAccounts Virtualization Project 1 Project         for virtual services to move them to MemberAccounts Virtualization Project 1 server.         Service (Binary messages over HTTP)         HTTP(S) Proxy         tanage Agents   Duplicate Original Configuration         ounts (SOAP over HTTP/HTTPS)         HTTP Gateway         Tanage Agents   Duplicate Original Configuration	- <b>I</b>
thange Se acify agents h Binary Com Agent [ MemberAcc Agent [ MemberAcc	rver for MemberAccounts Virtualization Project 1 Project         ior virtual services to move them to MemberAccounts Virtualization Project 1 server.         Service (Binary messages over HTTP)         HTTP(S) Proxy         lanage Agents   Duplicate Original Configuration         ounts (SOAP over HTTP/HTTPS)         HTTP Gateway         lanage Agents   Duplicate Original Configuration	- <b>I</b>
ithange Se acify agents h Binary Com Agent [ MemberAcc Agent [ MemberAcc	rver for MemberAccounts Virtualization Project 1 Project         for virtual services to move them to MemberAccounts Virtualization Project 1 server.         Service (Binary messages over HTTP)         HTTP(S) Proxy         Ianage Agents   Duplicate Original Configuration         ounts (SOAP over HTTP/HTTPS)         HTTP Gateway         Ianage Agents   Duplicate Original Configuration	- D
Change Se ecify agents h Binary Com Agent [ MemberAcc Agent [ MemberAcc	rver for MemberAccounts Virtualization Project 1 Project         ior virtual services to move them to MemberAccounts Virtualization Project 1 server.         Service (Binary messages over HTTP)         HTTP(S) Proxy         Lanage Agents   Duplicate Original Configuration         ounts (SOAP over HTTP)/HTTPS)         HTTP Gateway         Lanage Agents   Duplicate Original Configuration	
cify agents h acify agents h Agent [ MemberAcc Agent [ MemberAcc	rver for MemberAccounts Virtualization Project 1 Project         for virtual services to move them to MemberAccounts Virtualization Project 1 server.         Service (Binary messages over HTTP)         HTTP(S) Proxy         lanage Agents   Duplicate Original Configuration         ounts (SOAP over HTTP/HTTPS)         HTTP Gateway         lanage Agents   Duplicate Original Configuration	- III - CO

**To access** From the main menu, select **Project > Change Server**.

<b>UI Element</b>	Description
Runtime Server	Select a server or enter the URL for a new server on which to deploy the virtual services in the open project.
	<b>Note:</b> The servers available in the drop-down list are the servers configured in your project. To view, add, or delete servers, from the main menu, select Tools > Options, and click the <b>Servers</b> tab.
Agent	Select an agent for each service.
Manage Agents	Opens the Agents page, enabling you to add, delete, or reconfigure settings for virtual service agents. For details, see "Agents Page" on page 60.
Duplicate Original Configuration	Opens the Agents page, and copies the configuration on the current server to create a configuration on the new server. You can modify the settings of the new configuration.

User interface elements are described below:

# Chapter 4

## Simulation

This chapter includes:

Simulation Overview	111
How to Run Simulations	111
Service Locking	114
Simulation User Interface	114

### **Simulation Overview**

After a virtual service is created, you define simulation data. You can do this by manual design, or by recording real service activity in order to learn about the requests and responses of the real service. You can then use the recorded data to create data and performance models that define how the virtual service should behave during simulation.

Before a simulation session, you can select which simulation models to use. The virtual service can use both the data and performance models for simulation, or use them individually, as follows:

- Turn off data simulation and let the real service respond. Only performance is simulated using one of the performance models.
- Turn off performance simulation. Response times are not affected. Only data is simulated using one of the data models.
- Simulate the unavailability of a service.

You manage the simulation process by manipulating virtual service modes:

- Learning mode. The virtual service works as a proxy to record and learn the behavior of a real service. The virtual service forwards the real communication between a client and a service. In this mode, any communication through the virtual service is added to the virtual service's simulation models.
- Standby mode. The virtual service redirects requests to the real service, and redirects responses from the real service back to the client. The virtual service is not learning, and not simulating.
- **Simulating mode.** The virtual service responds to client requests according to learned behavior and the real service does not receive any communication. This is the main use of the virtual service, and the mode you use for testing purposes.

During learning or simulating sessions, you can monitor service behavior.

For task details, see "How to Run Simulations" below.

### How to Run Simulations

This task describes how to run simulations using your virtual services.

- This task is part of a higher-level task. For details, see "How to Use Service Virtualization" on page 24.
- To learn more about virtual services, see "Simulation Overview" above.

 If a service is locked by another client, a message displays in the Virtual Service Editor. For details, see "Service Locking" on page 114.

This task includes the following steps:

"Prerequisites" below

"Reconfigure clients" below

"Define simulation data" below

"Learn real service behavior" below

"Select simulation models" on next page

"Simulate" on next page

"Monitor all services" on next page

"Optional: Adjust simulation models" on next page

#### 1. Prerequisites

Create and configure virtual services.

#### 2. Reconfigure clients

Reconfigure your client to use the virtual service endpoints in place of the real service endpoints. This is required in cases where Service Virtualization can only perform intrusive virtualization.

#### 3. Define simulation data

You can define the data from scratch in the Data Model Editor. For task details, see "How to Edit a Data Model" on page 134.

Alternatively, you can define the data by recording real service behavior, as described in the next step.

#### 4. Learn real service behavior

Record the behavior of the real service in order to see the actual requests and responses.

 a. In the Virtual Service Editor, click Learn to record real service activity. The information is saved in the virtual service's data and performance models. For user interface details, see "Virtual Service Editor" on page 104.

Alternatively, you can choose to save only some of the collected data. Click the **Learn** drop-down arrow to select a simulation model to which you want to save recorded data.

b. Run the application communicating with the real service. Service calls are recorded.

c. To view the learned data after recording, open the Data Model Editor and click the **Learned Data** rule. For user interface details, see "Data Model Editor" on page 163.

#### 5. Select simulation models

In the Virtual Service Editor, select a data model and a performance model to use during simulation.

#### Note:

To simulate the unavailability of a service, select the **Offline** performance model.

You can also choose to use just one of the simulation models, by selecting **None** for either the data or performance model.

#### 6. Simulate

- a. In the Virtual Service Editor, click **Simulate** to place the virtual service in Simulating mode. The virtual service is ready to respond to client requests. The real service does not receive any communication.
- b. Run your client application. The virtual service responds to requests, and returns responses based on its associated simulation models.
- c. When you want to complete the simulation session, click **Stop** to move the virtual service into Standby mode. Client requests are then answered by the real service.

#### 7. Monitor all services

You can monitor virtual service activity in the following ways:

- a. **Runtime View.** View and control all of the virtual services in your project. During a learning or simulation session, the Runtime View provides an overview of the communication through the virtual services. From the main menu, select **View > Runtime View**.
- b. Problem List. View errors, warnings, and informational messages about events that occurred during the application or server run. From the main menu, select View > Problem List.
- c. **Service Administration.** View and manage all services from configured servers, without opening individual projects. On the Start Page, click **Service Administration**.

Alternatively, from the main menu, select **View > Service Administration**.

d. **Service Virtualization Management.** View and manage services from multiple Service Virtualization projects and servers in a web browser, without opening the projects. For details, see "Service Virtualization Management" on page 120.

#### 8. Optional: Adjust simulation models

You can make adjustments to the data and performance models associated with your virtual services. For example, if you are simulating a service based on learned data, you may need to customize some aspect of the virtual service behavior that is not addressed. For details, see "How to Edit a Data Model" on page 134 and "How to Edit a Performance Model" on page 158.

### Service Locking

If a service is locked by another client, the following message displays in the Virtual Service Editor:

 Member Accounts Service.vs

 Locked Service:
 Member Accounts Service is locked, so you cannot edit service and its models.

 Check Status
 X

The Service Virtualization Designer or a test emanating from HP LoadRunner / HP Service Test, may need to know that they own a virtual service, or that virtual service is available, in order to prevent conflicts. They may also need to know who the present owner of a service is, as a service can be owned by only one client at a time. If a service is locked by the owner, other clients can see who the owner is, as each client has a unique "client ID".

When a service is locked, its configuration and all of its data and performance models are also locked. The owner of the service can modify the service and its model, but other clients cannot. If a user tries to modify the service or its model, a message displays indicating that the service is locked, and specifying which client is the owner of the service. If a Designer or a test is the owner, then modification is permitted.

#### To unlock a locked service:

If a technical problem occurs or a test runs too long, you can force an unlock in the Service Virtualization Designer. To unlock the service, from the Runtime View or Service Administration, under More Actions, select **Unlock**.

**Note:** No changes are allowed to a service and its models during the learning process. This process must be completed regardless of the owner of the virtual service. **Unlock** is not available during this time.

### **Simulation User Interface**

This section includes:

Runtime View	115
Problem List	116
Service Administration	

### **Runtime View**

The Runtime View enables you to view and control all of the virtual services in your project. During a learning or simulation session, the Runtime View provides an overview of the communication through the virtual services.

Runtime View						▲ Å ×
All - Virtual Service	Status	Messages (Unique)	Data Model	Performance Model	Project	View All Services 🔻
Member Accounts	2 Problem(s)	8 (8)	Real Service	Maximal Performance	Simulation	
🔵 Learn 🔻 🕨 Simulate 🚺 Sto	More A	.ctions 🕶				
Runtime View Sproblem List						
<b>T</b>						
TO access		FIOID THE IT	iain menu, s	select view > Runtir	ne view.	

To access	From the main menu, select <b>View &gt; Runtime View</b> .
Important information	The context menu enables you to show/hide data columns on the page. Right-click to view.
Relevant tasks	"How to Run Simulations" on page 111
See also	"Virtual Service Overview" on page 79

User interface elements are described below.

<b>UI Element</b>	Description			
🥚 Learn 🔽	Puts the selected service into Learning Mode. Any communication through the Virtual Service is added to the Simulation Model in this mode.			
	Use the drop down arrow to select which models to update:			
	Data & Performance (default)			
	Data Model			
	Performance Model			
Simulate	Starts the simulation according to the simulation models selected in the Virtual Service Editor.			
	If the service was in Learning mode, Service Virtualization first finishes the learning session and adds any data learned in the session to the Simulation Model.			
OO Stop ▼	Puts the service into Standby Mode with the option of maintaining or disposing of learned data.			

<b>UI Element</b>	Description
More Actions 🔻	Includes the following:
	Info. Opens the Runtime Report to display current information about the service.
	<b>Unlock.</b> Unlocks the selected service. For more details, see "Service Locking" on page 114.
	Undeploy. Undeploys the selected service.
All	Enables you to filter the displayed services according to virtual service mode.
	Click the arrow to display the filter options.
Data Model	The data model currently in use for the selected service.
	Click the name link to open the model in the Data Model Editor.
Endpoints	The URL of the real service.
Info	Located under the More Actions menu. Opens the Runtime Report to display current information about the service.
Messages (Unique)	The number of messages and unique messages passed through the virtual service during the current learning or simulation session.
Performance	The performance model currently in use for the selected service.
Model	Click the name link to open the model in the Performance Model Editor.
Project	The project to which the service belongs.
Server	The server running the selected service.
Status	The number of problems that occurred.
Undeploy	Located under the More Actions menu. Undeploys the selected service.
Unlock	Located under the More Actions menu. Unlocks the selected service. For more details, see "Service Locking" on page 114.
Virtual Service	Displays the list of all services from configured servers. Click on a service name to open the service in the Virtual Service Editor.

### **Problem List**

The Problem List displays errors, warnings, and informational messages about events that occurred during the application or server run. The source of problems can be either runtime errors in the application, or a problem occurring during a service lifecycle. For example, during deployment, or while in Standby, Learning, or Simulating modes.

Problem	n List						<b>-</b> ₫ ×
	All	•	Туре	篖 Fix It	All Sources	Description	Time
	<u> </u>		3x Service Configuration	Fix User Store	Member Accounts	The credential store does not contain user hpguest.	9/20/2011 5:02:25 PM
	<u> </u>				Member Accounts	User tried to connect to service but has not supplied name.	9/20/2011 5:02:25 PM
🔁 Copy 🔀 Delete							
Runtime View Broblem List							

To access	From the main menu, select <b>View &gt; Problem List</b> .
Important information	By default, the information displayed is automatically filtered according to the editor that is open. For example, if you open the Virtual Service Editor, the Problem List displays problems related to the service. If you open the Data Model Editor, problems are filtered for issues related to the data model.
Relevant tasks	"How to Run Simulations" on page 111
See also	"Simulation Overview" on page 111

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

UI Element	Description
<message filter=""></message>	Enables you to filter the messages according to type: <b>Errors</b> , <b>Warnings</b> , <b>Information</b> . By default, only Errors and Warnings are displayed. Click the arrow to change the filter options.
Problem List Problems ▼ Type  Fix It M All Comparison All Warnings () Information	
Туре	The problem category and number of occurrences.
Fix It	If the problem can be resolved with user interaction, a link is displayed. The link connects you to the part of the application that may be the source of the problem.
Source Service Filter	Enables you to filter for a specific service call or display <b>All Sources</b> .
Description	A description of the problem.
Time	Time and date that the problem occurred.

### **Service Administration**

This page enables you to view and manage all services from configured servers, without opening individual projects. All virtual services are displayed with their statues, associated models, and

server locations. You can change selections for simulation models in use, and view the server on which a service is deployed.



To access	From the Start Page, click Service Administration.
Important information	The context menu enables you to show/hide data columns on the page. Right-click to view.
Relevant tasks	"How to Run Simulations" on page 111
See also	"Virtual Service Overview" on page 79

User interface elements are described below:

<b>UI Element</b>	Description
earn 🗸	Not enabled in Service Administration. To place services in Learning mode, you must use the Virtual Service Editor in an open project.
Simulate	Starts the simulation according to the selected simulation models. You can choose different models using the Data Model and Performance Model columns. If the service was in Learning mode, Service Virtualization first finishes the learning session and adds any data learned in the session to the Simulation Model.
OO Stop ▼	Puts the service into Standby Mode with the option of maintaining or disposing of learned data.
More Actions 🔻	<ul> <li>Includes the following:</li> <li>Manage Servers. Opens the Servers tab of the Options dialog box, enabling you to add and delete servers.</li> <li>Info. Opens the Runtime Report to display current information about the service.</li> <li>Unlock. Unlocks the selected service. For more details, see "Service Locking" on page 114.</li> <li>Undeploy. Undeploys the selected service.</li> </ul>

<b>UI Element</b>	Description
All	Enables you to filter the displayed services according to virtual service mode.
	Click the arrow to display the filter options.
Data Model	The data model currently in use for the selected service. Click the arrow to select a different data model.
	When you change a model, an asterisk is displayed next to the model name, indicating that the change was not yet applied. To apply the new model, you must redeploy the relevant service by changing its mode to Standby or Simulate.
Endpoints	The URL of the real service.
Info	Located under the More Actions menu. Opens the Runtime Report to display current information about the service.
Manage Servers	Located under the More Actions menu. Opens the Servers tab of the Options dialog box, enabling you to add and delete servers.
Messages (Unique)	The number of messages and unique messages passed through the virtual service during the current learning or simulation session.
Performance Model	The performance model currently in use for the selected service. Click the arrow to select a different performance model.
	When you change a model, an asterisk is displayed next to the model name, indicating that the change was not yet applied. To apply the new model, you must redeploy the relevant service by changing its mode to Standby or Simulate.
Project	The project to which the service belongs.
Server	The server running the selected service.
Status	The number of problems that occurred. Click to display details in the Problems List.
Undeploy	Located under the More Actions menu. Undeploys the selected service.
Unlock	Located under the More Actions menu. Unlocks the selected service. For more details, see "Service Locking" on page 114.
View	Enables you to filter the displayed services according to server. Click the arrow to display the filter options.
Virtual Service	Displays the list of all services from configured servers. Click on a service name to open the service in the Virtual Service Editor.

# Chapter 5

## **Service Virtualization Management**

This chapter includes:

Service Virtualization Management Overview	121
How to Get Started using Service Virtualization Management	. 121

### Service Virtualization Management Overview

Service Virtualization Management enables you to view and control services from multiple Service Virtualization projects and servers in one location, without opening the projects. You can:

- View a summary of all service activity on a server.
- Start and stop simulations.
- Undeploy services.
- Deploy additional virtualization projects and services located in HP Application Lifecycle Management (ALM) or in the file system.

After you create and configure virtual services in the Service Virtualization Designer, the services can be deployed on any Service Virtualization Server. Service Virtualization Management provides a convenient method for allowing others to access and manage virtual services deployed on any Service Virtualization Server. For example, anyone performing testing can work with the virtual services from a browser window, with no additional installation or configuration.

In addition, Service Virtualization Management enables you to consume virtual services that are stored in a network location. You can download virtual services to your Service Virtualization Server, without the need to install the Service Virtualization Designer.

#### Note:

- When you are working with a secured Service Virtualization Server, the actions available to you and the information displayed vary, based on your user access permissions. For example, a user who is not assigned to any of the Service Virtualization user groups cannot view any agent data or any services deployed on the server. For details on the Service Virtualization user groups, see the *HP Service Virtualization Installation Guide*.
- The Service Virtualization service, Server, and Management versions must match. If the service/project was created in an earlier version, open it in the Designer to upgrade the project to the new version.

For task details, see "How to Get Started using Service Virtualization Management" below.

### How to Get Started using Service Virtualization Management

This task describes how to start working with the Service Virtualization Management interface.

To learn more about Service Virtualization Management, see "Service Virtualization Management Overview" above.

This section includes:

- "Prerequisites" below
- "Start/stop the Service Virtualization Management service" below
- "Open Service Virtualization Management" below
- "Manage virtual services in Service Virtualization Management" on next page
- "Troubleshoot" on next page

#### Prerequisites

- Make sure you are using a supported browser:
  - Microsoft Internet Explorer 8, 9, and 10
  - Mozilla Firefox
  - Google Chrome

**Note:** For the most up-to-date list of supported browsers and versions, refer to the support matrix on the HP Software Support site at: <a href="http://h20230.www2.hp.com/sc/support\_matrices.jsp">http://h20230.www2.hp.com/sc/support\_matrices.jsp</a>, or contact support.

• Make sure that the Service Virtualization Server is running.

#### Start/stop the Service Virtualization Management service

- On the Service Virtualization Server machine, from the Windows Start menu, select All Programs > HP Service Virtualization > Server 3.00 > Management Interface - Start Service.
- 2. To stop the service, from the Windows Start menu, select **All Programs > HP Service** Virtualization > Server 3.00 > Management Interface - Stop Service.

#### **Open Service Virtualization Management**

Open a browser window and enter one of the following URLs:

• The Service Virtualization Management URL:

https://<Service Virtualization Server IP or hostname>:<Service Virtualization Management port>

By default, the Service Virtualization Management port is 6086.

• The Service Virtualization Server URL:

<Service Virtualization Server IP or hostname>:<HTTP/HTTPS port number>/management

For more details on Service Virtualization network ports, see the *HP Service Virtualization Installation Guide*.

#### Manage virtual services in Service Virtualization Management

For details on working with Service Virtualization Management, see the online help in Service Virtualization Management. From the Help menu, select **Help Center**.

#### Troubleshoot

If an issue arises, review the web server and proxy logs, located in **%ProgramData%\Hewlett-Packard\HP Service Virtualization Server\ManagementInterface\logs**.

# Chapter 6

# **Simulation Modeling**

This chapter includes:

Simulation Modeling Overview	. 125
How to Manage Simulation Models	. 133
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How to Define Custom Functions	153
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How to Edit a Service Description	. 159
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### **Simulation Modeling Overview**

Simulation models define the functional and performance behavior that the virtual service supplies during simulation. You can manually customize simulation models, or put the virtual service in Learning mode to record real service behavior and performance. This learned data is then added to the virtual service's models, for use during simulation.

When you create a virtual service, Service Virtualization creates a data model and a performance model, and links them to the virtual service. These models serve as the default models for learning and simulation sessions. You can associate each virtual service with multiple data and performance models. Prior to a learning or simulation session, you can select which data and performance models to use.

#### Data Model

The Data Model enables you to record actual requests and responses for a real service and then use this data for simulation using a virtual service. You can create and customize the data model to meet your needs. You can use recorded data as a basis for your data model, and also add new learned data, add service calls, and model *stateful* behavior. You can also add custom data, or add data from an external data source. This enables you to model the interaction between the service under test and the simulated service to meet many integration test cases. For details, see "Data Model Overview" on the facing page.

#### • Performance Model

The Performance Model enables you to record the performance for a real service and then use this as a model for a virtual service. You can customize the performance criteria of the model to meet many performance use cases. For details, see "Performance Model Overview" on page 132.

For task details, see "How to Manage Simulation Models" on page 133.

This section also includes:

Data Model Overview	126
Rule Functions	128
Data Driving	131
Performance Model Overview	132

### **Data Model Overview**

The data model enables you to customize message requests and responses to manipulate the simulated behavior of a virtual service. Each virtual service is associated with at least one data model which can contain the recorded behavior of the service and also customized data for simulation. Each data model contains a set of rules defining data behavior for each operation in the service, and **tracks** to determine the order of stateful behavior.

When you create a virtual service, Service Virtualization creates a data model associated with it. The data model can be customized to set specific data rules for its individual operations.

Each virtual service can have multiple data models. Prior to a Learning session, in which real service behavior is recorded, you can select the data model to which you want to save the learned behavior. After recording, you can use this data model to mimic real service behavior during simulation.

#### Data Rules

The data model consists of a set of data rules for each operation in the service. You can configure the model using the Service Virtualization default rules and functions, or create your own to customize simulated behavior.

The following types of rules are available:

#### Learned Data Rule

The Learned Rule stores the requests and responses from learning sessions. In general, you do not customize this data but you may want to set conditions to ignore parts of the requests and responses and add service call activity.

#### Default Response Rule

The Default Response provides a custom response for each response type or data format, to apply in cases where there is no other data, or where you want to ignore specific parts of recorded response data. The default responses are generated automatically, but you can edit them. The Default Response is used if no other rule matches the response data.

#### Custom Rules

Custom Rules enable you to manipulate some aspect of the simulated behavior. You can set custom responses and service call activity to specific requests enabling you to perform various testing use cases.

There are two types of custom rules:

 Blank rules. New, empty rules enable you to customize any element of a message. For example, you may find that your learned data rule is too specific, providing you with an incomplete response. You can create a new rule to customize one element of the message, enabling you to continue to use learned data for other elements.  Data driven rules. Data driven rules are used to bind request and response data from an external data source. The data can then be used by multiple applications or exported from external applications, such as HP Service Test, HP LoadRunner, or HP QuickTest. The data source can be edited by an external application and then refreshed in the data model.

#### Data Rule Configuration

You can configure rules in the following ways:

#### **Rule Prioritization**

You can set the priority of multiple rules to determine the order in which each rule is applied during simulation. This enables you to meet various simulation testing use cases. Generally, rules are applied in the following order:

1. Custom rules or external data rules. Custom rules can be used, for example, for requests that cannot be recorded or have not yet been recorded.

They can be placed before or after the Learned Data rule.

- 2. The Learned Data rule, to provide typical responses and service call activity of the real service.
- 3. The Default Response rule, to provide a single generic response or generic parts of response data where other rules do not apply.

You can also temporarily disable a rule. A disabled rule is not applied during simulation.

#### Service Call Activity

In many cases, the simulated service can call another service to perform some particular operation or to receive some additional data. Virtual services can simulate this behavior by adding service call activity to an operation. You can define static request data for the service call activity for any row in the rule or copy data from the virtual service request or from the response of another service call activity. If a called service also has a response, you can copy some response data from a service call activity to a virtual service response.

#### Tracks

Another main feature of the data model are tracks. Tracks determine the order of the simulated service behavior.

In many test cases, the order of requests is important because a service may return different responses for the same request depending on the current state of the service. Service Virtualization enables you to simulate this *stateful behavior* using tracks. Tracks enable you to construct sequences of requests and responses in the data model for the service. During a simulation session, Service Virtualization moves along the tracks according to test requests that match the requests in the track and returns the appropriate response. For example, if the simulated service can return an approve or deny response which is determined by a particular state of the service, you can determine which response to return by specifying the sequence of requests and responses in the track.

#### **Import Messages**

New rows can be added to a rule by learning new data, by adding a new row and manually editing its cells, or by importing messages.

Importing messages is useful in the case when it is not possible or it is difficult to learn communication between a tested application and a simulated service directly, but it is possible to listen to the communication and log transported messages via another tool. It is possible to import a request and/or response part of the message in the same format as it is sent via communication protocol from a clipboard or from a file. For example, you may have an SDK that includes sample messages which you can copy. If a message is imported from a file, the file may contain only the request or response part of one message.

#### Multi Response

In addition to the simple simulation of a request-response pattern, Service Virtualization can simulate a request-response pattern where 0 to n responses are given per request. The number of responses can vary based on the service state. An operation may have a one-way pattern, such as clearing a shopping cart, or may include multiple responses. For example, as part of an order processing update, responses could include "order received", "order opened", and "order shipped".

Service Virtualization enables both the learning and editing of multiple responses, their types, and their service states. For performance simulation, learning and simulation is limited to the response time of the first response. If learned data includes multiple responses, Service Virtualization looks only at the first response time. During simulation, all responses are sent at that first response time.

These features are available on both the Service Virtualization standalone server, and the embedded server. The supported protocols are XML and binary services over WebSphere MQ and JMS.

For task details, see "How to Edit a Data Model" on page 134.

To learn more, see also:

- "Rule Functions" below
- "Data Driving" on page 131

### **Rule Functions**

The data model is made up of rules that define the behavior of the virtual service. The rules are made up of rows, in which each row represents a response/request pair. Rule functions are used to define the behavior of the responses, in order to directly impact the simulation. Functions are set on a per column, per operation basis.

Each rule contains the following:

- Condition functions. Mainly used to evaluate data in request columns, to determine the appropriate response.
- Action functions. Used to manipulate data in **response** columns. Action functions cannot be used in request columns.

When the simulation is in progress, the simulator engine walks through each rule according to rule priorities, looking for a single row in each rule that most precisely conforms to the condition functions used. When a single data row is selected, all the action functions are applied to that row.

#### Example:

Suppose your scenario is to retrieve credit card data according to customer name.

- The name data is your request, and you would define it with the Is condition function.
- The credit card data is your response, and you would define it with the Set action function.

So, if the customer name is Jane Doe and her credit card number is 1234-5678-1234-5678, one row in your rule would be as follows:

The request data is **Jane Doe**, where the function used = **Is**.

The response data uses the function Set, which sets the response to 1234-5678-1234-5678.

There are several categories of functions in Service Virtualization:

- "Basic default functions" below
- "Array functions" on the facing page
- "Dynamic data functions" on the facing page
- "Custom functions" on the facing page

#### **Basic default functions**

- Default condition functions:
  - **Is.** If the incoming message data matches the value of this field, Service Virtualization performs the response action defined in this row.
  - Ignore. If the incoming message data matches the value of this field, Service Virtualization ignores the data. It does not impact the simulation.
- Default action functions:
  - Set. The simulation returns the response that is listed in this field.
  - Copy from. The simulation takes the value of another field and returns it as the response.

Note:

• For the Learned Data rule, request columns are defined as **Is**, and response columns are defined as **Set**.

- In a new, custom rule, the default function for all columns is **Ignore**. The data in the column does not influence the simulation in any way.
- If you type a value in a cell, the function is automatically set to Is or Set.

#### Array functions

The following functions are available for use when the message includes an array data structure:

- Condition functions:
  - **Compare ordered.** This condition is met when items in an array match and are in the same order. This is the default condition function for arrays.
  - **Compare unordered.** This condition is met when items in an array match, but may be in a different order.
- Action functions:
  - Replace array. Sets the response to the relevant array values.

#### Dynamic data functions

You can generate dynamic data in certain elements of the **responses** using the Service Virtualization data generator functions.

There are several types of dynamic data functions:

- Sequential number generator. Generates a series of increasing/decreasing numbers in a specified format. The number increases/decreases by a predefined value with each received request.
- Set relative date/time. Generates a date and/or time that is relative to the time of the request arrival. For example: time of request arrival plus 2 hours and 5 minutes.
- Set date/time relative to. Generates a date and/or time that is relative to a date/time that is stored in any element of the request. For example: time stored in a certain element minus 3 days and 5 hours.
- Random number generator. Generates a random sequence of integers.
- **Substring.** The simulation takes a substring of a value in another field that you select, and returns it as the response.

#### **Custom functions**

You can define custom functions to manage more complex conditions. These are to be used by an advanced user aware of the complete system structure. Complex conditions can be set with structured query language.

There are two classes of variables:

- Input (\$input\_\*). Input variables are those present in a processing row during simulation. A more simplified explanation of Input variables is that they are data from requests.
- Data (\$data\_\*). Data variables represent data written in the cell.

For task details, see "How to Define Rule Functions" on page 136.

### **Data Driving**

To facilitate data-driven testing, you can add external data sources to your virtual services.

When you associate an external data source with a virtual service, you need to create mappings between the data columns in the external file, and the columns/headers in your data rule. You do this by configuring **binding** in the data model.

#### Array Binding

You can also bind array data. When the message structure contains an array that needs to be datadriven, you need to work with a properly structured Excel file. The file must contain database-like relationships, using primary and foreign keys, which allow the mapping of one row to many. You can create the file manually, or by exporting learned data that is in the desired format to a new Excel file.

The following example shows the relationship between a search definition and the search result. A record in the **Search** worksheet is identified via its primary key 'id', and referenced from the **Search Result** worksheet via the foreign key '**searchId**'. This enables the return of two rows for a search with id 3, or zero rows for search of id 4.

	А	В	С	D		(	Α	В	С	D
1	id	firstName	lastName	socialSecurityNu	mbe		member Id	household Id	socialsecu	searchId
2	1	Hercule	Poirot	554-98-0001			1	1	554-98-00	1
3	2	Hercule	Poirot				1	1	554-98-00	2
4	3		Poirot				1	1	554-98-00	3
5	4	Karel	Got (fail: n	ot in system)		1	11	11	554-98-00	3
6	5	Sherlock	Holmes	332-10-0002		1	2	2	332-10-00	5
7	6			332-10-0002		t	2	2	332-10-00	6
8	7	Albert	Einstein	809-42-0002	_	ł	2	2	800-42-00	7
9	8			809-42-0002	_	ł	3	3	800 42 00	· · · · ·
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#### Data Format Binding

When binding to an Excel worksheet column where the response can contain different data formats (such as for the REST protocol), different response types (such as for the SOAP protocol), or a message structure which can be considered to contain different types, you can also configure binding for this in your data model.

You can configure mappings between real types or formats and cell values, and provide a default value that is used when no value from the mapping table matches. You can configure a value for each possible type or format.

For task details, see "How to Work With External Data Sources" on page 155.

### **Performance Model Overview**

The Performance Model enables you to customize the performance of a service during simulation.

When you create a Virtual Service, Service Virtualization creates a Performance Model associated with it. This model is then available to learn the performance of the real service and can be customized to set specific performance rules either for the whole service, or its individual operations.

Each virtual service can have multiple performance models. Prior to a Learning session, in which real service behavior is recorded, you can select the performance model to which you want to save the learned behavior. Prior to simulation, you can select which model to use to mimic real service behavior, including non-customizable models to ignore the performance or simulate the unavailability of a service.

You can configure the Performance Model in the following ways:

#### **Basic Performance Criteria**

Set levels for the following performance criteria for specific operations of the service:

- Response Time [ms] the time for the service to process a request and return a relevant response.
- Threshold [hits/s] the maximum number of requests and responses the service can process without any impact on performance.
- Throughput Limit [MB/s] the maximum data capacity the service can process.

#### Advanced Performance Criteria

In addition to the basic criteria, set levels for the following criteria for specific operations of the service:

- Tolerance [%] the acceptable range of variation in performance for the operation.
- Maximum Hits per Second the maximum number of requests and responses the operation is allowed to process.
- Maximum Response Time the maximum time for a response at peak performance levels.

#### Boosters

There are a number of boosters available which you can use to manipulate some aspect of the service performance. Service Virtualization applies the selected boost to the relevant performance criteria during simulation.

The boosters include:

- **CPU.** CPU power multiplication factor. Impacts the response time of the service.
- Network. Network throughput multiplication factor. Impacts the throughput limit.
- **Cluster.** Scalability multiplication factor. Impacts all measures simultaneously response time, hit rate, threshold, and throughput limit.
- **Expert.** Multiplication factors for response time, hit rate, and throughput limit values. You can change each measure separately.

For task details, see "How to Manage Simulation Models" below and "How to Edit a Performance Model" on page 158.

For user interface details, see "Performance Model Editor" on page 192.

### How to Manage Simulation Models

This task describes how to manage simulation models in your virtualization project.

- This task is part of a higher-level task. For details, see "How to Use Service Virtualization" on page 24.
- To learn more about simulation models, see "Simulation Modeling Overview" on page 125.

#### Create a simulation model

By default, each virtual service is associated with one data model and one performance model, which are created together with the virtual service. You can create additional models and associate them with a virtual service.

• To add a new simulation model, in the Virtual Service Editor, under Simulation Models, click Add.

• To create a new simulation model by copying an existing model, select a model and click **Duplicate**.

For user interface details, see "Virtual Service Editor" on page 104.

#### Edit a simulation model

In the Virtual Service Editor, under Simulation Models, select the model you want to edit and click **Edit**, or double-click the model to open.

Alternatively, in the Virtualization Explorer, select a model and double-click to open it in the relevant editor.

For user interface details, see "Data Model Editor" on page 163 and "Performance Model Editor" on page 192.

For task details, see "How to Edit a Data Model" below and "How to Edit a Performance Model" on page 158.

### How to Edit a Data Model

This task describes how you can edit a data model, and customize it to meet your needs.

To learn more about data models, see "Data Model Overview" on page 126.

This task includes the following steps:

- "Add data" below
- "Select columns to display" on next page
- "Create custom rules" on next page
- "Add external data sources" on next page
- "Add/Edit service call activity" on next page
- "Preview changes" on page 136
- "Apply changes" on page 136
- "Navigating the Data Model Editor" on page 136

#### Add data

You can add data to your data model in the following ways

• Learn Data. Put the virtual service into Learning mode to record real service behavior. When you are finished recording, the learned data is added to the data model. For user interface details, see "Virtual Service Editor" on page 104.

- Import Messages. Import existing messages from a file, or copy/paste message formats into the data model. For user interface details, see "Import Request/Response Message Dialog Box" on page 176.
- Enter data manually.

#### Select columns to display

You can specify which columns are displayed in the data table of a rule. In the Data Model Editor, select **Columns > Change Columns**, or right-click a column header and select **Change Columns**. For user interface details, see "Change Columns Dialog Box" on page 185.

#### Create custom rules

If you need to manipulate some aspect of the simulated behavior, create a new rule.

You can create your own customized rules to modify the responses used during simulation. One typical use case is when you want to use learned data for simulation, but want to modify some part of the response.

Create one of the following:

- Blank rule. Create a new, empty rule. In the Data Model Editor, click New Rule > Blank Rule.
- **Data driven rule.** Create a new rule using an external file as a data source. See the next step on adding external data sources.

For details on configuring the rules, see "How to Define Rule Functions" on the facing page.

#### Add external data sources

You can add additional data from external data sources to a data model for testing purposes. The supported format for this data is Microsoft Excel documents (*.xls, .xlsx*).

In the Data Model Editor, click **New Rule > Data Driven Rule**. Fill in the details. For user interface details, see "New Data Driven Rule Dialog Box" on page 179.

For more details on working with external data sources, see "How to Work With External Data Sources" on page 155.

#### Add/Edit service call activity

You can configure a virtual service to call external services.

Note: Only SOAP service call activities are supported.

- 1. In the Data Model Editor, select the operation from which you want to call the external service.
- 2. To select a WSDL that was already imported into the project, click **Activity**. Select the activity to add, and choose whether to add it before or after the response.
- 3. To import a new WSDL, click **Activity > Import Activities**, and enter the path to the WSDL schema.

- 4. In the Select Service Operation dialog box, select an activity to add, or import the service description document for use at a later time. For user interface details, see "Select Service Operation Dialog Box" on page 189.
- 5. To add service call activity at a later time, click Activity again and select an activity.
- To edit properties for a service call activity, right-click the activity's column header and click Activity Properties. For user interface details, see "Activity Properties Dialog Box" on page 190.
- 7. To **remove** the service call activity from a rule, right-click the column header and click **Remove Activity**.
- 8. To **enable/disable** the service call for a rule, click the **on/off •On •Off** icon in the rule's header.

**Tip:** You can use the **Copy from** function on any service call request column, or virtual service response column. Select the **Copy from** function. The columns that you can use as a source are highlighted. Click the desired source column.

#### **Preview changes**

You can view in real time how changes in the data model are affecting your simulation. In the Data Model Editor, select **View Options > Simulation Preview**.

The Simulation Preview pane displays a simulation of the message that has the request part equal to the currently selected message in the Data Model Editor. The message is passed to the simulation engine and the result is displayed in the response section.

#### Apply changes

To apply changes, you must restart your simulation. In the Data Model Editor, click **Restart Simulation**.

#### Navigating the Data Model Editor

For more actions you can perform in the Data Model Editor, see "Data Model Editor Context Menus" on page 169.

For additional tips on working in the Data Model Editor, see "FAQs: Data Model Editor" on page 209.

### How to Define Rule Functions

This task describes how to define rule functions to impact virtual service behavior.

To learn more about functions, see "Rule Functions" on page 128.

This task includes the following:

- "Select a function" below
- "Create a new, custom function" on the facing page
- "Preview your changes" on the facing page

#### Select a function

- 1. In the Data Model Editor, expand a rule.
- 2. Click inside the function field (fx) for a column and select a function. If the function row is not displayed, from the View Options menu, select **Functions**.

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3. Dynamic Data Functions:

a. Click inside the function field (fx) of a response column and select a function.



**Note:** Dynamic data functions are available for lowest level headers only. Complex headers that include lower level headers under them are displayed in italic text (*header*). To display lower level headers, double-click the column header.

b. Configure the output format for the function. For details on configuring dynamic data functions, see "How to Configure Dynamic Data Functions" on next page.

#### Create a new, custom function

- 1. In the Data Model Editor, expand a rule.
- Click inside the function field (fx) for a column and select New f(x). For user interface details, see "New/Edit Function Dialog Box" on page 184.

**Custom Functions:** Service Virtualization provides a number of pre-defined variables that you can use when creating and configuring custom functions. For details, see "How to Define Custom Functions" on page 153.

#### **Preview your changes**

Simulation Preview displays in real time how changes in the data model are affecting the simulation.

In the Data Model Editor, select **View Options > Simulation Preview**. The Simulation Preview pane displays a simulation of the message that has the request part equal to the currently selected message in the Data Model Editor. The message is passed to the simulation engine and the result is displayed in the response section.

### How to Configure Dynamic Data Functions

This task describes how to configure data generator functions.

Note: To learn more about functions, see "Rule Functions" on page 128.

This section includes:

How to Configure the Sequential Number Generator Function	139
How to Configure the Random Number Generator Function	.144
How to Configure the Date/Time Functions	.147
How to Configure the Substring Function	151

# How to Configure the Sequential Number Generator Function

This task describes how to configure the sequential number generator function.

To learn more about functions, see "Rule Functions" on page 128.

This section includes:

- "Prerequisite: Select the function" below
- "Configure the function" on the facing page
- "Format special sequences" on page 141
- "Examples" on page 142

#### Prerequisite: Select the function

- 1. In the Data Model Editor, expand a rule.
- Click inside the function field (fx) of a response column and select Sequential number generator. If the function row is not displayed, from the View Options menu, select Functions.



**Note:** Dynamic data functions are available for lowest level headers only. Complex headers that include lower level headers under them are displayed in italic text (*header*). To display lower level headers, double-click the column header.

#### Configure the function

In each cell under this function, enter a value in the following format:

#### Offset;Increment;FormatString

where:

• Offset is an integer. Used as the starting point for generating the output of the sequential number generator.

**Note:** To generate a sequence of numbers that differs for each request/response, each cell with this generator function has an internal numerical counter. When the simulation starts, this counter is always set to 0. Each time a generator function is called, the output value is determined based on the offset and counter. After the output is determined, the value of the counter is increased by the value of the increment, or decreased if the increment is a negative number.

- Increment is a positive or negative integer. Indicates the change to make from one number in the sequence to the next.
- FormatString defines the format of the output of the sequential number generator.

The format string includes:

- a regular text string
- (optional) one or more special sequences to define the format of the numerical output of the generator

To determine the output of the number generator, Service Virtualization goes through the format string and constructs an output string using specific rules, explained below.

#### Format special sequences

Special sequences enable you define the format of the numerical output of the function.

You construct special sequences as follows:

- Each special sequence must start and end with the '#' character.
- Each special sequence must contain one or more 'D' characters. These characters act like a digit wildcard for a number that will be generated by this generator function. The number will always occupy exactly the number of specified digits. If the number does not occupy all digits, zeros are added before it so that it does.

For example, if:

- the special sequence is #DDDD#

- and the number generated by the function is 568

- the output is 0568.

• A special sequence may also contain 'd' characters. These characters act as placeholders. If the output of the generator function requires this space, then it will hold a number. If the generated number does not occupy all digits, then the extra spaces are left empty, and not populated with zeros. 'd' characters may only be placed before 'D' characters.

For example, if:

- the special sequence is #ddDDD#

- and the number generated by the function is 9857

- the output is 9857.

For the number 125:

- the sequence #DDDDD# outputs 00125
- the sequence #ddDDD# outputs 125
- and the sequence ##dDDDD outputs 0125.

• You can construct a format string with multiple special sequences.

For example, you can enter a special sequence to resemble a credit card number format:

- if the special sequence is #DDDD#-#DDDD#-#DDDD#-#DDDD#

- and the number generated is 1234567812345678

- the output is 1234-5678-1234-5678

Service Virtualization defines the output of the generator according to the following additional guidelines:

- If the number is greater than the maximal number that can be stored within the digits, it is truncated so that it fits within (e.g. if the number was 3456 and the special sequence was #DDD#, the output will be 456).
- If the number is negative, it is truncated the same way as above. Then an additional offset is applied. The value of this offset is based on the number of digits and is selected so that -1 becomes the biggest number that fits within these digits. For example, if the special sequence was #DDDDD#, -1 becomes 99999. If it was #DD#, -67813 becomes -13 which then becomes 87.
- For each empty special sequence (when there are two '#' characters next to each other), a single '#' character is inserted into the output string.
- The numerical output of the generator will be a number that has exactly as many digits as there are 'D' characters in all of the special sequences in the field combined.
- Any characters that are not part of a special sequence are copied to the output string.

#### Examples

#### Increasing sequence

The typical use case is generating strings that make use of an increasing number sequence.

Example: Your input, typed in the cell under the sequential number generator function:

0;1;Visitor###DDD#

will produce the sequence Visitor#000, Visitor#001, Visitor#002...

#### Decreasing sequence

In cases where remaining time or another resource that is being depleted may identify some object, the decreasing sequences are used to generate such identifiers.

Example: The real service may be generating identifiers based on time remaining until some event starts.

Your input, typed into cell under the sequential number generator function:

10000;-100;SnapshotTimeTMinus:#DDDDD#

This cell produces the output sequence: SnapshotTimeTMinus:10000, SnapshotTimeTMinus:09900, SnapshotTimeTMinus:09800, etc.

#### **Multiple independent sequences**

When generating several classes of identifiers for various products, you want to maintain an independent sequence of identifiers for each class. You can achieve that by creating a separate rule for each class and use just one row in every rule. Use the *Is* function in the request to distinguish classes from each other. Each rule has a separate counter for the sequential number generator function, so that the sequences are independent.

Example: The 3 product lines have to have easily distinguishable ids. Class 1 has the "1" set as the first digit, class 2 has 2 etc.

Rule 1, Row 1, your input typed in the cell: 100000;1;codeNR-#DDDDDD#

Rule 2, Row 1, your input typed in the cell: 200000;1; codeNR-#DDDDDD#

Rule 3, Row 1, your input typed in the cell: 300000;1; codeNR-#DDDDDD#

If the service requests IDs in the following sequence {1,2,2,1,3,2,3,1}, the output results are as follows:

codeNR100000-, codeNR-200000, codeNR-200001, codeNR-100001, codeNR-300000, codeNR-200002, codeNR-300001, codeNR-100002

#### Multiple dependent sequences

Consider following the previous use case with just one rule containing all rows instead of separate rules. In such a case, the internal counter is shared. Therefore, the sequences are not independent and the output relies on the previous sequence of calls even though they were not triggering the current row.

Example:

Rule 1, Row 1, your input typed in the cell: 10; 10; X1-#DDD#

Rule 1, Row 2, your input typed in the cell: 100;100; X2-#DDD#

If we invoke the virtual service hitting the Row1, Row2, Row1, the output is "X1-010; X2-110; X1-120"

If the two rows were in separate rules, the output would be: "X1-010; X2-100; X1-020"

#### Multiple number occurrences

It is possible to split the number that is being computed by SNG into multiple parts in the output string. This is achieved by repeating the #DDD# sequence. Note that the 'Ds' sequences within a single row may differ in length.

Example: A cell with the following format, such as a credit card number format:

1234567890123456;1;#DDDD#-#DDDD#-#DDDD#-#DDDD#

produces the following output sequence:

1234-5678-9012-3456 1234-5678-9012-3457 1234-5678-9012-3458 1234-5678-9012-3459 etc.

# How to Configure the Random Number Generator Function

This task describes how to configure the random number generator function.

To learn more about functions, see "Rule Functions" on page 128.

This section includes:

- "Prerequisite: Select the function" below
- "Configure the function" on next page
- "Format special sequences" on next page
- "Examples" on page 147

#### Prerequisite: Select the function

- 1. In the Data Model Editor, expand a rule.
- Click inside the function field (fx) of a response column and select Random number generator. If the function row is not displayed, from the View Options menu, select Functions.


**Note:** Dynamic data functions are available for lowest level headers only. Complex headers that include lower level headers under them are displayed in italic text (*header*). To display lower level headers, double-click the column header.

### **Configure the function**

In each cell under this function, enter a value in the following format:

Minimum\_number;Maximum\_number;FormatString

where:

- **Minimum\_number** is the lowest possible number to be used in the output of the random number generator.
- **Maximum\_number** is the highest possible number to be used in the output of the random number generator.
- FormatString defines the format of the output of the random number generator.

The format string includes:

- a regular text string
- (optional) one or more special sequences to define the format of the numerical output of the generator

To determine the output of the number generator, Service Virtualization goes through the format string and constructs an output string using specific rules, explained below.

#### Format special sequences

Special sequences enable you define the format of the numerical output of the function.

You construct special sequences as follows:

- Each special sequence must start and end with the '#' character.
- Each special sequence must contain one or more 'D' characters. These characters act like a digit wildcard for a number that will be generated by this generator function. The number will always occupy exactly the number of specified digits. If the number does not occupy all digits, zeros are added before it so that it does.

For example, if:

- the special sequence is #DDDD#

- and the number generated by the function is 568

- the output is 0568.

 A special sequence may also contain 'd' characters. These characters act as placeholders. If the output of the generator function requires this space, then it will hold a number. If the generated number does not occupy all digits, then the extra spaces are left empty, and not populated with zeros. 'd' characters may only be placed before 'D' characters.

For example, if:

- the special sequence is #ddDDD#

- and the number generated by the function is 9857

- the output is 9857.

For the number 125:

- the sequence #DDDDD# outputs 00125

- the sequence #ddDDD# outputs 125

- and the sequence ##dDDDD outputs 0125.

• You can construct a format string with multiple special sequences.

For example, you can enter a special sequence to resemble a credit card number format:

- if the special sequence is #DDDD#-#DDDD#-#DDDD#-#DDDD#

- and the number generated is 1234567812345678

- the output is 1234-5678-1234-5678

Service Virtualization defines the output of the generator according to the following additional guidelines:

- If the number is greater than the maximal number that can be stored within the digits, it is truncated so that it fits within (e.g. if the number was 3456 and the special sequence was #DDD#, the output will be 456).
- If the number is negative, it is truncated the same way as above. Then an additional offset is applied. The value of this offset is based on the number of digits and is selected so that -1 becomes the biggest number that fits within these digits. For example, if the special sequence was #DDDDD#, -1 becomes 99999. If it was #DD#, -67813 becomes -13 which then becomes 87.
- For each empty special sequence (when there are two '#' characters next to each other), a single '#' character is inserted into the output string.
- The numerical output of the generator will be a number that has exactly as many digits as there are 'D' characters in all of the special sequences in the field combined.
- Any characters that are not part of a special sequence are copied to the output string.

### Examples

To generate a random number between 0 and 9999999, to be appended to the number 201, type the following format into each cell under the random number generator function:

0;9999999;201#DDDDDD#

where:

0 is the minimum number

99999999 is the maximum number

201 is a text string,

and **#DDDDDDD#** is a special sequence, indicating that the generated number can be up to 7digits in length

Result: The output is any number between 2010000000 and 2019999999.

Instead, you could format the cell as follows:

0;9999999;201#dddDDDD#

Result: The output is any number between 2010000 and 2019999999.

# How to Configure the Date/Time Functions

This task describes how to configure the Set Relative Date/Time and the Set Date/Time Relative to functions.

To learn more about functions, see "Rule Functions" on page 128.

This section includes:

- "Prerequisite: Select a date/time function" below
- "Configure the function" on next page
- "Configure the offset" on next page
- "Configure the date/time format" on page 150

### Prerequisite: Select a date/time function

- 1. In the Data Model Editor, expand a rule.
- 2. Click inside the function field (fx) of a response column and select one of the following functions:
  - a. Set relative date/time. The date and/or time value is calculated by adjusting the date/time when the request was received, using an Offset that you define.
  - b. Set date/time relative to. The date and/or time value is calculated by adjusting a specified date/time, using an Offset that you define. This function requires you to select a source column that contains the date/time to be adjusted.



#### Note:

If the function row is not displayed, from the View Options menu, select **Functions**.

Dynamic data functions are available for lowest level headers only. Complex headers that include lower level headers under them are displayed in italic text (*header*). To display lower level headers, double-click the column header.

## **Configure the function**

The output of the date/time function is configured as follows:

• **Offset.** Defines the modification that you want to make to the source date/time. Enter the offset into each cell under the date/time function.

If the offset is not specified for a particular cell or is in an incorrect format, an offset of 0 seconds is used.

- **Format.** Defines the format of the output. The resulting date/time that is output to the message response is formatted according to one of the following:
  - The XSD type of the source column.
  - The custom format that you define for the output of the function.

For example, -1:25:00#hh:mm indicates the following:

- an offset of -1 hours and 25 minutes (1 hour 25 minutes earlier than source time)
- a custom format for the output time, such as 07:15

For details on configuring the offset and custom formats, see below.

### Configure the offset

The Offset is formatted according to the following:

#### [-][d.]hh:mm:ss[.ff]

where:

- Items in square brackets ([ and ]) are optional
- Colons and periods (: and .) are literal characters
- "-" (optional) indicates a negative time (a time earlier than the source time)
- "d" optional days
- "hh" mandatory hours, ranging from 0 to 23
- "mm" mandatory minutes, ranging from 0 to 59
- "ss" mandatory seconds, ranging from 0 to 59
- "ff" optional fractional seconds, consisting of 1 to 7 decimal digits

#### Examples:

- -54.12:00:59.1234567
- 0:00:00.001
- 365.0:00:00

### Configure the date/time format

Service Virtualization can set the format based on autodetection of the XSD type, or by a custom format that you enter.

#### XSD Type

Service Virtualization can auto-detect the following XSD date/time types

- xsi:date "yyyy-MM-dd" (Example of output: 1984-11-28)
- xsi:time "HH:mm:ss" (Example of output: 23:59:59)
- xsi:dateTime "yyyy-MM-ddThh:mm:ss" (Example of output: 2001-12-13T10:15:33)

If detected, the format of the output of the date/time function is based on the XSD type, provided that you have not defined a custom format.

No other formats, including JSON date/time formats, can be detected, as their internal type is xsi:string. If the application cannot detect the format from the element's type, xsi:dateTime's format is used by default. If you want to specify other output formats, you can define a custom format.

#### **Custom Format**

To configure a custom format, enter the following into each cell under the date/time function:

#### Offset#CustomFormat

You define a custom format using the following:

- "d" The day of the month, from 1 through 31.
- "dd" The day of the month, from 01 through 31.
- "f" .. "fffffff" Fractions of a second, number of "f" characters specifies number of digits to print
- "h" The hour, using a 12-hour clock from 1 to 12.
- "hh" The hour, using a 12-hour clock from 01 to 12.
- "H" The hour, using a 24-hour clock from 0 to 23.
- "HH" The hour, using a 24-hour clock from 00 to 23.
- "m" The minute, from 0 through 59.

- "mm" The minute, from 00 through 59.
- "M" The month, from 1 through 12.
- "MM" The month, from 01 through 12.
- "s" The second, from 0 through 59.
- "ss" The second, from 00 through 59.
- "tt" The AM/PM designator.
- "yyyy" The year, four digit number.
- regular characters (all characters except the ones mentioned above) generated "as is". To generate a character that has a special meaning (is part of one of the custom formats above, such as "s"), place a '\' before it.

#### Examples:

If today's date is December 10, 2012:

• To generate yesterday's date: -1.00:00:00#yyyy-MM-dd

Result: The output is 2012-10-09.

• To generate today's date: : 0#MM/dd/yyyy

Result: The output is 12/10/2012.

• To generate the date 1 week from today: 7.00:00:00#MM/dd/yyyy

Result: The output is 12/17/2012.

# How to Configure the Substring Function

This task describes how to configure the substring function. The substring function enables you to copy part of a string in your data model from one column to another.

To learn more about functions, see "Rule Functions" on page 128.

You configure the substring function in the Substring Dialog Box. For user interface details, see "Substring Dialog Box" on page 173.

#### To configure the substring;

Create a format string to define which part of the data in the source column you want to copy.

The format string can consist of any combination of the following:

Format	Description	Example
{n}	Copies the <i>n</i> -th character from the source string.	Format string: <b>{3}</b> Source string: <i>abcde</i> Substring result: <b>c</b>
{n+}	Copies all characters from the <i>n</i> -th character to the end of the source string.	Format string: <b>{5+}</b> Source string: <i>abcdefgh</i> Substring result: <b>efgh</b>
<b>{n-m}</b> where n is located before m in the string	Copies all characters from the <i>n</i> -th character to the <i>m</i> -th character (inclusive).	Format string: <b>{2-6}</b> Source string: <i>abcdefgh</i> Substring result: <b>bcdef</b>
<b>{m-n}</b> where n is located before m in the string	Copies all characters from the <i>m</i> -th character, backwards to the <i>n</i> -th character (inclusive).	Format string: <b>{6-2}</b> Source string: <i>abcdefgh</i> Substring result: <b>fedcb</b>
{n:m}	Copies <i>m</i> characters, starting from the <i>n</i> -th character. If there are not enough characters in the source string, a space is added for each missing character.	Format string: <b>{7:2)</b> Source string: <i>abcdefgh</i> Substring result: <b>gh</b>

Format	Description	Example
Regular text	You can add additional text The text you enter is copied as is. Limitation: You cannot use the characters { } or \. They are used to mark special format sequences. Workaround: To use the characters { } or \ as part of a text string you enter, each of these characters must be preceded by the backslash character \. Placing a backslash before one of these special characters overrides their special meaning.	Format: Text with backslash \\ and curly brackets \{ \} Result: Text with backslash \ and curly brackets { }

#### Example:

In the Format field of the Substring dialog box, you enter the following format string:

All characters:  $\{1+\}$ . Only 6th and 8th characters:  $\{6\}$  Result of  $\{5:5\}$  is:  $\{5:5\}$ . First 13 characters reversed:  $\{13-1\}$ .

The source string is: 123456789ABCDEF

The result, output to the cell configured with the substring function is:

All characters: 123456789ABCDEF. Only 6th and 8th characters: 68. Result of {5:5} is: 56789. First 13 characters reversed: DCBA987654321.

# How to Define Custom Functions

You can create new functions to use in a data model. For user interface details, see "New/Edit Function Dialog Box" on page 184.

You can use the following variables to configure a new, custom function:

- \$input\_string The original string is automatically quoted in the place of usage.
- \$input\_string\_unquoted The original string is not automatically quoted.
- \$input\_int The original string is converted to the *int* data type, for integer data. It contains NULL if the input string is not of this data type.
- \$input\_float The original string is converted to the *float* data type, for floating point numeric data. It contains NULL if the input string is not of this data type.
- \$input\_date The original string is converted to the *date* data type, to define a date. It contains NULL if the input string is not of this data type.
- \$data\_string The actual data, converted to the *string* data type.
- \$data\_int The actual data, converted to the *int* data type.
- \$data\_float The actual data, converted to the *float* data type.
- \$data\_date The actual data, converted to the *date* data type.

Following are examples of custom functions:

- Match request data (cast to integer) smaller than actual value (cast to integer) found in the column \$input\_int < \$data\_int</li>
- Match request data (cast to integer) smaller than actual value (cast to float) found in the column \$input\_int < \$data\_float</li>
- Match actual value found in the column (cast to string) equal to 'cat' string \$data\_string = 'cat'
- Match request data (cast to string) equal to 'cat' string \$input\_string = 'cat'
- Match request data (cast to string) equal to actual value (cast to string using an SQL 'LIKE' operation) \$input\_string LIKE \$data\_string
- Match request data (cast to string) equal to any string starting with the actual value found in the column \$input\_string LIKE \$data\_string + '%'
- Match request data (cast to string) containing a substring 'cat' \$input\_string LIKE '%cat%'
- Match request data (cast to date) smaller than actual data \$input\_date < \$data\_date
- Match request data smaller than actual data OR request data equal to 'dogs' string \$input\_date <
  \$data\_date OR \$input\_string = 'dogs'</li>

# How to Configure Regular Expressions

This task describes how to configure regular expressions in Service Virtualization. Use regular expressions to match a specific string in order to mask select data.

In the Replace Algorithm Configuration dialog box, you can enter a regular expression in the **Match pattern** and **Replace value** fields. (For user interface details, see "Replace Algorithm Configuration Dialog Box" on page 204.)

In addition, when you use regular expressions in the **Replace value** field, the expression can reference groups from the search pattern you entered in the Match pattern field.

Examples:

Match pattern field	Replace value field	Sample input	Sample output
\b(\w+)(\s)(\w+)\b	\$3\$2\$1	one two	two one
\b(? <word1>\w+)(\s) (?<word2>\w+)\b</word2></word1>	\${word2} \${word1}	one two	two one

For information on creating regular expressions and some examples of their use, visit this site: Regular Expression Language - Quick Reference.

# How to Work With External Data Sources

This task describes how to work with an external data source. You can import or export data.

- This task is part of a higher-level task. For details, see "How to Edit a Data Model" on page 134.
- To learn more about external data sources, see "Data Driving" on page 131.
- For a use-case scenario related to this task, see "Working with External Data Sources Use-case Example" on page 158.

This task includes the following steps:

"Add an external data file" on the facing page "Bind the data" on the facing page "Bind array data" on page 157 "Bind other data" on page 157 "Configure import/export settings" on page 157 "Refresh the data" on page 157

"Change the path of the data source" on page 158

"Disconnect external data" on page 158

### 1. Add an external data file

You can associate a data rule with an external data file in order to import or export data.

In the Data Model Editor, select **New Rule > Data Driven Rule**. Select one of the following options:

**Create new data file.** The Service Virtualization Designer creates a new Excel file, structured according to the schema (message structure) associated with the virtual service. Rule columns are automatically bound to the worksheet columns.

**Use existing data file.** You must then manually bind rule columns to worksheet columns. After binding, the external data is imported to the Data Model.

For details, see "New Data Driven Rule Dialog Box" on page 179.

**Result:** A "preview" of your external data file displays within the rule.

Memb	erAccounts Data	Model								
	Member. Data Model fi	Accoun	ts Data Model		New Rule	Operations	Columns	Activity	View Options	Stateful • Layout
perat 1	ion: emember New Rule 1	erSearch <b>•</b>	l user						-	0/0ro
E	Request				Response					
Ţ	nemberSearch				Response Type		men men Men	iberSearchR iberSearchR iber[] None eboldId me	<i>esponse</i> esult e	
A					😝 <bind data=""></bind>			bind data 🔒	  bind data	le <bind d<="" td=""></bind>
$f_X$ I	gnore			•	Ignore		▼ Ignor	e 🔻 Ign	ore 🔻	Ignore 🔻
<u>.</u>										Þ
id	<u>firstName</u>	lastName	socialSecurity gender	address-line1 address	-line2 city co	untry stat	e zip	) pla	an name	approvalLimit
11	Agatha	Poirot	554-98-0011 FEMALE	56B WhitehavCharterh	ouse Smithfield LonGre	at Britain Engla	and	Allp	ay Total 11	000
2	Sherlock	Holmes	332-10-0002 MALE	221b Baker St	London NW1 (Gre	at Britain Engla	and	Allp	ay Select !5	00
3	Albert	Einstein	809-42-0002 MALE	3875 Vicksbur	Colorado Spri(US/	4 (CO	809	917 Sav	/er 100  1	00
< <	Select property and	' <b>s2</b> Search Re	esults Search	ı column,					ОК	Cancel
2	Learned Dat Contains all d	a lata collected	during Learning phase.							5 / 7 ro
2	Default Res	ponse								2 / 6 ro

Note that the worksheets in the external file are displayed as tabs at the bottom of the data table.

### 2. Bind the data

If you selected an existing data file, you must bind the data. You create mappings between the data columns in the external file, and the columns/headers in your data rule.

a. In a column header, click **bind data**. If it is not visible, click **View Options > Data Binding**.

Headers must be expanded down to the lowest level in order to bind.

- b. Click a column in the displayed external data source table to bind that column.
- c. Repeat steps a and b for all columns you need to bind.
- d. Click OK. The data is imported.

#### 3. Bind array data

When the message structure contains an array that needs to be data-driven, you need to work with a properly structured Excel file. The file must contain database-like relationships, using primary and foreign keys, which allow the mapping of one row to many.

When binding an array item, the Edit Sheet Relations dialog box opens automatically, enabling you to define the relationships between worksheets that are required for array binding. . For user interface details, see "Edit Sheet Relations Dialog Box" on page 187.

Alternatively, right-click the rule or column header and select **External Data Properties**. See the **Sheet Relations** area.

#### 4. Bind other data

You can configure binding for working with different data formats (REST protocol), different response types (SOAP protocol), or a message structure containing different types.

When you start to bind to an Excel worksheet column where the response can contain these types of data, the relevant dialog box opens automatically (The Data Format, Response Type, or Choice Data Binding dialog boxes). For user interface details, see "Data Format/Response Type/Choice Binding Dialog Box" on page 189.

#### 5. Configure import/export settings

You can configure rules to import or export data, or configure settings for rules already associated with an external data file.

Learned Data rule: To export learned data, right-click the Learned Data rule and select Export Data.

**Blank/custom rule.** To import data from or export data to an external data file, right-click the rule and select **Import Data** or **Export Data**.

**Data driven rule.** For a rule already associated with an external file, you can change settings. Right-click the rule and select **External Data Properties**.

#### 6. Refresh the data

If you have selected the Data Synchronization option for your rule, the data is automatically re-

imported or exported.

To manually refresh data, right-click the rule and select **Refresh Data**. The data is imported or exported, depending on how the rule is configured.

### 7. Change the path of the data source

To change the location of the external data file, right-click the rule and select **External Data Properties**.

### 8. Disconnect external data

To disconnect a rule from an external data source and remove bindings, right-click the rule and select **Disconnect External Data**.

# Working with External Data Sources - Use-case Example

This section provides an example of working with an external data file.

**Note:** For a task related to this example, see "How to Work With External Data Sources" on page 155.

It can be difficult to manually configure an Excel worksheet when your data has a particular complex structure. As an alternative to manually setting up a file and configuring binding in the Data Model, you can create a new data driven rule, and have Service Virtualization create a new data file for you, according to your message structure.

- 1. Create a virtual service.
- 2. In the Data Model, create a new data driven rule and select **Create new data file**. Service Virtualization will create the new file according to your message structure, and bind the columns.
- 3. Select Data Synchronization to automatically re-import data in the new file before Simulation.

Alternatively, clear the Data Synchronization check box. You can choose to import at a later time.

4. After the new data file is created, you can add data to it. If you selected Data Synchronization, when you place your virtual service into Simulating mode, the external data is re-imported. If you did not select Data Synchronization, you can choose to refresh the data manually at any time, or reconfigure the rule for data synchronization.

# How to Edit a Performance Model

This task describes how to edit the performance model to manipulate simulation behavior.

To learn more about performance models, see "Performance Model Overview" on page 132.

#### Service-level view

- 1. In the Virtualization Explorer, double-click a performance model to open the Performance Model Editor.
- 2. In the left pane, select the service name.
- 3. In the **Booster** drop-down box, select a performance criteria. For details on the available criteria, see "Performance Model Editor" on page 192.
- 4. Use the booster controls to set the boost level for the selected boosters.
- 5. Under **Model**, select the **Boost** or **Throughput Limit** check boxes to apply the performance changes to the service and all its operations.

Clear the boxes to manually set boosters for individual operations.

#### **Operation-level view**

- 1. Click an operation name in the left pane or in the operations table to view operation level detail for that operation.
- 2. Click a performance value to edit.
- 3. Click Show Measured Data to display any recorded performance data in the graph.

# How to Edit a Service Description

This task describes how to edit a service description. This includes service editing and URI space editing.

To learn more about service descriptions, see "Service Descriptions" on page 83.

This task includes the following steps:

- "Open a service description" on the facing page
- "Edit metadata" on the facing page
- "Manage XML schemas" on the facing page
- "Add or remove an operation" on the facing page
- "Add or remove a URI space" on the facing page
- "Add or remove data formats" on page 161

- "Define session identifiers" on next page
- "Hide data" on next page
- "Update a SOAP service description" on next page

### Open a service description

In the Virtual Service Editor, under Service Description, click **Edit**. For user interface details, see "Service Description Editor" on page 195.

### Edit metadata

You can add, delete, enable, disable, and edit metadata.

In the Service Description Editor, under Request Metadata or Response Metadata, click **Edit**. For user interface details, see "Edit Metadata Dialog Box" on page 205.

### Manage XML schemas

In the Service Description Editor, under XML Schemas, select an option to add, edit, or remove XML schemas. For user interface details, see "Service Description Editor" on page 195.

#### Add or remove an operation

You can add operations to your service.

In the Service Description Editor, in the bottom left of the Operations pane, click **Add Operation**. Select input and output message types. You must assign each operation a unique input message type.

**SAP services:** For a SAP service, the Add Operation dialog box enables you to import operations from a SAP server. For user interface details, see "Add SAP Operation Dialog Box" on page 208.

#### Add or remove a URI space

You can create additional URI spaces for your data.

In the Service Description Editor, in the bottom left of the Operations pane, click **Add URI Space**. Enter a URI path.

#### Note:

- Segments are separated with a '/' and the wildcard character '\*' is used for several characters or segments. For example, "Customer/\*/Europe/\*".
- Caution: If a URI Space that is in conflict with an existing URI Space and the new URI Space is more specific, the conflicting URI Space is split to several new URI Spaces and data from all associated rules are moved to these new URI Spaces.

To delete a URI space, in the left pane of the Service Description Editor, select the URI space and click **Delete URI Space**.

### Add or remove data formats

Data formats can be added and removed from a URI space as either request or response data formats.

- 1. In the Service Description Editor, in the operations pane on the left side, select a URI space.
- 2. Under Data Formats > Request Data Formats or Response Data Formats, click Add.

For user interface details, see "Add Data Format Dialog Box" on page 207.

### **Define session identifiers**

Set session IDs to identify requests that reflect the same source.

- 1. In the Service Description Editor, under Session IDs Definition, click Edit.
- 2. In the wizard pages that open, specify values for session identifiers, and click **Finish**. For user interface details, see "Session ID Definition Wizard" on page 197.
- 3. Learn data again. Service Virtualization uses the session IDs to create different tracks based on the learned data, and uses the tracks to create different sessions during simulation.

### Hide data

Configure data masking to protect sensitive data. Data recorded during Learning is masked and cannot be viewed in the data model.

Do one of the following:

- In the Service Description Editor, under Data Masking, view the data masking configuration for your virtual service. To configure data masking, click **Edit**.
- In the Data Model Editor, right-click a column header and select Mask.

For user interface details, see "Data Masking Dialog Box" on page 202.

### Update a SOAP service description

You may need to update a SOAP service description after a virtual service is created. A service commonly evolves over time, along with its WSDL, requiring an update of the virtual service.

You can update the service description in the following ways:

#### Automatically:

During Learning, Service Virtualization updates the SOAP service description automatically, based on the data received.

#### Manually:

- 1. In the Virtual Service Editor, under Service Descriptions, click Update From File.
- 2. In the Update Service Description dialog box, enter the path or URL, or browse to enter a new file.

# Simulation Modeling User Interface

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# **Data Model Editor**

The Data Model Editor enables you to view and edit a data model. You can configure requests, responses, and service activity calls for individual operations of a virtual service.

Data Model		= >
Data Model for Member Accounts	New Rule Operations Columns Activity View Options	Stateful Layout
Enter text to filter	Operation: Search •	
© Member Accounts	▶ 1 Learned Data Contains all data collected during Learning phase.	0 / 0 rows
<ul> <li>gett/emberDetal</li> <li>gett/emberPlan</li> <li>memberSearch</li> </ul>	▶ 2 Default Response Default response if no other data matches exist.	4 / 6 rows

To access	Use one of the following:
	• In the Virtualization Explorer, double-click a data model.
	• In the Virtual Service Editor, under Data Models, select a data model and click <b>Edit</b> .
Important information	Many of the actions you can perform in the Data Model Editor are available only from context menus. For details, see "Data Model Editor Context Menus" on page 169.
Relevant tasks	<ul> <li>"How to Manage Simulation Models" on page 133</li> <li>"How to Edit a Data Model" on page 134</li> <li>"How to Define Rule Functions" on page 136</li> <li>"How to Work With External Data Sources" on page 155</li> </ul>
See also	<ul> <li>"Data Model Overview" on page 126</li> <li>"Data Model Editor Context Menus" on page 169</li> <li>"Rule Functions" on page 128</li> <li>"FAQs: Data Model Editor" on page 209</li> </ul>

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

UI Element	Description
<data and="" description="" model="" name=""></data>	The name and description of the data model. Click to edit.
<operations spaces<br="" uri="">pane&gt;</operations>	<b>Operations pane.</b> Located in the left pane of the editor. Displays a list of the operations in the service associated with the selected data model.
	Enter text in the filter box to filter for specific operations in the list.
	Select an operation from the list to display its details in the main pane of the Data Model Editor.
Operation	Displays the name of the currently selected virtual service, and lists the operations in the virtual service. Select an operation from the list to display its details in the main pane of the Data Model Editor.
Learned Data	<b>Learned Data rule.</b> Created by default when you create a virtual service. Displays the requests and responses recorded during a learning session of a virtual service.
Default Response	<b>Default Response rule.</b> Created by default when you create a virtual service. The response that is provided when the data does not match any other rule. The Default Response rule always has the lowest priority.

UI Element	Description
<rule elements=""></rule>	Rules in the data model contain the following elements:
	► 2 ♦ New Rule 3 Custom rule created by the user.
	• <b>Expand rule.</b> Click the arrow before the rule number to expand a rule.
	For details on the functions used in rules, see "Rule Functions" on page 128.
	• <b>Rule priority.</b> The rule number indicates the order in which the rule is applied during simulation.
	To move a rule up or down in the list to change its priority, click
	the up/down icon 🔺 🍸 after the rule number.
	Note: Not available for the Default Response rule.
	• Rule name and description. Click to edit. Available only for custom rules.
	• Import/Export icons. When the rule is associated with an external data file, one of the following icons is displayed:
	The data was imported from an external file.
	The data was imported from an external file and is configured to automatically re-import before each Simulation session.
	The data was exported to an external file.
	The data was exported to an external file and is configured to automatically re-export after each Learning session.
	• <b>x/x rows.</b> Indicates the number of rows for this rule in this operation, out of the total rows for this rules across all operations in this service.

UI Element	Description
UI Element	<ul> <li>Description</li> <li>Enables you to create a new custom rule. Custom rules apply to all operations in the service. Includes the following options:</li> <li>Blank Rule. Enables you to create a new, custom rule with an embedded data source, used to modify some aspect of simulation, such as to rewrite part of the response, add service call activity, or add more data.</li> <li>The blank rule can be added before or after the default Learned Data rule.</li> </ul>
	• Data Driven Rule. Opens the Use Existing Data Source dialog box, enabling you to create a new rule using an external file as a data source, such as an Excel file. A new read-only rule is created for this data source.
	Select the data source file, and assign a name to the data source.
	Select <b>First row contains names of columns</b> to use the header row of the source file for the rule's column names.
	The data driven rule can be added before or after the default Learned Data rule.
	For more details on rules, see "Rule Functions" on page 128.

UI Element	Description
	Depending on the virtual service, displays options for the operations or URI spaces defined in the virtual service.
Operations	Includes the following options:
URI Spaces	• Browse and Search Operations/URI Spaces. Opens the Operations pane, displaying the list of operations included in the service.
	In the search box, enter a name or part of a name to search and filter for specific operations in the list.
	Select an operation from the list to display its details in the main pane of the Data Model Editor.
	• Edit Operations/URI Spaces. Opens the Service Description Editor, enabling you to modify the operations or URI spaces, their data formats, and metadata. For details, see "Service Description Editor" on page 195.
	Note: Available only for supported protocols.
	<ul> <li>Recently Used Operations/URI Spaces. Lists your most recently used operations or URI spaces, allowing you quick access.</li> </ul>
	Includes the following options:
Columns	• <b>Change Columns.</b> Opens the Change Columns dialog box, enabling you to select the headers to display for the operation. For details, see "Change Columns Dialog Box" on page 185.
	• Flat/Structured Headers. Toggles between flat and structured column headers.

UI Element	Description				
<b>*</b>	Enables you to configure the virtual service to call an external service:				
Adding	• <b>Import Activities.</b> Opens the Import Real Service Description dialog box, enabling you to import a service description of a service whose operations you can use as service call activities.				
	In the Select Service Operation dialog box, select an activity to import into the rule, or import the service description to use later. For more details, see "Select Service Operation Dialog Box" on page 189.				
	<b>Note:</b> After import, the <b>on/off</b> icon displays in the activity column header in the rule, enabling you to enable/disable the service call for the rule.				
	addltem 🔍 🖓 👘				
	HTTPInputParameters UriPath ClientAddr Davameters				
	Ignore   Ignore  Ignor				
View Options T	<ul> <li>Includes the following options:</li> <li>Functions. Displays the function row within rules, enabling you to set conditions for data columns.</li> <li>Data Binding. Displays the data binding row within rules, enabling you to configure binding. For more details, see "Data Driving" on page 131.</li> <li>Time Stamp. Displays the time stamp column within rules, which shows the time of creation or last modification of the rule.</li> <li>Operations/URI Spaces Pane. Opens the Operations/URI Spaces pane, displaying the list of operations/URI spaces included in the service.</li> <li>Simulation Preview. Displays how changes in the data model are affecting the simulation.</li> </ul>				
Stateful Layout	Displays the <b>Track Position</b> column within rules, and opens the track pane on the right side of the editor. For details, see "Stateful Layout View" on page 175.				

# **Data Model Editor Context Menus**

You can perform additional actions on rules in the Data Model Editor by accessing the context menus.

To access	Right-click a rule and select an option.	
See also	• "Data Model Editor" on page 163	
	• "Data Model Overview" on page 126	
Relevant tasks	"How to Edit a Data Model" on page 134	

User interface elements are described below.

## **Rule actions**

The following items are available when you right-click a rule.

UI Element	Description
New Rule	Creates a new custom rule.
Delete Rule	Deletes the selected rule. Available for: Custom rules
Disable Rule	Deactivates the selected rule. The rule is not applied during simulation.          Image: New Rule 1         Custom rule created by the user.    To reactivate the rule, right-click and select Enable Rule.
Import Data	Opens the Import Data dialog box, enabling you to import data from an external data file. For details, see "Import/Export Data Dialog Box" on page 180. Available for: Blank custom rule
Export Data	Opens the Export Data dialog box, enabling you to export data from an external data file. For details, see "Import/Export Data Dialog Box" on page 180.
Open External Data	Inside the data table, displays the data from the external file with which your rule is synchronized. Available for: Data driven rules

UI Element	Description
Refresh Data	Depending on whether your rule is configured for import or export to an external data file, re-imports or re-exports the data. <b>Available for:</b> Data driven rules
External Data Properties	Opens the External Data Properties dialog box, enabling you to modify your configuration for working with an external data source. For details, see "External Data Properties Dialog Box" on page 182. Available for: Data driven rules
Disconnect External Data	Disconnects the rule from the external data file with which it is synchronizing. This discontinues any import/export actions. Available for: Data driven rules

# Column header actions

The following items are available when you expand a rule and right-click a column header.

<b>UI Element</b>	Description
Activity Properties	Opens the Activity Properties dialog box, enabling you to modify properties for a service call activity. For details, see "Activity Properties Dialog Box" on page 190.
Remove Activity	Removes the selected activity from the rule.
Sort	Sorts the rows within the rule.
Reset Column Width	Resets default column widths.
Change Columns	Opens the Change Columns dialog box, enabling you to specify which columns are displayed in the data table of a rule. For details, see "Change Columns Dialog Box" on page 185.
Import/Export Data	Opens the Import/Export Data dialog box, enabling you to import/export data from/to an external data file. For details, see "Import/Export Data Dialog Box" on page 180.
Mask Change Masking	Opens the Data Masking dialog box, enabling you to hide specific request and response data elements. For details, see "Data Masking Dialog Box" on page 202.

# **Row actions**

The following items are available when you right-click a row within a rule.

UI Element	Description
Add Row	Creates a new row in the data table.
Import Message	Opens the Import Request/Response Message dialog box, enabling you to import messages from a file, by copying from the clipboard, or by manually entering text. For details, see "Import Request/Response Message Dialog Box" on page 176.
Add to Track	Opens the Stateful Layout view of the Data Model Editor, enabling you to order request/response pairs to define the sequence in which they are used during a stateful simulation. For details, see "Stateful Layout View" on page 175.
Row Detail	Opens the Row Detail dialog box, enabling you to view, enter, and edit data in the row. For details, see "Row Detail Dialog Box" below.
	<b>Tip:</b> If your structure includes many columns, the Row Detail dialog box offers a more user friendly format for viewing, entering, and editing data manually.
	Available for: Rows containing data

# **Row Detail Dialog Box**

This dialog box enables you to view, enter, and edit data in the row.

🎇 Row Detail - Learned Dat	3					- • •
Call 1 of 9 *Add	i Call 🔀 Delete	Call Search :	Enter te	xt to search (Ctrl + F)		Q in Message 🔹
Request				Response		
HTTPInputParameters	<mix></mix>	<ul> <li>16.213.226.11, HTTP</li> </ul>		Response Type	Set	<ul> <li>IMemberAccounts</li> </ul>
memberSearch		•		<ul> <li>IMemberAccounts_memberSearch_</li> </ul>	Set	•
▶ name	Ignore	<ul> <li>Einstein</li> </ul>		<ul> <li>HTTPOutputParameters</li> </ul>	Set	•
dateOfBirth	Is	▼ 0001-01-01T00:00:00		✓ memberSearchResponse	Set	•
socialSecurityNumber	Is	•		▶ memberSearchResult	Set	<ul> <li>[0, 3, 809-42-0002]</li> </ul>
zipCode	Is	•				
						Close

To access	Use one of the following:
	<ul> <li>In the Data Model Editor, right-click a row within a rule of an operation and select Row Detail.</li> </ul>
	• Select a row and click <b>Ctrl+D</b> .

Important information	• Changes you make to functions in this dialog box, such as <b>Is</b> or <b>Ignore</b> , apply to all rows in the rule.
	• Changes you make to data are immediately updated in the Data Model Editor when you move to a different field.
	• To enter multi-line values, click <b>Shift+Enter</b> at the end of the line of text to add a new line.
	• When you click a parameter, the related header in the Data Model Editor table is highlighted.
	If the header is not displayed in the Data Model Editor table, you can change display settings in the Change Columns dialog box.
Relevant tasks	"How to Edit a Data Model" on page 134
See also	"Data Model Editor Context Menus" on page 169

UI Element	Description		
Call <x> of <y></y></x>	Indicates the row number (x) that is selected within the rule, which contains (y) rows.		
Add Call	Adds a new row to the rule, enabling you to enter data manually.		
Delete Call	Deletes the selected row.		
Search	Enter the text you want to find. The first matching text is highlighted. Click the <b>Previous</b> and <b>Next</b> arrows in the Search box to move to other matching text. Search : name		
<search filter=""></search>	<ul> <li>Limits the search according to the criteria you select. Options include:</li> <li>Message. Searches both request and response data.</li> <li>Request. Searches request data only.</li> <li>Response. Searches response data only.</li> </ul>		
Request/Response	The tables display the data for the selected row. You can view, search, and modify the data.		

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

# Substring Dialog Box

This dialog box enables you to copy a part of a string from one data column to another. You can also add additional text to the copied text.

🌃 Substring			? 🗙
Set form	natting string for substring	of 'totalPrice' column	
Source:	totalPrice		Change
Format:	{1+} () E.g. {1-6}{9}{8}{10+}		More
Preview	г.		
Origina	I Value	Substring Result	
123456	789	123456789	
Hello W	orld!	Hello World!	
1234	5678910	12345678910	
		ОК	Cancel

To access	<ol> <li>In the Data Model Editor, expand a rule.</li> <li>Click inside the function field (fx) of a response column and select Substring.</li> <li>Image: Click inside the function field (fx) of a response column and select Substring.</li> </ol>
Polovant	<ul> <li>Tip: If the function row is not displayed, from the View Options menu, select Functions.</li> <li>3. Select a column to be used as the source of the data from which to extract the substring. The columns available for selection are highlighted.</li> </ul>
Relevant tasks	"How to Configure the Substring Function" on page 151
See also	"Rule Functions" on page 128

User interface elements are described below:

UI Element	Description
Source	The substring is taken from the data in the source column you specify. By default, the column you already selected is displayed. Click <b>Change</b> to select a different column.
Format	Defines which part of the string you want to copy from the source column, and any additional text you want to add to the string. For details on how to define the format, see "How to Configure the Substring Function" on page 151.
Preview	Simulates an example of the substring result based on the settings you defined in the <b>Source</b> and <b>Format</b> fields.

UI Element	Description
Change	Enables you to select a source column for the substring of data to be copied.
More	Opens the Service Virtualization help to assist you in defining the substring format.

# **Stateful Layout View**

This view enables you to order request/response pairs to define the sequence in which they are used during a stateful simulation.

FootballPoolWeb Data Model* FootballPoolWeb	Service Approval Da	sta Model Appro	val Service Description				# 3
Approval Data Model Data Model for Approval Service						New Rule Operations	Columns Attivity View Options
×	Operation: • appr	rovePaymentOper	ration •				Track 4-23-2012
Enter text to filter Q	. d Larmed D	***				14/14 rows	
Approval Soprice	4 Contains	all data collected du	ving Learning phase.				v v
· Approvar Service	Request			TrackPosition	Response		approvePaymentOp
approvePaymentOperation	MQInputMetod.	approvePayment			MQOutputMetadata	approvePayme	*
	6 10	customer	amount		Carl	T Cat	approvePaymentOp
	J/ B	B Manuala Oniver	- B	- Teach ( 22, 2012) 14	- MOSTR 427 427 4 Terrs 1272	- Jet	approvePaymentOn
	2	Herryle Point	2000	Track 4125-2012 pos. 14	<ul> <li>MOCTP 427 427 4 Enive</li> </ul>	procession -	W W
	3	Herryle Point	3000	Track 4-23-2012 post 13	<ul> <li>MOSTR 437 437 4 Entre</li> </ul>	processing =	approvePaymentOp
	4	Herryle Print	3000	Track 4-23-2012 po5-12	<ul> <li>MOSTR 437 437 4 False</li> </ul>	processing	*
	5	Herede, Poret	2000	Track 4-23-2012 pos-11	- MOSTR 427,427,4 Ealer	processing	(approvePaymentOp)
	6	Hereule, Point	2000	Track 4-23-2012 post 10	- MOSTR 427 427 4 False	processing	( and the second flow
	7	Herrole Point	3000	Track 4-23-2012 pos. 9	<ul> <li>MOSTR 437 437 4 Folge</li> </ul>	processing	(approveraymentop)
	8	Hercole, Point	2000	Track 4-23-2012 pos. 8	- MOSTR 497 497 9 Teve	processing	(approvePaymentOp)
	*	HERCOLE, POPOL		Track 4-25-2012 pol. 7	· Prigatik , kar, kar, a, true,	approved -	Ψ.
							(approvePaymentOp)
							gorounPaymentOp.     gorounPaymentOp.     gorounPaymentOp.     gorounPaymentOp.     gorounPaymentOp.     gorounPaymentOp.     Gorount Bulk Tracks
							Track 4-23-2012

To access	In the Data Model Editor, click the Stateful Layout button.
Important information	Service Virtualization creates tracks automatically based on learned data and Session ID definition. For details, see "Service Description Editor" on page 195.
Relevant tasks	"How to Edit a Data Model" on page 134
See also	"Data Model Editor" on page 163

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

UI Element	Description
Track Position	Located in the main pane of the Data Model Editor, indicates the track and track position of the selected row.
COLUMN	Right-click in the Track Position column for a given row and click <b>Add to Track</b> to add the call to the sequence of calls in the track.

UI Element	Description
<track pane&gt;</track 	Located in the right pane, displays the sequence of calls in the track. The order reflects how the calls are used in a stateful simulation.
<track name&gt;</track 	Located at the top of the track pane. Click to edit.
Current Rule Tracks	List of all tracks modeling stateful behavior.
New Track	Creates a new track.
Delete	Deletes the currently displayed track. You can choose to delete the track only, or also delete the rows that include track positions of the selected track.

# Import Request/Response Message Dialog Box

This dialog box enables you to import messages from a file, by copying from the clipboard, or by manually entering text. You can also import multiple files simultaneously.

Request Message: From File(s)   From Clipboard         Response Message: From File(s)   From Clipboard         When importing multiple files, use the same file name for the request and response parts of a specific message. File name extens are ignored.		-
Response Message: From File(s)   From Clipboard         Response Message: From File(s)   From Clipboard         ) When importing multiple files, use the same file name for the request and response parts of a specific message. File name extens are ignored.		
Response Message: From File(s)   From Clipboard           When importing multiple files, use the same file name for the request and response parts of a specific message. File name extens are ignored.		Request Message: From File(s)   From Clipboard
Response Message: From File(s)   From Clipboard           When importing multiple files, use the same file name for the request and response parts of a specific message. File name extens are ignored.		
Response Message: From File(a)   From Clipboard ) When importing multiple files, use the same file name for the request and response parts of a specific message. File name extens are ignored.		
Response Message: From File(s)   From Clipboard           ) When importing multiple files, use the same file name for the request and response parts of a specific message. File name extens are ignored.		
Response Message: From File(s)   From Clipboard           ) When importing multiple files, use the same file name for the request and response parts of a specific message. File name extens are ignored.		
Response Message: From File(s)   From Clipboard ) When importing multiple files, use the same file name for the request and response parts of a specific message. File name extens are ignored.		
Response Message: From File(a)   From Clipboard           ) When importing multiple files, use the same file name for the request and response parts of a specific message. File name extens are ignored.		
Response Message: From File(a)   From Clipboard ) When importing multiple files, use the same file name for the request and response parts of a specific message. File name extens are ignored.		
Response Message: From File(s)   From Clipboard ) When importing multiple files, use the same file name for the request and response parts of a specific message. File name extens are ignored.		
Response Message: <u>From File(s)</u>   <u>From Ciloboard</u> ) When importing multiple files, use the same file name for the request and response parts of a specific message. File name extens are ignored.		
Response Message: From File(s)   From Cilibboard         )           When importing multiple files, use the same file name for the request and response parts of a specific message. File name extens are ignored.		
) When importing multiple files, use the same file name for the request and response parts of a specific message. File name extens are ignored.		Response Message: From File(s)   From Clipboard
) When importing multiple files, use the same file name for the request and response parts of a specific message. File name extens are ignored.		
) When importing multiple files, use the same file name for the request and response parts of a specific message. File name extens are ignored.		
) When importing multiple files, use the same file name for the request and response parts of a specific message. File name extens are ignored.		
) When importing multiple files, use the same file name for the request and response parts of a specific message. File name extens are ignored.		
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When importing multiple files, use the same file name for the request and response parts of a specific message. File name extens are ignored.		
When importing multiple files, use the same file name for the request and response parts of a specific message. File name extens are ignored.		
uro griorou.	rts of a specific message. File name extensions	When importing multiple files, use the same file name for the request and response parts of a specific message. File name extensions are innored.
		ure grovea.
	01	

To access	In the Data Model Editor, expand a rule.
	<ul> <li>To import messages to a specific operation/URI space, select the operation/URI space in the Operations/URI Spaces pane. Right-click inside the rule and select Import Message.</li> </ul>
	• To import messages at the service level, select the service in the Operations/URI Spaces pane. Right-click the rule and select <b>Import Message</b> . (Available for SOAP and XML services only.)
	Available for: Custom rules and the Learned Data rule.
Important information	• <b>Importing multiple messages at the service level:</b> The messages are placed in the proper operations.
	If a message contains a new schema/message structure that does not currently exist in any operations in the service:
	<ul> <li>For an XML service, a new operation is created.</li> </ul>
	<ul> <li>For a SOAP service, an error message displays.</li> </ul>
	Importing multiple messages directly into a specific operation:
	If a message contains a new schema/message structure that does not currently exist in the operation:
	<ul> <li>For a REST service, a new data format is created.</li> </ul>
	<ul> <li>For an XML or SOAP service, an error message displays.</li> </ul>
Relevant tasks	"How to Edit a Data Model" on page 134
See also	"Data Model Overview" on page 126

User interface elements are described below:

<b>UI Element</b>	Description
~ ^	Expand/Collapse. Click to show/hide message content.
Request/Response	Enter request and response message content.
Message	You can import request messages, response messages, or both.

<b>UI Element</b>	Description
From File	Click to select a file from the file system. Each file may contain only the request or response part of a single message.
	To import multiple messages, select multiple files to import. Service Virtualization matches pairs of request and response messages by file name, according to one of the following methods:
	• Files are matched according to any numerical index present within the file name.
	<ul> <li>The index can be located at the beginning or end of the file name, or as a separate part of the file name, . For example: 5_req.xml, req5.xml, req.5.xml</li> </ul>
	• The index must be in the same location in all files.
	<ul> <li>Example: 9984_req1.xml and 9984_req2.xml. The files are compared according to index numbers are 1 and 2 (not 9984).</li> </ul>
	Files with the same name are paired.
	File name extensions are ignored.
	<b>Tip:</b> Place request and response files in separate folders to ease the import process.
From Clipboard	Pastes clipboard content into the message box.

# Request/Response Pairing Dialog Box

This dialog box enables you to review and make changes to the request/response message pairing performed by Service Virtualization.

Request File	Response File	
request? txt	request1.txt	<del>`</del>
request3.txt	¥ request3.txt	<u> </u>
		~

To access	Opens automatically when you select to import multiple messages in the Import Request/Response Message dialog box.
Important information	<ul> <li>Service Virtualization pairs request and response files according to file names. For additional details, see "Import Request/Response Message Dialog Box" on page 176.</li> <li>A file that does not match another file is also imported. For example, if there is a request file, but no corresponding response file, the request file is still imported.</li> </ul>
Relevant tasks	"How to Edit a Data Model" on page 134
See also	"Data Model Overview" on page 126

User interface elements are described below:

<b>UI Element</b>	Description
Request/Response File	The request and response files to import.
	To make changes to the request/response file pairing, select a request or response file and move it up or down in the list.
Create a Track	Places the imported messages into a separate track in the data model.

# New Data Driven Rule Dialog Box

This dialog box enables you to create a new rule connected to an external data source.

🎇 New Data Driven Ru	le	? ×
Specify path to existing data	source which contains data for testing.	
Existing External Data File:		
Column Names:	Supported file formats are e.g. xls, xlsx.     Supported file formats are e.g. xls, xlsx.     (i) First row contains names of columns	
Data Synchronization:	Data are imported automatically from external data file before virtual service	dep
Service Operations:	All Change	
	< Back Finish C	ancel

To access	1. In the Data Model Editor, select <b>New Rule &gt; Data Driven Rule</b> .
	2. Select one of the following:
	<ul> <li>Create new data file.</li> </ul>
	<ul> <li>Use existing data file.</li> </ul>
Important information	<b>Creating a new data file:</b> The Service Virtualization Designer creates a new Excel file, structured according to the schema (message structure) associated with the virtual service. Rule columns are automatically bound to the worksheet columns.
	<b>Using an existing data file:</b> After you create the rule you must then manually bind rule columns to worksheet columns. After binding, the external data is imported to the Data Model.
Relevant	"How to Edit a Data Model" on page 134
lasks	"How to Work With External Data Sources" on page 155
See also	"Data Model Overview" on page 126

User interface elements are described below:

<b>UI Element</b>	Description
New/Existing External Data File	<b>To use an existing data file:</b> Select a file from the drop-down list, or click the browse button to navigate to the file location.
	<b>To create a new data file:</b> Type a name for the file and specify its path, or click the browse button to navigate to the file location.
Column Names	If you are adding an existing file, this option indicates that the first row of your file is a header row, containing the names of each column.
Data synchronization	The rule is configured to import data automatically from the external data file before each simulation.
Service Operations	The operations in your virtual service for which you want to import data. By default, all of the virtual service's operations are selected for import. To change this selection, click <b>Change</b> and edit the list of operations for import.

# Import/Export Data Dialog Box

The Import Data dialog box enables you to import data from an external data file to your data model.
🌃 Import Data		? ×
Specify path to existing	file which contains data to import.	()
External Data File:	*	
<u>, , , , , , , , , , , , , , , , , , , </u>	Supported file formats are e.g. xls, xlsx.	
Column Names:	(i) First row contains names of columns	
Service Operations:	Data are imported automatically nom external data me before virtual service deploy     All	11
	Change	
	Finish Can	cel

The Export Data dialog box enables you to export data from your data model to an external data file.

🐝 Export Data		? ×
Data are going to be exp	ported. Specify path for a new file.	
External Data File:	C:\Demo\demo_export.xlsx  Supported file formats are e.g. xls, xlsx.	
Column Names:	First row contains names of columns	
Data Synchronization:	Data are exported automatically to external data file after virtual service learning.	
Service Operations:	All Change	
	Finish C	ancel

To access	Import Data: Right-click a custom rule and select Import Data.
	Export Data: Right-click a custom rule or the Learned Data rule and select Export Data.
Relevant tasks	"How to Work With External Data Sources" on page 155
See also	"Data Model Overview" on page 126

User interface elements are described below:

Import Data Dialog Box

<b>UI Element</b>	Description
External Data File	Specify the path to the external data file containing data to import, or click the browse button to navigate to the file location.

<b>UI Element</b>	Description
Column Names	Indicates that the first row of your file is a header row, containing the names of each column.
Data synchronization	Data is automatically re-imported from the external data file before each Simulation session.
	<b>Note:</b> After import, do not modify data directly in the Data Model Editor. The next time that the data is re-imported from the external file your changes will be lost.
Service Operations	The operations in your virtual service for which you want to import data. By default, all of the virtual service's operations are selected for import. To change this selection, click <b>Change</b> and edit the list of operations.

### Export Data Dialog Box

<b>UI Element</b>	Description
External Data File	Specify the path for the new external data file, or click the browse button to navigate to the file location.
Data synchronization	Data is automatically exported to the external data file after a virtual service Learning session.
	<b>Note:</b> After export, do not modify the external data file. Each time the data is exported, the external file is deleted and recreated. Therefore any changes you make in the external file will be lost on the next automatic export.
Service Operations	The operations in your virtual service for which you want to export data. By default, all of the virtual service's operations are selected for export. To change this selection, click <b>Change</b> and edit the list of operations.

# **External Data Properties Dialog Box**

This dialog box enables you to configure options for a data rule that is working with an external data file.

🖥 External Data Properties	? X
Modify external data properties.	÷.
<ul> <li>Importing data from external data file</li> <li>Exporting data to external data file</li> </ul>	
External Data File: C:\Demo\Demo.xls	<b>.</b>
Supported file formats are e.g. xls, xls	х.
Column Names: 🗹 👔 First row contains names of co	lumns
Data Synchronization: 🔲 🕕 Data are imported automaticali	y from external data file before virtual service deployment.
Service Operations: All	
Change	
Sheet Relations:	
N Primary Key	C Foreign Key
memberSearch.PK	memberSearch_Member.FK
memberSearch.PK	memberSearch_any.FK
getMemberPlan.PK 🔹	getMemberPlan_any.FK
getMemberDetail.PK	getMemberDetail_any.FK
Add   Delete	
Foreign key comes from sheet containg array items. Both pr	imary and foreign keys are required fields. More
Refresh On Finish	
	Finish Cancel

To access	Right-click a rule or column header and select <b>External Data Properties</b> . Available for a rule that is associated with an external data file for import or export.
Relevant tasks	"How to Work With External Data Sources" on page 155
See also	"Data Driving" on page 131

<b>UI Element</b>	Description
Importing data from external data file	The rule is associated with an external file from which it has imported data.
Exporting data to external data file	The rule is associated with an external file to which it has exported data.
External Data File	The path to the associated external data file .
Column Names	Indicates that the first row of your file is a header row, containing the names of each column. Available for import only.

<b>UI Element</b>	Description
Data Synchronization	For import: Data is automatically re-imported from the external data file before each Simulation session.
	For export: Data is automatically exported to the external data file after a virtual service Learning session.
Service	The operations in your virtual service that are configured for import or export.
Operations	By default, all of the virtual service's operations are selected. To change this selection, click <b>Change</b> and edit the list of operations.
Sheet Relations	Binding configuration for working with array data. You can define the relationships between worksheets that is required for array binding.
	<b>Primary/Foreign Key:</b> The drop-down lists display the columns in the external data file. The format of the keys is <worksheet_name>.<column_name>. Select a value for each key to define the relationship.</column_name></worksheet_name>
Add	Adds a row, enabling you to define an additional relationship between primary and foreign keys.
	Available when working with array data.
Delete	Removes the selected row.
	Available when working with array data.
Refresh Data on Confirm	Updates the data according to your new settings. For example, if you changed the setting from Import to Export, the data is exported to the external file when you click <b>Finish</b> .

# **New/Edit Function Dialog Box**

The New Function f(x) dialog box enables you to create a new function to use in your data model. You can then edit functions from the Edit Function dialog box.

🊟 New Func	tion f(x) ? 🗙
Function:	
Name:	E.g. \$input_int < \$data_int OR \$input More
	OK Cancel

To access	New Function dialog box: Use one of the following:
	<ul> <li>In the Data Model Editor, click inside the function field (fx) for a column and select New f(x).</li> </ul>
	• In the Virtualization Explorer, under Data Models, right-click the Functions folder, and select <b>New f(x)</b> .
	<b>Edit Function dialog box</b> : In the Virtualization Explorer, under Data Models, expand the <b>Functions</b> folder. Double-click a function to edit.
Relevant tasks	"How to Define Rule Functions" on page 136
See also	"Rule Functions" on page 128

UI Element	Description
Function	Enter a function. For details on the variables you can use to configure a new, custom function, see "How to Define Custom Functions" on page 153.
Name	Enter a name for the new function or accept the default.
More	Opens the online help on how to define rule functions.

# Change Columns Dialog Box

The Change Columns dialog box enables you to specify which columns are displayed in the data table of a rule.

🖀 Change Columns 📃 🗆 🗙
Filtering columns in the tree:
Enter text to filter 🔍 👰 🔻
Columns tree:
Request     HTTPInputParameters     ClientAddress     Parameters     Headers     Transport     W memberSearch
E Response
Response Type
<ul> <li>□ IMemberAccounts_memberSearch_OutputMessage</li> <li>□ HTTPOutputParameters</li> <li>□ Headers</li> <li>□ memberSearchResponse</li> <li>□ Fault</li> <li>□ HTTPOutputParameters</li> <li>□ Headers</li> <li>□ faultstring</li> <li>□ faultactor</li> <li>! □ detail</li> <li>○ Preview</li> </ul>
OK Cancel

To access	Use one of the following:
	<ul> <li>In the Data Model Editor, select Columns &gt; Change Columns.</li> </ul>
	• Right-click a column header and select Change Columns.
Relevant tasks	"How to Edit a Data Model" on page 134

<b>UI Element</b>	Description
Filtering columns in the tree	Enter text in the search field to filter the columns displayed in this dialog box.
Default Filter Options ₩	Displays default filters you can apply to assist you in viewing the list of columns.

UI Element	Description
UI Element Columns tree	Description         Select the columns that you want to display in the data table.         • When you click on a column name, it is highlighted for you in the currently open model.         • Select a radio button option to change the current view in the open model.         • Select a radio button option to change the current view in the open model.         • Response <ul> <li>Response</li> <li>Response</li> <li>Henders</li> </ul> • Right-click an item in the tree to display additional options for showing/hiding branches/children.         Note: Selecting a header level checkbox does not select all child headers.         In this example, the Request box is selected, indicating that you have selected the Request header to display in the Data Model Editor.         The shaded box for the Request header indicates that one or more child headers are selected.
OK/Cancel	Saves/discards your selections.

# **Edit Sheet Relations Dialog Box**

This dialog box enables you to configure binding for an array. You can define the relationships between worksheets that are required for array binding.

🔍 Primary Key	🔍 Foreign Key
Search.id	Search Results.searchId
	Search Results.household Id (11,) Search Results.socialsecuritynumber (1554-98-0001) Search Results.searchId (11,21,31)

To access	Use one of the following within the data rule:		
	• When binding an array item, this dialog box opens automatically.		
	• Right-click the rule or column header and select <b>External Data Properties</b> . See the <b>Sheet Relations</b> area.		
Relevant tasks	"How to Work With External Data Sources" on page 155		
Important information	When there is a 1 to 1 relationship, there will be exactly one item in the array for each row. Items of the array can be located on the same worksheet as other data, and the relationship will be specified as the same worksheet column for the Primary and Foreign Key. This works only for a one level array. It cannot be used if the array is part of another array.		
See also	"Data Driving" on page 131		

<b>UI Element</b>	Description
Primary/Foreign Key	The drop-down lists display the columns in the external data file. The format of the keys is <worksheet_name>.<column_name>. Select a value for each key to define the relationship.</column_name></worksheet_name>
Add	Adds a row, enabling you to define an additional relationship between primary and foreign keys.
Delete	Removes the selected row.

# Data Format/Response Type/Choice Binding Dialog Box

This dialog box enables you configure binding for working with different data formats (REST protocol), different response types (SOAP protocol), or a message structure containing different types.

	Specify data format used in case when value does not match to any cell value specified below.
Cell Valu	Je
PRODU	CT .
CUSTON	MER
INVOIC	E
	Cell Valu PRODUC CUSTON

To access	The dialog box opens automatically when you start to bind to an Excel worksheet column where the response can contain different data formats, different response types, or a message structure which can be considered to contain different types.
Relevant tasks	"How to Work With External Data Sources" on page 155
Important information	Map choices to cell values based on predefined cell values read from an external data source or by setting custom values.
See also	"Data Driving" on page 131

User interface elements are described below:

UI Element	Description
Default Data Format/Response Type/Choice Binding	Used when no value from the mapping table matches.
Data Format/Response Type/Choice	The mapping table lists the real formats or types based on the data in your external data file.
Cell Value	To configure a value for each possible real type or format, select a value from the drop-down list.

# **Select Service Operation Dialog Box**

This dialog box enables you to configure a virtual service to call external services.

🞇 Select Service Operation	? 💌
Select an operation from the service description, or import the service description to use later.	Ô
<ul> <li>Service operation:         <ul> <li>addItem</li> <li>Add the activity after response.</li> </ul> </li> <li>Do not add an activity now. Import the service description for later use.</li> </ul>	
< Back Finish	Cancel

To access	<ol> <li>In the Data Model Editor, select the operation from which you want to call the external service.</li> <li>Click Activity &gt; Import Activities, enter the path to the WSDL schema, and click Next.</li> </ol>
Important information	Only SOAP service call activities are supported.
Relevant tasks	"How to Edit a Data Model" on page 134
See also	"Data Model Overview" on page 126

UI Element	Description	
Service operation	The list of operations available for the service call activity.	
Add the activity after response	Runs the activity after the response is sent to the client.	
	By default, the service call activity is added to the rule before the response.	
Do not add an activity now. Import the service description for later use.	Imports the service description document. No activity is added to the current rule.	

# **Activity Properties Dialog Box**

This dialog box enables you to modify properties for a service call activity.

🚟 Activity Pr	roperties	? 💌
Change prop	perties of the activity.	÷
State:	●On	
Name:	addItem	
URL:	http://localhost: 8101/ServiceSimulation/Demo/ShoppingCartService/ShoppingCartServic	
Delay after response: 0 ms		
	ОК	Cancel

To access	1. In the Data Model Editor, expand a rule.
	2. Right-click the column header of a service call activity, and select <b>Activity Properties</b> .
Relevant tasks	"How to Edit a Data Model" on page 134
See also	"Data Model Overview" on page 126

UI Element	Description
State	Indicates if the service call activity is currently enabled or disabled for the rule.
	Click the on/off icon •On •Off to change the state.
Name	The name of the activity. By default, this is the name of the operation in the called service. <b>Tip:</b> You can edit this field. If you add multiple activities calling the same
	operation in the same service, give each activity a different name.
URL	The endpoint location of the called service.
Delay after response	Indicates the amount of time, in milliseconds, to wait after sending a response to the client, before running the activity.
	Available only for a service call activity that is scheduled for after the response.

# **Performance Model Editor**

The Performance Model Editor enables you to configure performance metrics for a virtual service to use during simulation. You can configure the performance for the whole service or for its individual operations.

Member Accounts_Default_Performance.vspfmodel Member Accounts.vs			⇒ ×			
Performance Model Performance Model for Member Accounts						
<ul> <li>Member Accounts</li> <li>memberSearch</li> <li>getMemberPlan</li> <li>getMemberDetail</li> </ul>	Performance Overvi Booster: CPU Computing p	<b>EW</b> for Member A ower	in Max Ix Ix	•		
	Model Boost 📝 Re	sponse Time [ms]	Hit Rate Threshold [hits/s]	Throu	ghput Limit	[MB/s]
	Service					
	Member Accounts 📝	n/a	n/a		0	
	Operations					
	memberSearch	100	1000		0.01	Detail
	getMemberPlan 🛛	100	1000		0.01	Detail
	getMemberDetail 🔽	100	1000		0.01	<u>Detail</u>

To access	<ul> <li>Use one of the following:</li> <li>In the Virtualization Explorer, double-click a performance model.</li> <li>In the Virtual Service Editor, under Performance Models, select a performance model and click Edit.</li> </ul>
Important information	Click a value to edit.
Relevant tasks	<ul><li> "How to Manage Simulation Models" on page 133</li><li> "How to Edit a Performance Model" on page 158</li></ul>
See also	"Performance Model Overview" on page 132

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

## **Common Areas**

<b>UI Element</b>	Description
<pre><performance and="" description="" model="" name=""></performance></pre>	The name and description of the data model. Click to edit.

<b>UI Element</b>	Description
<operations></operations>	Located in the left pane of the editor. Displays a list of the operations in the service associated with the selected performance model.
	By default, the service name is selected, and a performance overview is displayed in the main pane of the Performance Model Editor. For details, see Service Level View.
	Enter text in the filter box to filter for specific operations in the list.
	Select an operation from the list to display its details in the main pane of the Performance Model Editor. For details, see Operation Level View.
Edit Service Description	Opens the Service Description Editor. For details, see "Service Description Editor" on page 195.

## Service Level View

UI Element	Description
Booster	<ul> <li>A set of boosters to provide high-level control of the operations selected in the operation table.</li> <li>Available boosters include: <ul> <li>CPU. CPU power multiplication factor.</li> </ul> </li> <li>Network. Network throughput multiplication factor.</li> <li>Cluster. Scalability multiplication factor.</li> <li>Expert. Multiplication factors for Response Time, Hit Rate, and Throughput Limit values.</li> <li>None. Turn off all boosters.</li> </ul>
	Note: You must restart the simulation to apply changes.
<booster controls&gt;</booster 	The sliding controls and inputs enable you to set the boost level for the selected booster. The setting affects the various performance criteria displayed in the operation table.

UI Element	Description
Model	Enables you to set more granular settings for individual performance criteria for individual operations. You can set the following:
	• <b>Response Time [ms].</b> The time for the service to process a request and return a relevant response.
	• <b>Threshold [hits/s].</b> The maximum number of requests and responses the service can process without any impact on performance.
	Throughput Limit [MB/s]. The maximum data capacity the service can process.
	To apply the performance changes to the service and all of its operations, select the <b>Boost</b> or <b>Throughput Limit</b> check boxes at the top of the table.
	Alternatively, select options separately for the service and per operation.
	Click an operation name to open the operation level view for the specific operation.

## **Operation Level View**

<b>UI Element</b>	Description
<performance graph&gt;</performance 	The graph displays the expected performance based on the criteria set for the operation.
	Select <b>Show Measured Data</b> to view any recorded performance data in the graph. Note: This option is displayed only after data is recorded for the service.
	The graph is interactive. Move the graph elements to show the effects on performance.
<performance criteria&gt;</performance 	Displays the advanced performance criteria for the operation with the option to edit them. The following additional criteria are available:
	• <b>Tolerance [%].</b> The acceptable range of variation in performance for the operation.
	• <b>Maximum Hits per Second.</b> The maximum number of requests and responses the operation is allowed to process.
	• <b>Maximum Response Time.</b> The maximum time for a response at peak performance levels.
	Click a value to edit.

# **Service Description Editor**

The Service Description Editor enables you to edit a virtual service description, including editing metadata, managing XML schemas, adding and removing operations, and defining session identifiers.

Approval Service Description App	roval Service	<del>,</del> <del>,</del> <del>,</del>
Approval Service Service Description for Appr	Description wal Service	
Enter text to filter  Approval Service Descripti  approvePaymentOpe	<ul> <li>Message Metadata</li> <li>Request Metadata: Sen@rocesangMessages, TransictionId</li> <li>Edt</li> </ul>	Response Metadata: Format, CharaterSe, Transactorida, DachaReasonCode, Prodificadrigo Edit
	YP4 Schema     Hamspace     Hamspace     Heme     High confSOAQServiceSmulator/2010/d appro-     http://tp.confSOAQServiceSmulator/2010/d	ks Types Øfleyment, approvelleymentResuk Custoner, ApprovaResuk
	Add J Edit   Collece  Session ID's Definition  Default service session ID's  Session ID Source  Response None  Edit	Operation specific session IDs operation Session ID Source Data Key approvelymentOperation (Request) Inherited
Add Occupies 1 Dalate Occupies		

To access	<ul> <li>In the Virtualization Explorer, expand a virtual service and double-click the service description.</li> <li>In the Virtual Service Editor, under Service Description, click Edit.</li> <li>In the Data Model Editor, select one of the following:         <ul> <li>URI Spaces &gt; Edit URI Spaces</li> <li>Operations &gt; Edit Operations</li> </ul> </li> </ul>
Important information	Not all editing operations are available for all protocols. You can edit URI Spaces when working with the REST protocol, and edit operations when working with XML protocols.
Relevant tasks	"How to Edit a Service Description" on page 159
See also	"Service Descriptions" on page 83

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

UI Element	Description
<operations pane=""></operations>	Located in the left pane of the editor. Displays a list of the operations or URI spaces in the service.
	Enter text in the filter box to filter for specific operations in the list.
	Select an operation or URI space to display its details.
Add Operation	Located at the bottom of the operations pane.
	Opens the Add Operation dialog box, enabling you to select input and output message types. You must assign each operation a unique input message type. Available for XML services.
	SAP RFC: Connects to the SAP Server and displays a list of available operations that you can add to your virtual service.
Add URI Space	Located at the bottom of the operations pane.
	Opens the Add New URI Space dialog box, enabling you to create a new URI space. Enter the URI path.
	Available for REST services.
Delete	Located at the bottom of the operations pane.
Operation/URI Space	Deletes the selected operation/URI space.
Session ID Definition	Defines the elements used to identify requests coming from the same source during a Learning session.
	The following identifiers are configured by default:
	For HTTP: ClientAddress metadata
	For MQ: UserID metadata
	Other transport protocols (TibcoEMS, GenericJMS, JDBC) do not have default session identifiers. Tracks are created after each Learning session.
	Click <b>Edit</b> to modify the settings. For details, see "Session ID Definition Wizard" on next page.
Message Metadata	Enables you to edit request and response metadata. Click <b>Edit</b> to open the <b>Edit Metadata</b> dialog box. For details, see "Edit Metadata Dialog Box" on page 205.

<b>UI Element</b>	Description
XML Schemas	<ul> <li>Lists all XML schema defined in the service description. You can add an XML schema, or edit or remove schemas.</li> <li>Add. Opens the Import XML Schema dialog box, enabling you to enter a file location for an existing schema (.xsd file), and add it to the service description.</li> <li>Edit. Opens the schema in an XML editor, enabling you to modify.</li> </ul>
	<ul> <li>Delete. Removes the schema from the service description.</li> </ul>
URI Space Properties	Displays the URI space path.
Data Formats	Lists the available request and response data formats.
	Click <b>Add</b> to add a new data format. For details, see "Add Data Format Dialog Box" on page 207.
	Available for URI spaces.
Data Masking	Enables you to hide specific data elements, to protect sensitive data. For details, see "Data Masking Dialog Box" on page 202.

# **Session ID Definition Wizard**

This wizard enables you to specify which metadata or message elements to use to identify requests coming from the same source. Service Virtualization uses this information to create different tracks from learned data, and uses the tracks to create different sessions during simulation.

To access	In the Service Description Editor, under Session ID Definition, click Edit.
Wizard map	This wizard contains: "Define Default Session IDs Page" on the facing page > "Define Operation Specific Session IDs Page" on page 199 > "Define Data Format Session IDs Page" on page 200 > "Define Session IDs Summary Page" on page 201

Important information	<ul> <li>Service Virtualization defines default identifiers based on the protocol and agent you define for the virtual service. This wizard enables you to modify the default selections.</li> <li>The following can be defined as session identifiers: <ul> <li>message elements</li> <li>protocol metadata (headers)</li> </ul> </li> </ul>
	<ul> <li>cookies</li> </ul>
Relevant tasks	"How to Edit a Service Description" on page 159
See also	"Service Descriptions" on page 83

## Define Default Session IDs Page

This wizard page enables you to define session identifiers at the **service** level.

Define De	efault Session II	)s				? ×
Specify values	s for default service se	ssion IDs in order	er to	build tracks from learned data.		Ô
Default se	rvice session IDs					
	Session ID Source	Data Key				
Request	Metadata 🔹	ClientAddress	•			
Response	None 🔻		Ŧ			
					Next >	Cancel

Important information	General information about this wizard is available here: "Session ID Definition Wizard" on previous page
Wizard map	The create new virtual service wizard contains: <b>"Define Default Session IDs Page" above</b> > "Define Operation Specific Session IDs Page" on next page > "Define Data Format Session IDs Page" on page 200 > "Define Session IDs Summary Page" on page 201

<b>UI Element</b>	Description
Request/Response	Displays current settings for request and response elements.

<b>UI Element</b>	Description
Session ID Source	The source for identifying sessions. Options include:
	• <b>Metadata.</b> Enables you to define which metadata to use as a session identifier. Select an option from the Data Key list.
	• None. The data is not placed into tracks based on metadata values.
Data Key	The metadata (protocol header) used to identify a unique session.
	Available when you select Metadata in the Session ID Source field.

# **Define Operation Specific Session IDs Page**

 Operation Specific Session IDs
 ? ×

 Specify values of service operation session IDs in order to build tracks from learned data.
 Image: Comparison of the session ID service operation of the session operation of the session operation oper

This wizard page enables you to define session identifiers at the **operation** level.

Important information	General information about this wizard is available here: "Session ID Definition Wizard" on page 197
Wizard	The create new virtual service wizard contains:
тар	"Define Default Session IDs Page" on previous page > "Define Operation Specific Session IDs Page" above > "Define Data Format Session IDs Page" on the facing page > "Define Session IDs Summary Page" on page 201

UI Element	Description
Operation	The operations in the virtual service.

UI Element	Description
Session ID Source	The source for identifying sessions. Options include:
	• In Message. Enables you to define an element within the message to use as a session identifier. Select an option from the Data Key list.
	• Inherited. Uses the setting that is defined at the service level.
	• None. The data is not placed into tracks based on values at the operation level.
Data Key	The message element used as the session identifier. The data key can be a message header or a field.
	Available when you select In Message in the Session ID Source field.
Edit Response	Displays fields for response specific data. By default, only fields for request- specific information are displayed.
Delete Response	Removes the response-specific session ID row.
Edit Data Formats	Opens the <b>Define Data Format Session IDs</b> page, enabling you to define session identifiers per data format type. For details, see "Define Data Format Session IDs Page" below.

# Define Data Format Session IDs Page

This wizard page enables you to define session identifiers per data format type.

efine Data Form	at Session IDs				
ecify values of data forr	mat session IDs in order	to build tracks from le	earned data.		Ę
Data Format	Session ID Source	Data Key			
addItemResponse	Inherited 👻	-	_		
Fault	Inherited 🔻	-			
				Save	Discare

Important	General information about this wizard is available here: "Session ID Definition
information	Wizard" on page 197

Wizard	The create new virtual service wizard contains:	
тар	"Define Default Session IDs Page" on page 198 > "Define Operation Specific Session IDs Page" on page 199 > "Define Data Format Session IDs Page" on previous page > "Define Session IDs Summary Page" below	

UI Element	Description
Data Format	The data formats available in the service.
Session ID Source	<ul> <li>The source for identifying sessions. Options include:</li> <li>In Message Enables you to define an element within the message to use as a session identifier. Select an option from the Data Key list.</li> <li>Inherited. Uses the setting that is defined at the operation level.</li> <li>None. The data is not placed into tracks based on data format.</li> </ul>
Data Key	The message element used as the session identifier. Select a value. Available when you select <b>In Message</b> in the Session ID Source field.

## Define Session IDs Summary Page

This wizard page displays a summary of how Service Virtualization can organize your learned data into tracks.

Based on the session identifiers you have defined, Service Virtualization will create a separate track for each unique session identifier value.



Note: Learned data is grouped into tracks after the next Learning session.

Important information	<ul> <li>General information about this wizard is available here: "Session ID Definition Wizard" on page 197</li> <li>In the event of an error, click <b>Back</b> to modify your settings.</li> </ul>
Wizard map	The create new virtual service wizard contains: "Define Default Session IDs Page" on page 198 > "Define Operation Specific Session IDs Page" on page 199 > "Define Data Format Session IDs Page" on page 200 > "Define Session IDs Summary Page" on previous page

<b>UI Element</b>	Description
Learned Data pie chart	Displays the expected results based on current learned data.
Mapped	The percentage of current learned data that can be mapped to a distinct session, based on your session ID selections.
Not mapped	The percentage of current learned data that cannot be mapped to a distinct session, based on your session ID selections.
Finish	Saves your selections. Learned data is grouped into tracks after the next Learning session.

# **Data Masking Dialog Box**

🚟 Da	ata Masking			? 🗙
	Search element: Enter text to filter Q	Algorithm	Parameters	
	<ul> <li>operation</li> </ul>			
	<ul> <li>Request</li> </ul>			
	<ul> <li>HTTPOutputParameters</li> </ul>	<none> 💌</none>		
	<ul> <li>BinaryContent</li> </ul>	<none> 💌</none>		
	Data	<none> 💌</none>		
	Filename	<none> 💌</none>		
	Mimetype	<none> 💌</none>		
			ОК	Cancel

This dialog box enables you to hide specific request and response data elements.

To access	Use one of the following:	
	• In the Service Description Editor, under Data Masking, click Edit.	
	• In the Data Model Editor, right-click a column header and select Mask.	
Important information	• When you set or change data masking settings, all data from associated operations in all data models in the service are removed.	
	<ul> <li>In the Data Model Editor, columns that are configured for data masking are marked with a red hash sign (#) in the column header.</li> </ul>	
Relevant tasks	"How to Edit a Service Description" on page 159	
See also	"Service Descriptions" on page 83	

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

UI Element	Description
Search element	Search for a specific request or response element.
Algorithm	The masking option for the selected element. <b>None.</b> Data masking is not configured for the element. <b>Replace.</b> Opens the Replace Algorithm Configuration dialog box, enabling you to configure a custom algorithm for hiding the data. For details, see "Replace Algorithm Configuration Dialog Box" on the facing page. <b>SHA1.</b> Masks data using the secure hash algorithm SHA-1. <b>Note:</b> When you configure a parent element, all child elements are automatically configured with the same settings.
Parameters	If you are using the Replace algorithm option, the parameters indicate the match pattern and replace value you defined. To change the parameters, click the parameter link to open the Replace Algorithm Configuration dialog box. <b>Tip:</b> RIght-click in the parameter field and select <b>Copy</b> to copy/paste the parameter definition to another element.
<operations table&gt;</operations 	Displays each operation in the service. Click to expand operations and drill down to the specific request and response elements that you want to configure.

# **Replace Algorithm Configuration Dialog Box**

This dialog box enables you to select or define an algorithm for replacing specified text in message data.

🞇 Replace Algorithm Configuration 🛛 🔹 💌
Replace using static value:
From File
Replace using regular expression:
Match Pattern:
Replace Value:
For help on creating a regular expression, click <u>here</u> .
Change all occurences of the regular expression
Test Input:
Test Output:
① Test Input and Test Output are optional fields and help to test regular expression.
OK Cancel

To access	In the Data Masking dialog box, select a data element, and do one of the following:	
	Under Algorithm, select <b>Replace</b> .	
	• For an element already configured to use the Replace function, click in the <b>Parameters</b> column.	
Important information	When you set or change data masking settings, all data from associated operations in all data models in the service are removed.	
Relevant tasks	"How to Edit a Data Model" on page 134	
See also	"Data Model Overview" on page 126	

UI Element	Description
Replace using static value	Enter a string to use to replace the strings that match your specifications.
	For example, you might want to replace credit card data with the following value: XXXX-XXXX-XXXX-XXXX
	<b>From File.</b> Browse the file system to select a file. The data is masked using the contents of the selected file.
Replace using regular expression	Enables you to define a regular expression to match a particular string of text.
	You can use regular expressions in the <b>Match pattern</b> and <b>Replace value</b> fields.
	For help on creating regular expressions, see "How to Configure Regular Expressions" on page 154.
Match pattern	Enter the string that you want to match, or click the drop-down arrow to select a previously entered string.
Replace value	The value you want to use to replace the data that matches your Match pattern.
	Enter the string that you want to use to mask the data you are replacing.
Change all occurrences of regular expression	Updates all elements in all data models in the service that are using this regular expression for data masking.
Test Input	Enter a string to test your settings.
Test Output	Displays the masked output based on the settings you defined.

# **Edit Metadata Dialog Box**

The Edit Metadata dialog box enables you to edit metadata for the current service description. Metadata are parameters that contain some protocol-specific information such as time stamps, correlation information, or status codes. They are part of the protocol message, but external to the message body, such as URL parameters, or HTTP headers.

Edit Metadata	? 2
Enter text to filter	Q
Matching Items:	
<ul> <li>Headers         <ul> <li>Accept-Encoding</li> <li>Connection</li> <li>Content-Type</li> <li>Expect</li> <li>Host</li> <li>SOAPAction</li> </ul> </li> <li>Parameters</li> </ul>	
Enable   Disable   Add   Edit   Delete	
	OK Cancel

To access	In the Service Description Editor, under Request Metadata or Response Metadata, select <b>Edit</b> .
Important information	Items displayed in gray are disabled.
Relevant tasks	"How to Edit a Service Description" on page 159
See also	"Service Descriptions" on page 83

UI Element	Description
Enable	Activate the selected metadata. This is the default status.
Disable	Deactivate the selected metadata. Disabled metatada are not available for viewing or editing in the Data Model Editor, and values for disabled metadata are not learned or simulated. Disabled metadata are displayed in gray.
Add	Opens the Add New Metadata dialog box. Enter a name and select a type for the new metadata. The types available vary based on the protocol with which you are working.
Edit	Enables you to modify the selected item.
Delete	Removes the metadata from all data models in the virtual service, and deletes the metadata's related data.

# Add Data Format Dialog Box

This dialog box enables you to add a new data format to your service description. You can copy from an existing URI space, or create a new format.

🎇 Add Data Format	? ×
Reuse already existing message type or create new one.	÷
O Copy from existing URI Space URI Space:	
New Data Format     Data Format: XML	
Type:	
① If the Service Description does not contain required schema, you can import new sch from External File.	hema
Finish	Cancel

To access	<ol> <li>In the Service Description Editor, in the operations pane on the left side, select a URI space.</li> <li>Under Request or Response Data Format, click Add.</li> </ol>
Relevant tasks	"How to Edit a Service Description" on page 159
See also	"Service Descriptions" on page 83
	"Service Description Editor" on page 195

UI Element	Description
URI Space	Enter the path of the existing URI space you want to copy.
Data Format	Lists supported data formats.
Туре	The data format types available in the schema. Available for XML data format only.
External File	Opens the Import XML Schema dialog box, enabling you to import a schema from an external file.

# Add SAP Operation Dialog Box

This dialog box enables you to import operations to your service from a SAP server.

K Add Operation	? 💌
Import Operations From SAP Server	
User Name:	
Password:	
Search for:	Search
RFC Function	
Add	Cancel

To access	In the Service Description Editor, in the operations pane on the left side, click <b>Add Operation</b> .
Relevant tasks	"How to Edit a Service Description" on page 159
See also	"Service Descriptions" on page 83 "Service Description Editor" on page 195

UI Element	Description
User Name/Password	Credentials of a user account that can connect to the SAP server.

UI Element	Description
Search for	Enter text to search for specific operation names, and click the <b>Search</b> button.
	Use the asterisk (*) as a wildcard character in your search string to match any text. For example, <b>STFC_*</b> will search for all functions that start with <b>STFC_</b> .
Search	Enter text in the <b>Search for</b> box and click <b>Search</b> to display matching functions.
	<b>Tip:</b> To display all available RFC functions from the SAP server, enter user name and password credentials and click <b>Search</b> .
RFC Function	Lists all RFC Functions available on the SAP server configured for the virtual service.
	Click the checkbox next to RFC Function to select all functions.
Add	Adds selected functions to the SAP virtual service.

# FAQs: Data Model Editor

This section provides tips on working in the Data Model Editor.

For task details, see "How to Edit a Data Model" on page 134.

## I can't see all my columns. Can I configure what is displayed?

To show/hide columns, use the Change Columns dialog box. To access, click the **Columns** button, and select **Change Columns**.

Alternatively, click the **x** in a column header to hide a specific column.

## Can I view the entire header structure?

Double-click headers to drill down within the header structure.

## Some column headers are in italic text (header). What does that mean?

These are complex headers that include lower level headers under them. Double-click the header to display its lower level headers, or change your selections in the **Change Columns** dialog box.

## How does the 'Copy from' function work?

When you select the **Copy from** function for a column and then scroll over the other columns, an indicator displays to show whether a source column is compatible with the target column.

+ Indicates a column that you can use as a source.

V Indicates a column that you cannot use as a source.

Click the desired source column to select.

## What's the best way to work with array data?

It is recommended to work directly in the data row within the rule.

# It's hard to work with all the columns in my message data. Is there a better way?

If your structure includes many columns, the Row Detail dialog box offers a more user friendly format for viewing, entering, and editing data manually. Right-click a row and select **Row Detail**.

## Can I search within a row?

The Row Detail dialog box enables you to search the row to find specific text. Right-click a row and select **Row Detail**.

## I exported data to an Excel file, but I can't find the file. Where is it?

Hover over the import/export icon in the data rule to see the location of your external data file.

You can also right-click the rule and select **External Data Properties** for more information on the external file.

## How can I update column bindings for a data-driven rule?

Do one of the following:

- Expand a rule, and click the bind icon 🗐 . A "preview" of your external data file displays within the rule.
- Right-click a rule and select **Open External Data**.

## I see more columns than I need to. How can I hide some of them?

To show/hide columns, use the Change Columns dialog box. To access, click the **Columns** button, and select **Change Columns**.

## Why is part of the row gray, with no visible data?

The headers are showing a different message structure. Double-click on the grayed area to switch header structure.

### How can I add data as a message?

Right-click a rule and select Import Message.

## I see metadata, but no actual data. Why don't I see the data?

The columns (headers) that contain the data are hidden. Click the **Columns** button, and select select **Change Columns** to change the display settings.

# Some column headers are marked with a red hash sign (#). What does that mean?

These columns are configured for data masking. For details, see "Data Masking Dialog Box" on page 202.

# Chapter 7

# **Composite Application Topology**

This chapter includes:

Topology Overview	213
How to Model Composite Applications	213
Topology User Interface	216

# **Topology Overview**

The Topology Editor enables you to model composite applications by creating a visual map of services, called a **topology**. You can group them into larger composites, mark their types, and display the service calls between them.

For task details, see "How to Model Composite Applications" below.

# How to Model Composite Applications

This task describes how to create and configure a topology to model and test your composite application.

This task is part of a higher-level task. For details, see "How to Use Service Virtualization" on page 24.

This task includes the following steps:

"Optional: Discover services" below

"Create a topology" on the facing page

"Configure the topology" on the facing page

"Test your composite application" on the facing page

"Virtualize services" on page 215

"Reconfigure clients" on page 215

"Learn service behavior" on page 215

"Simulate service behavior" on page 216

#### 1. Optional: Discover services

You can use Service Discovery to find all the services used by an application via a proxy agent.

Note: Supported for SOAP services only.

a. On the Start Page, click **Discover Services** to create a new virtualization project and starts the discovery process, enabling you to find all services used by an application.

Alternatively, you can discover services in an existing project. In the Topology Editor, rightclick and select **Start Service Discovery**.

b. In the Service Discovery dialog box, configure your client application to use the Service Virtualization proxies. You must configure the proxies before running Service Discovery.

For user interface details, see "Service Discovery Dialog Box" on page 222.

- c. Run your client application under test .
- d. When services are discovered, click **Stop Discovery**. The discovered services are stored in a group called **Discovered Services**. You can use them in your topology.

## 2. Create a topology

From the main menu, select **File > New > Topology**. For user interface details, see "Summary of New Topology Dialog Box" on page 217.

The new topology opens in the Topology Editor. By default, Service Virtualization creates the new topology with one service which calls another, limited access service.

## 3. Configure the topology

You configure your topology using the Topology Editor. To model your composite application, create a visual map of your services, their types, and the connections between them.

- a. From the Tools pane in the Topology Editor, add items to the topology.
- b. Connect services using service call connectors. Move the cursor to the right edge of the calling service until the hand icon displays. Then click and drag the connector to the called service.
- c. To mark additional services as limited or secure, right-click a service and select Set Limited Access or Set Secured Access. For additional configuration options, right-click a service to view the context menu.

For user interface details, see "Topology Editor" on page 217.

### 4. Test your composite application

The process of testing your composite application includes the following steps:

- a. virtualize services
- b. reconfigure clients
- c. learn services
- d. simulate services

To test a service, in the Topology Editor, right-click the service and select **Test**. Services with limited access, or services that may require reconfiguration are indicated with unique icons in the Topology Editor. When you select to test a service that calls other limited access services, the Task List opens on the right side of the Topology Editor. The Task List provides step-by-step instructions to guide you through the process required to virtualize, learn, and simulate the limited access service that your service under test calls.

For user interface details, see the **Task List** section of the "Topology Editor" on page 217.

In addition, you can add and virtualize individual components, as described in the subsequent steps in this task.

### 5. Virtualize services

In the Topology Editor, right-click a service and select **Create Virtual Service**. You can select an existing virtual service from a drop-down list, or choose to create a new virtual service.For user interface details on creating a new virtual service, see "Create New Virtual Service Wizard" on page 91.

If a service is marked as secure and does not already have any associated authentication Service Virtualization cannot access the service and prompts you to provide authentication. For details on setting authentication credentials, see "How to Set Security" on page 226.

## 6. Reconfigure clients

When you virtualize services, the services that call them may require reconfiguration to use the new virtual service in place of the real service.

- a. A service that requires reconfiguration is displayed in the Topology Editor with an exclamation point icon. Click the icon to open the Reconfigure Service dialog box, and update endpoint details for real and virtual services as required.
- b. When you have reconfigured the calling component, click **Mark Completed** and close the dialog box. The exclamation point icon is no longer displayed.

## 7. Learn service behavior

You can learn the behavior of individual services in the topology of a composite application.

- a. Prerequisites: Edit the topology, marking limited and secured services, and import service descriptions for the services you want to learn.
- b. In the Topology Editor, right-click each service for which you want to record the real service behavior and select **Learn**.
- c. Run your test through the composite application using a client or test script. Service Virtualization records the requests and responses for the virtualized services and creates simulation models for each one.

As you run your test, the Runtime View, located in the lower pane of the window, displays details for each virtual service.

d. When you have finished recording, right-click each service you are recording and select **Stop Learning**. The services are placed in Simulate Mode.

Alternatively, select **Simulate** and the application stops the learning process and switches directly to simulating.

## 8. Simulate service behavior

You can test your composite application using the virtual services in your topology to simulate the behavior of the real services.

- a. Prerequisites: Learn the behavior of the services you want to simulate.
- b. In the Topology Editor, right-click each service that you want to simulate and select **Simulate**. The service is placed in Simulate mode.
- c. Run your test through the composite application using a client or test script. Service Virtualization processes the requests to each virtualized service and returns responses based on the simulation model for each.

As you run your test, the Runtime View, located in the lower pane of the window, displays details for each virtual service.

# **Topology User Interface**

This section includes:

Summary of New Topology Dialog Box	217
Topology Editor	217
Service Discovery Dialog Box	
## Summary of New Topology Dialog Box

This dialog box enables you to create a new virtualization project.

🚟 Summary	of New Topology	? ×
Confirm or cha	inge properties of the topology.	Ô
Topology:	Composite Application Topology Change	
		Create Cancel

To access	From the main menu, select <b>File &gt; New &gt; Topology</b> .
Important information	By default, Service Virtualization creates the new topology with one service which calls another, limited access service.
Relevant tasks	"How to Model Composite Applications" on page 213
See also	"Topology Overview" on page 213

User interface elements are described below:

UI Element	Description
Topology	Displays the default name for the topology you are creating.
Change	Opens the Change Topology dialog box, enabling you to edit the name of the topology.
Create	Creates the new topology.

## **Topology Editor**

The Topology Editor enables you to model composite applications.



To access	In the Virtualization Explorer, double-click the topology you want to view or edit.
Relevant tasks	"How to Model Composite Applications" on page 213
See also	"Topology Overview" on page 213

User interface elements are described below:

### **Tools Pane**

Located on the left side of the editor, enables you to drag and drop the following items to add to your topology:

UI Element	Description
Service	A service with no particular notation.
Limited Service	A service marked as having limited access. Access to such services may be limited due to time or financial constraints.
Secured Service	A service marked as requiring authentication.
Group	A box enabling you to organize services into larger composites for purposes of visual mapping.

Note: If the Tools pane is not displayed by default, from the main menu, select View > Tools.

### Context menu

**Note:** To discover services, right-click inside the Topology Editor and select **Start Service Discovery**. For details on service discovery, see "Service Discovery Dialog Box" on page 222.

Menu Item	Description
Set/Unset Limited Access	Marks or unmarks the selected service as having limited access.
Set/Unset Secured Access	Marks or unmarks the selected service as requiring authentication. For details on setting authentication credentials, see "How to Set Security" on page 226.
Test	Marks the selected service, indicating that it is "under test".
	Service Virtualization analyzes calls, suggests services to virtualize, and creates a task in the Task List.
	When you select this option for a service that uses other services with limited access, the Task List opens, displaying step-by-step instructions for testing the composite application. For details, see Task List.
Preview Test Impact	Enables/disables the Test Impact highlighting bar.Service Virtualization analyzes client calls and highlights services that you may want to virtualize.
Learn and Simulate	Enables you to create a new virtual service or import an existing service, and then places the service in Learning mode.
Create Virtual Service	Enables you to create a new virtual service or import an existing service. If you choose to create a new virtual service, launches the Create Virtual Service wizard. For details, see "Create New Virtual Service Wizard" on page 91.
Rename	Enables you to rename the selected service.
Delete	Removes the selected service from the topology.

Right-click a service in the Topology Editor to access the following commands:

### **Service Annotation**

The annotation for each service varies depending on its settings and various stages of configuration.

Service Diagram	Description
Service 1	An empty service.
Service 1 🔌	A service marked as having limited access.

Service Diagram	Description
Service 1	A service marked as secure, requiring credentials to access.
Service 1	A virtualized service.
Service 1	A virtualized service in Learning Mode. Service Virtualization records any requests and responses through this service and adds them to the associated Simulation Model.
Service 1	A virtualized service in Simulating Mode. Service Virtualization monitors any requests to this service and returns responses based on the associated Simulation Model.
Service 1	Indicates a service that is "under test".
Service 2	A service suggested for virtualization.
Service 1	A service requiring attention because it calls a virtualized service and may require reconfiguration to call the virtual service instead of the real one.
	Click the exclamation point icon to open the Reconfigure Service dialog box.

### Task List

When you select to test a service that calls other limited access services, the Task List opens on the right side of the Topology Editor. The Task List guides you through the process of testing your composite application.

**Note:** The options in a step become available only after you have completed all previous (prerequisite) steps. When you pass or skip a step, the options in that step are automatically disabled.

UI Element	Description
Virtualize Services	Includes the following options:
	• Virtualize Services. Enables you to define a new virtual service or import an existing service. If you choose to create a new virtual service, launches the Create Virtual Service wizard. For details, see "Create New Virtual Service Wizard" on page 91.
	This option enables you to virtualize all relevant services as indicated in the Task List.
	• Customize Virtualization of Services. Enables you to select the services that you want to virtualize. Select the desired services and click Virtualize Selected Service.
	When all the missing information for each service in complete, Virtualize Services is marked as complete and you proceed to Reconfigure Clients.
	Service Virtualization adds the virtual services, any new service descriptions, and a data and performance model for each service to the Virtualization Explorer.
Reconfigure Clients	Reconfigure the client to use the endpoints of virtual services in place of the real service endpoints. This is required in cases where Service Virtualization can only perform intrusive virtualization.
	Includes the following:
	• View. Displays instructions for reconfiguring clients.
	• Save As. Saves the instructions as a text file.
	• Mark as Completed. Marks the service under test as complete when you have reconfigured it to use the virtual services in place of real services.

UI Element	Description
Learn Services	<ul> <li>Includes the following options:</li> <li>Learn Services. Places the virtual services in your composite application in Learning mode. For details on Learning mode, see "Virtual Service Overview" on page 79.</li> <li>Run your test through the composite application using a client or test script. Service Virtualization records the request and responses for each virtualized service and creates a simulation model for each. As you run your test, the Runtime View, located in the lower pane of the window, displays details for each virtual service.</li> </ul>
	• Skip to Simulate Services. Proceed to service simulation without recording any additional service communication. Select this option if you already have simulation models for your composite application.
Simulate Services	Places the virtual services in your composite application in Simulation mode, enabling you to simulate the behavior of the real services without using them. Run your test through the composite application using a client or test script. Service Virtualization processes the requests from your service under test to each virtualized service and returns responses based on the simulation model for each. As you run your test, the Runtime View, located in the lower pane of the window, displays details for each virtual service.

## Service Discovery Dialog Box

This dialog box enables you to start Service Discovery to discover all the services used by an application.

🞇 Service Discovery	
Configure proxy settings in your application under test. Then run Service Discovery to lo HTTP endpoints.	ocate
You must configure your client application to use the Service Virtualization proxies before runn HTTP Proxy: localhost:7201 HTTPS Proxy: localhost:7206	ing Service Disc
Run Service Discov	ery Cancel

To access	Do one of the following:
	• On the Start Page, click <b>Discover Services</b> to create a new virtualization project and start the discovery process.
	<ul> <li>In an existing project, in the Topology Editor, right-click and select Start Service Discovery.</li> </ul>
Important information	Supported for SOAP services only.
Relevant tasks	"How to Model Composite Applications" on page 213
See also	"Topology Overview" on page 213

User interface elements are described below:

<b>UI Element</b>	Description
Server	Currently supported for the Service Virtualization embedded server only.
Service Virtualization proxies	You must configure your client application to use the Service Virtualization proxies before running Service Discovery.

# **Chapter 8**

# Security

This chapter includes:

Virtual Service Security Overview	225
How to Set Security	226
Security User Interface	236

# **Virtual Service Security Overview**

This section describes how security is handled by Service Virtualization. Service Virtualization supports virtualization of secured services using either HTTP transport level security or a subset of SOAP message level security.

Security consists of four components:

• Confidentiality. The data is encrypted. Only an ultimate recipient can read the data.

Service Virtualization must be able to decrypt the message passed to the virtual service in order to learn the service. It must also be able to encrypt messages passed to the real service.

• Integrity. The data is signed. A recipient can validate that the data has not been modified during transmissions.

Service Virtualization must be able to validate signatures in messages received from clients and from the real service. It must also be able to sign messages sent to clients and the real service.

• Authentication. The identity of a client is transferred with the message.

Service Virtualization does not validate received client credentials. In some scenarios, incoming credentials are secured and are not directly readable. Therefore, the virtual service must have these credentials (certificates with private keys or user names with passwords) defined in Service Virtualization's Credential Store, to be able to compute the secured value and pass it to the real service.

• Authorization. The service validates that an authenticated client can execute the required operation.

Service Virtualization does not handle authorization. Authorization logic is left for the real service.

You can set the following levels of security in Service Virtualization:

• Transport Security. Transport level security is point-to-point. Security is ensured only on the transport level connection between two machines. Transport level integrity and confidentiality is ensured through SSL / TLS (HTTP(s) Proxy agent or the HTTPS Gateway agent) and transport level authentication is ensured with HTTP authentication mechanisms.

Transport authentication in service virtualization is used only in Stand-By and Learning modes to access the real service. It is transparently managed by the HTTP Gateway or HTTP(S) proxy agents. Transport authentication only requires that correctly configured credentials are available in Service Virtualization's Credential Store.

• **Message Security.** Message level security is end-to-end. Security is ensured on the message level – security is part of message data which can be passed through many intermediaries

(many connections) without revealing unsecured message content.

Message security in Service Virtualization is used for Stand-By, Learning, and Simulation modes.

• **Mixed Security.** Mixed security uses transport security to ensure confidentiality and integrity and message security to pass client credentials (authentication). This security configuration requires the use of the HTTPS agent and message security modes with names ending with OverTransport.

For task details, see "How to Set Security" below.

# How to Set Security

This task describes how to set security for your virtual service.

- This task is part of a higher-level task. For details, see "How to Use Service Virtualization" on page 24.
- To learn more about Service Virtualization security, see "Virtual Service Security Overview" on previous page.

This task includes the following steps:

- "Set authentication credentials" below
- "Set message security" below
- "Set transport security" on next page

### Set authentication credentials

Some services may require client authentication on either the transport or message level. When virtualizing these services, Service Virtualization needs to know the client credentials used to connect to the real service. The only exception is a scenario wherein a real service with HTTP transport authentication (Basic, Digest, NTLM) is virtualized through the HTTP(S) proxy agent. In this scenario, authentication requests are forwarded. Service Virtualization does not need to have the credentials in the service's credential store.

In the Virtual Service Editor, expand Security Settings and click **Edit Credential Store** to configure the required settings.

For user interface details, see "Edit Credential Store Dialog Box" on page 237.

### Set message security

Set message security for your virtual service in the Virtual Service Editor. For task details, see "How to Set Message Security" on next page.

### Set transport security

Transport authentication in Service Virtualization is used in Standby and Learning modes to access the real service. It is transparently managed by the HTTP Gateway or HTTP(S) proxy agents. Transport authentication only requires that correctly configured credentials are available in Service Virtualization's Credential Store.

For task details, see "How to Set Transport Security" on page 233.

## How to Set Message Security

This task describes how to configure settings for the default message security modes.

- This task is part of a higher-level task. For details, see "How to Set Security" on previous page.
- To learn more about Service Virtualization security, see "Virtual Service Security Overview" on page 225.

In the Virtual Service Editor, under Security Settings, configure one of the following security modes for your virtual service:

- "Configure CertificateOverTransport mode" below
- "Configure UserNameOverTransport mode" on the facing page
- "Configure MutualCertificate mode" on page 229
- "Configure MutualCertificateDuplex mode" on page 231
- "Configure SupportingCertificateOverTransport mode" on page 232

### Configure CertificateOverTransport mode

Certificate over transport mode uses an endorsing supporting binary token over HTTPS:

- Transport security binding
  - Algorithm suite: Basic256
  - Layout: Strict
- Endorsing supporting token
  - X509Token (WssX509V3Token10) always included to recipient
  - Inclusion type: MustSupportRefThumbprint / RequireThumbprintReference

#### To configure CertificateOverTransport mode:

- 1. Prerequisites:
  - a. You must have created a virtual service.
  - b. The Service Virtualization Credential Store must contain an identity with each used client certificate.
  - c. Certificates must contain a private key.
- 2. In the Virtual Service Editor, expand Security Settings. Under Message Security, select **Enabled**.
- 3. In the Mode drop-down box, select **CertificateOverTransport**.

Note: Do not configure Real Service Identity or Virtual Service Identity

- 4. Click **Advanced Settings** to open the Advanced Message Security Settings dialog box, and configure as follows:
  - Protection Level. This setting has no effect because encryption and signing are provided by the transport level (HTTPS).
  - Message Protection Order. This setting has no effect because encryption and signing are provided by the transport level (HTTPS).
  - Message Security Version. Oonly WS-Security 1.1 is supported because this configuration mode requires thumbprint token inclusion mode which is not supported in WS-Security 1.0.
  - Require Derived Keys. This setting should not be changed.
  - Include Timestamp. This setting must be checked because the endorsing supporting token passed in the request must sign the timestamp header.
  - Allow Serialized Signing Token on Reply. This setting has no effect.

### Configure UserNameOverTransport mode

User name over transport mode uses a signed supporting user name token over HTTPS:

- Transport security binding
  - Algorithm suite: Basic256
  - Layout depends on WS-Security version configured in Advanced settings:
    - WS-Security 1.0: Lax
    - WS-Security 1.1: Strict

#### • Endorsing supporting token

UserNameToken (WssUsernameToken10) always included to recipient.

Only PasswordText token type is supported.

#### To configure UserNameOverTransport mode:

- 1. Prerequisites:
  - a. You must have created a virtual service.
  - b. The Service Virtualization Credential Store must contain an identity with each user and password used for authentication to the real service.
- 2. In the Virtual Service Editor, expand Security Settings. Under Message Security, select **Enabled**.
- 3. In the Mode drop-down box, select UserNameOverTransport.

Note: Do not configure Real Service Identity or Virtual Service Identity

- 4. Click **Advanced Settings** to open the Advanced Message Security Settings dialog box, and configure as follows:
  - Protection Level. This setting has no effect because encryption and signing are provided by the transport level (HTTPS).
  - Message Protection Order. This setting has no effect because encryption and signing are provided by the transport level (HTTPS).
  - Message Security Version. Layout used for security header:
    - Message security versions using WS-Security 1.0 use Lax layout for security header.
    - Message security versions using WS-Security 1.1 use Strict layout for security header.
  - Require Derived Keys. This setting has no effect.
  - Include Timestamp. This setting controls if requests and responses must contain a security timestamp.
  - Allow Serialized Signing Token on Reply. This setting has no effect.

### Configure MutualCertificate mode

MutualCertificate is a mode with asymmetric security binding (WS-Security 1.0) which uses both client and server certificates to secure messages over unsecured transport (HTTP):

#### Assymetric security binding

- Initiator token: X509Token (WssX509V3Token10) always included to recipient.
- Recipient token: X509Token (WssX509V3Token10) never included.
- Algorithm suite: Basic256
- Layout: Strict
- Token inclusion type:
  - MustSupportRefKeyIdentifier
  - MustSupportRefIssueSerial

#### To configure MutualCertificate mode:

- 1. Prerequisites:
  - a. You must have created a virtual service.
  - b. The Service Virtualization Credential Store must contain an identity with a real service certificate.

If the certificate does not contain a private key, the Credential Store must also contain an identity for the virtual service, with a certificate containing a private key.

- c. The Credential Store must contain an identity with each used client certificate.
- d. Client certificates must contain a private key.
- 2. In the Virtual Service Editor, expand Security Settings. Under Message Security, select **Enabled**.
- 3. In the Mode drop-down box, select MutualCertificate.
- 4. In the **Real Service Identity** drop-down box, select an identity configured in the **Credential Store**.

If the identity for the real service does not contain a certificate with a private key, or if you want to use separate identity for the virtual service, select an identity configured in the Credential Store for Virtual Service Identity. This identity must contain a certificate with a private key.

- 5. Click **Advanced Settings** to open the Advanced Message Security Settings dialog box, and configure as follows:
  - **Protection Level.** Configures the level of security applied to each message.
  - Message Protection Order. Configures the order of protection operations used to secure messages.

- Message Security Version. Use only WS-Security 1.0.
- Require Derived Keys. This setting should not be changed.
- Include Timestamp. This setting controls if requests and responses must contain a security timestamp.
- Allow Serialized Signing Token on Reply. This setting has no effect.

### Configure MutualCertificateDuplex mode

MutualCertificateDuplex mode with asymmetric security binding (WS-Security 1.0 and 1.1) uses both client and server certificates to secure messages over unsecured transport (HTTP). The difference between MutualCertificate and MutualCertificateDuplex is that MutualCertificateDuplex security mode also sends the recipient's signing token back to the initiator.

- Assymetric security binding
  - Initiator token: X509Token (WssX509V3Token10) always included to recipient.
  - Recipient token: X509Token (WssX509V3Token10) always included to initiator.
  - Algorithm suite: Basic256
  - Layout: Strict
  - Token inclusion type depends on WS-Security version configured in Advanced settings::
    - WS-Security 1.0
      - MustSupportRefKeyIdentifier
      - MustSupportRefIssueSerial
    - WS-Security 1.1
      - MustSupportRefThumbprint / RequireThumbprintReference

#### To configure MutualCertificateDuplex mode:

- 1. Prerequisites:
  - a. You must have created a virtual service.
  - b. The Service Virtualization Credential Store must contain an identity with a real service certificate.

If the certificate does not contain a private key, the Credential Store must also contain an identity for the virtual service, with a certificate containing a private key.

- c. The Credential Store must contain an identity with each used client certificate.
- d. Client certificates must contain a private key.
- 2. In the Virtual Service Editor, expand Security Settings. Under Message Security, select **Enabled**.
- 3. In the Mode drop-down box, select **MutualCertificateDuplex**.
- 4. In the **Real Service Identity** drop-down box, select an identity configured in the **Credential Store**.

If the identity for the real service does not contain a certificate with a private key, or if you want to use separate identity for the virtual service, select an identity configured in the **Credential Store for Virtual Service Identity**. This identity must contain a certificate with a private key.

- 5. Click **Advanced Settings** to open the Advanced Message Security Settings dialog box, and configure as follows:
  - **Protection Level.** Configures the level of security applied to each message.
  - Message Protection Order. Configures the order of protection operations used to secure messages.
  - Message Security Version. this setting defines how the binary token is referenced in the request message.
    - Message security versions using WS-Security 1.0 requires either issuer serial number or key identifier of the certificate.
    - Message security versions using WS-Security 1.1 requires thumbprint of the certificate.
  - Require Derived Keys. This setting should not be changed.
  - Include Timestamp. This setting controls if requests and responses must contain a security timestamp.
  - Allow Serialized Signing Token on Reply. You must select this setting because the recipient's signing token is always send back to an initiator.

### Configure SupportingCertificateOverTransport mode

Supporting certificate over transport mode uses a supporting binary token over HTTPS:

- Transport security binding
  - Algorithm suite: Basic256
  - Layout: Strict
- Endorsing supporting token

- X509Token (WssX509V3Token10) always included to recipient
- Inclusion type: MustSupportRefThumbprint / RequireThumbprintReference

#### To configureSupportingCertificateOverTransport mode:

- 1. Prerequisites:
  - a. You must have created a virtual service.
  - b. The Service Virtualization Credential Store must contain an identity with each used client certificate.
- 2. In the Virtual Service Editor, expand Security Settings. Under Message Security, select **Enabled**.
- 3. In the Mode drop-down box, select SupportingCertificateOverTransport.

#### Note:

- Do not configure Real Service Identity or Virtual Service Identity.
- This mode does not support advanced configuration.

## How to Set Transport Security

This task describes how to set transport security for your virtual service.

- This task is part of a higher-level task. For details, see "How to Set Security" on page 226.
- To learn more about Service Virtualization security, see "Virtual Service Security Overview" on page 225.

Transport level security is completely handled by the HTTP based agent. The virtual and real services can use HTTP authentication to prevent unauthorized use. The service can use basic, digest, NTLM authentication, or Mutual HTTPS.

This task includes the following:

- "HTTPS and mutual authentication" on the facing page
- "HTTP authentication over HTTP(S) Proxy agent" on the facing page
- "HTTP authentication over HTTP / HTTPS Gateway agent" on page 235
- "Windows accounts for HTTP authentication" on page 235

### HTTPS and mutual authentication

Services secured with HTTPS are supported by either the HTTPS Gateway agent or the HTTP(S) Proxy agent. Both agent types also support Mutual HTTPS where the client authenticates itself with a client certificate. To use Mutual HTTPS, the credential store must contain a client certificate and its private key for every client accessing the virtual service. For details on setting authentication credentials, see "Edit Credential Store Dialog Box" on page 237

The mutual HTTPS authentication for the HTTPS Gateway agent is handled by the client operating system. Therfore, the certificate of the certification authority that issued all client certificates in use must be imported into the local computers's Trusted Root Certificate Authorities store.

To import the Certification Authority's certificate into the local system's certificate store:

- 1. From the command line or Windows Start menu Search bar, type mmc to run Microsoft Management Console.
- 2. From the File menu, select Add/Remove Snap-in.
- 3. From the Available Snap-ins list, select **Certificates** and click **Add**. In the screens that follow, select **Computer account**, and then **Local Computer**. Click **Finish**.
- To import the certificates, expand the Certificates (Local Computer) node, as shown below. Under Trusted Root Certification Authorities, right-click Certificates and select All Tasks > Import.
- 5. Follow the on-screen directions to import the certificates.



### HTTP authentication over HTTP(S) Proxy agent

When using a proxy agent and running the virtual service in Stand-By or Learning mode, the authentication is fully transparent and the virtual service does not need any further configuration. The entire security handshake is passed from the client to the real service through the proxy, and client credentials are validated just by the real service.

HTTP authentication is not used when the service is in Simulating mode.

### HTTP authentication over HTTP / HTTPS Gateway agent

When using the gateway agent and running the virtual service in Stand-By or Learning mode, the client authenticates to the virtual service and the virtual service authenticates to the real service. The virtual service must be able to validate a client's credentials and pass them to the real service, meaning that the service must have all user names and passwords in the credential store.

There are several steps to set this authentication:

1. All users who are authenticating to your service must be present in the Windows system where the virtual service is running. They can be added as local users of the machine or added to the domain to which the computer belongs. The username and password must be the same as the one the client uses to authenticate to the real service.

**Note**: HTTP digest authentication only works with domain users, not local ones. The domain must have reversibly encrypted passwords. See IIS documentation for details.

- 2. To delegate requests to the real service (when learning or in stand-by mode), the username and password must be in the service's credential store.
  - a. In the Virtual Service Editor, expand Security Settings and click Edit Credential Store.
  - b. Click Add Identity.
  - c. Enter Identity details and supply a certificate if required.
  - d. Click **OK** to add the identity and **OK** again to close the Credential Store.

**Note**: When using HTTP Basic authentication, credentials missing in the credential store are automatically detected and can be simply added via the Fix It command in the Problem List.

HTTP authentication is not used when the service is in simulating mode.

### Windows accounts for HTTP authentication

Basic, digest and NTLM authentication in the HTTP / HTTPS Gateway agent is supported only with Windows accounts:

- 1. If the computer running Service Virtualization is in the same domain as the service host, make sure the domain users are able to log on to the machine the application is running on. Clients authenticated on the real service must be able to authenticate on the machine running the virtual service.
- 2. If machines cannot be placed in the same domain, create local windows or domain user accounts (domain users still need to be able to log on the machine the application is running on) with the same names that the client is using to authenticate to the service.

**Note:** If you would like to use the HTTP Digest authentication, use only domain user accounts as local user accounts will not authenticate.

# **Security User Interface**

This section includes:

Edit Credential Store Dialog Box	237
Advanced Message Security Settings Dialog Box	238

# Edit Credential Store Dialog Box

This dialog box enables you to add, modify, or delete the users or certificates in the credential store for the selected service.

👿 Edit Cre	dential S	tore				? ×
Add, n	nodify or dele	ete identities of	users or servi	ices of Credent	ial Store of Me	mber Accounts
	Identity	Username	Password	Certificate		
	hpguest	hpguest	*****			
Add I	dentity   Edit	<u>Delete</u>   <u>Impo</u>	<u>nt</u>		ОК	Cancel

To access	In the Virtual Service Editor, expand Security Settings and click <b>Edit Credential Store</b> .				
Important information	When creating credentials for transport security over the HTTP(S) Gateway agent, the user of the virtual service must be a valid Windows account. This Windows account can be one of the following:				
	• A domain account. This is supported automatically.				
	• A local account. If it does not already exist, you must create a local Windows account on the machine hosting the Service Virtualization Designer or standalone server. You must use the same user name and password.				
Relevant tasks	"How to Set Security" on page 226				
See also	"Virtual Service Security Overview" on page 225				

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

UI Element	Description
<user grid&gt;</user 	Displays the users and credentials defined in the credential store for this service.

UI Element	Description
Add Identity	Opens the Add Identity dialog box, enabling you to define a new user to add to the credential store.
	Enter a username and password. These credentials can represent either a Windows account (for transport security - Basic, Digest, or NTLM) or other type of user credentials used by the real service (for message security).
	Click Show password to display the password.
	Click the browse button to select a certificate to add. The following certificate types are supported: .pfs, .p12, .cer, .der, .crt. Click <b>OK</b> . If the certificate's private key requires a password, you are prompted to enter the password.
Edit	Enables you to modify user credentials. Select a user and click <b>Edit</b> to open the Edit Identity dialog box.
Delete	Enables you to remove user credentials. Select one or more users in the grid and click <b>Delete</b> .
Import	Enables you to select identities to add to the service.
	In the Import Identities dialog box, under <b>Services</b> , select the virtual service containing the identity you want to import. Then under <b>Identities</b> , select the identity to import into your virtual service.

## Advanced Message Security Settings Dialog Box

🛐 Advanced Message Security Settings			
Protection Level:	EncryptAndSign		
Message Protection Order:	SignBeforeEncryptAndEncryptSigna		
Message Security Version:	WSSecurity10WSTrustFebruary200		
<ul> <li>Require Derived Keys</li> <li>Include Timestamp</li> <li>Allow Serialized Signing Token</li> </ul>	on Reply		
	OK Cancel		

This dialog box enables you to set advanced options for message security.

To access	In the Virtual Service Editor, under Security Settings, configure basic message security options and then click <b>Advanced Settings</b> .
Relevant tasks	"How to Set Message Security" on page 227
See also	"Virtual Service Editor" on page 104

<b>UI Element</b>	Description
Protection Level	<ul> <li>The level of security applied to each message. This configuration has service scope levels. All messages must have the same security requirements. Options include:</li> <li>None.</li> <li>Sign.</li> <li>Encrypt and Sign.</li> </ul>
Message Protection Order	<ul> <li>The order of protection operations used to secure messages. Options include:</li> <li>Sign before encrypt.</li> <li>Sign before encrypt and encrypt signature.</li> <li>Encrypt before sign.</li> </ul>
Message Security Version	The set of WS-* specifications used to establish security.
Require Derived Keys	Supporting tokens must use derived keys.
Include Timestamp	Messages must contain a security timestamp.
Allow Serialized Token on Reply	Replies can contain a service token used to sign the message. This setting is used only for asymmetric security bindings.

#### User interface elements are described below.

# Chapter 9

# **HP Test Automation Tools Integration**

This chapter includes:

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Performance Center and Load Runner	.241
Performance Counters	.242

# **HP Test Automation Tools Integration Overview**

Service Virtualization can be integrated with HP test automation tools. The virtual services are managed via the tests, and the performance monitors exposed by the virtual services are used by the performance testing tools.

**Note:** Virtual services must be deployed to the Service Virtualization Server for this integration. Integration with virtual services deployed on the embedded server is not supported. For more details on the HP Service Virtualization Server, see the *HP Service Virtualization Installation Guide*.

Service Virtualization integrates with HP Unified Functional Testing, HP Service Test, HP LoadRunner, and HP Performance Center. For details on currently supported versions, see the **Integrations Page** on the HP Software Support Online web site at: http://support.openview.hp.com/sc/solutions/index.jsp.

# **Unified Funtional Testing/Service Test**

Service virtualization projects can be integrated with HP Unified Functional Testing (UFT) and HP Service Test. For details, see the HP documentation for those applications.

The virtual services are then managed by the test after the integration.

- The simulation start is triggered by the test start. Make sure that the virtual services are already deployed on the Service Virtualization Server.
- Particular data and performance models can be selected for the test.
- Simulating or Standby modes using the real service are chosen during the test.

## **Performance Center and Load Runner**

Service virtualization projects can be integrated with the Performance Center or Load Runner Scenarios. For details, see Performance Center or Load Runner Documentation.

The virtual services are then managed by the test after the integration.

- The simulation start is triggered by the test start. Make sure that the virtual services are already deployed on the Service Virtualization Server.
- Specific data and performance models can be selected for the test.
- Simulating or Standby modes using the real service are selected during the test.

Performance monitors exposed by virtual services are used immediately in the Performance Center or Load Runner Controller. The performance monitors exposed by Service Virtualization are named **Services** and **Operations**.

- The Services performance counter provides measurement data per virtual service.
- The **Operations** performance counter provides data per virtual service and service operation.

For more details, see "Performance Counters" below.

# **Performance Counters**

You can monitor Service Virtualization message processing using predefined performance counters. The performance counters are created during installation of either the Service Virtualization Designer or the Service Virtualization Server. You can then view the counters in Windows Performance Monitor. You can also use the performance counters to monitor Service Virtualization that is running on a remote machine. The uninstallation of both the Designer and Server delete the counters from the Windows system.

This section includes:

- "Performance Counter Categories" below
- "Performance Counter Instances" on next page
- "Remote Monitoring" on page 244

### **Performance Counter Categories**

There are two Service Virtualization performance counter categories added to the Windows Performance Monitor, named **HP Service Virtualization - Services** and **HP Service Virtualization - Operations**. The performance counters in these categories are characterized by the following:

- The Services performance counters provide measurement data per virtual service.
- The **Operations** performance counters provide data per virtual service and service operation.

The performance counters in these categories are shared by both the Designer and the Server. Both the Designer and the Server write their data to these same counters.

Counter Name	Counter Description		
Throughput	The data capacity of the virtual service.	MB/s	
HitRate	The number of requests and responses processed by the virtual service.	hits/s	
AverageResponseTime	The average time for the virtual service to process a request and return a relevant response.	ms	
DataSimulationAccuracy	The accuracy of data model emulation of the real service by the virtual service.	%	

The Services performance counters include the following:

Counter Name	Counter Description	Units
PerformanceSimulationAccuracy	The accuracy of performance model emulation of the real service by the virtual service.	%

The **Operations** performance counters include the following:

Counter Name	Counter Description	Units
Throughput	The data capacity of the virtual service operation.	MB/s
HitRate	The number of requests and responses processed by the virtual service operation.	hits/s
AverageResponseTime	The average time for the virtual service to process a request and return a relevant response for the operation.	ms

### **Performance Counter Instances**

Service Virtualization creates instances of all the performance counters for each virtual service that is deployed locally, either on the Service Virtualization Designer's embedded server, or on the Service Virtualization Server.

Instance names are created in the following format:

- For services: <service\_name>
- For operations: <service\_name>\_<operation\_name>

For example, for a locally deployed virtual service called *HelloWorld* which has two operations named *Hello* and *Bye*, the performance counters in the local system have the following instances:

Counter Category	Counter Name	Counter Instance Name	
		Helloworl	d Service
Services	AverageResponseTime	helloworld	
	HitRate	helloworld	
	Throughput	helloworld	
	DataSimulationAccuracy	helloworld	
	PerformanceSimulationAccuracy	helloworld	
		Hello Operation	Bye Operation

Counter Category	Counter Name	Counter Instance Name	
Operations	AverageResponseTime	helloworld_ hello	helloworld_ bye
	HitRate	helloworld_ hello	helloworld_ bye
	Throughput	helloworld_ hello	helloworld_ bye

### **Remote Monitoring**

You can use the performance counters to monitor Service Virtualization that is running on a remote machine.

To remotely access the performance counters, you must use a Windows user account with appropriate privileges on the remote machine. You can create this account in the following ways:

- Automatically. During installation of Service Virtualization, you have the option to create a user account that is automatically configured with the proper privileges. For details, see the *HP Service Virtualization Installation Guide*.
- **Manually.** If you create the Windows user account manually, you must add this user to the default Windows group **Performance Monitor Users**. In Windows XP, add the user to the **Administrators** group.

# Chapter 10

# HP Application Lifecycle Management (ALM) Integration

This chapter includes:

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# **HP ALM Integration Overview**

The integration of Service Virtualization with HP Application Lifecycle Management (ALM) enables you to store your Service Virtualization projects as test resources in ALM. This can facilitate the use of the virtual services by other users, or by testing tools.

For details on currently supported versions of ALM, see the **Integrations Page** on the HP Software Support Online web site at: http://support.openview.hp.com/sc/solutions/index.jsp.

The ALM integration enables you to:

- Save a virtualization project in ALM. When you save a virtualization project, you can save it in the file system, or in the ALM repository. If you choose to save the virtualization project in ALM, it is stored as a resource in the Test Resources module of the selected ALM project.
- **Collaborate on virtual service design.** Multiple users can work with a virtualization project that is stored in ALM. ALM enables you to control this process by ensuring that changes are made by only one user at a time.
- Reuse a virtualization project. You can copy a project that is stored in ALM, and save it in either ALM or in the file system.

**Tip:** You can also add a project to existing solutions. For more details on working with projects, see "How to Manage Virtualization Projects" on page 88.

For task details, see "How to Work with HP ALM" below.

## How to Work with HP ALM

This task describes how to integrate Service Virtualization with HP Application Lifecycle Management (ALM).

To learn more about integrating with ALM, see "HP ALM Integration Overview" above.

This task includes the following:

"Prerequisite: Connect to ALM" on the facing page

"Save a virtualization project in ALM" on the facing page

"Open a virtualization project saved in ALM" on page 248

"Copy a virtualization project" on page 248

"Work with service templates" on page 248

"Work with an ALM version controlled project" on page 248

"Frequently Asked Questions" on page 249

### Prerequisite: Connect to ALM

To perform any of the steps in this task, you must first connect to ALM.

- 1. From the main menu, select **ALM > ALM Connection**.
- 2. Enter the ALM URL, in the following format: <ALM server name or IP address>:<port number>/qcbin.
- 3. Enter a username and password for connecting to the server. Click Connect.
- 4. Select an ALM domain and project, and click Login.
- 5. Select **Restore Connection on Startup** to automatically log in to ALM each time you start the Service Virtualization Designer.

### Save a virtualization project in ALM

You can save new and existing projects in ALM.

#### To create a new project and save it in ALM:

When you create a new virtualization project, you can choose to save the project in the file system, or in ALM.

- 1. From the main menu, select **File > New > Virtualization Project**. For more details on creating a new project, see "How to Manage Virtualization Projects" on page 88.
- 2. In the Summary of Virtualization Project dialog box, click **Change** to modify the Path field.
- 3. In the Change Project dialog box, click the **Browse** button to select a place to save the new project.
- 4. In the Browse dialog box, select **ALM Resources** to save the new project on the ALM server to which you are connected.

**Tip:** Create a new folder under **ALM Resources** for your virtualization project. All project files and services will be saved under that folder.

#### To save an existing project in ALM:

1. In the Service Virtualization Designer, open a project that is saved in the file system.

**Tip:** On the Start Page, under Recent Projects, hover over a project name to see the full path to the saved project.

From the main menu, select File > Save Project As. In the Save dialog box, select
 ALM Resources to save a copy of the project on the ALM server to which you are connected.

### Open a virtualization project saved in ALM

To open a project, do one of the following:

- From the main menu, select File > Open Project/Solution. In the Open dialog box, select ALM Resources, and select a project.
- On the Start Page, under Recent Projects, select a project.

**Tip:** Hover over a project name to see the full path to the saved project. Projects saved in ALM are displayed with the [ALM-RESOURCE] prefix.

If you try to open a project that is already opened, you are notified that the project is locked by another user. If you choose to open the project, it is opened in read-only mode.

### Copy a virtualization project

You can copy a Service Virtualization project stored in ALM.

- 1. Open the project in Service Virtualization.
- 2. From the main menu, select **File > Save Project As**. Select a location in ALM or in the file system, and enter a name for the new project.

### Work with service templates

You can save a service as a template in ALM, and create new services from templates saved in ALM.

#### To save a service as a template in ALM:

- 1. In the Virtualization Explorer, right-click the service and select **Save as Template**.
- 2. In the Save dialog box, select **ALM Resources**, and select a folder for saving the service template.

#### To create a virtual service from a template saved in ALM:

- 1. Select one of the following:
  - a. From the main menu, select File > New > Virtual Service From Template.
  - b. In the Virtualization Explorer, right-click a virtualization entity and select Add > Virtual Service From Template.
- 2. In the Open dialog box, select **ALM Resources**, and select a template for creating the new virtual service.

### Work with an ALM version controlled project

• Open a Service Virtualization project that is saved in ALM.

If the project is currently checked in, you are prompted to check it out.

If you do not want to check out the project, click **No**. The project is opened in read-only mode.



To check out the project at a later time, from the main menu, select **ALM > Check out**.

#### • Check in your changes.

From the main menu, select **ALM > Check in**.

Alternatively, in the Virtualization Explorer, right-click the project name and select **Check In to ALM**.

#### • Save your changes without checking in.

From the main menu, select **File > Save**. You are prompted to check in the project. If you choose no, your changes are uploaded and saved in ALM in the checked out version.

#### • Discard your changes without saving.

From the main menu, select **ALM > Undo Check Out**.

#### • View version history.

From the main menu, select **ALM > Version History**.

For full details on working with version control in HP ALM, see the HP Application Lifecycle Management User Guide.

## **Frequently Asked Questions**

# My ALM connection was lost while I was in the middle of working. What now?

Any changes you make are saved locally. When the connection to ALM is restored, your changes are automatically uploaded to ALM.

# Can a Service Virtualization solution include projects saved both in the file system and in ALM?

Yes. You can create a solution with projects that are saved both in the file system and in ALM. You can also add a new project to your existing solution, and save it in ALM. For details on creating a new project within an existing solution, see "How to Manage Virtualization Projects" on page 88.

In the event that a project saved in ALM is unavailable when you open the solution, a message displays. After the connection to ALM is restored, you can reload the solution to work on the ALM projects. From the main menu, click **File > Reload Solution**.

**Note:** All virtualization projects within a solution must be saved in the same ALM project, as you can connect to only one ALM project at a time.

### Can I see my Service Virtualization projects from within ALM?

Yes. You can view the following details in your saved projects in the ALM Test Resources module:

- **Resource type.** Service Virtualization projects and services are created as the **Test Resource** resource type.
- **Resource description.** In the resource Details tab, the **Description** area lists the services included in the project, and details on each service. For example, you can see the service endpoints, which are required to reconfigure your application under test.
- **Resource filename.** Select a resource and click the **Resource Viewer** tab. Service Virtualization resources are identified as follows:
  - Virtualization project: .vproj file extension.
  - Virtual service: **.vs** file extension.
  - Virtual service template: .vstz file extension.
- Relationships between virtualization projects and services. Select a resource and click the **Dependencies** tab.
  - For a virtualization project: displays the services in the project.
  - For a virtual service: displays the virtualization project in which it is located.

### Can I share my services?

You can make your Service Virtualization projects and services available to others to download and deploy to other Service Virtualization Servers. This functionality is enabled using the Service Virtualization Management. For details on the Service Virtualization Management, see "How to Start Service Virtualization" on page 23.

# I want to view a project in the Designer but not make any changes. What should I do?

You can open the project in read-only mode. This prevents you from inadvertently making any changes. It also allows another user to open the project for editing.

When opening a project that is saved in ALM, select **Open in read-only mode** in the Open dialog box.

Tip: After you close the project, the Recent Projects list on the Start Page indicates that you

previously opened it in read-only mode.

Recent Projects
Demo Project 1[Read-Only]

If you open the project again from the Recent Projects list, it is opened in read-only mode.

# Chapter 11

# Version Control Support

This chapter includes:

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# Subversion (SVN) Support Overview

You can manage the version control of your virtualization projects from within the Service Virtualization Designer. Service Virtualization supports integration with Apache Subversion, using the TortoiseSVN client.

When you open a virtualization project that is under version control, standard SVN options are available in the Service Virtualization Designer. These options open the TortoiseSVN interface, enabling you to manage versioning from within your virtualization project. For more details on specific SVN functionality, see the TortoiseSVN documentation.

For task details, see "How to Work with SVN" below.

### How to Work with SVN

This task describes how to work with virtualization projects that are under SVN version control.

To learn more, see "Subversion (SVN) Support Overview" above.

This task includes the following steps:

- "Prerequisites" below
- "Check out a virtualization project" below
- "Open a version controlled project" below
- "Manage version control" on the facing page
- "View version status" on the facing page

#### Prerequisites

- 1. Integration with SVN requires that TortoiseSVN version 1.7 is installed on the Service Virtualization Designer machine. You can download TortoiseSVN from http://tortoisesvn.net.
- 2. Check in your virtualization project or solution using TortoiseSVN.

#### Check out a virtualization project

Your virtualization project must be committed to an SVN repository.

From the main menu, select **File > Checkout**. This accesses the TortoiseSVN user interface, and you can proceed to check out a project to the file system.

#### Open a version controlled project

You can open a project or solution, or add a project to an existing solution.

- 1. Select one of the following:
  - Open an existing project or solution. From the main menu, select Open Project/Solution.
  - Add an existing project to a solution. In the Projects pane, right-click a solution and select Add > Existing Project.
- 2. Navigate to and select a checked out project located in the file system.

#### Manage version control

When a virtualization project is under version control, standard SVN actions are available in the Service Virtualization Designer.

Select one of the following:

- In the Virtualization Explorer, right-click a project name and select an SVN action.
- From the main menu, select **View > Projects** to display the Projects pane. Right-click a solution or project and select an SVN action.

The following options are available:

- **Commit.** Commit your changes to the SVN repository.
- Revert. Undo changes you made since the last update.
- Subversion. Opens a sub-menu with additional SVN actions you can perform.

The TortoiseSVN user interface opens, enabling you to manage version control for the project. For more details on SVN actions, see the TortoiseSVN documentation.

#### View version status

From the main menu, select **View > Projects** to display the Projects pane. SVN icons indicate the version control status of your project's files.

# Chapter 12

# Troubleshooting

This chapter includes:

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### **Runtime View Errors**

Runtime view doesn't respect selected data model when changing mode.

**Problem**: User chooses a simulation model in the Service Editor and starts a new learning/simulation from the Runtime View. Instead of using the new simulation, the simulation model from the previous learning/simulation is used again.

**Solution**: Runtime View is used just to change service modes, not configurations. To change the simulation model, open the Service Editor, select a new simulation model and start a new learning/simulation from the Service Editor.

Cannot start learning service 'My Service'.

Problem: Real Data model or Performance model must be selected in service configuration.

**Solution**: This error may happen when all data and performance models are deleted from the service configuration and the user tries to start a new learning/simulation session from the Runtime View. To solve the problem, create a new Data/Performance Model and start a new learning/simulation session from the Service Editor.

# **HTTPS Client Connection Aborted**

**Problem**: The client connection to a virtualized service deployed on an HTTPS endpoint is aborted with the error message SSL\_ERROR\_RX\_RECORD\_TOO\_LONG when Service Virtualization is running on a Windows XP or Windows 2003 machine. The client is normally able to connect to a real service without any issue.

**Solution**: See http://support.microsoft.com/default.aspx?scid=kb;EN-US;933430 for a list of possible solutions. For Windows 2003, any workaround method as described in the Knowledge Base article can be used, however, only the first or second methods work with Windows XP.

# **Configuring HTTP Proxy on Clients**

Problem: A virtual service is created on a proxy agent and the user is unable to record messages.

**Solution**: Configure the HTTP Proxy on clients.

All examples below of specific client configurations are using the proxy server *HTTP(S) Proxy Agent* listening on address hostname with port 6071.

This section includes:

- HTTP Proxy in .Net Client
- HTTP Proxy in Java Client
- HTTP Proxy in WebLogic

- HTTP Proxy in WebSphere
- HTTP Proxy in JBoss

#### HTTP Proxy in .Net Client

The .Net client can be configured to use a default proxy server or a specific proxy server.

If using the default proxy server, take *HTTP Proxy Agent* settings to configure the default proxy server. This is done in MS Windows or Internet Explorer in **Internet Properties > Connections > LAN settings > Proxy server**. You must then configure the client to use the default proxy. This is set in the application configuration file either for application in element <defaultProxy>:

<configuration>

<system.net>

<defaultProxy enabled="true">

cproxy usesystemdefault="true"/>

</defaultProxy>

</system.net>

</configuration>

, or for a specific binding in a binding element:

<configuration>

<system.serviceModel>

<bindings>

<basicHttpBinding>

<br/><binding name="myHttpBinding" bypassProxyOnLocal="false" useDefaultWebProxy="true">

</binding>

</basicHttpBinding>

</bindings>

</system.serviceModel>

</configuration>

The same configuration file can be used to set a specific proxy server. This is an example of client configuration for application:

<configuration>

<system.net>

<defaultProxy enabled="true">

<proxy proxyaddress="http://hostname:6071"/>

</defaultProxy>

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</system.net>

</configuration>

, or for specific binding:

<configuration>

<system.serviceModel>

<bindings>

<basicHttpBinding>

<br/><br/>shinding name="myHttpBinding" bypassProxyOnLocal="false" useDefaultWebProxy="false" proxyAddress=" http://hostname:6071">

</binding>

</basicHttpBinding>

</bindings>

</system.serviceModel>

</configuration>

#### HTTP Proxy in Java Client

The proxy settings for Java client are given to the JVM via command line arguments. This is an example of how to run the client from the command line with proxy configuration:

java -Dhttp.proxyHost=hostname -Dhttp.proxyPort=6071 MyJavaClient

#### HTTP Proxy in WebLogic

Add the Java proxy parameters to Java options in JAVA\_OPTIONS environment variable in the proper section of script %WL\_HOME%\common\bin\commEnv.cmd for MS Windows or in \${WL\_HOME}/common/bin/commEnv.sh for Unix/Linux. This is example of setting proxy configuration in file commEnv.cmd (MS Windows):

set JAVA\_OPTIONS=%JAVA\_OPTIONS% -Dhttp.proxyHost=hostname -Dhttp.proxyPort=6071

, or in file commEnv.sh (Unix/Linux):

JAVA\_OPTIONS="\${JAVA\_OPTIONS} -Dhttp.proxyHost=hostname -Dhttp.proxyPort=6071

#### HTTP Proxy in WebSphere

The HTTP proxy on the WebSphere application server can be configured via setting transport properties http.proxyHost and http.proxyPort. These HTTP transport properties can be set via:

- 1. Using wsadmin.
- 2. Using an assembly tool.
- 3. Using the JVM custom property panel in the administrative console.

To learn more about (1) and (2), see the *Configuring additional HTTP transport properties documentation* in WebSphere. To configure the HTTP proxy properties using (3) use the administrative console with the following steps:

- 1. Open the administrative console.
- 2. Click Servers > Application Servers > server > Java and Process Management > Process definition > Java Virtual Machine > Custom Properties.
- 3. (Optional) If the property is not listed, create a new property name.
- 4. Enter the name http.proxyHost and value hostname.
- 5. Enter the name http.proxyPort and value 6071.
- 6. Restart the server.

#### HTTP Proxy in JBoss

Add the Java proxy parameters to Java options in JAVA\_OPTS environment variable in the startup script %JBOSS\_HOME%\bin\run.bat or run.conf.bat for MS Windows or in \${JBOSS\_HOME} /bin/run.sh or run.conf for Unix/Linux. This is an example of setting the proxy configuration in JAVA\_OPTS environment variable in file run.conf.bat (MS Windows):

set "JAVA\_OPTS=-Dhttp.proxyHost=hostname -Dhttp.proxyPort=6071

, or in file run.conf (Unix/Linux):

JAVA\_OPTS="-Dhttp.proxyHost=hostname -Dhttp.proxyPort=6071

# Setting HTTP Proxy in Designer

Problem: User is unable to access any remote WSDL or Service Virtualization Server.

Solution: Proxy setting needs to be configured in Designer.

This section includes:

- "How to Set HTTP Proxy in Designer" below
- "Setting HTTP Proxy in the Designer configuration file" on next page
- "System HTTP Proxy" on next page
- "Specific HTTP Proxy" on next page
- "Setting Credentials for Authenticated HTTP Proxy" on page 261

#### How to Set HTTP Proxy in Designer

In some cases Service Virtualization Designer communicates with external services using the HTTP protocol. The first case is the communication with Service Virtualization Server, where the service is the server management API. The second case is the import of the a real service WSDL.

In some situations, the Designer's HTTP communication must be forwarded through an external HTTP Proxy. In that situation, the HTTP Proxy settings must be placed in the Designer's configuration file.

**Note**: The setting of HTTP Proxy for agents is not done in the Designer configuration file. For details, see "How to Forward HTTP Agent Communication Through an HTTP Proxy" on page 57.

#### Setting HTTP Proxy in the Designer configuration file

In order to use an external HTTP Proxy for the Designer HTTP communication with a server and the import of a WSDL from real services, the Designer configuration file must be modified. This file is located at %[INSTALLLOCATION]%\Designer\bin\VirtualServiceDesigner.exe.config.

In the configuration file the element <defaultProxy> holds the HTTP Proxy configuration. This element is located in the document in elements <configuration><system.net>. By default, HTTP Proxy is disabled by <defaultProxy enabled="false"/>.

The Designer can be configured to use the system HTTP Proxy or to use a specific HTTP Proxy. Detailed documentation can be found at <a href="http://msdn.microsoft.com/library/kd3cf2ex.aspx">http://msdn.microsoft.com/library/kd3cf2ex.aspx</a>. The Designer must be restarted in order to apply the changes in the configuration file.

#### System HTTP Proxy

If using the system HTTP Proxy, ensure that the HTTP Proxy is configured in the system. The settings are available in Windows Internet Explorer® menu Internet Properties > Connections > LAN settings > Proxy server. The Designer must be configured to use the same proxy in the configuration file in the element <defaultProxy> like this:

<configuration>

<system.net>

<defaultProxy enabled="true">

<proxy usesystemdefault="true"/>

</defaultProxy>

</system.net>

</configuration>

#### **Specific HTTP Proxy**

If using a specific HTTP Proxy other than the system one, follow this example of Designer configuration:

<configuration>

<system.net>

<defaultProxy enabled="true">

<proxy proxyaddress="http://foo.com:8080"/>

</defaultProxy>

</system.net>

</configuration>

#### Setting Credentials for Authenticated HTTP Proxy

If the Designer is configured to use HTTP Proxy with authentication, some additional modifications may be required in the Designer configuration file. This will allow the supplying of credentials for the HTTP Proxy. These modifications are required in the case of HTTP communication with the server management API. In the case of WSDL imports, these modifications are only optional as the Designer will prompt the user for credentials if needed.

In order to set credentials for authenticated HTTP Proxy in the Designer, this section must be enabled in the configuration file VirtualServiceDesigner.exe.config:

<configuration>

<system.net>

<defaultProxy enabled="true" useDefaultCredentials="false">

<module type =

"HP.SOAQ.ServiceVirtualization.ServerManagementClient.Remote.AuthenticatedProxy, HP.SV.ServerManagementClient" />

</defaultProxy>

</system.net>

</configuration>

The credentials for the authenticated HTTP Proxy are set in application keys section. Example of credential settings follows:

<configuration>

<appSettings>

<add key="proxyUserName" value="user1" />

<add key="proxyPassword" value="pass1" />

<add key="proxyAddress" value="http://foo.com:8080" />

</appSettings>

</configuration>

Where keys are defined as:

proxyUserName	User name for authenticated proxy credentials
proxyPassword	Password for authenticated proxy credentials
proxyAddress	Address of authenticated proxy (e.g. http://foo.com:8080). If this value is empty then the Proxy Server address in the system proxy is used.

Once the credentials and the proxy settings are configured as described above then the Designer will use them both for HTTP communication with the server management API and WSDL imports from real services.

### **Slow Designer Responsiveness**

**Problem**: After installing the new version of Service Virtualization, or making a change to your computer, such as installing an update or new software, the Designer responds very slowly, especially when working in the Data Model Editor.

**Solution 1:** This may be related to a known Microsoft issue. For details, see Poor WPF application performance due to UI Automation on certain machines. You can install the following hotfix to address the issue: Microsoft KB2484841.

**Solution 2**: Modify the Designer configuration file, **VirtualServiceDesigner.exe.config**, located in %[INSTALLLOCATION]%\Designer\bin\. To edit the file, you must have administrator privileges on the machine.

Open the file in a text editor and change the value of SeV.Global.EnableAutomationFix from False to True. If the Designer is open, close it and restart.

If this does not solve the problem, do the following:

- 1. Change the value of SeV.Global.EnableAutomationFix back to False.
- 2. Change the value of SeV.Global.ClearAutomationEvents from False to True.
- 3. If the Designer is open, close it and restart.