

HP Operations Manager

Service Navigator

Concepts and Configuration Guide

Software Versions: 9.02

for the UNIX and Linux operating systems



Manufacturing Part Number: None

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Printing History

The manual printing date and part number indicate its current edition. The printing date will change when a new edition is printed. Minor changes may be made at reprint without changing the printing date. The manual part number will change when extensive changes are made.

Manual updates may be issued between editions to correct errors or document product changes. To ensure that you receive the updated or new editions, you should subscribe to the product support service. See your HP sales representative for details.

First Edition: June 2009

Second Edition: February 2009

Conventions

The following typographical conventions are used in this manual:

Table 1 **Typographical Conventions**

Font	Meaning	Example
<i>Italic</i>	Book titles and manpage names	For more information, see the <i>HPOM Administrator's Reference</i> and the <i>opc(1M)</i> manpage.
	Emphasis	You <i>must</i> follow these steps.
	Variable that you must supply when entering a command (in angle brackets)	At the prompt, enter rlogin <i><username></i> .
	Parameters to a function	The <i>oper_name</i> parameter returns an integer response.
Computer	Text and other items on the computer screen	The following system message displays: Are you sure you want to remove current group?
	Command names	Use the <code>grep</code> command ...
	Function names	Use the <code>opc_connect()</code> function to connect...
	File and directory names	Edit the <code>itopr</code> file... <code>/opt/OV/bin/OpC/</code>
	Process names	Check to see if <code>opcmon</code> is running.
Computer Bold	Text that you enter	At the prompt, enter ls -l

Table 1 **Typographical Conventions (Continued)**

Font	Meaning	Example
Keycap	Keyboard keys	Press Return .
	Menu name followed by a colon (:) means that you select the menu, and then the item. When the item is followed by an arrow (->), a cascading menu follows.	From the menu bar, select Actions: Filtering -> All Active Messages .
	Buttons in the user interface	Click OK .

HPOM Documentation Map

HP Operations Manager (HPOM) provides a set of manuals and online help that help you to use the product and to understand the concepts underlying the product. This section describes what information is available and where you can find it.

Electronic Versions of the Manuals

All the manuals are available as Adobe Portable Document Format (PDF) files in the documentation directory on the HPOM product CD-ROM.

With the exception of the *HPOM Software Release Notes*, all the manuals are also available in the following HPOM web-server directory:

```
http://<management_server>:3443/ITO_DOC/<lang>/manuals/*.pdf
```

In this URL, *<management_server>* is the fully qualified hostname of your management server, and *<lang>* stands for your system language, for example, C for the English environment.

Alternatively, you can download the manuals from the following website:

```
http://support.openview.hp.com/selfsolve/manuals
```

Watch this website regularly for the latest edition of the *HPOM Software Release Notes*, which is updated every two to three months with the latest news (for example, additionally supported operating system versions, the latest patches and so on).

HPOM Manuals

This section provides an overview of the HPOM manuals and their contents.

Table 2 **HPOM Manuals**

Manual	Description	Media
<i>HPOM Installation Guide for the Management Server</i>	<p>Designed for administrators who install HPOM software on the management server and perform the initial configuration.</p> <p>This manual describes the following:</p> <ul style="list-style-type: none">• Software and hardware requirements• Software installation and de-installation instructions• Configuration defaults	PDF only
<i>HPOM Concepts Guide</i>	<p>Provides you with an understanding of HPOM on two levels. As an operator, you learn about the basic structure of HPOM. As an administrator, you gain an insight into the setup and configuration of HPOM in your own environment.</p>	PDF only
<i>HPOM Administrator's Reference</i>	<p>Designed for administrators who install HPOM on the managed nodes and are responsible for HPOM administration and troubleshooting. Contains conceptual and general information about the HPOM managed nodes.</p>	PDF only
<i>HPOM HTTPS Agent Concepts and Configuration Guide</i>	<p>Provides platform-specific information about each HTTPS-based managed node platform.</p>	PDF only
<i>HPOM Reporting and Database Schema</i>	<p>Provides a detailed description of the HPOM database tables, as well as examples for generating reports from the HPOM database.</p>	PDF only
<i>HPOM Java GUI Operator's Guide</i>	<p>Provides you with a detailed description of the HPOM Java-based operator GUI and the Service Navigator. This manual contains detailed information about general HPOM and Service Navigator concepts and tasks for HPOM operators, as well as reference and troubleshooting information.</p>	PDF only

Table 2 **HPOM Manuals (Continued)**

Manual	Description	Media
<i>Service Navigator Concepts and Configuration Guide</i>	Provides information for administrators who are responsible for installing, configuring, maintaining, and troubleshooting the HP Operations Service Navigator. This manual also contains a high-level overview of the concepts behind service management.	PDF only
<i>HPOM Software Release Notes</i>	Describes new features and helps you: <ul style="list-style-type: none">• Compare features of the current software with features of previous versions.• Determine system and software compatibility.• Solve known problems.	PDF only
<i>HPOM Firewall Concepts and Configuration Guide</i>	Designed for administrators. This manual describes the HPOM firewall concepts and provides instructions for configuring the secure environment.	PDF only
<i>HPOM Web Services Integration Guide</i>	Designed for administrators and operators. This manual describes the HPOM Web Services integration.	PDF only
<i>HPOM Security Advisory</i>	Designed for administrators. This manual describes the the HPOM security concepts and provides instructions for configuring the secure environment.	PDF only
<i>HPOM Server Configuration Variables</i>	Designed for administrators. This manual contains a list of the HPOM server configuration variables.	PDF only

Additional HPOM-Related Products

This section provides an overview of the HPOM-related manuals and their contents.

Table 3 **Additional HPOM-Related Manuals**

Manual	Description	Media
HP Operations Manager Developer's Toolkit If you purchase the HP Operations Manager Developer's Toolkit for UNIX or for Linux operating systems, you receive the full HPOM documentation set, as well as the following manuals:		
<i>HPOM Application Integration Guide</i>	Suggests several ways in which external applications can be integrated into HPOM.	PDF
<i>HPOM Developer's Reference</i>	Provides an overview of all the available application programming interfaces (APIs).	PDF

HPOM Online Information

The following information is available online.

Table 4 **HPOM Online Information**

Online Information	Description
HPOM Java GUI Online Information	HTML-based help system for the HPOM Java-based operator GUI and Service Navigator. This help system contains detailed information about general HPOM and Service Navigator concepts and tasks for HPOM operators, as well as reference and troubleshooting information.
HPOM Manpages	<p>Manpages available online for HPOM. These manpages are also available in HTML format.</p> <p>To access these pages, go to the following location (URL) with your web browser:</p> <p><code>http://<management_server>:3443/ITO_MAN</code></p> <p>In this URL, the variable <code><management_server></code> is the fully qualified hostname of your management server. Note that the manpages for the HP Operations HTTPS agents are installed on each managed node.</p>

1 **HP Operations Service
Navigator**

In This Chapter

This section describes what Service Navigator is and how it works.

NOTE

It is essential for successful deployment and operation of this product that you understand its underlying concepts. This applies in particular to the status propagation and calculation rules.

This guide assumes that you are a knowledgeable system and network administrator, and that you have previous experience with HP Operations Manager.

What is HP Operations Service Navigator?

HP Operations Service Navigator is an add-on component of the HP Operations Manager Java-based operator GUI. It enables you to manage your IT environment while focusing on the IT services you provide.

While HP Operations Manager lets you detect, solve, and prevent problems occurring in networks, systems and applications in your IT environment, Service Navigator takes you one step further. Service Navigator lets you map the problems discovered by HPOM to the IT services you want to monitor. Instead of focusing on single elements within a complex IT environment, you can now manage your IT environment by focusing on the IT services you are responsible for.

Service Navigator is based on HPOM and depends on the monitoring, message, and action capabilities HPOM provides. If a problem occurs on one of the objects managed by HPOM, a message about this problem is generated and sent to the user responsible for the area concerned. With Service Navigator installed and configured, this message is mapped to the service that is affected by the problem, and sent to the user responsible for that service.

The severity status of the problem also changes the severity status of the service so that the user can easily identify services that are in a problematic state. To solve service-related problems, HPOM's problem resolution capabilities have been further extended to include service-specific analysis operations and actions.

If enabled, Service Navigator logs each change of status in the database so that reports about service availability can be generated.

Figure on page 22 shows the main window of Service Navigator. In addition to the customary HPOM managed nodes and message groups, managed services are displayed in the scoping pane on the left. The content area on the right is split into two sections. The upper section displays a service hierarchy in graphical form where each service is represented by an icon. The lower section contains the standard HPOM message browser configured to display only the messages that pertain to your service.

The Service Navigator GUI

The screenshot displays the HP Operations Service Navigator interface. On the left, a 'Nodes' pane lists managed nodes like 'bled', 'bronhi', 'njami', and 'spekvm1'. Below it are sections for 'Services', 'Filter Settings', and 'URL Shortcuts'. The main area shows a 'Service Graph [Application Server]' with a hierarchy: 'Application Server' -> 'Application Instance inst1' -> 'Queues', 'Operation System', 'Performance', 'Processes', 'RollPaging', 'Tablespace TBSAP1', and 'Tablespace T'. A 'Message Dashboard' at the bottom shows '1 services: Application Server: Normal'. A 'Message Browser' at the bottom displays a table of service messages.

Severity	Dup.	SUIAONE	Time Received	Node	Application	MsgGrp	Object	Message Text
Warning	--X--X-		12:10:53 06/09/09	spekvm1....	HP Op...	OpC	opcmona	(... An error occurred in the processing of the policy 'distrib_m...
Warning	--X--X-		09:30:54 06/08/09	spekvm1....	HP Op...	OpC	opcmona	(... An error occurred in the processing of the policy 'mondbrfile'...
Warning	----	X--	12:43:15 06/02/09	spekvm1....			0	Monitor OVPM_CodaCPU: Threshold: 0.00 Value: 1.34
Warning	----	X--	12:43:14 06/02/09	spekvm1....			1	Monitor OVPM_CodaCPU: Threshold: 0.00 Value: 0.79
Unknown	-----		12:42:43 06/02/09	spekvm1....	OpenV...	OpenView	ovlogmsg	Agent System Detection Error[1]: timeout at /opt/OV/Mib/ASS...

32 of 1 0 0 7 17 7 0 0 Lock

All Active Messages

Select Map View

Browser displays max 50 messages.

What Does Service Navigator Do?

Service Navigator helps you to quickly identify and solve the most critical problems affecting your services before service performance deteriorates.

There are two ways of handling problems with Service Navigator:

- ❑ The traditional method of watching messages arrive in the message browser, then highlighting the service that is affected and performing a get impacted services analysis to find out which other services are affected.
- ❑ Following a service-oriented top-down approach: open a service graph and monitor the status of the displayed services; when a service changes status, perform a root cause analysis to find out where the cause of the problem lies.

Impacted Services Analysis

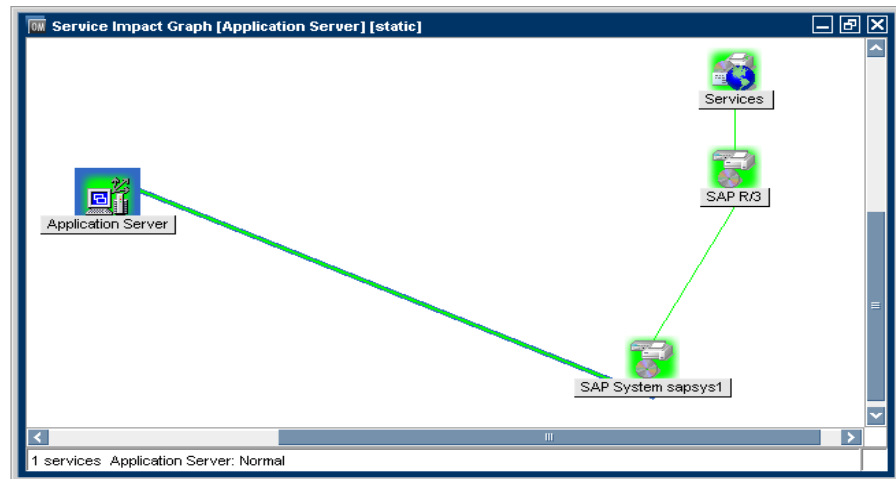
Whereas the root cause analysis drills down the service hierarchy to the service that caused the status to change, get impacted services works the other way: it searches upwards through the service hierarchy and displays all other services that are affected by the change in status. The nature of the effect is determined by considering the configured status propagation and calculation rules. This helps operators prioritizing their tasks. They can determine which problem has the highest impact, for example, a problem that impacts critical business services and a large number of users should be solved first. Get impacted services analysis identifies whether these critical business services are affected.

In Figure 1-1 on page 24, the subservice `Update` has the severity `major` which impacts the services `Display Queues` and `Processes`. Both services are affected by a problem related to `Update`. Note that the service impact graph, just like the root cause graph, is static; it does not get updated but displays the status of the services at the time it was generated.

Impact analysis is also available for messages: select a message in a browser and click `Get Impacted Services`. This highlights the affected services in the service tree in the scoping pane.

Note that impact analysis only considers negative effects, that is a status change from “good” to “bad”; for example, a status change from major to critical, but not from critical to major. This means that the impact graph does not necessarily display the toplevel service, but stops where the last service was impacted.

Figure 1-1 Get Impacted Services Analysis



Root Cause Analysis

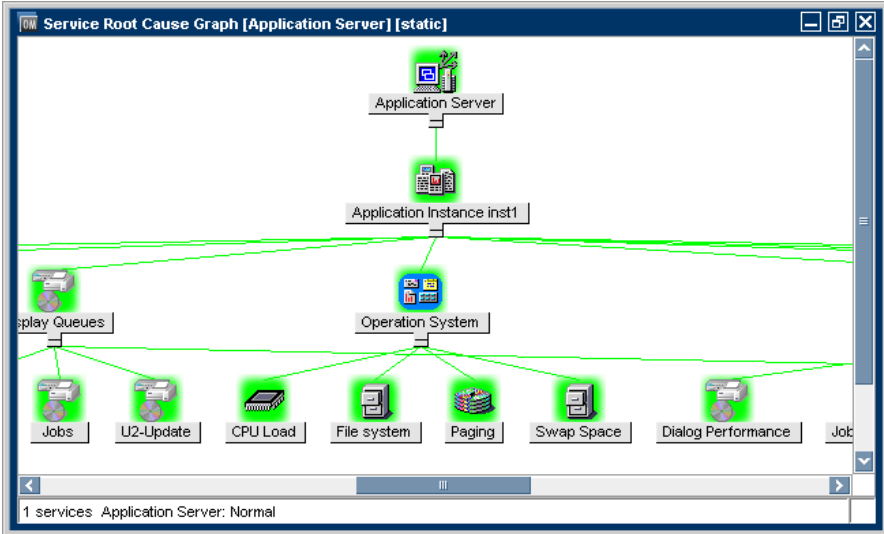
In a service hierarchy with many hierarchical levels it can be difficult to determine why a service has adopted a certain severity status. Did it turn critical because of a critical message, a critical subservice, or several affected subservices?

Service Navigator helps you answer these questions by performing a root cause analysis. You simply highlight the icon of the service you are interested in and select or click **Get Root Cause**. This opens a new window which displays the service you had selected and all other subservices that contributed to its status.

Root cause analysis performs a top-down investigation. It stops on the hierarchical level where the cause of the problem lies. Note that there may be more branches or levels below that which are not displayed because the services on these levels did not contribute to the problem.

See Figure 1-2 on page 25 for an example of a root cause graph. Note that the root cause graph is static; it does not get updated but displays the status of the services at the time it was generated.

Figure 1-2 Get Root Cause Analysis



How Does Service Navigator Work?

The concept behind Service Navigator is that of a hierarchical service structure. Service Navigator lets you build a hierarchy that reflects the relationships and dependencies between the service-relevant managed objects in your IT environment.

The following section explains the concept of a service hierarchy and how a service can be logically related to a subservice. “What is the Status of a Service?” on page 29 explains the dynamic aspects of the relationship between a service and its subservices in terms of status severity.

What is a Service Hierarchy?

A **service hierarchy** is a logical organization of the services you provide, each higher level covering a wider or more general service area than the next lower level.

The relationship between services in a hierarchy can be one of two types:

❑ **containment**

A service is contained in a service; that is, a service is part of, and defined within, another service. The contained service cannot exist without the containing service. A service can contain more than one subservices.

❑ **usage**

A service is contained in a service but, at the same time, is used, or referenced, by another service. The used service can exist without the using service; the using service depends on the used service.

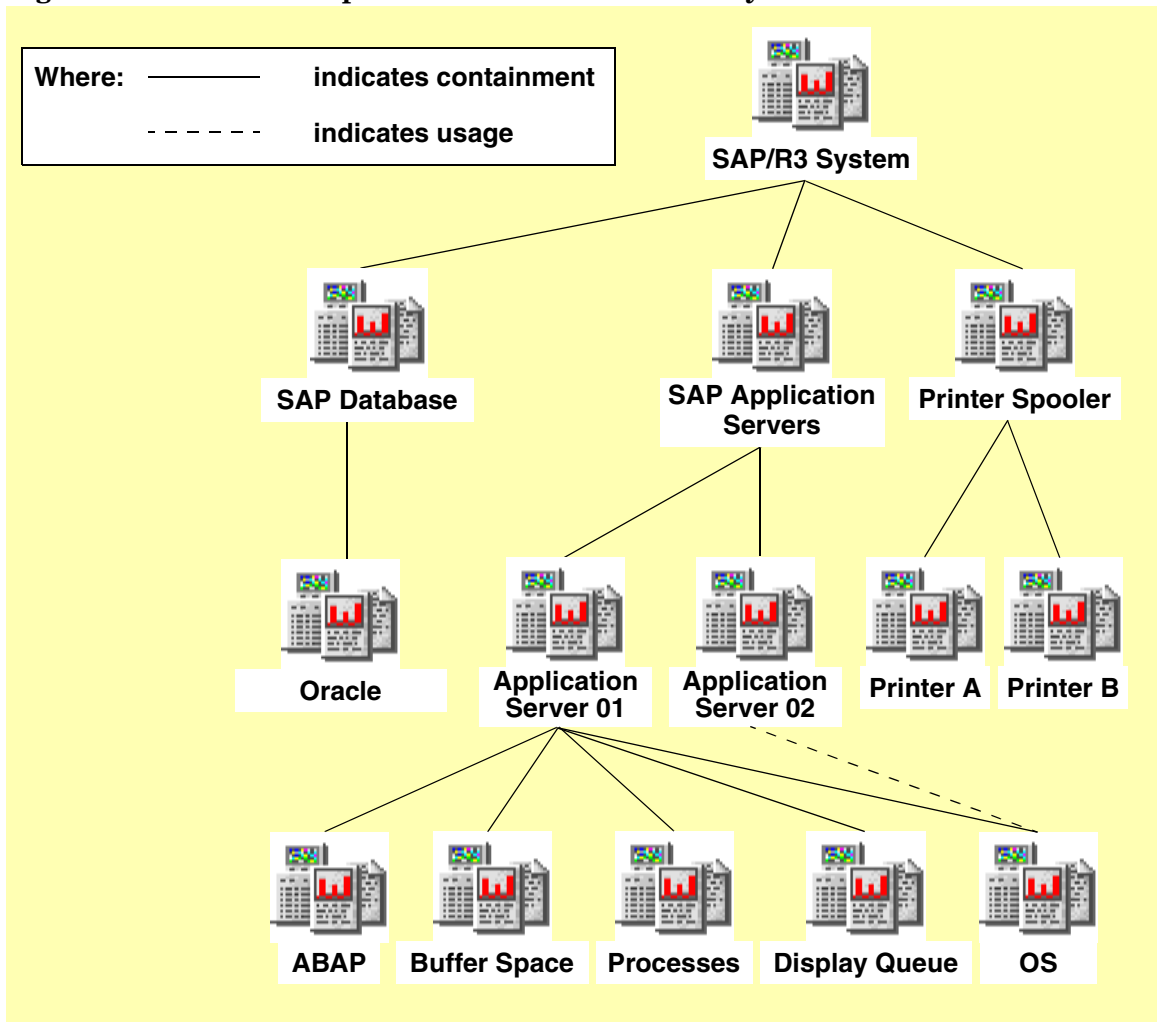
For the purposes of status propagation and calculation it is of no consequence whether a service is contained in or used by another service. Note, however, that a service can be defined only once but be used or contained many times.

Service Navigator supports up to 256 hierarchical levels.

Figure 1-3 on page 28 shows an example of a service hierarchy for an SAP/R3 system. The SAP/R3 service includes components of SAP database servers and application servers, as well as a printer spooler. Each of these subservices is divided into further elements. Together they build the SAP/R3 service hierarchy. The relationship between the services is of the type *containment*, except for the relationship between the Application Server 02 and its subservice. Application Server 02 *uses* a subservice contained in Application Server 01.

The fact that HPOM allows one service using another subservice, saves you having to set up specific subservices for each of your service hierarchies. You can set up a generic service, for example monitoring the operating system on an SAP/R3 application server, that can be used by any other service hierarchy responsible for monitoring an SAP/R3 application server.

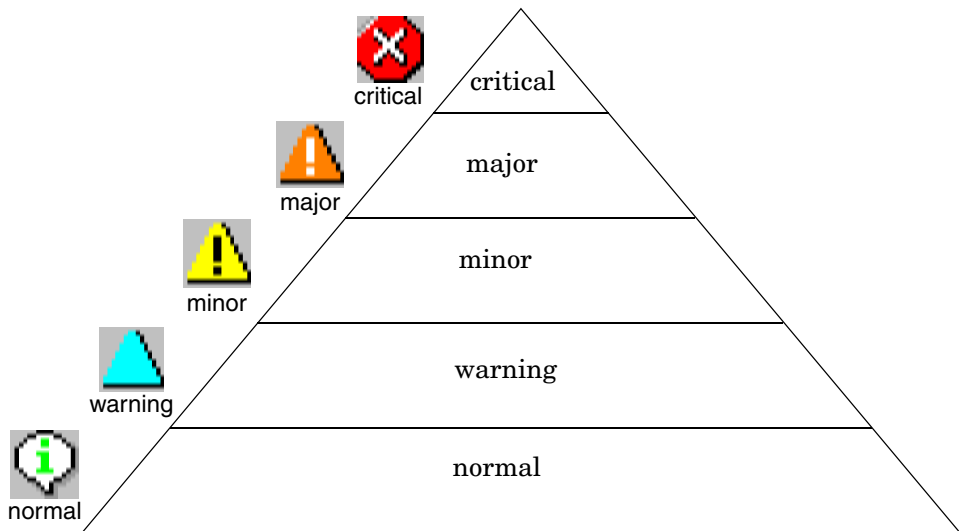
Figure 1-3 Example: SAP/R3 Service Hierarchy



What is the Status of a Service?

The status of a service is the current operational status of a service. The status is indicated by status colors, each color signalling how severe the current situation is. For example, the color red indicates a critical problem situation. See also Figure 1-4 for an illustration of the HPOM severity status model.

Figure 1-4 HPOM Severity Pyramid



Since a service contains or uses several subservices, and since each subservice in turn contains or uses other subservices, the severity status of the service must be determined and calculated on the basis of the severity statuses of the next lower services in addition to the severity statuses of the messages targeting the service.

This is done on the basis of status propagation and status calculation rules. These rules define the relationship of a service to its subservices in terms of how they interpret each other's severity status. Status rules are defined in the service configuration file; see "The Service Configuration File Syntax" on page 149 for more information.

An example: a service contains two subservices, one has the severity status critical, the other has the severity status normal. The service interprets these for what they are, and sets its own severity status to critical because a critical state is more serious than a normal state.

However, Service Navigator gives you much greater flexibility in terms of how the service interprets other severity statuses. For example, a subservice may be less important than another subservice; that is, problems in that subservice have a smaller effect on the service than problems in another subservice. In this case, you would want to decrease the severity status of the one subservice but increase the severity status of the other subservice. This is defined by applying different **status propagation rules** to the relationship between a service and a subservice; see also “Status Propagation Rules” on page 31.

Status calculation rules, on the other hand, define how a service computes its severity status from the severity statuses of its subservices after the status propagation rules have been applied. In the above example, the service sets its severity status to critical because one of its subservices is critical. This is an application of the status calculation rule **Most Critical**. You can, however, define other rules, as explained in “Status Calculation Rules” on page 34.

You can also make one service count more than another service by adding a **weighting factor** for the purposes of status calculation. See the section on “Weighting” on page 36 for more information.

Status Propagation Rules

Status propagation rules define how a service determines the severity of a subservice. The relationship between two services can be one of the following:

increase If the subservice is interpreted as more important, that is, its severity status has more effect on the next higher service than other subservices on the same hierarchical level, its severity status is increased by a level.

For example, if a subservice has the severity status minor, and status propagation is defined as increase, its severity status is increased from minor to major.

unchanged The subservice propagates its severity status unchanged to the service. This is the default configuration.

For example, if a subservice has the severity status normal, the service interprets it as normal.

decrease If the subservice is interpreted as less important, that is, its severity status has less effect on the next higher service than other subservices on the same hierarchical level, its severity status is decreased by a level.

For example, if a subservice has the severity status critical, and status propagation is defined as decrease, its severity status is decreased from critical to major.

ignore The severity of the subservice does not influence the service. Propagation does not take place.

setto The severity of the subservice is set to a specified severity. The new severity status can be either higher or lower than the original status.

For example, the severity of a subservice can always be set to the severity status critical.

See Figure 1-5 on page 33 for an illustration of how the selected status propagation rule influences the status of a service. In this example the subservices ABAP and Buffer Space are interpreted as more important than the subservices Processes and Display Queue. Therefore, the severity statuses of the former are increased, the severity statuses of the latter are decreased. The service Application Server now has a manipulated but correct view of the actual situation.

Status propagation rules can be set in two ways:

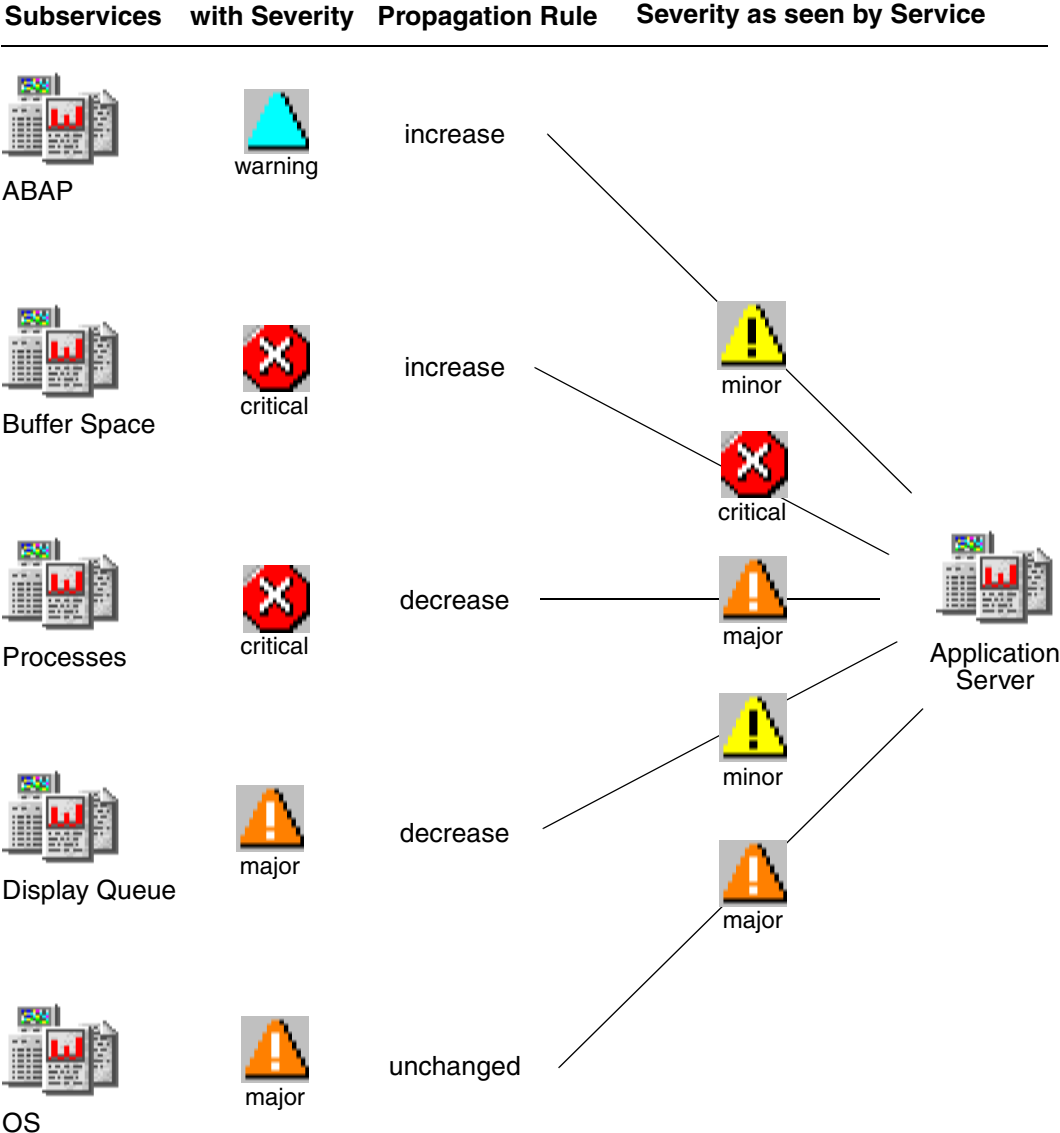
❑ **Default Propagation Attribute**

A default propagation attribute is applied; for example, the severity of a subservice is always increased.

❑ **Severity-specific Propagation Attribute**

Severity-specific propagation attributes are applied. This means that, depending on the severity of the subservice, a specific propagation rule is applied; for example, the severity normal is always ignored, but the severity warning is always increased.

Figure 1-5 Example: Status Propagation Rules



Status Calculation Rules

Status calculation rules define the formula for calculating the severity of a service based on the severity of its subservices and the messages targeting the service directly. Calculation rules model the behavior of the relationship between services. For example, by selecting a calculation rule, you determine, whether the highest severity of the subservices or the highest average severity of the subservices determines the severity of the service.

The concept is based on setting thresholds that must be exceeded before the status of the service changes. The service adopts the status of the subservice or message that first exceeds the threshold.

The following status calculation rules are available:

Most Critical The service adopts the status of the subservice with the highest severity. The absolute threshold is set to 0. (This is a special case of the Single Threshold rule.)

The Most Critical rule models a worst-case scenario: the highest severity of the subservices “wins”.

Single Threshold The highest severity of the subservices that is found more often than the threshold will be the severity of the service. (This is a special case of the Multiple Threshold rule where the same threshold is defined for all severities.)

The Single Threshold rule computes the highest average severity of all subservices. This average severity is then adopted by the service.

Multiple Thresholds The concept is the same as Single Threshold but you can set individual thresholds for each severity except the severity normal.

NOTE

It is *not* possible to specify more than one threshold for the same severity. If multiple thresholds are specified, only the last one will be active.






The Multiple Thresholds rule, for example, allows a few severe problems to be more important than many problems of a lower severity.

The threshold itself can be defined as an absolute value or as a percentage. See Appendix , “The Service Configuration File Syntax,” on page 149 for information on the format of a percentage that should be used when specifying a relative threshold value in the service configuration file.

When calculating the value that is compared to the threshold, the severity of the subservice and their lower severities are counted. For example, if a subservice has the severity critical, the severities major, minor, warning, and normal are also counted. See also Figure 1-4 on page 29.

Table 1-1 details how the severity of each subservice in Figure 1-5 and each message is calculated. The first column lists all subservices and messages. The second column states the severity of each subservice as it is interpreted by the service. This is determined by the status propagation rules explained in the previous section. The remaining columns are then compared to the severity of the subservice, and a **1** is entered if they match, a **0** if they do not match. You must also enter a **1** for each lower severity of a matching subservice.

Table 1-1 Example: Status Calculation Scenario

Subservices	Severity as interpreted by the service Application Server					
		critical	major	minor	warning	normal
ABAP	minor	0	0	1	1	1
Buffer Space	critical	1	1	1	1	1
Processes	major	0	1	1	1	1
Display Queue	minor	0	0	1	1	1
OS	major	0	1	1	1	1
Messages targeting Application Server: severity minor ^a		0	0	1	1	1
	Total:	1 (16%)	3 (50%)	6 (100%)	6 (100%)	6 (100%)

a. The messages directly targeting a service are seen as an entity: the message with the highest severity effects the service.

For example, the service Application Server interprets the severity of the subservice ABAP as minor. The original severity of the ABAP is warning but the relationship is defined as increase. Consequently the status normal is increased to minor (see also Figure 1-5). You enter a **1** in the column where minor matches minor, and a **1** for every subsequent lower severity, in this case for warning and normal.

When you have done this for all subservices, you add up each column to arrive at a total for each severity.

Depending on the status calculation rule and the threshold you have selected, the service Application Server changes severity. For example, if one of the following were configured:

- Most Critical:** the service changes to critical because the highest severity found amongst the subservices and messages (critical) is adopted by the service.
- Single Threshold 50%:** the service changes to major because the severity that first exceeds the threshold of 50% is adopted by the service. In this case the severity major with 50% is the first to exceed the threshold of 50%.
- Multiple thresholds:**
 - threshold of 15% for severity critical
 - threshold of 50% for severity major
 - threshold of 60% for severity minor
 - threshold of 70% for severity warning

The service changes to critical because the first threshold to be exceeded is 15% (severity critical).

Note that there is no need to specify a threshold for the severity normal because normal is the lowest severity status.

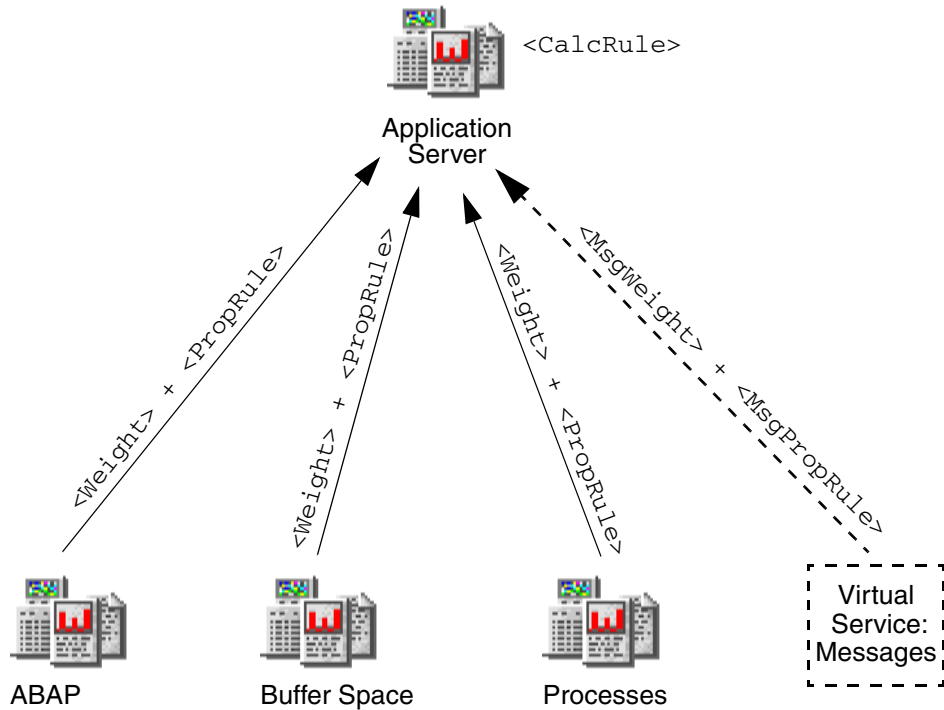
Weighting

Weighting enables you to associate a factor with a subservice. This is done by specifying the tag `<Weight>` when defining the service in the service configuration file. The subservice is then weighted more compared to all other subservices, and consequently affects status calculation differently than without the weighting factor. `<Weight>` can be a decimal number.

You can also add a weighting factor to the messages directly targeting the service. The tag is `<MsgWeight>` and is specified when defining the service in the service configuration file. `<MsgWeight>` can be a decimal number. Figure 1-6 on page 38 illustrates how the messages directly targeting the service contribute to its status. These messages can also be seen as a “virtual message service”.

Figure 1-6 on page 38 also shows that the calculation rule of the service considers both the `<Weight>` (or `<MsgWeight>`) and the `<PropRule>` (or the `<MsgPropRule>`).

Figure 1-6 Virtual Message Service



For example, if you define the weight of the subservice OS to be 2 instead of 1 which is the default for all subservices, OS is weighted more when the status of the service is calculated. However, the weight is not taken as an absolute number but as a fraction of all subservices and messages. Service Navigator calculates the factor using the following formula:

$$\text{Weighting Factor} = \frac{\text{Factor of a subservice/message}}{\text{Sum of all factors of all subservices/messages}}$$

The following example assumes that OS has been attributed the factor 2 whereas all other subservices have the default factor 1. In addition, the messages targeting the service directly are weighted with the message factor 2. The sum of all factors is 8. So according to the above formula the weighting factor for ABAP is: 1 divided by 8 equals 0.125; and the weighting factor for OS is: 2 divided by 8 equals 0.25. The message weighting factor is: 2 divided by 8 equals 0.25. See also Table 1-2.






Table 1-2

Example: Calculating the Weighting Factor

Subservices	Weight	Factor
ABAP	1	0.125
Buffer Space	1	0.125
Processes	1	0.125
Display Queue	1	0.125
OS	2	0.25
Message	2	0.25
Total	8	1

When calculating the status of a service, Service Navigator multiplies each severity with the factor and arrives at the following results; see Table 1-3.

Table 1-3 Example: Status Calculation modified by the Factor

Sub-services	Severity as interpreted by the service Application Server	Multiply with the factor	 critical	 major	 minor	 warning	 normal
ABAP	minor	0.125	0	0	0.125	0.125	0.125
Buffer Space	critical	0.125	0.125	0.125	0.125	0.125	0.125
Processes	major	0.125	0	0.125	0.125	0.125	0.125
Display Queue	minor	0.125	0	0	0.125	0.125	0.125
OS	major	0.25	0	0.25	0.25	0.25	0.25
Messages targeting Application Server: severity minor ^a		0.25	0	0	0.25	0.25	0.25
Total		1	0.125 (12%)	0.50 (50%)	1 (100%)	1 (100%)	1 (100%)

a. The messages directly targeting a service are seen as an entity: the message with the highest severity effects the service.

If we now compare the results with Table 1-1 on page 35, we can see the effect the weighted subservice OS and the weighted messages have on the overall status calculation. If one of the following were configured:

- ❑ **Most Critical:** the service changes to critical because the highest severity found amongst the subservices (critical) is adopted by the service.

This is not different from the example without the weighting factor on page 35 because critical is still the highest severity found amongst the subservices and messages.

- ❑ **Single Threshold 50%:** the service changes to major because the severity that first exceeds the threshold of 50% is adopted by the service. In this case the severity major with 50% is the first to exceed the threshold of 50%.

This is not different from the example without the weighting factor on page 35 because major is still the first to exceed the threshold.

- ❑ **Multiple thresholds:**
 - threshold of 15% for severity critical
 - threshold of 50% for severity major
 - threshold of 60% for severity minor
 - threshold of 70% for severity warning

The service changes to major because the first threshold to be exceeded is 50% (severity major). Note the difference here to the example without the weighting factor on see page 35: critical does not exceed the threshold but major does. So instead of adopting the severity critical the service adopts the severity major.

Note that there is no need to specify a threshold for the severity normal because normal is the lowest severity status.

Service Multi-status Calculation Views

Service status is, as described in the “Status Calculation Rules” on page 34, a result of the formula for calculating the severity of a service. Service severity depends on its relationship among services and the messages targeting the service. However, services can also reflect the status based on the ownership of messages targeting them.

You can monitor and work with services displayed in the following two status calculation views:

- ❑ **Overall**

The service status calculation view based on all messages present in the active message browser.

- ❑ **Operational**

The service status calculation view based on all *non-owned* messages present in the active message browser.

What is the difference between these two views? For example, a message with severity *Critical* targets a service and colors it red. Consequently, all upper services in the service hierarchy change their color depending on the propagation rule set for them.

The *Overall* status calculation view displays these services in the same way, irrespective of the targeting message ownership status. In this example, these services are colored red. You can observe this in the object pane, service graph or map, and in the shortcut bar, where the nodes containing these services are also colored red.

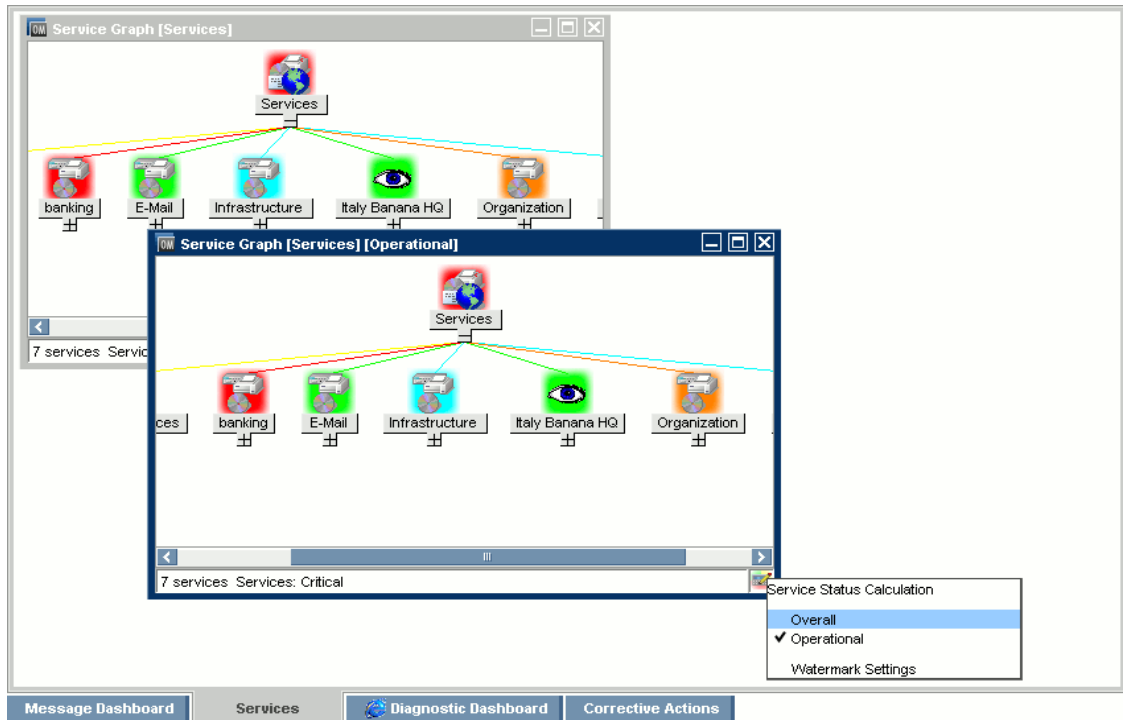
When you take the ownership of the message, the severity of the service does not change until the message is acknowledged.

If your status calculation view is set to *Operational* and you take ownership of the message, the severities of the targeted service and all dependent services change back to the severity visible prior to the message arrival.

The benefit of service multi-status calculation views is that you can get an insight of how the service hierarchy would look if the message targeting a service is acknowledged; in other words, if the problem is solved.

This is very useful, especially if you monitor your services in both calculation views simultaneously, as shown in Figure 1-7.

Figure 1-7 Service Status Calculation Views



In Figure 1-7, both Overall and Operational status calculation views are shown. In the service graph presenting the Operational status calculation view, the currently displayed view is clearly indicated in the window title bar. In addition, an icon appears in the bottom right corner to indicate that the currently set view is Operational.

NOTE

You can monitor the service multi-status calculation changes not only by using the Java GUI. You can integrate the status changes with a third party client. For more details, see “Monitoring Service Multi-status Changes” on page 81.

Setting Service Status Calculation Views

Service status calculation views are set in the following ways:

- ❑ **By the HPOM administrator** (enabling and setting the default view)

Service status calculation views are enabled and set by the HPOM administrator in the `ovconfchg` configuration file. The HPOM administrator also specifies the global default calculation view, which is displayed every time you start the Service Navigator. It is also possible to rename the service status calculation views. For more information, see “Enabling and Configuring Service Multi-status Calculation” on page 79.

- ❑ **In the Preferences dialog** (setting the default view)

Even though the HPOM administrator sets the status calculation views, you do not have to accept all these settings. You can set your custom status calculation view if more than one is enabled in the `ovconfchg` configuration file. You can achieve this by selecting the status calculation view in the `Services` tab of the `Edit->Preferences` dialog. Refer to *HPOM Java GUI Operator's Guide* for more details on the Preferences dialog.

- ❑ **From the ‘calculation’ toolbar drop-down list** (only for the currently active service graph or map)

Service status calculation view set using the toolbar list is displayed within the currently active service graph or map, but it does *not* change the default calculation view in the object pane or in the shortcut bar. If no service graph or map is currently active, the ‘calculation’ drop-down list is disabled.

Refer to *HPOM Java GUI Operator's Guide* for more details about ‘calculation’ drop-down list.

IMPORTANT

As soon as you restart the Java GUI, these changes on service graphs and maps are lost, and the default status calculation view is reset again.

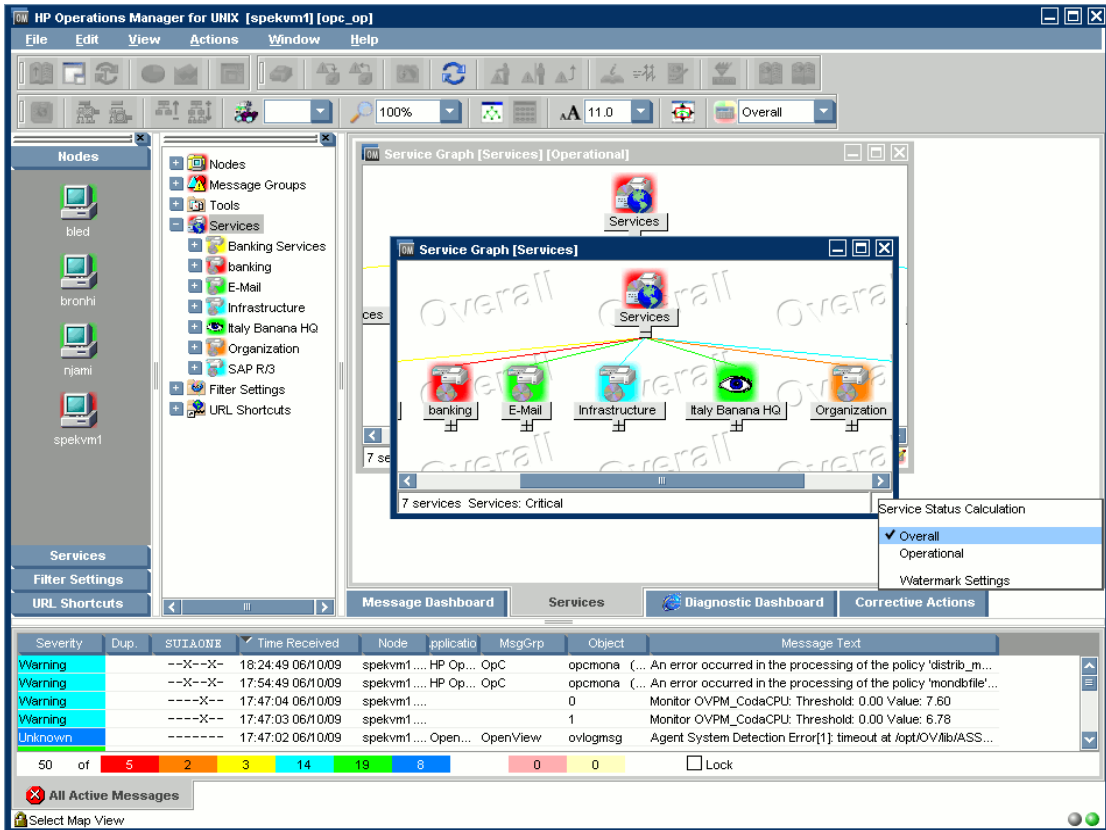
- ❑ **From the service graph's or map's pop-up menu** (for the currently active service graph or map only)

This is an alternative to the toolbar 'calculation' drop-down list, which can be used when the services toolbar is turned off. Service status calculation view that is set using service graph's or map's pop-up menu is displayed within the currently active service graph or map, but it does *not* change the default calculation view in the object pane. As with the 'calculation' drop-down list, the default calculation view is reset after the Java GUI is restarted.

Setting Watermarks on Service Graphs and Maps

To easily differentiate between two service status calculation views, you can set watermarks on service graphs and maps for any of the status calculation views. A watermark represents the text displayed in the background of a service graph or map. Figure 1-8 shows an example of a custom watermark for the Overall status calculation view.

Figure 1-8 Watermark for Overall Status Calculation View



You can enable and customize watermarks for any of the calculation views in the Watermark Advanced Setting dialog, which is accessible in one of the following ways:

❑ **From the Preferences dialog**

To open the Watermark Advanced Setting dialog, click the [Advanced] button in the Services tab of the Edit->Preferences dialog. Refer to *HPOM Java GUI Operator's Guide* for more details on the Preferences and the Watermark Advanced Setting dialogs.

❑ **From the service graph's or map's pop-up menu**

To open the Watermark Advanced Setting dialog, select the Watermark Settings option from the Service Status Calculation pop-up menu. Right-click the area in the bottom right corner of the service graph or map to access the menu. Refer to *HPOM Java GUI Operator's Guide* for more details on the Watermark Advanced Setting dialog.

Enabling and Disabling Customized Watermarks

To enable or disable already customized watermark(s) on the service graphs and maps, use the Show Watermark on Service Graphs and Maps checkbox in the Services tab of the Edit->Preferences dialog.

This checkbox is automatically selected if you enable the watermark for at least one of the status calculation views in the Watermark Advanced Settings dialog; likewise, if you disable watermarks for both status calculation views in the Watermark Advanced Settings dialog, the Show Watermark on Service Graphs and Maps checkbox is automatically de-selected.

Refer to *HPOM Java GUI Operator's Guide* for more details on the Preferences dialog and the Watermark Advanced Settings dialog.

How Does HPOM Map Messages to Services?

HPOM generates a message as a result of an event or change of status on a managed node. If the event matches preconfigured filters (that is, the HPOM message conditions), a message is generated, formatted, and then sent to the responsible user. If the event does not match the filtering criteria, the event is ignored.

Formatting takes place by attaching attributes to the message. Attributes are, for example, the node or application on which the event happened, the object that was affected, or the message group of the message.

Service Navigator enables you to attach a **service name** as an additional attribute to the message. If an event occurs on a managed object and this event matches the filtering criteria, HPOM generates a message and attaches the service name as an attribute to this message. The service name of the message is then compared with the service names in your hierarchy. If the service name of the message is matched by a service name in the hierarchy, the message is sent to the GUI of the user who is assigned to that service.

When mapping messages to services, you should first consider what the problem is, and then which service is affected by it, before setting the service name.

The service name can be set by using the `opcmsg(1)` parameter.

Example:

```
/opt/OV/bin/OpC/opcmsg application=appl \  
object=obj msg_text=msg_text service_id=service_id
```

For more information, see the *opcmsg(1)* man page.

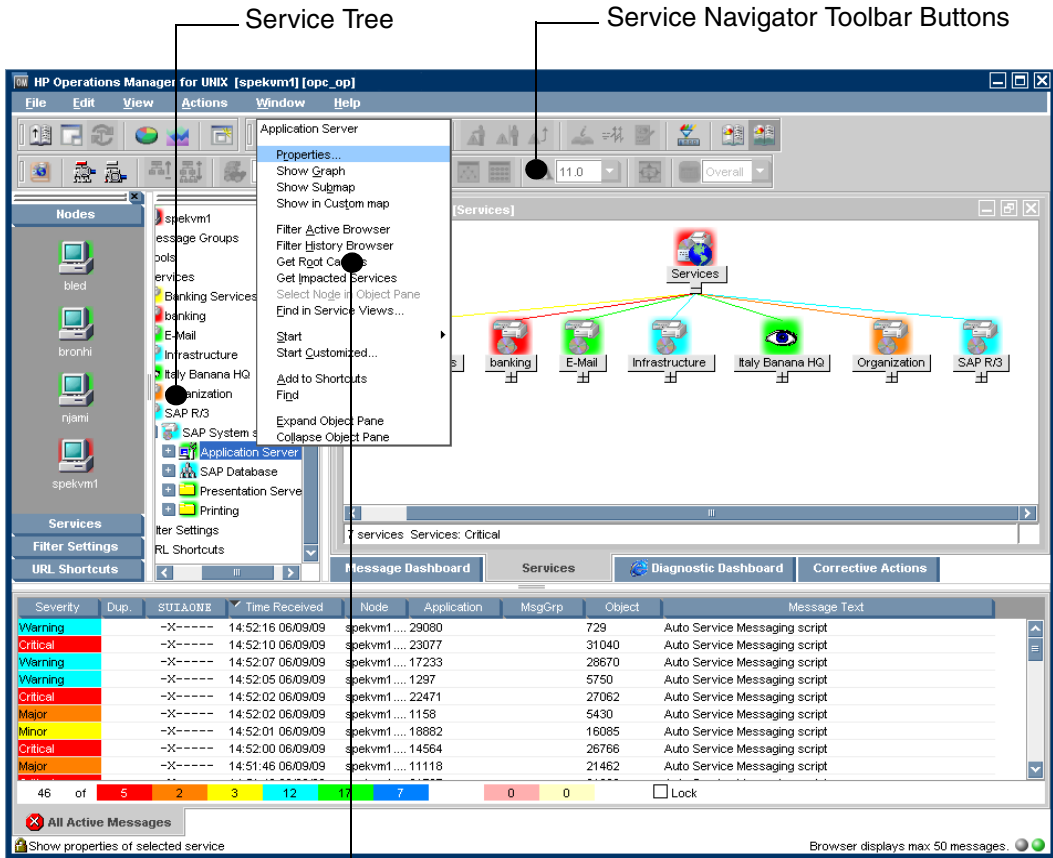
Naming the service takes place when you define the service in the configuration file. Service names must be unique for each service so that HPOM can identify the service and map messages to that service. Note that the service name can contain HPOM variables and can make use of HPOM's pattern-matching mechanism. This has the advantage that you can keep your HPOM policies as generic as possible, namely by using variables to match service names, and that you can use one policy to match several services.

The Service Navigator GUI

When you start the Service Navigator GUI you see that the HPOM Java-based GUI is extended to include the following:

- ❑ A service tree in the scoping pane on the left.
- ❑ Additional toolbar buttons.
- ❑ Additional options in the menu bar and popup menu.

Figure 1-9 Service Navigator GUI

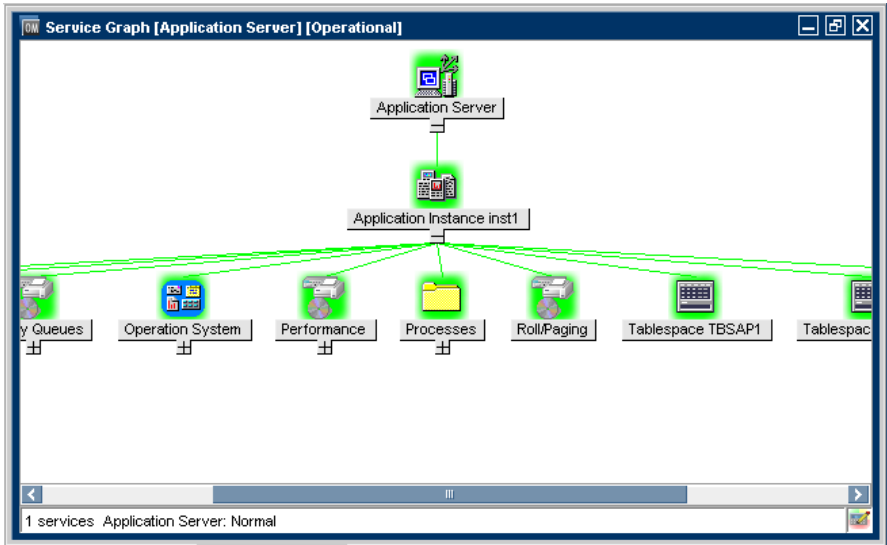


Service-specific Popup Menu

Service Graphs

Service Navigator displays a simple hierarchical view of services through a service tree in the scoping pane of the GUI. This information can also be graphically presented in the content area with service graphs. These are graphical representations of the hierarchy of services and their subservices. Service graphs are dynamic and are updated whenever the severity of a displayed service changes. An example of a service graph is shown in Figure 1-10.

Figure 1-10 A Service Graph



TIP You can also double-click a service icon in the service graph to expand or collapse the service hierarchy below. If this service's submap is defined to be displayed with the background image display, it will be opened instead.

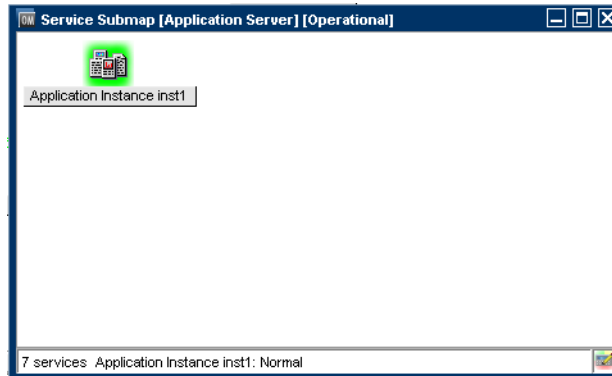
Service Submaps

Service submaps are graphical representations of subservices of a selected service. No hierarchical information is displayed. Service submaps are most useful for providing a clear view of the status of the subservices within parent services when hierarchical relationships are not of primary interest. An example of a service submap is shown in Figure 1-11.

Subservice submap of the current service submap are accessed by double-clicking the service icon.

Figure 1-11

A Service Submap



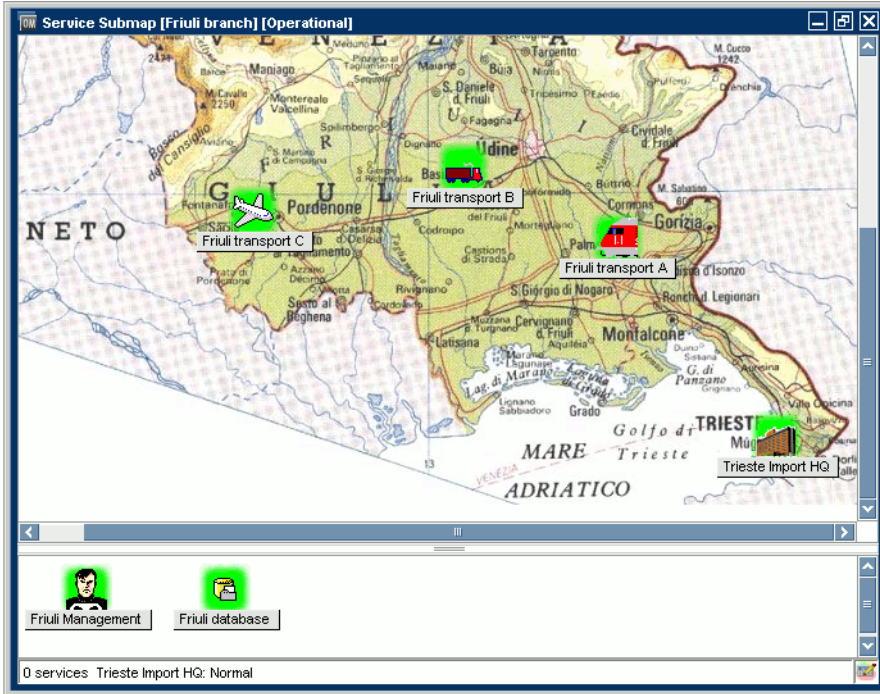
Enhancing Service Submaps

Service submaps can be enhanced with alternative background images, for example a network schematic or a country map. You can also define the display position of subservice icons on the background image to create clearer overview of the services being managed. For example, position service icons over their geographical locations on a country map.

The customized Service Submap window of a service may be split into two horizontal panes, when there are services which have not been allocated any positional information. These icons are then placed in the lower pane.

Figure 1-12 shows the service submap of the Friuli branch service. The Friuli branch service has some subservices located on the submap background and others without positional information placed in the lower pane.

Figure 1-12 An Enhanced Service Submap



For information on how to customize your service submaps, see “... How to Enhance a Service Submap?” on page 134 for details.

Custom Service Maps

Custom service maps are graphical representations of services. Multiple services from the service hierarchy can be selected and displayed within a custom service map. Custom service maps are very useful for maintaining an overview of the most important, top-level services or even displaying them on a large screen in the IT Center.

Service Properties

Service properties contain detailed information about a service. This information can be viewed in the `Service Properties` dialog box. The following information is displayed in different tabs:

❑ General

The `General` tab of the `Services Properties` dialog box includes basic information about the selected service, such as service name, display label, a short description of the service, node to which the service is attached, and the current status of the service.

❑ Actions

The `Actions` tab of the `Services Properties` dialog box displays the actions assigned to the selected service and includes the unique name, the type, and a detailed description of the service action.

❑ Attributes

The `Attributes` tab of the `Services Properties` dialog box displays the attributes assigned to the selected service. Service attributes are defined by the administrator and can be used to convey any additional information about a service.

Reserved attributes are used to apply background images to service submaps, position subservice icons on these backgrounds, and add additional labels to service icons. For more information, refer to “Reserved Service Attributes” on page 172.

❑ Status Information

The `Status` tab of the `Services Properties` dialog box displays parameters and their values, as well as service calculation names and their corresponding severities for the selected service.

For example, a parameter of a service can be the number of subservices for the service and its current value can be 3.

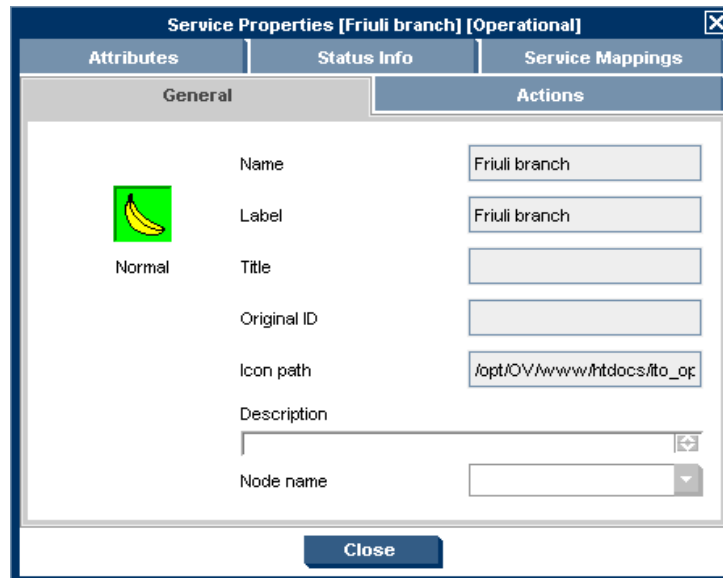
In addition to currently enabled calculation names for a service, severities for each status calculation view are also listed. Service calculation name, for example, can be `Overall` and its corresponding severity can be `Major`.

❑ **Service Mappings**

The Service Mappings tab of the Services Properties dialog box displays a list of service names that defines message-to-service mapping.

Figure 1-13 shows the general properties of a service.

Figure 1-13 **Displaying the Properties of a Service**



Labeling Services

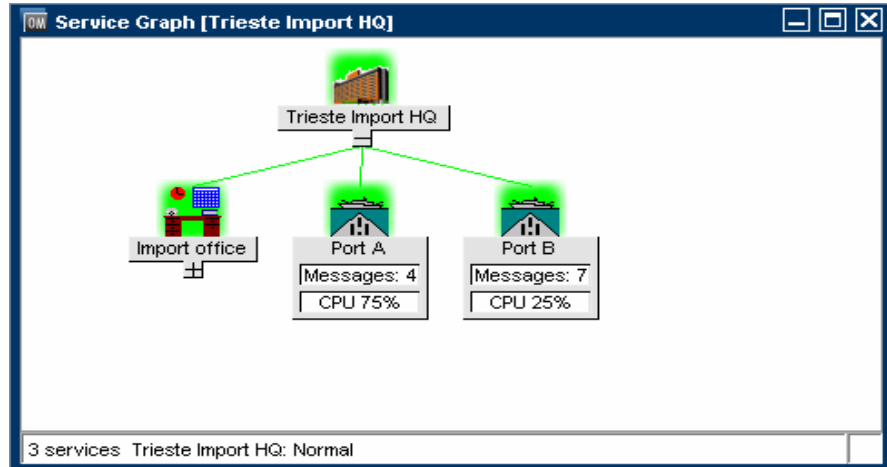
All service icons are identified using a label. The label appears below an icon in the shortcut bar, service graph, service submap, and custom service map. Additional text or image labels can also be displayed by service icons. An unlimited number of labels can be applied to an icon, the practical limitation being the space available on the display.

Additional labels are used to display information that is important for monitoring the service. For example, the CPU load of the systems that are hosting the service can be displayed as a numerical value and as a bar graph for at-a-glance information. An example of how these labels can be applied to service icons is shown in Figure 1-14.

A collection of reserved service attribute names that are recognized by the GUI are used for labeling. For more information, refer to “Reserved Service Attributes” on page 172.

Figure 1-14

Labeling a Service



There are two ways of labeling services using reserved service attributes:

❑ Service Configuration File

As part of the service configuration file. The values for these labels are acquired at Service Navigator start-up and cannot be changed or removed during the current session.

❑ **Dynamically**

It is also possible to automatically update the text or image of a label and display the most up-to-date information by the use of messages.

The refresh rate is determined by that set for the message browser.

For more information, refer to “... How to Label Service Icons?” on page 128.

Loading Services on Demand

Loading a large service tree containing hundreds of services can take a very long time. The HPOM Java GUI enables you to set the number of levels in a service hierarchy to be retrieved from the management server. This way the time needed for Java GUI startup is significantly reduced.

It is also possible to configure an automatic reload of the service configuration when a change occurs on the management server, so that services information is regularly updated. You can choose to retain only the services that are displayed in service graph or Object Pane, visible or minimized, in the Java GUI cache. All other retrieved service information is removed from Java GUI cache.

For more information about loading services on demand, refer to the *HPOM Java GUI Operator's Guide*.

Service Logging and Reporting

A critical aspect of IT management is the capability to generate reports about your service delivery performance.

If configured, Service Navigator creates a log entry in the HPOM database whenever a service changes severity. Reports retrieve the logs from the HPOM database and display the information in graphical or statistical form. You can design and generate your own reports or use the service reports that are bundled with HP Reporter.

Service reports cover a wide range of reports, starting from reports about the current status of a service, to reports about trends based on historical status data. The following Service Navigator reports are bundled with Reporter:

❑ **Service availability**

This report displays the duration of a service in each status. Each status is presented in percent using a pie chart. Alternatively, a bar chart can be displayed. The report is based on all status logs in the HPOM database.

❑ **Message trend by service**

This report displays the number of messages received for each service over time. It is based on all active and history messages in the HPOM database that affect a service. The report displays a line graph for each service.

❑ **Top active messages by service**

This report displays the three services with the highest number of active messages, broken down by severity. The report is based on all active messages in the HPOM database and displays a bar chart.

See the HP Reporter documentation for more information about these reports. For information about the contents of the HPOM database and how to go about designing and generating your own reports, see the *HPOM Reporting and Database Schema*.

Service logging is easily enabled (or disabled) using a Service Navigator command line tool. Command line tools are also available to download or upload service data from or into the HPOM database. This can be useful for database maintenance purposes. See “Enabling Service Logging” on page 78 for more information.

Note that the HPOM Developer’s Toolkit includes APIs for Service Navigator to get the current status of a service and to register for service status changes. See the *HPOM Application Integration Guide* for more information.

The service logging file lists the services for which logging is enabled and is located in:

```
/etc/opt/OV/share/conf/OpC/mgmt_sv/opcsvcm/loggings
```

NOTE

Never edit this file directly.

2 **Getting Started**

In This Chapter

This chapter answers the following questions:

- ❑ How Do I Install Service Navigator?
- ❑ How Do I Configure Service Navigator?
 - Planning Your Service Hierarchy
 - Writing the Service Configuration File
 - Activating the Service Configuration
 - Setting the Service Name in HPOM
 - Assigning Services to Operators
 - Planning Your Service Hours
 - Enabling Service Logging
 - Enabling and Configuring Service Multi-status Calculation
 - Monitoring Service Multi-status Changes
 - Setting Service Attributes Dynamically
- ❑ How Do I Start Service Navigator?
- ❑ How Do I Upgrade Service Navigator?
- ❑ How Do I De-install Service Navigator?

How Do I Install Service Navigator?

Installing Service Navigator

To ensure that the Service Navigator is properly installed on your management server system, perform the following:

❑ **Adapt kernel parameters**

The `max_thread_proc` kernel parameter must be set appropriately. See “Determining the size of `max_thread_proc`” on page 66.

❑ **Install HPOM**

For detailed information about installing HPOM, see the *HPOM Installation Guide for the Management Server*.

IMPORTANT

Service Navigator is installed automatically during the installation of HPOM 9.0x management server.

❑ **Install the Java-based Operator GUI**

For detailed information about installing the Java-based operator GUI, see the *HPOM Installation Guide for the Management Server*.

NOTE

If you have a previous version of Service Navigator installed and configured, see the section “How Do I Upgrade Service Navigator?” on page 99 for more information about upgrading to the current version of Service Navigator.

Determining the size of `max_thread_proc`

The kernel parameter `max_thread_proc` determines the maximum number of threads allowed in each process. By default, HPOM and Service Navigator require this parameter be set to 1024. This value is a result of the following formula and is sufficient for standard HPOM and Service Navigator environments. For larger environments, use the following formula as a guideline for increasing this value.

$$\begin{aligned} \text{threads} = & \quad [\text{NumberOfGUIs} * 2] + \\ & \quad [\text{NumberOfAPIClients}] + \\ & \quad [\text{NumberOfopcservice}] + x + 9 \\ x = & \quad 1 \text{ (if service logging is enabled)} \\ x = & \quad 0 \text{ (if service logging is disabled)} \end{aligned}$$

where:

NumberOfGUIs =
Number of running Service Navigator GUIs.

NumberOfAPIClients =
If using the APIs of the Developer's Toolkit:
Number of API clients.

NumberOfopcservice =
Number of concurrent `opcservice` commands.
`opcservice` uses internally the APIs of the Developer's Toolkit. Therefore, the number of concurrent `opcservice` commands that may run at any time must be added to calculate the value for `max_thread_proc`.

How Do I Configure Service Navigator?

Service Navigator is easily configured if you follow these step-by-step instructions:

1. Plan your service hierarchy. Identify the managed elements that are part of your service and plan your service hierarchy accordingly.
See “Planning Your Service Hierarchy” on page 69.
2. Write the service configuration file (or convert existing configuration files to the XML syntax).
See “Writing the Service Configuration File” on page 71.
3. Activate your new service configuration with `opcservice`.
See “Activating the Service Configuration” on page 73.
4. Set the message attribute service in HPOM. Configure HPOM so that it knows how to assign messages to services.
See “Setting the Service Name in HPOM” on page 74.
5. Plan the operator responsibilities and assign them with `opcservice`.
See “Assigning Services to Operators” on page 75.
6. Plan your service hours. When do you provide your service?
See “Planning Your Service Hours” on page 77.
7. Plan the reports you need for each service and enable service logging accordingly.
See “Enabling Service Logging” on page 78.
8. Enable and configure service status calculation view(s).
See “Enabling and Configuring Service Multi-status Calculation” on page 79.
9. Monitor service multi-status changes.
See “Monitoring Service Multi-status Changes” on page 81.

See also Chapter 3, “The Service Configuration File,” on page 103 for more detailed instructions for writing the service configuration file.

NOTE

Some HP Operations Smart Plug-ins provide out-of-the-box service instrumentations.

Planning Your Service Hierarchy

We recommend that you draft your service hierarchy before you start writing the service configuration file. When planning your service hierarchy, keep the following questions in mind:

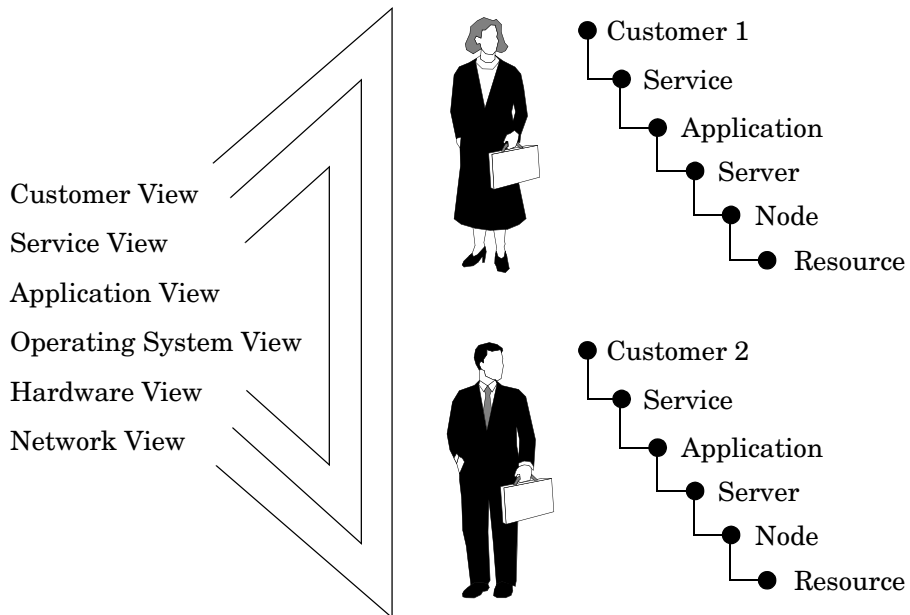
- ❑ Which IT services do you provide? Which ones do you want to monitor?
- ❑ Who are the customers of your services? Which organizations, departments, or lines of business?
- ❑ How can you logically group the services you provide? Which services are used by other services?
- ❑ How do problems in one service affect another? Which status propagation rule should you apply?
- ❑ How do you evaluate the severity of a problem? Which status calculation rule should you apply?
- ❑ Which service actions should be assigned to each service?

For example, you may want to organize your service hierarchy as illustrated in Figure 2-1 on page 70: your service hierarchy could start with the customers for which you provide services, followed by the business services you provide for them, for example, a backup service. The next level could be the application level; in the case of your backup service, this could be the HP Data Protector application you are using for backup purposes at your customer sites. The following level could be the software or operating system level where you monitor the health of the operating system installed on your backup servers. The next level could be the hardware level where your servers and clients are monitored. Finally, the last level could be the network level which enables you to control the health of all network components.

NOTE

Only ASCII characters are allowed in service names.

Figure 2-1 **Service Hierarchy Example**



See also “... That Names are Important?” on page 119 for more information about planning a service hierarchy.

You can also have a look at the example service configuration files. They show you what a service hierarchy can look like and how to use the XML tags. The example configuration files are available in the following directory on the management server after the installation of Service Navigator:

```
/opt/OV/OpC/examples/services/
```

See the README file for more information about each file.

Writing the Service Configuration File

When you have a good plan of your service hierarchy, you can start putting it into practice by writing the service configuration file. In general, you have the choice between the following methods:

❑ **Manually**

Manually write (or edit) a service configuration file as explained in this section.

❑ **Automatically**

Automatically generate a service configuration file using scripts or programs. Service Navigator provides some shell scripts in the directory `/opt/OV/OpC/examples/services/` that help you to get started.

Use the example configuration files to copy the sections of the configuration syntax that you need. See also Chapter 3, “The Service Configuration File,” on page 103 for information about how parts of the SAP/R3 service hierarchy have been configured.

TIP

File Name Extensions

Save the service configuration files with the standard file name extension `.xml`.

Large Service Hierarchies

If you are planning a large service hierarchy, it can be useful to distribute the service configuration over multiple configuration files; this would make it easier for you to maintain your configuration. For example, you could define your business services and application services in one file, and all hardware and software services in a second file.

1. Change to the directory containing the example configuration files.
Enter:

```
cd /opt/OV/OpC/examples/services/
```

2. As user `root`, copy the file that comes closest to your planned hierarchy to a temporary directory. Enter:

```
cp <service_example> /tmp <service_config>
```

3. Open the copied example file using an XML or a plain text editor of your choice and translate the service hierarchy you have planned into the service configuration syntax. See “The Service Configuration File Syntax” on page 149.

Configuring a service includes the following aspects:

- a. Defining the services and subservices, and the relationships between them.
 - b. Defining the status calculation and status propagation rules.
 - c. Defining the service-specific actions.
 - d. Defining the service attributes.
 - e. Defining operator assignments.
4. Use the `opcservice` command on the finished configuration file to ensure that your changes are correct:

```
/opt/OV/bin/OpC/opcservice -check /tmp/<service_config>
```

If the syntax of the configuration file is correct, `opcservice` will output an OK message. If the configuration file contains any errors, errors messages are displayed. Fix any syntax errors before continuing.

If element values for service files are not specified, warning messages are displayed. To handle error messages, see “Service Files Error Checking” on page 74 for more details.

Activating the Service Configuration

When you have finished writing the service configuration file, use the command `opcservice` to load the new configuration. Enter:

```
/opt/OV/bin/OpC/opcservice -add /tmp/<service_config>
```

`opcservice` passes the configuration to the `opcsvcm` process which maintains the internal service repository file:

```
/etc/opt/OV/share/conf/OpC/mgmt_sv/opcsvcm/services
```

NOTE

You should not edit this file directly. Any changes done during runtime are lost the next time the `opcsvcm` process rewrites the repository file.

Modifying the Service Configuration

If you need to modify the configuration, execute the following with the management server running:

```
opcservice -list -all -xml > current_ServNav.xml
```

```
cp current_ServNav.xml new_ServNav.xml
```

Edit the new configuration file, remove the `<Results>` and `</Results>` tags and update the configuration with the following command:

```
opcservice -add new_ServNav.xml
```

NOTE

Do not use the `-replace` option, otherwise you will have to re-do the operator assignments.

The execution of `opcservice -list -all -xml` is time consuming.

You can also get an overview of your configuration by listing all services with

```
opcservice -list -all.
```

See also “The `opcservice` Command” on page 175 for more information about available command line options for `opcservice`.

Service Files Error Checking

HPOM implements error checking of service files. If element values are *not* specified, by default, warning messages are displayed. For example:

```
Warning: Operation 'Add' : Element 'car_manufact' Label is empty,  
using Element name instead. (SVC50-3) (SVC10-123)
```

```
Warning: Operation 'Add' : Element 'supply-chain' Label is empty,  
using Element name instead. (SVC50-3) (SVC10-123)
```

To enable error checking, enter the following command:

```
ovconfchg -ovrg server -ns opc -set \  
OPC_SVCM_ADD_WARN_IF_EXISTS <mode>
```

Where *<mode>* is one of the following:

- TRUE
- FALSE

Setting the Service Name in HPOM

When you have set up your services, you need to tell HPOM how to match messages against services. You can provide the service name by specifying it as a parameter of the `opcmsg(1)` command.

For more information, see the `opcmsg(1)` man page.

Assigning Services to Operators

A service is only visible to the operator or operators to whom you have assigned responsibility for that service. If a service is assigned to more than one operator, its status is visible to all operators.

Note that the operators should also have message groups and node groups assigned. If responsibilities for services, nodes, and message groups do not overlap, the operators can receive messages from a service but do not have the corresponding nodes in their responsibility matrix. Messages from assigned services are also displayed in the Java-based operator GUI so that an operator who uses the Java GUI will also see messages from assigned services.

Operator capabilities are not restricted on service messages or on the nodes from which service messages are received. For example, if an operator is in general not allowed to own/disown messages, messages from assigned services can still be owned or disowned. Similarly, actions can be executed on service nodes, even if these nodes are not in the responsibility matrix of the operator.

Services can be assigned using one of the following methods:

- ❑ **opcservice command**

Use the `opcservice` command to assign services to operators. This is the recommended method.

- ❑ **service configuration file**

Define the assignment in the service configuration file using the `<Operator>` tag.

If you want to find out which operators are responsible for your services, use `opcservice` with the `-operators` option. This outputs a list of all operators who have services assigned as well as the assigned services. Service assignments are kept in the HPOM database.

Assigning Services with opcservice

1. Decide which operator is responsible for a service.

Note that in a complex service hierarchy it may be useful to assign subservices to different operators instead of the full hierarchy.

2. Use `opcservice` to assign the service and all contained subservices to the operator. Enter:

```
/opt/OV/bin/OpC/opcservice -assign <operator> \  
<service_name>...
```

Where:

<code><operator></code>	HPOM login name of the operator.
<code><service_name></code>	Name of the service as defined in the service configuration file. Multiple service names can be listed.

See also “The `opcservice` Command” on page 175 for more information about available command line options for `opcservice`, for example for deassigning services from operators.

Assigning Services in the Configuration File

Service assignments can also be specified in the service configuration file. This involves defining the operators with the XML tag `<Operator>` and specifying the desired services.

This method has the advantage that you can define additional aspects of the Service Navigator GUI, for example, you can define the label, description, or icon of the topmost service assigned to the operator. Note that using `opcservice` is the recommended method. See also “Setting up Service Assignments” on page 115.

Assigning User Profiles to a Service

Beside assigning services to each operator separately, it is possible to assign user profiles to a service. To do so, use the command-line tool `ovconfchg` on the HP Operations management server.

Enter the following:

```
ovconfchg -ovrg server -ns opc -set \  
OPCSVC_CONSIDER_PROFILES TRUE
```

NOTE

To ensure that new assignments of user profiles are reflected in currently running Java GUI sessions perform a Reload Configuration.

Planning Your Service Hours

With HPOM you can set up service hours and schedule outages. Messages which arrive outside of defined service hours are buffered, and messages which arrive during a scheduled outage are suppressed. See the *HPOM Concepts Guide* and the *HPOM Administrator's Reference* for more information.

Enabling Service Logging

If enabled, Service Navigator keeps a log of each status change in the HPOM database. This enables you to design and generate reports about the availability of your services based on the data kept in the HPOM database.

1. Decide for which services you want to enable logging.
2. Enable logging, enter:

```
/opt/OV/bin/OpC/opcservice -log_enable <service_name>
```

To enable logging for all subservices or for subservices up to a certain level, use the `-recursive` or `-depth` options respectively.

3. To check for which services logging is enabled, enter:

```
/opt/OV/bin/OpC/opcservice -logs
```

See also the man page *opcservice(1M)* for more information about disabling service logging and other command line options.

The service logging file lists the services for which logging is enabled. It is located in:

```
/etc/opt/OV/share/conf/OpC/mgmt_sv/opcsvcm/loggings
```

NOTE

Never edit this file directly.

Use the command line tools *opcsvcdwn* and *opscvcupld* to download or upload service logs from or into the HPOM database. Downloading service logs can become necessary when too many logs exist in the HPOM database and the amount of available disk space is not sufficient. See also the man pages *opcsvcdwn(1M)* and *opscvcupld(1M)* for more information about these commands. More details about service logging and the service-related tables are also available in the *HPOM Reporting and Database Schema*.

Enabling and Configuring Service Multi-status Calculation

You can specify service status calculation views that you want to be enabled on your HP Operations management server, as well as set the global default service status calculation view.

To enable and configure multi-status calculation, perform the following:

1. Login as user `root` to the HP Operations management server.
2. Enable or disable service status calculation view(s) on your HP Operations management server.

IMPORTANT

You *must* enable at least one service status calculation view. If you fail to do so, Service Navigator will fail at its startup.

- To enable or disable the `Overall` calculation view, enter the following:

```
ovconfchg -ovrg server -ns opc -set OPC_SVC_CALC0 \  
<calc_value>
```

Where `<calc_value>` is one of the following:

TRUE (to enable this status view)

FALSE (to disable this status view)

- To enable or disable the `Operational` calculation view, enter the following:

```
ovconfchg -ovrg server -ns opc -set OPC_SVC_CALC1 \  
<calc_value>
```

Where `<calc_value>` is one of the following:

TRUE (to enable this status view)

FALSE (to disable this status view)

For example, if you want to enable the `Operational` calculation view, and to disable the `Overall` calculation view, enter the following:

```
ovconfchg -ovrg server -ns opc -set OPC_SVC_CALC0 FALSE  
ovconfchg -ovrg server -ns opc -set OPC_SVC_CALC1 TRUE
```

3. Specify default service status calculation view(s). Enter the following:

```
ovconfchg -ovrg server -ns opc -set \  
OPC_SVC_DEFAULT_CALC <calc_value>
```

Where *<parameter>* and *<calc_value>* are the service status calculation view and its value. This value can be one of the following:

- 0 (Overall calculation view)
- 1 (Operational calculation view)

For example, to set your default service status calculation view to Operational, enter the following:

```
ovconfchg -ovrg server -ns opc -set \  
OPC_SVC_DEFAULT_CALC 1
```

IMPORTANT

You *must* restart the Service Navigator for changes to take effect.

To Rename Service Status Calculation Views

To rename the service status calculation views, set the following parameters using `ovconfchg` utility:

```
OPC_SVC_CALC_NAME0 <calc_name1>
```

```
OPC_SVC_CALC_NAME1 <calc_name2>
```

Where *<calc_name1>* and *<calc_name2>* are the names of service status calculation views.

For example, if you want to rename the Overall calculation view to Overall_1, enter the following:

```
ovconfchg -ovrg server -ns opc -set OPC_SVC_CALC_NAME0 \  
Overall_1
```


Monitoring Service Multi-status Changes

You can monitor the service multi-status changes and check the current service status calculation view in one of the following ways:

□ By using `opcservice` command

To check the status calculation view for the service `perfsvc`, perform the following:

1. Login as user `root` to the HP Operations management server.
2. Enter the following:

```
opcservice -list perfsvc -xml
```

You should get output similar to the following:

```
<Results>
  <Services>
    <Service>
      <Name>perfsvc</Name>
      <Status>
        <Normal/>
      </Status>
      <MultiStatus>
        <CalculationId>1</CalculationId>
        <Normal/>
      </MultiStatus>
      <Label>Performance Service</Label>
    </Service>
    <Association>
      <Composition/>
      <SourceRef>perfapp</SourceRef>
      <TargetRef>perfsvc</TargetRef>
      <Status>
        <Normal/>
      </Status>
    </Association>
  </Services>
</Results>
```

```
        <CalculationId>1</CalculationId>
        <Normal/>
    </MultiStatus>
</Association>
</Services>
</Results>
```

❑ **By Creating Your Own Applications**

You can create your own applications using C++ Service Engine APIs. Refer to *HPOM Developer's Reference* and to man page *opcsvc_api.1m* for more information on Service Engine APIs.

❑ **By using the HPOM Java GUI**

You can monitor service multi-status changes by using the HPOM Java GUI. See “Service Multi-status Calculation Views” on page 42 for more information.

Setting Service Attributes Dynamically

Service attributes are used to provide additional information about a service. You can define service attribute values in the service configuration file. Information on defining service attributes is available in “Setting Service Attributes” on page 113. Service attributes that are specified in the service configuration file are loaded at start-up and cannot be updated during runtime.

Attribute values can also be added dynamically without the need to update the service configuration file and restart Service Navigator. This has the advantage that Service Navigator is always updated with the latest service attribute values and you are always presented with the latest service information. You can also dynamically update service attribute values, which are already specified in the service configuration file. Any values which are dynamically set can also be stored and reloaded the next time Service Navigator is started by enabling the recovery feature.

There are two ways to set service attributes dynamically:

❑ **opcsvcattr command line tool**

`opcsvcattr` is a shell script that can be called on the command line to add, change, or remove service attributes.

This script is useful for testing purposes to verify that the service attributes are updated as expected. You can also call this tool as an automatic action for a message. Beware though that performance could be impaired.

Logging is not available for this method.

To find out how to use the `opcsvcattr` tool, refer to “Setting Service Attributes Dynamically with `opcsvcattr`” on page 85.

❑ **HPOM messages**

HPOM message attributes can be used to convey updated information used to dynamically set service attribute values. The following message attributes are used:

- *Application and object message attributes*

This method is available for all message sources.

- *Custom message attributes*

This method is only available for message sources where custom message attributes are supported: logfiles, opcmsg(1 | 3) and threshold monitor.

Using HPOM messages to set service attributes has the advantage that performance is not impaired and that the changes can be logged. However, the configuration effort is higher than when using the `opcsvcattr` tool.

See “Setting Service Attributes Dynamically with HPOM Messages” on page 87 for more information about this method.

Attributes are added at runtime and when the Service Navigator is stopped, the values are deleted unless message logging is enabled. A service attribute that is added dynamically overrides the value of the service attribute of the same name. When the service configuration is reloaded, the service attribute value that is defined in the service configuration file will again be displayed unless message logging is enabled.

To find out how to enable logging, see “Message Logging for `opccustproc1`” on page 92.

TIP

You can save a current service configuration to a file in XML format with the `opcservice -dump <filename>` command. Portions of this configuration can be used to enhance the associated service configuration file.

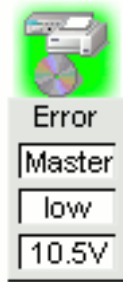
Setting Service Attributes Dynamically with `opcsvcatrr`

Use the shell script `opcsvcatrr` to add, change, or remove service attributes dynamically. For example, to add the three labels, Master, Low, and 10.5V, to the service `Error`, enter the following command on the management server:

```
/opt/OV/bin/OpC/opcsvcatrr svc_id=Error \  
name=ov_label1 value=Master\  
name=ov_label2 value=low\  
name=ov_label3 value="10.5V"
```

The icon representing the service `Error` now displays three new labels with the values as illustrated in Figure 2-2.

Figure 2-2 Example Results for `opcsvcatrr`



TIP

Service Navigator uses reserved attribute names such as `ov_label1`, `ov_label2`,... `ov_labeln`, to add additional labels to service icons. See the section “... How to Label Service Icons?” on page 128 and “Reserved Service Attributes” on page 172 to learn more labeling service icons.

The `opcsvcatrr` tool can be used as an automatic action in the HPOM policies. Beware though that this may cause performance problems. Ideally, `opcsvcatrr` should only be used when testing the configuration of service attributes.

Syntax for `opcsvcatr`:

```
opcsvcatr  svc_id=<svc_name> {name=<name> value=<value>} |  
           -remove svc_id=<svc_name> {name=<name>} |  
           -removeall svc_id=<svc_name> |  
           -removepref svc_id=<svc_name>name=<name_prefix>,
```

where:	<svc_name>	Name of the service to which the service attributes apply.
	<name>	Service attribute name. For example <code>ov_label1</code> .
	<value>	Service attribute value to be displayed.
	-remove	Removes all specified service attributes.
	-removeall	Removes all service attributes.
	-removepref	Removes all service attributes which name matches the specified name prefix.
	<name_prefix>	Prefix string for -removepref.

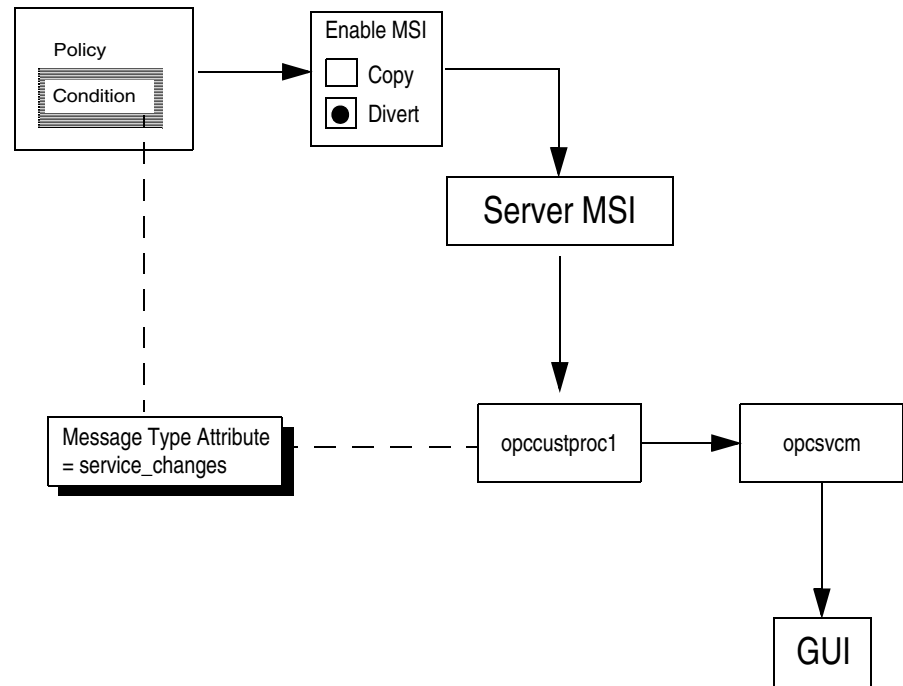
For more information about `opcsvcatr`, refer to the *opcsvcatr(1M)* man page.

Setting Service Attributes Dynamically with HPOM Messages

Use HPOM messages to transport service attributes from managed nodes to the management server. Messages that contain information relevant for service attributes are fed into the server message stream interface; the message flow of the management server. On the management server, the process `opccustproc1` retrieves those messages from the flow and, using the `opcsvcm` process, changes or removes the service attributes in the Service Navigator GUI.

See Figure 2-3, “Message Flow with `opccustproc1`,” for an illustration of the message flow from the managed nodes to the Service Navigator GUI through the management server.

Figure 2-3 Message Flow with `opccustproc1`



Information for service attributes can be attached in two ways to HPOM messages, both are available for all message sources. For these methods, message attributes are used to convey relevant information:

- ❑ Application and object message attributes
- ❑ Custom message attributes

To set service attributes:

1. On the management server, enable the `opccustproc1` process:

- a. Copy the binary by entering:

```
cp /opt/OV/contrib/OpC/opccustproc/opccustproc1 \
/opt/OV/bin/OpC
```

- b. Copy the library by entering:

- *On HP-UX on HP Integrity:*

```
cp /opt/OV/contrib/OpC/opccustproc/ \
libopccustproc1.so /opt/OV/lib/hpux32
```

- *On Solaris and Linux:*

```
cp /opt/OV/contrib/OpC/opccustproc/ \
libopccustproc1.so /opt/OV/lib
```

- c. Register the `opccustproc1` process by entering the following command:

```
/opt/OV/bin/ovcreg -add \
/etc/opt/OV/share/ovc/opccustproc1.xml
```

- d. Restart the management server by entering:

```
/opt/OV/bin/OpC/opcsv -start
```

This integrates `opccustproc1` into the management server processes. `opccustproc1` can be controlled with the `ovc` or `opcsv` command.

2. On the management server, enable output to the server message stream interface (MSI):

```
/opt/OV/bin/OpC/opcsrvconfig -msi -enable
```

(Do *not* send all messages to the server MSI.)

3. Prepare a policy and condition with the following characteristics:

- a. In policy body, use keyword `MPI_SV_DIVERT_MSG` to divert messages to Server MSI. You can use `MPI_SV_COPY_MSG` to copy them instead, but consider that the message browser can become filled with irrelevant messages.

Divert the messages rather than copying them to avoid filling the message browser with irrelevant messages.

- b. Set the message type attribute to `service_changes` by using the keyword `MSGTYPE`.

`opccustproc1` uses the message type attribute to identify the messages to be sent to Service Navigator.

- c. Set custom message attributes or the application and object message attributes:

- *Application and object message attributes*

Use keywords `APPLICATION` and `OBJECT` in the `SET` section of the policy body to set the values of application and object fields of the message.

- *Custom message attributes*

You need to define two attributes: the first attribute specifies the operation (set or remove), the second attribute specifies the parameters (service attribute name and value). Use keyword `CUSTOM` followed by name and value of the preferred attribute.

See the section “Syntax for Setting Service Attributes Dynamically” on page 90 for detailed information about the required syntax.

4. Distribute the policy to the managed nodes.

Syntax for Setting Service Attributes Dynamically

When setting service attributes with `opccustproc1`, you always need to define two parts:

❑ Operation

The operation part instructs `opccustproc1` what to do: set or remove a service attribute.

When setting service attributes with custom message attributes, the name of the custom message attribute is `OV_OPERATION`.

❑ Parameter

The parameter part contains the data for the service attribute. It consists of a name and the corresponding value.

When setting service attributes with custom message attributes, the name of the custom message attribute is `OV_PARAMS`.

Table 2-1 on page 91 describes the syntax for custom message attributes. The `OV_OPERATION` column lists the operations that are possible (set or remove). The `OV_PARAMS` column lists the names and values for service attributes.

When setting service attributes with application and object message attributes, enter the operation (set or remove) in the `Application` field, and the parameters (service attribute name and value) in the `Object` field.

Table 2-1 Syntax for Custom Message Attributes

Custom Message Attribute Name	OV_OPERATION ^a	OV_PARAMS ^b
Custom Message Attribute Value	SVC_ATTR_SET	[name=value] [name=value]...
	SVC_ATTR_REMOVE	[name] [name]...
	SVC_ATTR_REMOVE_PREF	[name_prefix]
	SVC_ATTR_REMOVE_ALL	

- a. Corresponds to the application message attribute.
- b. Corresponds to the object message attribute.

where:	SVC_ATTR_SET	Sets/adds service attributes specified in OV_PARAMS.
	SVC_ATTR_REMOVE	Removes service attributes specified in OV_PARAMS.
	SVC_ATTR_REMOVE_PREF	Removes service attributes, which name matches the name prefix specified in the OV_PARAMS.
	SVC_ATTR_REMOVE_ALL	Removes all service attributes. OV_PARAMS custom message attributes are ignored.

Message Logging for `opccustproc1`

Service attributes that are added dynamically are not stored in the database and are therefore lost after the Service Navigator `opcservice` process has been restarted. Dynamic service-related data can be logged and reused by configuring the `opccustproc1` process.

NOTE

This is not possible for service attributes that are added with `opcsvcatrr`.

The format of the logfile is XML. The message ID, the service ID, `OV_OPERATION` and `OV_PARAMS` data are stored from each message. The file is stored on the management server at the following location:

```
/var/opt/OV/share/tmp/OpC/mgmt_sv/opccustproc1.xml
```

When the `opccustproc1` process is started as part of the `ovc -start` or `opcsv -start` commands, it reads the messages from the `opccustproc1.xml` logfile as though they were being received from the message stream interface. Once all stored messages have been processed, `opccustproc1` registers with the message stream interface and reverts to normal operation.

To enable logging for the `opccustproc1` process on the HP Operations management server, use the `ovconfchg` command line tool. Enter the following:

```
ovconfchg -ovrg server -ns opc -set OPC_CUSTPROC1_LOG TRUE
```

The default maximum number of messages that can be written to the `opccustproc1` logfile is 1000. You can change this number, to 5000, for example, by using the following command:

```
ovconfchg -ovrg server -ns opc -set \  
OPC_CUSTPROC1_LOG TRUE,5000
```

After the maximum number of messages has been reached, for every further message that is appended to the end of the logfile, the earliest message is removed.

Example Policy for opcmsg Message Source

Service Navigator provides the example policy `opcmsg(1|3)DSA` for the `opcmsg(1|3)` message source. Use this example to help you set up a message source policy for your message source.

Any `opcmsg` message matched by this policy is fed into the server message stream interface and sent to the management server where the `opccustproc1` process retrieves the message and adds, changes or removes the service attributes accordingly on the Service Navigator GUI.

To Install the Example Policy `opcmsg(1|3)DSA`

Perform the following steps to install the example policy `opcmsg(1|3)DSA`:

1. Untar the upload tree that contains the example policy:

```
tar -xvf /opt/OV/OpC/examples/services/ \
dsa_upload.tar
```

The upload tree will be placed in the `/tmp/dsa` directory.

2. Upload the example policy:

```
/opt/OV/bin/OpC/opccfgupld -add -index dsa.idx \
/tmp/dsa
```

3. Run `opcpolicy -list_pols` command line utility. The policy `opcmsg(1|3)DSA` is now available in the policy list.
4. Assign and distribute the policy `opcmsg(1|3)DSA` to the managed nodes.

To Submit Messages for `opcmsg(1|3)DSA`

Use the `opcmsg` command line tool to submit messages for this policy.

❑ Example Using Custom Message Attributes:

```
opcmsg a=new_label o=my_obj msg_text="message text" \
service_id=my_service -option OV_OPERATION=SVC_ATTR_SET\
-option OV_PARAMS="[ov_label1=Master] [ov_label2=low]"
```

In this example, a message is submitted that adds two labels for the service `my_service`. The first label has the text `Master` and the second label has the text `low`. The application attribute of this message is set to `new_label` to match the attribute that is set in the policy condition.

To create a condition that would match the `new_label` value of the application field, use keyword `APPLICATION` followed by `new_label` in the `MSGCONDITIONS` block of the policy body. Setting the message type to `service_changes` is performed by entering the keyword `MSGTYPE` in the `SET` block of the policy body.

For details about policy body grammar, refer to the *HPOM Concepts Guide*.

You can find the values of the custom message attributes which belong to the policy `opcmsg(1|3)DSA` using the keyword `CUSTOM`. Look for the attributes with the following name patterns: `*OV_OPERATION*` and `*OV_PARAMS*`.

❑ Example Using Application and Object Message Attributes:

```
opcmsg a=SVC_ATTR_SET o="[ov_label1=Master] [ov_label2=low]" \
msg_text="message text" service_id=my_service
```

This example does exactly the same as the example above, but uses the application and object message attributes instead. The application attribute of this message is set to `SVC_ATTR_SET`, which is the operation type for setting the service attributes recognized by the `opccustproc1` and is simultaneously one of the match conditions specified in the `opcmsg(1|3)DSA` policy.

The following is an excerpt from the policy `opcmsg(1|3)DSA` that uses an application field of the condition block to perform the operation:

```
MSGCONDITIONS
  DESCRIPTION "Application and Object"
  CONDITION
    APPLICATION "SVC_ATTR_SET|SVC_ATTR_REMOVE|
                SVC_ATTR_REMOVE_PREF|SVC_ATTR_REMOVE_ALL"
  SET
    MSGTYPE "service_changes"
```

opccustproc1 in Flexible Management Environments

If you are operating in a flexible management environment, that is with one or more secondary management servers, you need to ensure that the `opccustproc1` process forwards messages from the primary management server to other management servers as defined in the flexible management configuration file `allnodes` that is located on the primary management server.

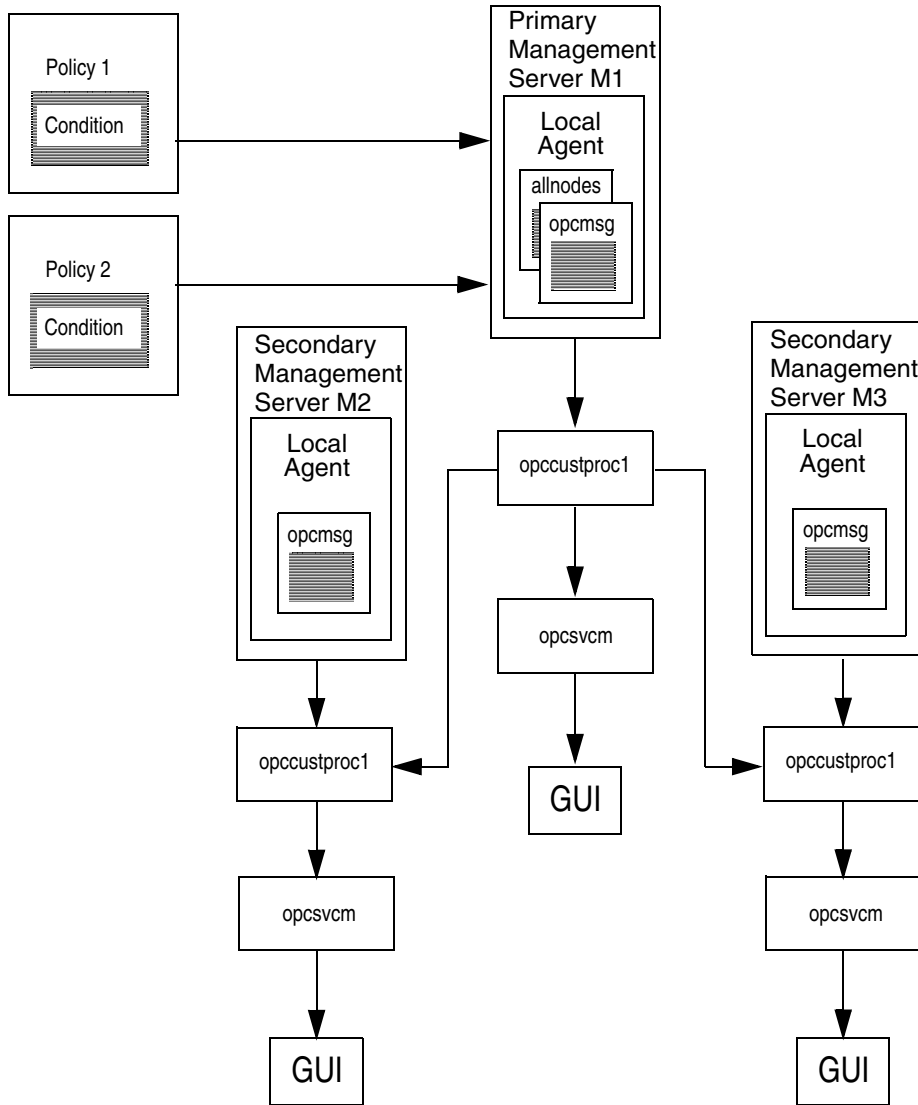
NOTE

The `opccustproc1` and `libopccustproc1.sl` must be running on the primary and all secondary management servers.

The example policy `opcmsg(1|3)DSA` can be used for this purpose. It contains a condition, `MoM_forward`, that instructs the local agent of the primary management server to send matched HPOM messages to the secondary management server.

Figure 2-4 on page 96 shows how `opccustproc1` on the primary management server *M1* forwards messages to the secondary management servers *M2* and *M3*. All management servers have `opcmsg` files installed, while only the primary server has an `allnodes` file installed. It is *not* necessary to have `allnodes` file installed on the secondary management servers for this purpose.

Figure 2-4 Message Flow with `opccustproc1` in Flexible Management Environments



To configure flexible management with `opccustproc1`:

1. Install the example policy `opcmsg(1|3)DSA` as described on page 93.
2. Make sure that the managed nodes of your primary management server are added to the Node Bank and to the Node Group Bank of your secondary management server.
3. On the HP Operations management server, use the command-line tool `ovconfchg`. Enter the following:

```
ovconfchg -ovrg server -ns opc -set \  
OPC_CUSTPROC1_MOM_FORWARD TRUE
```

4. Restart the HP Operations processes:

```
/opt/OV/bin/ovc -start
```

5. Copy the flexible management configuration file to the distribution directory:

```
cp /etc/opt/OV/share/conf/OpC/mgmt_sv/tmpl_respmgrs/  
allnodes /etc/opt/OV/share/conf/OpC/mgmt_sv/respmgrs
```

6. Edit the flexible management configuration file `/etc/opt/OV/share/conf/OpC/mgmt_sv/respmgrs/allnodes` and replace the name of the example secondary management server (`tcbbn040.bbn.hp.com`) with the name of your secondary management server.
7. Distribute the policy `opcmsg(1|3)DSA` to the managed nodes to start a distribution of the `allnodes` file.
8. Submit a test message with `opcmsg` as described in “To Submit Messages for `opcmsg(1|3)DSA`” on page 94 to test whether the label changes on both the primary and the secondary management server.

How Do I Start Service Navigator?

Starting the Service Navigator GUI depends on the platform where you want to run the GUI.

If you are running the GUI on a UNIX system, enter:

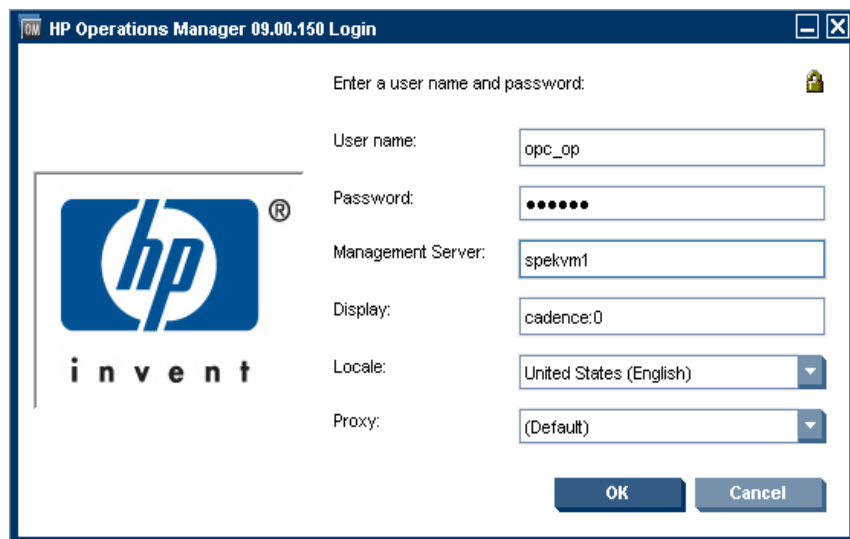
```
/opt/OV/www/htdocs/ito_op/ito_op
```

For more information about the command `ito_op`, see the man page `ito_op(1M)`.

If you are running the GUI on a PC, execute the file `ito_op.bat`.

The HPOM Java-based GUI starts and displays a login screen, see Figure 2-5. Enter your user name and password, and the HP Operations management server you are connecting to. You can also select the language you want to use. This opens the main window of the HPOM Java-based GUI.

Figure 2-5 Logging into Service Navigator



How Do I Upgrade Service Navigator?

To upgrade Service Navigator from version 8.xx to 9.0x, perform the following steps:

1. If service status logging is enabled and you want to migrate service status logs, do this:

- a. Download all service status logs by entering:

```
/opt/OV/bin/OpC/opcsvcdwn -file /tmp/svclogs
```

- b. Store the download data on a tape or separate system.

2. Store the service and service logs repository files on a tape or separate system:

```
/etc/opt/OV/share/conf/OpC/mgmt_sv/opcsvcm/services
```

```
/etc/opt/OV/share/conf/OpC/mgmt_sv/opcsvcm/loggings
```

3. Upgrade the HP Operations management server, as described in the *HPOM Installation Guide for the Management Server*.

NOTE

Service Navigator is installed automatically during the installation of HPOM 9.0x management server.

4. If you have downloaded service status logs, upload them now by entering:

```
/opt/OV/bin/OpC/opcsvcupl /tmp/svclogs
```

5. Stop the HP Operations management server with the following command:

```
/opt/OV/bin/OpC/opcsv -stop
```

6. Restore the service and service logs repository files to their original location on the management server:

```
/etc/opt/OV/share/conf/OpC/mgmt_sv/opcsvcm/services
```

```
/etc/opt/OV/share/conf/OpC/mgmt_sv/opcsvcm/loggings
```

7. Start the HP Operations management server with the following command:

```
/opt/OV/bin/OpC/opcsv -start
```

8. Check the configuration and service assignments, enter:

```
/opt/OV/bin/OpC/opcservice -list
```

```
/opt/OV/bin/OpC/opcservice -operators
```

9. Upgrade the HPOM Java-based operator GUI if it is not already done.

How Do I De-install Service Navigator?

If you no longer require Service Navigator, you can easily de-install it from the GUI client or the management server.

To De-install the Service Navigator GUI Client

NOTE

This procedure de-installs the entire HPOM Java-based GUI. If you want to remove *only* services, de-assign them from the operator. Alternatively, you can use `opcservice -remove <service_name>` to remove only one service including subservices, or `opcservice -remove` to remove all services.

❑ PC client

1. Close all running GUIs on the client.
2. Select Start: Settings -> Control Panel. The Windows Control Panel opens.
3. In the Windows Control Panel, double-click the Add/Remove Programs icon. The Add/Remove Programs Properties dialog opens.
4. In the Add/Remove Programs Properties dialog, select HP Operations for UNIX Java Console and click [Add/Remove ...].

❑ **HP-UX client**

1. Close all running HPOM GUIs on the client.
2. De-install Service Navigator interactively, using the `swremove` command. Enter the following:

```
/usr/sbin/swremove OVOPC-SVC
```

3. Check the following logfiles for problems occurring during the de-installation:

- `/var/adm/sw/swagent.log`
- `/var/adm/sw/swremove.log`

❑ **Other UNIX-based systems (for example AIX systems)**

1. Close all running HPOM GUIs on the client.
2. Remove the directory `ito_op/` and its contents.

To De-install Service Navigator from an HPOM Management Server

To de-install Service Navigator product from the HPOM management server:

1. Ensure that all client GUIs accessing Service Navigator are closed.
2. De-install Service Navigator interactively, using the `swremove` command. Enter the following:

```
/usr/sbin/swremove OVOPC-SVC
```

3. Check the following logfiles for problems occurring during the de-installation:

- `/var/adm/sw/swagent.log`
- `/var/adm/sw/swremove.log`

3 **The Service Configuration File**

In This Chapter

This chapter helps you writing the service configuration file. It contains examples of how the functionality available for Service Navigator can be translated into the configuration syntax. The configuration task can be split into the following steps:

- ❑ Creating the Service Hierarchy
- ❑ Defining the Rules
- ❑ Setting up Service Actions
- ❑ Setting Service Attributes

Creating the Service Hierarchy

Before you start writing the service configuration file you should have a good plan of your service hierarchy and of the relationships between the services. See “Planning Your Service Hierarchy” on page 69 for a list of questions you should consider.

After your hierarchy is drafted, write the configuration file. Begin with setting up the hierarchy and defining the attributes of each service. For example, the icon that represents the service in the GUI, the label that is displayed in the scoping pane or below the icon in the service graph, the title of the service graph window or of the submap displayed in the content area, and so on.

The following example builds the service hierarchy for the SAP/R3 service from the toplevel SAP/R3 service to the ABAP subservice. The service Application Server 01 *contains* its subservices, and the service Application Server 02 *uses* the OS subservice contained in Application Server 01. The name of this relationship is to be displayed in the GUI as use, so the XML tag <Label> is used.

The configuration file is available as an example file in the following directory on the management server:

```
/opt/OV/OpC/examples/services/sap.xml
```

See the following tables for more information about the service tags:

- ❑ Table B-3, “The Root Service Tags,” on page 159
- ❑ Table B-4, “The Service Tags,” on page 160
- ❑ Table B-5, “The Source Tags,” on page 162
- ❑ Table B-6, “The Association Tags,” on page 163

The Service Configuration File

Creating the Service Hierarchy

```
<?xml version='1.0' ?>
<!DOCTYPE svcengine SYSTEM "service.dtd">

<Services>
  <Service>
    <Name>SAP</Name>
    <Label>SAP R/3</Label>
    <Title>SAP R/3 Service</Title>
    <Source>
      <Composition/>
      <ServiceRef>application_server</ServiceRef>
    </Source>
  </Service>
  <Service>
    <Name>application_server</Name>
    <Label>SAP Application Server Class</Label>
    <Title>SAP Application Server Class</Title>
    <Icon>/opt/OV/www/htdocs/ito_op/images/server.32.gif</Icon>
    <Source>
      <Composition/>
      <ServiceRef>application_server_01</ServiceRef>
    </Source>
  </Service>
  <Service>
    <Name>application_server_01</Name>
    <Label>Application Server 01</Label>
    <Description>SAP/R3 Application Server01</Description>
    <Source>
      <Composition/>
      <ServiceRef>ABAP</ServiceRef>
    </Source>
    <Source>
      <Composition/>
      <ServiceRef>buffer_space</ServiceRef>
    </Source>
    <Source>
      <Composition/>
      <ServiceRef>processes</ServiceRef>
    </Source>
    <Source>
      <Composition/>
      <ServiceRef>display_queue</ServiceRef>
    </Source>
    <Source>
      <Composition/>
      <ServiceRef>OS</ServiceRef>
    </Source>
  </Service>
  <Service>
    <Name>application_server_02</Name>
    <Label>Application Server 02</Label>
    <Description>SAP/R3 Application Server 02</Description>
    <Source>
      <Dependency/>
      <ServiceRef>OS</ServiceRef>
      <Label>use</Label>
    </Source>
  </Service>
</Services>
```

The previous example uses the `<Source>` tag to establish the service hierarchy. You can also use the `<Association>` tag to achieve a similar effect. The choice depends on your XML coding style. The `<Source>` tag produces nested XML. The `<Association>` tag produces linked XML.

IMPORTANT

Make sure that all services to which you refer in your `<Association>` tags are specified in the same XML file.

❑ **Example using the `<Source>` tag:**

```
<Service>
  <Name>application_server_01</Name>
  <Source>
    <Composition />
    <ServiceRef>ABAP</ServiceRef>
  </Source>
</Service>
```

```
<Service>
  <Name>ABAP</Name>
</Service>
```

❑ **Example using the `<Association>` tag:**

```
<Service>
  <Name>application_server_01</Name>
</Service>

<Service>
  <Name>ABAP</Name>
</Service>

<Association>
  <Composition />
  <SourceRef>ABAP</SourceRef>
  <TargetRef>application_server_01</TargetRef>
</Association>
```

Defining the Rules

After you have the structure of your hierarchy in place, you can think about the status propagation and status calculation rules, as well as any weighting factors you may want to apply. See the section on “What is the Status of a Service?” on page 29 for more information about the general concepts behind status propagation and calculation, and about weighting.

The following example is similar to the previous one. Note, however, that some subservices have been omitted to keep the structure simple and clear. Instead, the rules by which Service Navigator calculates the severity statuses have been added.

Note that the rules have been configured as shared rules. This means that they are defined once and used wherever required. This saves you time and ensures consistency; when you want to change a rule, rather than changing a rule every time it is used, you only need to change the definition once.

❑ Status propagation rules

Status propagation rules for the subservices ABAP and OS are defined as increase. In addition, OS is weighted by the factor 2, and a message factor of 2 has been defined for the Application Server 01.

❑ Status calculation rules

The status calculation rule for the service Application Server 01 defines multiple thresholds.

See also Table B-7, “The Calculation Rule Tags,” on page 165 and Table B-8, “The Propagation Rule Tags,” on page 167 for a detailed list of the calculation and propagation rule tags.

The configuration file is available as an example file in the following directory on the management server:

```
/opt/OV/OpC/examples/services/sap.xml
```

```
<?xml version='1.0' ?>
<!DOCTYPE svcengine SYSTEM "service.dtd">
<Services>
  <Service>
    <Name>SAP</Name>
    <Label>SAP R/3</Label>
    <Title>SAP R/3 Service</Title>
    <Source>
      <Composition/>
      <ServiceRef>application_server</ServiceRef>
    </Source>
  </Service>

  <Service>
    <Name>application_server</Name>
    <Label>SAP Application Server Class</Label>
    <Title>SAP Application Server Class</Title>
    <Icon>/opt/OV/www/htdocs/ito_op/images/server.32.gif</Icon>
    <Source>
      <Composition/>
      <ServiceRef>application_server_01</ServiceRef>
    </Source>
  </Service>

  <Service>
    <Name>application_server_01</Name>
    <Label>Application Server 01</Label>
    <Description>SAP/R3 Application Server 01</Description>
    <MsgWeight>2</MsgWeight>
    <CalcRuleRef>multiple_thresholds</CalcRuleRef>
    <Source>
      <Composition/>
      <ServiceRef>ABAP</ServiceRef>
      <PropRuleRef>propagation_rule</PropRuleRef>
    </Source>
    <Source>
      <Composition/>
      <ServiceRef>OS</ServiceRef>
      <PropRuleRef>propagation_rule</PropRuleRef>
    </Source>
  </Service>

  <Service>
    <Name>application_server_02</Name>
    <Label>Application Server 02</Label>
    <Description>SAP/R3 Application Server 02</Description>
    <Source>
      <Dependency/>
      <ServiceRef>OS</ServiceRef>
      <Label>use</Label>
      <Weight>2</Weight>
    </Source>
  </Service>
```

The Service Configuration File

Defining the Rules

```
<CalcRule>
  <Name>multiple_thresholds</Name>
  <CalcMultiThreshold>
    <Relative/>
    <Calc>
      <Critical/>
      <Threshold>0.15</Threshold>
    </Calc>
    <Calc>
      <Major/>
      <Threshold>0.5</Threshold>
    </Calc>
    <Calc>
      <Minor/>
      <Threshold>0.6</Threshold>
    </Calc>
    <Calc>
      <Warning/>
      <Threshold>0.7</Threshold>
    </Calc>
  </CalcMultiThreshold>
</CalcRule>
```

```
<PropRule>
  <Name>propagation_rule</Name>
  <Prop>
    <Increase>1</Increase>
  </Prop>
</PropRule>
```

```
</Services>
```

Setting up Service Actions

The previous examples show you how to configure Service Navigator to display parts of the SAP/R3 service hierarchy example used in this manual. To allow operators to fully use Service Navigator, you can also set up service-specific actions which are executed on the node or application which generated the message.

The attributes of a service action include the label which is displayed in the GUI, and the URL or command to be executed. These attributes can be further modified by parameters such as a description, server, service, node, or user. See “The Service Configuration File Syntax” on page 149 for details.

To make these parameters as generic as possible, use HPOM variables in the command string when defining service actions. Consider the following example:

You want to define an action with the label `Ping Node` which executes the command `/etc/ping` on the system where your service is running. Enter the following in the service configuration file:

```
<?xml version='1.0' ?>
<!DOCTYPE Services SYSTEM "service.dtd">
<Services>
  <Action>
    <Name>ping</Name>
    <Label>Ping Node</Label>
    <Description>Ping IP addresses</Description>
    <Program>
      <Command>/etc/ping $OPC_SERVICE_VALUE[ip]
      </Command>
    </Program>
  </Action>
</Services>
```

See also Table B-9, “The Service Action Tags,” on page 169 for a detailed list of the service action tags.

Using Attributes in Service Actions

How do you know the IP addresses of the systems where your services are running? Specify them with the tag <Attribute> when defining the service in the service configuration file:

```
<?xml version='1.0' ?>
<!DOCTYPE Services SYSTEM "service.dtd">
<Services>
<Service>
  <Name>application_server</Name>
  <Label>SAP Application Server Class</Label>
  <Title>SAP Application Server Class</Title>
  <Icon>/opt/OV/www/htdocs/ito_op/images/server.32.gif
  </Icon>
  <Attribute>
    <Name>ip</Name>
    <Value>70.154.198.255</Value>
  </Attribute>
  <ActionRef>ping</ActionRef>
  <Source>
    <Composition/>
    <ServiceRef>application_server_01</ServiceRef>
  </Source>
</Service>
</Services>
```

Setting up Local Actions

Service actions can also be executed locally on the client where the Service Navigator GUI is running. For example, to find out the hostname of the client where the Service Navigator GUI is currently running, set up the following action. This executes the command `hostname` on the Service Navigator GUI client.

```
<?xml version='1.0' ?>
<!DOCTYPE Services SYSTEM "service.dtd">
<Services>
  <Action>
    <Name>Hostname</Name>
    <Label>Local Action</Label>
    <Description>Get hostnames</Description>
    <Program>
      <Command>hostname</Command>
      <Localnode/>
    </Program>
  </Action>
</Services>
```

Setting Service Attributes

Service attributes are characteristics of a service that can be defined in the service configuration file. They are used to carry additional information about a service.

Service Navigator can also handle attributes dynamically. These are attributes that are added at runtime and can override the values of attributes of the same name defined in the service configuration file. Updating attribute values at runtime can create dynamic effects in the Service Navigator GUI, for example changing labels of a service icon.

The following XML file shows you how you can change the appearance of a service submap with service attributes in a service configuration file. See “... How to Enhance a Service Submap?” on page 134 for details.

The XML shown below is extracted from the example configuration file `/opt/OV/OpC/examples/services/italy_geo.xml`. In this example, the attributes of the service `Italy Banana HQ` define a map of Italy as service submap background. This map has a width of 722 pixels and a height of 792 pixels. The subservice `Friuli branch` is positioned at 385 by 85 pixels on this background.

```
<?xml version="1.0"?>
<Services xmlns="http://www.hp.com/OV/opcsvc">
  <Service>
    <Name>italy_geo</Name>
    <Label>Italy Banana HQ</Label>
    <Icon>/opt/OV/www/htdocs/ito_op/images/eye.gif</Icon>
    <Attribute>
      <Name>ov_background</Name>
      <Value>italy.jpg</Value>
    </Attribute>
    <Attribute>
      <Name>ov_map_width</Name>
      <Value>722</Value>
    </Attribute>
    <Attribute>
      <Name>ov_map_height</Name>
      <Value>792</Value>
    </Attribute>
    <Source>
      <Composition/>
      <ServiceRef>Friuli branch</ServiceRef>
    </Source>
  </Service>
</Services>
```

```
        </Source>
</Service>
<Service>
  <Name>Friuli branch</Name>
  <Label>Friuli branch</Label>
  <Icon>/opt/OV/www/htdocs/ito_op/images/banana.gif</Icon>
  <Attribute>
    <Name>ov_posX</Name>
    <Value>385</Value>
  </Attribute>
  <Attribute>
    <Name>ov_posY</Name>
    <Value>85</Value>
  </Attribute>
</Service>
```

When you have set your service attributes in the XML configuration file, use the command `opcservice` to load the new configuration. Refer to “The `opcservice` Command” on page 175 and the `opcservice(1M)` man page for more information.

Setting up Service Assignments

The last step in configuring Service Navigator is the operator-to-service assignment. If you do not want to do this with the `opcservice` command, you can define the assignments in the service configuration file itself. Note, however, that using `opcservice` is the recommended way.

The following example assigns the service `SAP` to the operator `ito_op`. The advantage of this method is that you can customize the Service Navigator GUI for each operator by defining further attributes of the services for which the operator is responsible. See also Table B-10, “The Operator Tags,” on page 171 for a detailed list of the operator tags.

The configuration file is available as an example file in the following directory on the management server:

```
/opt/OV/OpC/examples/services/sap.xml
```

The Service Configuration File

Setting up Service Assignments

```
<?xml version='1.0' ?>
<?xml version='1.0' ?>
<!DOCTYPE svcengine SYSTEM "service.dtd">
<Services>
  <Service>
    <Name>SAP</Name>
    <Label>SAP R/3</Label>
    <Title>SAP R/3 Service</Title>
    <Source>
      <Composition/>
      <ServiceRef>application_server</ServiceRef>
    </Source>
  </Service>

  <Service>
    <Name>application_server</Name>
    <Label>SAP Application Server Class</Label>
    <Title>SAP Application Server Class</Title>
    <Icon>/opt/OV/www/htdocs/ito_op/images/server.32.gif</Icon>
    <Source>
      <Composition/>
      <ServiceRef>application_server_01</ServiceRef>
    </Source>
  </Service>

  <Service>
    <Name>application_server_01</Name>
    <Label>Application Server 01</Label>
    <Description>SAP/R3 Application Server 01</Description>
    <MsgWeight>2</MsgWeight>
    <CalcRuleRef>multiple_thresholds</CalcRuleRef>
    <Source>
      <Composition/>
      <ServiceRef>ABAP</ServiceRef>
      <PropRuleRef>propagation_rule</PropRuleRef>
    </Source>
    <Source>
      <Composition/>
      <ServiceRef>OS</ServiceRef>
      <PropRuleRef>propagation_rule</PropRuleRef>
    </Source>
  </Service>

  <Operator>
    <Name>ito_op</Name>
    <Label>ito_op's services</Label>
    <Description>Services of operator ito_op</Description>
    <ServiceRef>SAP</ServiceRef>
  </Operator>
```

A **Did You Know...**

In This Chapter

This section contains tips and tricks for configuring Service Navigator:

- ❑ ... That Names are Important?
- ❑ ... How to Use HPOM Variables?
- ❑ ... That You Can Use Example Configuration Files?
- ❑ ... That You Can Customize Icons and Backgrounds?
- ❑ ... How to Label Service Icons?
- ❑ ... How to Customize Messages in the Message Browser?
- ❑ ... How to Enhance a Service Submap?
- ❑ ... That You Can Operate with Service Navigator GUI From Other Applications?
- ❑ ... That You Can Personalize Your Service Graph and Service Map View?

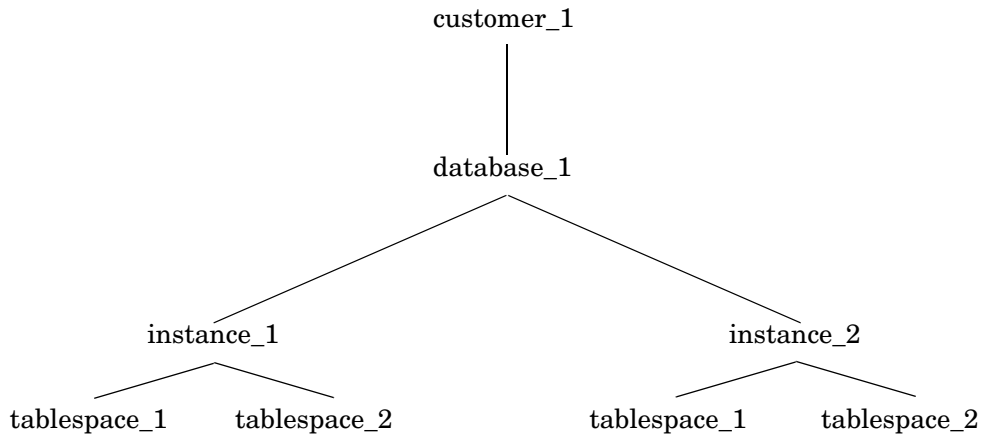
... That Names are Important?

Service names are unique identifiers or strings which you can choose freely when you write the configuration file. They do become important when you enter them in the HPOM administrator GUI to tell HPOM which messages match which services. Note, however, that you do not have to create a new policy or condition for each service you are monitoring. If you devise a structured naming schema for your services, you can use HPOM's predefined variables to match the service name attached to the message with the service names set for Service Navigator. This has the advantage that you can keep your HPOM policies generic.

Consider the following example: your IT company is managing several database installations for different customers. You know that each database installation can have several instances, and that each instance has several tablespaces which you want to monitor. You also know that you want to use the same HPOM policy to monitor the tablespaces. So you need to come up with a naming schema that enables you to create unique service names, *and* enables you to match these names with your policy.

Your service hierarchy draft would look similar to the one in Figure A-1:

Figure A-1 **A Service Hierarchy Draft**



When you know the general layout you can think about the names. Think of what makes each name unique and then compose the name with this information. In the example in Figure A-1 on page 120, the customer name and the system name on which the database is installed would uniquely identify your service.

How can you tell HPOM without hardcoding the names in the GUI? HPOM can find out some of this information by resolving variables. For example, you can use the HPOM variable `$MSG_NODE_NAME` which would return the name of the node to which the policy is assigned.

How can you find out the customer name? This depends on the type of policy you are using. If you were using a logfile policy and the name of your customer was included in the logfile, you could use HPOM pattern-matching mechanism to retrieve the customer name. You would use `<*.customer>` with `TEXT` keyword in `CONDITION` block of the policy body and would use `<customer>` with `keyword SERVICE_NAME` keyword in the `SET` block. HPOM then matches `customer` with the name of the customer and would set it as the value of the service name.

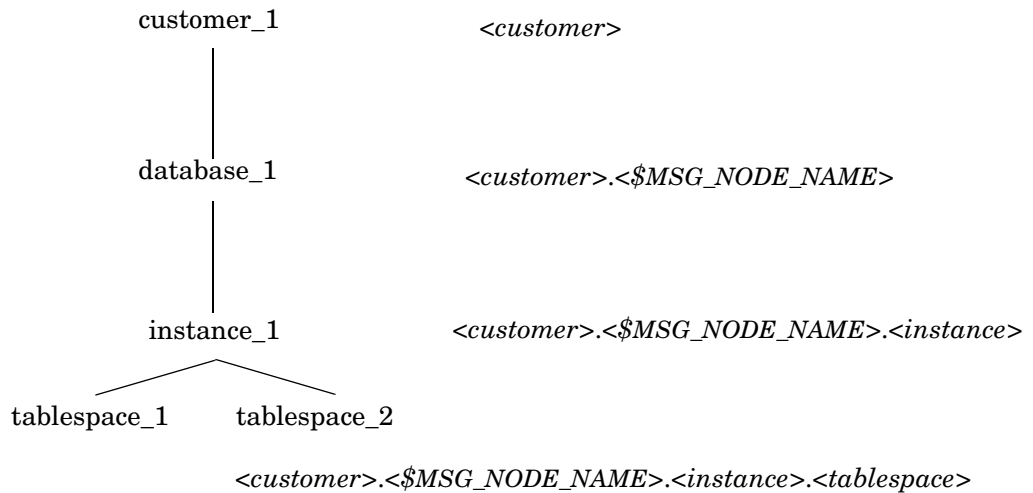
HPOM then matches `customer` with the name of `customer` and would enter it in the `Service Name` field.

In general, you can match any text that your policy or condition provides.

Figure A-2 shows the naming schema for your database monitoring services:

Figure A-2

A Naming Schema



To receive messages for the service `tablespace_1`, use the following with the `SERVICE_NAME` keyword in the policy body:

`<customer>.<MSG_NODE_NAME>.<instance>.<tablespace>`

And define its name in the service configuration file as:

`Company.system01.your.tech.com.instance_1.tablespace_1`

... How to Use HPOM Variables?

HPOM allows you to use variables as part of the service name in the Service Name field.

For example, consider the following services:

```
SAP:applsv01
```

```
SAP:applsv02
```

To intercept messages from all application servers, enter `SAP:<$MSG_NODE_NAME>` in the Service Name field.

The message condition resolves the variable to `applsv01` or `applsv02` depending on where the message originated, and sends it to the corresponding service.

See the *HPOM Administrator's Reference* for a list of variables that can be used in this field. Note that you cannot use these variables in the service configuration file.

... That You Can Use Example Configuration Files?

Service Navigator comes with a selection of service configuration files which you can copy and edit at your leisure. The example files show how to use the configuration syntax and how to apply Service Navigator to your environment. The examples are available in the following directory on the HP Operations management server:

`/opt/OV/OpC/examples/services/`

This directory also contains a README file that lists all available examples and their related files. The following examples are available:

Table A-1

Example Configuration File

File Name	Description
action.xml	Example of how to use actions.
banking.xml ^a	Banking services example.
carsupply.xml ^a	Supply chain services example of the car industry.
cltsvr.xml	Client-server system with database and nodes.
cluster.xml ^a	MC/ServiceGuard cluster system.
diskless.xml ^a	NFS diskless sample service.
email.xml ^a	Email sample service using resources.
factor.xml	Factor usage sample service.
fileserv.xml	File server example with file systems and daemons.
georga.xml	Geographically and organizationally structured servers.
icons.xml	Service file that shows all available custom icons.

Table A-1 Example Configuration File (Continued)

File Name	Description
inet.xml	Network services.
isp.xml	Internet Service Provider service with customers.
local.xml	Example of how to use local service actions.
lvm.xml ^a	Logical Volume Manager example service.
oracle.xml ^a	Oracle tablespace monitoring example.
outage.xml ^a	Outages from Service Navigator as service actions.
perf.xml	Integrating performance applications and messages.
redundant.xml ^a	4 redundant servers where at least 3 must be running
res.xml	Shared and private resources.
sap.xml	The SAP/R3 example from this manual.
vpo.xml ^a	HP Operations Manager as service.

a. This configuration file can be generated automatically with the shell scripts available in the same directory.

If element values for service files are not specified, warning messages are displayed. To handle error messages, see “Service Files Error Checking” on page 74 for more details.

The `svcapps.tar` file is a tar archive of an HPOM upload tree that can be uploaded into HPOM. It installs an application group with applications that list, assign, deassign, and remove services and assignments. Add, check, and replace the operations that are not included.

1. Change the directory:

```
cd /var/opt/OV/share/tmp/OpC_appl/
```

2. Untar the file:

```
tar -xvf /opt/OV/OpC/examples/services/svcapps.tar
```

3. Upload the upload data:

```
opccfgupld -add /var/opt/OV/share/tmp/OpC_appl/svcapps
```

... That You Can Customize Icons and Backgrounds?

You can customize the Service Navigator GUI by changing the default background, tree icons, and icons in the service graph. This is done by specifying your choice in the service configuration file, see “The Service Configuration File Syntax” on page 149.



Note that some example image files are at your disposal in the following directory on the management server after the Service Navigator installation:

`/opt/OV/www/htdocs/ito_op/images/`

All available icons are used in the example service configuration file `/opt/OV/OpC/examples/services/icons.xml`; activate this file to display each icon in the Service Navigator GUI.

Table A-2 gives an overview of the areas you can customize.

Table A-2 Customizing the Service Navigator GUI

Area	Tag	Input	Size in Pixels	Type	Default
Background graphic	<Background>	URL or path on the management server	any; graphics are resized to fit the GUI	GIF	white
Tree icon	<Icon>	URL or path on the management server	32 x 32; resized to 16 x 16	GIF ^a	
Graph icon	<Icon>	URL or path on the management server	32 x 32; resized to 16 x 16	GIF ^a	

a. Your icons must have a transparent background to properly display the severity status.

The URLs for these icons and graphics must be well-formed. You can choose between the following transport modes:

To retrieve files through a web server:

```
http://<$OPC_MGMTSV>:3443/ITO_OP/images/<icon.gif>
```

To retrieve files from the management server file system:

```
/opt/OV/www/htdocs/ito_op/images/<icon.gif>
```

You can either specify an absolute or relative path name.

Note that you can use variables as part of the URL. See “HPOM Variables in URL Definitions” on page 183 for more information.

... How to Label Service Icons?

Labels can be added to service icons, and messages to display additional information about the service. A label can be text or an image in service presentations and can apply to all service information, such as graphs, custom service maps, service submaps, impacted services and root causes, and service icons in the shortcut bar.

Services can be labeled in two ways using reserved service attributes that are recognized by the GUI:

❑ **Service Configuration File**

Specify labels in the service configuration file. The values for these labels are acquired at Service Navigator start-up and cannot be changed or removed during the current session. See “Setting Service Attributes” on page 113 for an explanation of specifying labels using the service configuration file. Labels displayed from service configuration data can be overridden dynamically.

❑ **Dynamically**

It is also possible to continuously update the text or image of a label and display the most up-to-date information by the use of messages. The refresh rate is determined by that set for the message browser. The methods of automatically setting and updating are detailed in “Setting Service Attributes Dynamically” on page 83.

The refresh interval of the GUI is 5 seconds or longer. All visible changes in the GUI are triggered by the refresh cycle, dynamic changes cannot be faster than 5 seconds from initiation.

The information represented in dynamic labels is usually retrieved from messages. The text or an image file name, parsed from, for example, message text, can then be used in a service label in the Service Navigator GUI.

Syntax for Dynamic Labels

Dynamic labels use the concept of dynamically set service attributes to achieve an effect where the content and position of labels displayed for service icons changes dynamically. For this purpose, Service Navigator uses predefined reserved service attribute names. The following table explains this syntax:

Table A-3 Key Attribute Names for Dynamic Labels

To Change:	Label Text	Label Image
Attribute Name:	<code>ov_label<n></code>	<code>ov_label<n></code>
	<n> is a number that determines the position of the label below the service icon. Must be a positive integer.	
Attribute Value:	<code><string></code>	<code>ov_image:<path_to_image></code>
	<string> must be a positive integer. <path_to_image> is the full path to the image in the file system.	

Text Labels

The service icon labels have a maximum width that is sufficient to display approximately 25 characters. If the label is too long to be fully displayed, it is cut short and appended with three dots (. . .). The tool-tip on the label shows the complete label string.

Image Labels

Image indicators using graphic files instead of text can be used to represent service information in labels. These images are typically gauge graphs as seen in Figure 3-1 on page 130, pie charts, or icons, but can be any kind of image that represents information.

Valid image file formats are gif or jpeg.

If an image is to be used as a label, the syntax is of the form:

```
ov_image:<path_to_image>
```

The file name must be specified with the full path name or with the URL (http or ftp).

It is advisable to store the image files on the HP Operations management server in the directory:

```
/opt/OV/www/htdocs/ito_op/images/
```

where they can be accessed without the full path specified, or a subdirectory of this directory.

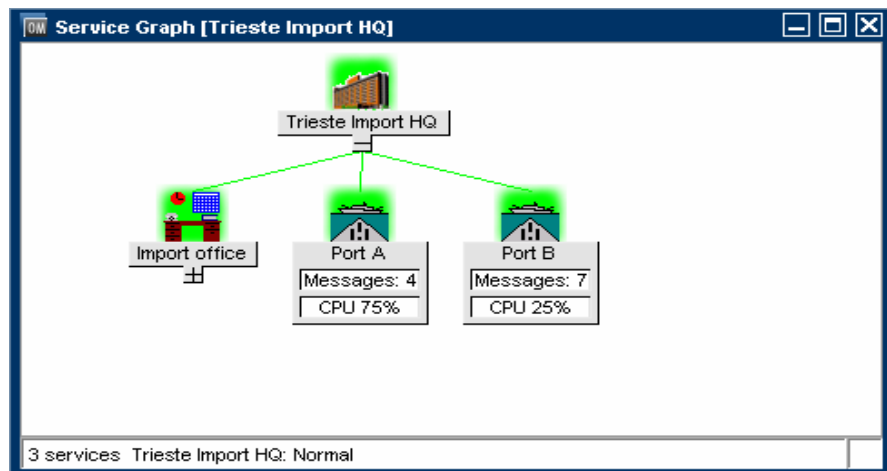
It is also advisable to use logical file names to make later application easier. For example, a set of level gauge files could be called:

```
gauge0.gif, gauge25.gif, gauge50.gif, gauge75.gif and  
gauge100.gif.
```

An Example for Setting Labels Dynamically

Figure 3-1 shows an example of how additional labels can be applied. The following command examples describe how to set up these labels. These have however been entered using `opcsvcattr`. To be of greatest value, these should be entered as variables through message attributes so as to update fully automatically.

Figure 3-1 Labeling a Service Icon



The following commands show how these labels were applied. If the command is executed successfully, a check is made and an OK message is displayed.

```
# /opt/OV/bin/OpC/opcsvcatr \  
svc_id="Port A" \  
name=ov_label1 value="Messages: 4" \  
name=ov_label2 value="CPU 75%" \  
name=ov_label3 value=ov_image:\  
/opt/OV/www/htdocs/ito_op/images/gauges/gauge75.gif  
  
<Results>  
  <OK/>  
</Results>  
  
# /opt/OV/bin/OpC/opcsvcatr \  
svc_id="Port B" \  
name=ov_label1 value="Messages: 7" \  
name=ov_label2 value="CPU 25%" \  
name=ov_label3 value=ov_image:\  
/opt/OV/www/htdocs/ito_op/images/gauges/gauge25.gif  
  
<Results>  
  <OK/>  
</Results>
```

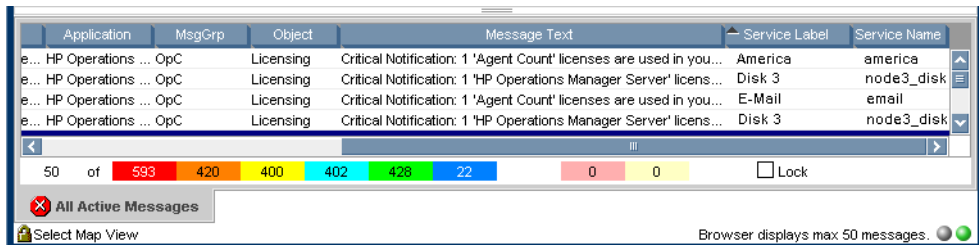
... How to Customize Messages in the Message Browser?

All messages can be identified using service labels and service names. The service label and service name are specified in the message browser displayed as columns.

You can also specify the service label and service name as attributes in the Message Properties dialog box, and as columns properties in the message browser configuration file `itoopbrw`.

Additional labels are used to display information that is important for monitoring messages. An example of how these labels can be applied to messages is shown in Figure A-3.

Figure A-3 Customizing a Message Service Label



The changes in the service label or service name are visible:

❑ Immediately

- After an operator modifies a message, this message is displayed in the message browser and in the Message Properties dialog box.
- A new message arrives, after the Administrator specified service label and service name. This change is visible immediately.

If the label is empty because the service was not yet downloaded by Java GUI, you can expand the service in the service tree. This displays the missing service label in the message browser immediately.

❑ On specified refresh rate

HPOM displays messages in the message browser on a specified refresh rate, as set in the *Preferences* dialog box.

- After different operators make their changes to a message. (For example, taking ownership or changing the service label). The changes are visible on refresh rate.
- If the attributes in the *Message Properties* dialog box are updated, they are displayed on refresh rate.

Administrator has to enable the service name and service label on the server side. Otherwise operators cannot customize them on the client side.

If you do not customize the service label and name (disabled by default), or if the service is not loaded because of Service Load on Demand, the columns in the message browser display empty fields.

Example for Customizing Service Labels in the Message Browser Using `itooprc`

To customize the message browser to display the service labels, set the `show_svc_label_in_msgs` option in the `itooprc` file before the Java GUI startup. The `itooprc` file is located in the user's home directory.

For example, by adding the following line:

```
show_svc_label_in_msgs yes.
```

The service labels have a maximum width that is sufficient to display approximately 16 characters. The service names have a maximum width that is sufficient to display approximately 12 characters. If the label or name is too long to be fully displayed, it is cut short and appended with three dots (...).

Refer to *HPOM Java GUI Operator's Guide* for more details about customizing service labels.

... How to Enhance a Service Submap?

A service submap can be customized so that the service icons are placed on a preselected background and positioned to correspond to their real world location. A submap can be configured individually for each service.

It is advisable to define backgrounds and icon locations in the service configuration file. See “Setting Service Attributes” on page 113 for an explanation of specifying backgrounds and icon positions using the service configuration file. However, it is possible to update these dynamically, as explained in “Setting Service Attributes Dynamically” on page 83.

You can configure the following aspects of a service submap:

❑ **Background image**

A graphic file with one of the following formats: gif or jpeg. For example, you could choose an image representing a geographical map of the country where your service is located.

If a background graphic is not specified, the default service submap is displayed. You cannot change the image specification in the service configuration file through the service navigator GUI.

❑ **Background size**

You define the size of the background image in pixels, usually in the service configuration file. The size is defined by the image width and height and cannot be changed in the service configuration file through the service navigator GUI.

❑ **Subservice position**

You can define the position of subservices on the background image of the parent service. The position is defined by specifying values on the X and Y axes, which applies to the display size of the parent service background image.

Any service can have any or all of the above service attributes (Background, Map Size and Position) specified, as any service can simultaneously be a parent service and a subservice.

Figure A-4 An Enhanced Service Submap

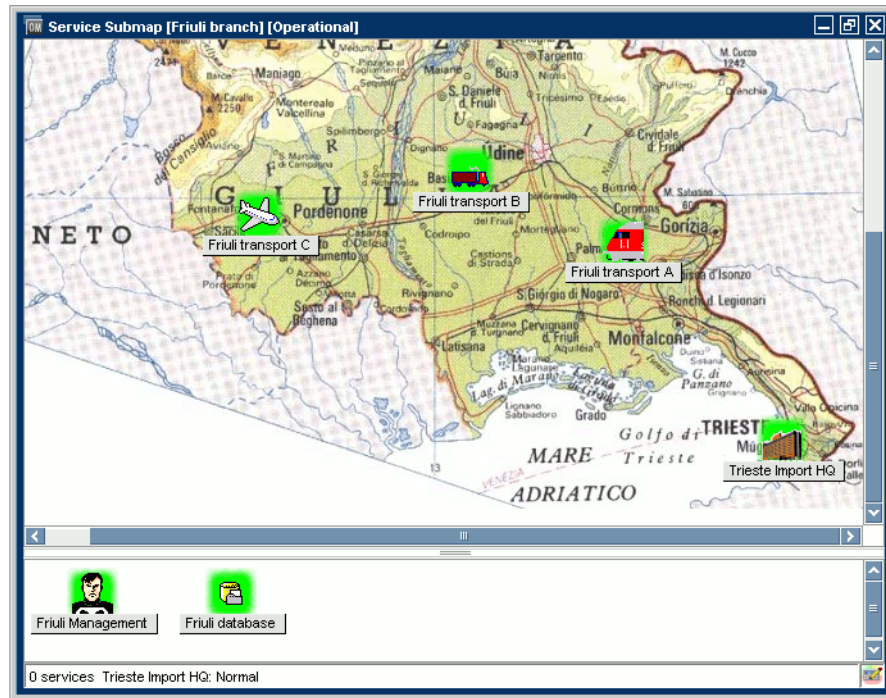


Table A-4 Key Attribute Names for Service Submap Backgrounds

To Configure	Background	Background Size	Subservice Position on Background
Attribute Name	ov_background	ov_map_width ov_map_height	ov_posX ov_posY
Attribute Value	<path_to_image> <path_to_image> is the full path to the image in the file system.	<string> <string> must be a positive integer. The value is defined in pixels.	<string> <string> must be a positive integer. The value is defined in pixels.

... That You Can Operate with Service Navigator GUI From Other Applications?

You can operate with the Service Navigator GUI remotely from other Java applications using the Java GUI Remote APIs. These applications can run in one of the following ways:

- ❑ separately from the Service Navigator GUI
- ❑ as an integrated add-on components in the workspace of the Service Navigator GUI

Java GUI Remote APIs are useful if you have mapped HPOM services in other applications because they enable you to resolve problems without searching for problem causing elements directly in the Service Navigator GUI.

For details about the available Remote APIs, refer to the Java GUI Remote APIs Specification, which can be accessed through the following URL:

`http://<management_server>:3443/ITO_OP`

In this instance, `<management_server>` is the fully qualified hostname of your management server.

For more information on the concept, integration details and usage of the Java GUI Remote APIs, refer to *HPOM Application Integration Guide*.

When the Java GUI Remote APIs are enabled, an additional icon is displayed in the Service Navigator GUI. Refer to the *HPOM Java GUI Operator's Guide* for more information.

... That You Can Personalize Your Service Graph and Service Map View?

When operating with many service graphs and maps, especially large ones, it can become difficult to access a particular service or to easily navigate through the graph or map.

You can personalize your service graph and map views in Service Navigator to obtain a more focused overview of the services and make easier to work with them.

You can achieve this by using the following Service Navigator features:

- Service Graph and Map Zooming
- Navigating through Service Graphs and Maps
- Easy Scrolling and Repositioning of Services in Service Graphs
- Making Selections in Service Graphs
- Customizing Font Size in Service Graphs and Maps

NOTE

Zooming and navigating are supported in service graphs (including Service Root Cause Graph and Service Impact Graph) and in service maps. Easy scrolling, repositioning of services, and making selections are supported *only* in service graphs.

Service Graph and Map Zooming

You can set the size of service graphs and maps using the manual and automatic zooming adjustments of the following zooming commands:

- Service Graph and Map Quick Zooming
- Setting Default Zoom Ratio

Service Graph and Map Quick Zooming

You can instantly magnify or reduce your view of the service graph or map in the following ways:

Using the ‘zoom’ drop-down list from the toolbar

From the ‘zoom’ toolbar drop-down list, select a value from a predefined set of proportional zoom ratios expressed in percentages, from 5% to 100%.

There are two other zoom options available from the ‘zoom’ toolbar drop-down list:

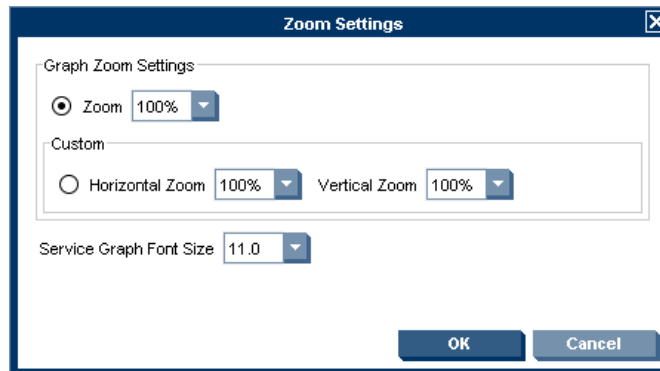
- Fit

Fit zooms the whole service graph or map, so that it fits exactly into the current window.

- Custom

Custom opens the Zoom Settings Dialog window, where you can specify the overall zoom ratio, the horizontal, and the vertical zoom ratio, as shown in the Figure A-5.

Figure A-5 Zoom Settings Dialog Window



Using the Zoom Settings pop-up menu

The options available from the ‘zoom’ toolbar drop-down list are also available from the Zoom Settings pop-up menu.

To raise the Zoom Settings pop-up menu, right-click any empty (white) area of the Service Graph or Service Submap window.

Setting Default Zoom Ratio

You can set the zoom ratio that is used each time a new service graph or map is opened in the Services tab of the Java GUI

Edit-> Preferences dialog.

Refer to *HPOM Java GUI Operator's Guide* for a description of each option on the Preferences dialog box.

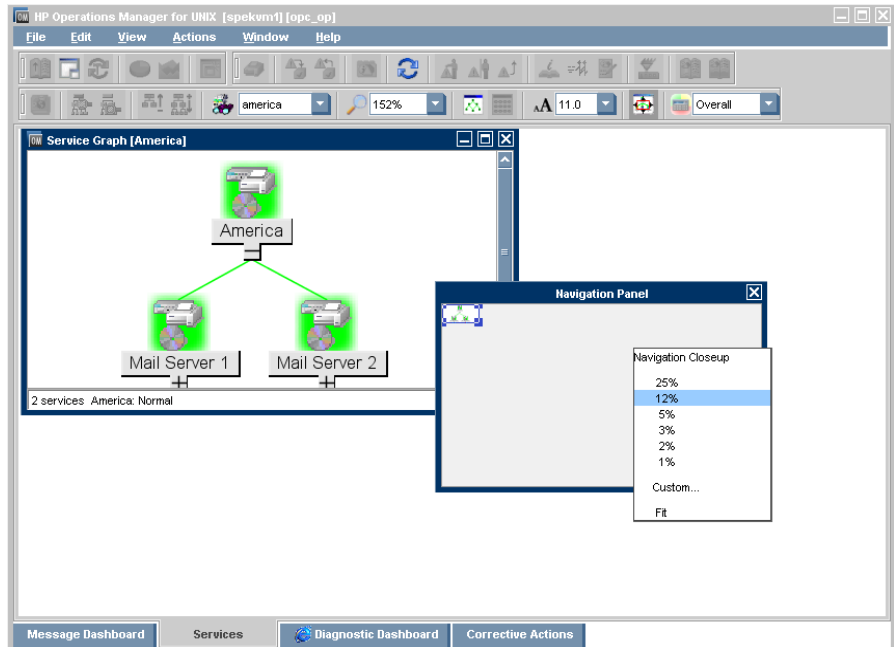
Navigating through Service Graphs and Maps

Navigating Using Navigation Panel

The Navigation Panel is a resizable window which helps you to easily navigate through the whole service graph or map area, and to get a better overview of the services.

Figure A-6 represents the Navigation Panel and Service Graph windows in the Service Navigator workspace.

Figure A-6 Service Graph Navigation Panel



The view box in the Navigation Panel represents the boundaries of the service graph area that is displayed in the Service Graph window.

NOTE

A Navigation Panel in one pane has no influence on another pane. If you want to navigate through service submaps that are split into two horizontal panes, such as service submaps with a geographical display, you must use the Navigation Panel in each pane to navigate through that pane.

When two service (sub)maps are displayed, you can switch the target for the Navigation Panel by clicking the title bar of a service (sub)map where you want to navigate.

If the entire service graph or map is not visible in the current workspace, you can use the Navigation Panel to bring another area of the service graph into view by dragging the view box over the Navigation Panel.

It is also possible to magnify or reduce the size of the service graph or map area visible in the Service Graph or Service Submap window. You can achieve this by manually resizing the view box in the Navigation Panel.

You can also magnify or reduce the size of the Navigation Panel by using the Navigation Closeup pop-up menu as shown in the Figure A-6.

NOTE

You can also use the Navigation Panel to navigate through Service Impact Graph and Service Root Cause Graph windows.

Navigation Panel can be enabled or disabled and you can do this in one of the following ways:

- By selecting the View-> Navigation Panel from the menu bar.
- By choosing the Toggle Navigation Panel icon from the toolbar.

Navigating from the Toolbar

NOTE

Go to Service drop-down list is available only from the toolbar list.

Go to Service drop-down list is a part of the Service Toolbar component. It contains a list of all services currently present in Java GUI cache that can be displayed within selected service graph.

NOTE

You can use Go to Service drop-down list for navigating only from service graphs.

When you select a service and press the [Go] button on the service toolbar, the service is displayed in the center of a service graph surrounded by its neighboring services. This way you can easily navigate through your service graph.

NOTE

If the Service Load on Demand option from the Edit-> Preferences dialog is enabled, only the names of the services that are currently retrieved from the management server are displayed in the Go to Service drop-down list.

Making Selections in Service Graphs

In large service graphs, with many service icons and connection lines, it can be difficult to determine relationships between service icons.

To easily distinguish between service icons and determine the relationships among them, you can do the following:

❑ **Selecting service icons**

When you select a service icon, all connection lines to its subsequent services are highlighted, as shown in the Figure A-7 on page 145.

Multiple selections of service icons, either using the CTRL key or mouse (lasso selections), are also possible.

❑ **Highlighting connection lines**

It is possible to highlight any connection line among service icons to determine their relationships.

NOTE

You can select the service icons and their connection lines only in active Service Graph windows. When the Service Graph window becomes inactive, all selections are no longer highlighted.

Easy Scrolling and Repositioning of Services in Service Graphs

The following features make your work with the service graphs easier:

❑ Easy scrolling

You can scroll the whole service graph area by dragging it with the mouse, without need to use the scroll bars. The dragging continues even if you move the mouse outside the `Service Graph` window.

❑ Repositioning of service icons

You can reposition service icons and their connection lines by using drag-and-drop. If more than one service icons are selected, you can simultaneously move them over the service graph area.

You can switch between customized and auto service layout.

— auto service layout

Your changes are not saved, and the positioning is restored to the previous state (default).

— customized layout

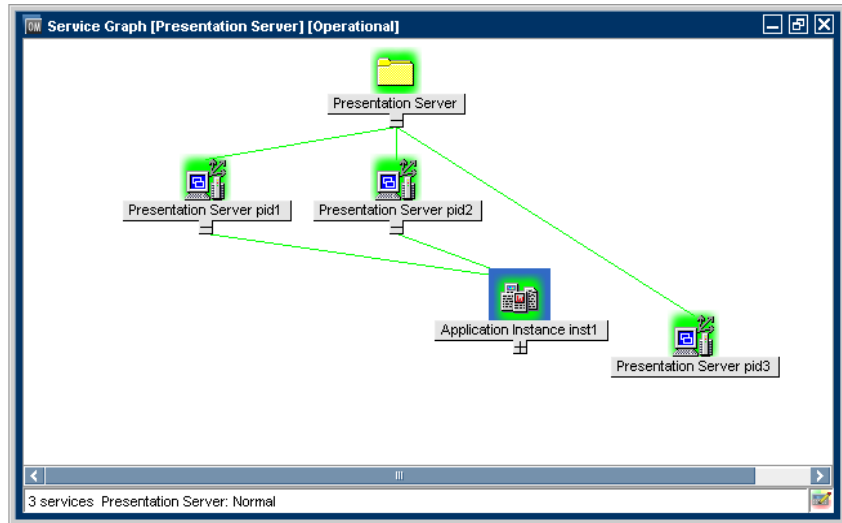
Your changes, restore the positions of the service icons.

- ❑ These features make it much easier to determine the connections that belong to a particular services as well as allow you to personalize the service graph shape. Figure A-7 on page 145 shows a repositioned `Internet Services` icon.

NOTE

It is possible to move service icons even outside service graphs and maps, as well as it is possible to move service graphs and maps themselves outside the workspace pane. To learn more about Java GUI drag and drop operations, and about the possible ways how they can be performed, refer to the *HPOM Java GUI Operator's Guide*.

Figure A-7 **Repositioning Service Icons**



NOTE

Any action that changes the service graph structure, such as expand or collapse, restores the service icons to their default positions.

Customizing Font Size in Service Graphs and Maps

You can customize the font size in service graphs and maps by setting it in the following ways:

❑ **Using the ‘font size’ drop-down list from the toolbar**

You can change the font size in your currently active service graph or map by choosing one of the available values from the ‘font size’ toolbar drop-down list.

❑ **By specifying the value in the Zoom Settings Dialog window**

You can set the font size in your currently active service graph or map, by specifying a value in the Zoom Settings Dialog window.

NOTE

In the Zoom Settings Dialog window, you can also set the overall zoom ratio, the horizontal, and the vertical zoom ratio, as shown in the Figure A-5 on page 138.

The Zoom Settings Dialog window opens when you choose Custom option from the ‘zoom’ toolbar drop-down list, or from the Zoom Settings pop-up menu in your Service Graph or Service Submap window. To learn more about Zoom Settings Dialog window, see “Service Graph and Map Quick Zooming” on page 138.

❑ **By setting the default value in the Preferences dialog**

You can set the font size that is used each time a new service graph or map is opened in the Services tab of the Java GUI Edit-> Preferences dialog.

Refer to *HPOM Java GUI Operator’s Guide* for a description of each option on the Preferences dialog box.

NOTE

You can also set the general font size, which applies to all Java GUI components except for the service graphs and maps. Refer to *HPOM Java GUI Operator’s Guide* for more information.

B **Reference Information**

In This Chapter

This section contains detailed information about the XML syntax used in the service configuration file. Additionally, all options available for the `opcservice` command are documented.

- ❑ The Service Configuration File Syntax
- ❑ The `opcservice` Command
- ❑ HPOM Variables
- ❑ Service Navigator Man Pages
- ❑ Service Navigator Product Bundles

The Service Configuration File Syntax

The service configuration file is originally a file in Extensible Markup Language (XML) format. You can edit the file using any text or XML editor. When you have finished working on this file, use the command `opcservice` to update the HPOM configuration with your additions or modifications. `opcservice` reads the service configuration file and moves it into the following directory:

```
/etc/opt/OV/share/conf/OpC/mgmt_sv/opcsvcm/services
```

NOTE

Never edit this file directly.

Defining a service configuration includes the following aspects:

- ❑ Defining the Services and Associations
- ❑ Defining Status Calculation and Propagation Rules
- ❑ Defining Service Actions
- ❑ Assigning Services to Operators

Notation Used

The format of the service configuration file is based on the World Wide Web Consortium Extended Markup Language (XML).

The Document Type Definition (DTD) for the Service Navigator XML syntax is printed in this section and is also available on the management server in:

```
/etc/opt/OV/share/conf/OpC/mgmt_sv/dtds/service.dtd
```

This DTD is also available in XML Schema Definition (XSD) format in the same directory. This alternative format is based on XML and therefore easier to read with XML editors.

The following syntax rules apply:

❑ Case Sensitive

The Service Navigator XML parser is case sensitive; the XML tags must be specified as defined in the DTD.

❑ XML Processing Instructions

Each XML file must *start* with an XML processing instruction:

```
<?xml version='1.0' ?>
```

Comments or any other tag are not allowed before this instruction.

❑ **Codeset**

If no codeset is defined, the default value UTF-8 is used.

```
<?xml version="1.0" encoding="UTF-8"?>
```

The following codesets can be used with Service Navigator:

Table B-1 Supported Codesets

Language	Codeset	
Czech	UTF-8 UTF-16BE UTF-16LE	ISO-8859-2
Japanese		Shift_JIS
Korean		EUC-KR
Russian		ISO-8859-5
Simplified Chinese		GB2312
Traditional Chinese		Big5
Western European (for example, English, French, German, or Spanish)		ISO-8859-1 ISO-8859-15 roman8

The codesets are the standard codeset names as defined by IANA (Internet Assigned Numbers Authority).

❑ **Name Spaces**

The following namespace is used by the Service Navigator service
 DTD: <http://www.hp.com/OV/opcsvc>

Name spaces are specified within the toplevel XML tag and are used to uniquely identify the XML tags. For example, a file `services.xml` should start like this:

```
<?xml version='1.0' ?>
<Services xmlns="http://www.hp.com/OV/opcsvc">
```

- ❑ **Comments**

XML provides a mechanism for commenting code which has the same syntax as for HTML comments: `<!-- comment -->`; comments must not occur within declarations or inside element tags.

- ❑ **Content Model Operators**

The following content model operators occur in the DTD:

Table B-2

XML Content Model Operators

Symbol	Usage
,	Strict ordering
	Selection
+	Repetition; minimum one
*	Repetition
?	Optional
()	Grouping

- ❑ **#PCDATA**

Elements that have character content are declared as #PCDATA.

- ❑ **#ASCII**

Elements that have ASCII only character content are declared as #ASCII.

- ❑ **EMPTY**

Elements that are empty are declared as EMPTY.


```
<!-- XML DTD for service engine files and repository -->
<!-- Services is the root element -->

<!ELEMENT Services (CalcRule | PropRule | Action
                    | Service | Operator | Association)* >
<!ATTLIST Services xmlns CDATA #IMPLIED
                    version CDATA #IMPLIED>

<!ENTITY % Severity "(Normal | Warning | Minor | Major | Critical)"
>

<!-- Status Calculation Rules -->
<!ELEMENT CalcRule (Name,
                    (CalcMostCritical |
                     CalcSingleThreshold |
                     CalcMultiThreshold)) >

<!ELEMENT CalcMostCritical EMPTY >

<!ENTITY % ThresholdType "(Absolute | Relative)?" >

<!ELEMENT CalcSingleThreshold (%ThresholdType;,
                               Threshold, SetTo?) >
<!ELEMENT CalcMultiThreshold (%ThresholdType;,
                               Calc*) >
<!ELEMENT Calc ((Warning | Minor | Major | Critical),
               Threshold, SetTo?) >

<!-- Status Propagation Rules -->
<!ELEMENT PropRule (Name, Prop*) >
```

The Service Configuration File Syntax

```
<!ELEMENT Prop ((%Severity;)?,  
                (Increase | Decrease | Unchanged | Ignore | SetTo))  
>
```

```
<!-- Actions -->
```

```
<!ELEMENT Action (Name,  
                  Label?,  
                  Description?,  
                  (Program | URL | Applet))>
```

```
<!ELEMENT Applet (Class, Width, Height, Parameter*) >
```

```
<!ELEMENT Parameter (Name, Value) >
```

```
<!ELEMENT Program (Command,  
                   User,  
                   ServiceNodes?,  
                   ServerNode?,  
                   LocalNode?,  
                   NodeRef*) >
```

```
<!-- Service Elements -->
```

```
<!ELEMENT Service (Name,  
                  Status?,  
                  MultiStatus*,  
                  Label?,  
                  Description?,  
                  Title?,  
                  Icon?,  
                  Depth?,  
                  Background?,  
                  MsgWeight?,
```

```
CalcRuleRef?,  
MsgPropRuleRef?,  
OriginalId?,  
(NodeRef | Attribute | ActionRef | Source |  
MsgSvcName)* ) >
```

```
<!-- Service Attributes -->
```

```
<!ELEMENT Attribute (Name, Value) >
```

```
<!-- Associations -->
```

```
<!ELEMENT Source ((Dependency | Composition),  
ServiceRef,  
Status?,  
Label?,  
Weight?,  
PropRuleRef?) >
```

```
<!ELEMENT Association ((Dependency | Composition |  
OperatorAssignment),
```

```
SourceRef,  
TargetRef,  
Status?,  
MultiStatus*,  
Label?,  
Weight?,  
PropRuleRef?) >
```

```
<!-- Operators -->
```

```
<!ELEMENT Operator (Name,  
Status?,  
MultiStatus*,  
Label?,  
Description?,
```

```
Title?,
Icon?,
Depth?,
Background?,
ServiceRef*)>
```

```
<!-- Basic Attribute Elements -->
<!ELEMENT Status          %Severity; >
<!ELEMENT SetTo           %Severity; >
<!ELEMENT MultiStatus     (CalculationId, Status)>
<!ELEMENT CalcRuleRef     (#PCDATA) >
<!ELEMENT MsgPropRuleRef  (#PCDATA) >
<!ELEMENT ServiceRef      (#PCDATA) >
<!ELEMENT SourceRef       (#PCDATA)>
<!ELEMENT TargetRef       (#PCDATA)>
<!ELEMENT PropRuleRef     (#PCDATA) >
<!ELEMENT ActionRef       (#PCDATA) >
<!ELEMENT AttrRef         (#PCDATA) >
<!ELEMENT NodeRef         (#PCDATA) >
<!ELEMENT Name            (#PCDATA) >
<!ELEMENT Label           (#PCDATA) >
<!ELEMENT Description      (#PCDATA) >
<!ELEMENT Threshold       (#PCDATA) >
<!ELEMENT Increase        (#PCDATA) >
<!ELEMENT Decrease        (#PCDATA) >
<!ELEMENT MsgWeight       (#PCDATA) >
<!ELEMENT Weight          (#PCDATA) >
<!ELEMENT Value           (#PCDATA) >
<!ELEMENT Command         (#PCDATA) >
<!ELEMENT URL             (#PCDATA) >
<!ELEMENT Title           (#PCDATA) >
```

```
<!ELEMENT Background      (#PCDATA) >
<!ELEMENT Depth           (#PCDATA) >
<!ELEMENT Icon            (#PCDATA) >
<!ELEMENT User            (#PCDATA) >
<!ELEMENT Class           (#PCDATA) >
<!ELEMENT Width           (#PCDATA) >
<!ELEMENT Height          (#PCDATA) >
<!ELEMENT MsgSvcName      (#PCDATA) >
<!ELEMENT OriginalId      (#PCDATA) >
<!ELEMENT CalculationId   (#PCDATA) >
<!ELEMENT Absolute        EMPTY >
<!ELEMENT Relative        EMPTY >
<!ELEMENT Unchanged       EMPTY >
<!ELEMENT Ignore          EMPTY >
<!ELEMENT Normal          EMPTY >
<!ELEMENT Warning         EMPTY >
<!ELEMENT Minor           EMPTY >
<!ELEMENT Major           EMPTY >
<!ELEMENT Critical        EMPTY >
<!ELEMENT ServerNode      EMPTY >
<!ELEMENT ServiceNodes    EMPTY >
<!ELEMENT LocalNode       EMPTY >
<!ELEMENT Dependency      EMPTY >
<!ELEMENT Composition     EMPTY >
<!ELEMENT OperatorAssignment EMPTY >

<!-- EOF -->
```

The following sections describe the tags used in the service configuration file.

Defining the Services and Associations

The following are descriptions of the service tags. The definition includes the relationship of the service to other services, and the attributes of the service.

- ❑ The Root Service Tags
- ❑ The Service Tags
- ❑ The Source Tags
- ❑ The Association Tags
- ❑ The Calculation Rule Tags
- ❑ The Propagation Rule Tags
- ❑ The Service Action Tags
- ❑ The Operator Tags

Table B-3 The Root Service Tags

Tag	Required?	Description
<Services>	Required.	Is the root element. It contains the following tags: <ul style="list-style-type: none"> • <CalcRule> • <PropRule> • <Action> • <Service> • <Operator> • <Association>
<CalcRule>	Any number possible.	Specifies the calculation rule.
<PropRule>	Any number possible.	Specifies the propagation rule.
<Action>	Any number possible.	Specifies the action.
<Service>	Any number possible.	Specifies the service.
<Operator>	Any number possible.	Specifies the operator.
<Association>	Any number possible.	Specifies an association.

Table B-4 The Service Tags

Tag	Required?	Description
<Service>	Any number possible.	<p>Specifies the service. It contains the following tags:</p> <ul style="list-style-type: none"> • <Name> • <Status> • <MultiStatus> • <Label> • <Description> • <Title> • <Icon> • <Depth> • <Background> • <MsgWeight> • <CalcRuleRef> • <MsgPropRuleRef> • <OriginalId> • <NodeRef> • <Attribute> • <ActionRef> • <Source> • <MsgSvcName>
<Name>	Required.	<p>Specifies the name of the service. The name must match the string that is entered in the policy, condition, or regroup condition window, or supplied as parameter of <code>opcmsg (1)</code>.</p> <p>Note that the name must not be longer than 254 characters, and must not start with a hyphen (-).</p>
<Status>	Optional.	<p>Contains the current status of the service. This tag is ignored when specified in a service configuration file. Status queries, for example, with the command <code>opcservice -xml -list</code> or with the Service Navigator APIs of the Developer's Toolkit, output a severity for the service.</p>
<MultiStatus>	Optional.	<p>Contains the current multistatus of the service. This tag is ignored when specified in a service configuration file. Similarly as status, multistatus queries, for example, with the command <code>opcservice -xml -list</code> or with the Service Navigator APIs of the Developer's Toolkit, output a severity for the service.</p>

Table B-4 The Service Tags (Continued)

Tag	Required?	Description
<Label>	Optional.	Specifies the label of the service. The string that is entered here is displayed in the Service Navigator GUI. If <Label> is not used, <Name> is displayed.
<Description>	Optional.	Specifies the description of the service. A detailed description can be useful for future reference.
<Title>	Optional.	Specifies the title of the service window in the Service Navigator GUI. If <Title> is not used, <Label> is displayed.
<Icon>	Optional.	Specifies an icon for the service.
<Depth>	Optional.	Specifies the number of hierarchical levels displayed in the Service Navigator GUI. By default, two levels are displayed: the service itself and one more level. The number must be an integer, for example 3.
<Background>	Optional.	Specifies a background graphic for the content pane in the Service Navigator GUI. Graphics are defined through URLs or can be called from the filesystem on the management server. If <Background> is not used, a default white background is used.
<MsgWeight>	Optional.	Specifies the weight of the service's own messages against the weight of its subservices. The default value is 1. The number can be a floating value, for example 1.8 or 2.5.
<CalcRuleRef>	Optional.	References the calculation rule (defined in <CalcRule>) to be applied to this service.
<MsgPropRuleRef>	Optional.	References the propagation rule (defined in <PropRule>) for the service's messages.
<OriginalId>	Optional.	Identifier set by HP Operations Service Configuration for Service Navigator.
<NodeRef>	Any number possible.	References one or more nodes that belong to a service.

Table B-4 The Service Tags (Continued)

Tag	Required?	Description
<Attribute>	Any number possible.	Specifies name=value pairs which can be referenced by service actions. It contains the following tags: <ul style="list-style-type: none"> • <Name> • <Value> See “Reserved Service Attributes” on page 172 for a list of attribute names that are reserved for Service Navigator internal use.
<ActionRef>	Any number possible.	Specifies a service action.
<Source>	Any number possible.	Specifies a subservice.
<MsgSvcName>	Any number possible.	“Service name in message” attribute of the service. Used by HP Operations Service Configuration for Service Navigator only.

Table B-5 The Source Tags

Tag	Required?	Description
<Source>	Any number possible.	Specifies the service. It contains the following tags: <ul style="list-style-type: none"> • <Dependency> • <Composition> • <ServiceRef> • <Status> • <Label> • <Weight> • <PropRuleRef>
<Dependency>	Required.	Specifies a usage relationship to a subservice.
<Composition>	Required.	Specifies a containment relationship to a subservice.
<ServiceRef>	Required.	References the subservice as defined in <Service>.

Table B-5 The Source Tags (Continued)

Tag	Required?	Description
<Status>	Optional.	Contains the current status of the service. This tag is ignored when specified in a service configuration file. Status queries, for example with the command <code>opcservice -list, -xml</code> , or with the Service Navigator APIs of the Developer's Toolkit, output a severity for the service.
<Label>	Optional.	Specifies the name of the link between the service and the subservice. The label is displayed in the Service Navigator GUI.
<Weight>	Optional.	Specifies the factor to be used to modify the importance of a service's impact on its parent. This can be a decimal number. The default value is 1. The number can be a floating value, for example 1.8 or 2.5.
<PropRuleRef>	Optional.	References the propagation rule (defined in <PropRule>) for the service's messages.

Table B-6 The Association Tags

Tag	Required?	Description
<Association>	Any number possible.	<p>Specifies an association of a service to another service. It contains the following tags:</p> <ul style="list-style-type: none"> • <Dependency> • <Composition> • <OperatorAssignment> • <SourceRef> • <TargetRef> • <Status> • <MultiStatus> • <Label> • <Weight> • <PropRuleRef> <p>Using the <Association> tag has an effect similar to using the <Source> tag. The choice depends on your XML coding style. The <Source> tag produces nested XML. The <Association> tag produces linked XML.</p>

Table B-6 The Association Tags (Continued)

Tag	Required?	Description
<Dependency>	Required.	Specifies a usage relationship to a subservice.
<Composition>	Required.	Specifies a containment relationship to a subservice.
<Operator_Assignment>	Required.	Specifies an assignment of an operator to a service.
<SourceRef>	Required.	References the source service as defined in <Service>.
<TargetRef>	Required.	References the target service as defined in <Service>.
<Status>	Optional.	Contains the current status of the association. This tag is ignored when specified in a service configuration file. Status queries, for example with the command <code>opcservice -xml -list</code> output of severity for the association.
<MultiStatus>	Optional.	Contains the current multistatus of the association. This tag is ignored when specified in a service configuration file. Similarly as status, multistatus queries, for example, with the command <code>opcservice -xml -list</code> output of severity for the service.
<Label>	Optional.	Specifies the name of the link between the service and the subservice. The label is displayed in the Service Navigator GUI.
<Weight>	Optional.	Specifies the factor to be used to modify the importance of a service's impact on its parent. This can be a decimal number. The default value is 1. The number can be a floating value, for example 1.8 or 2.5.
<PropRuleRef>	Optional.	References the propagation rule (defined in <PropRule>) for the service's messages.

Defining Status Calculation and Propagation Rules

The following tags define the status calculation and propagation rules used by Service Navigator.

Table B-7 The Calculation Rule Tags

Tag	Required?	Description
<CalcRule>	Any number possible.	Specifies a calculation rule. It contains the following tags: <ul style="list-style-type: none"> • <Name> • <CalcMostCritical> • <CalcSingleThreshold> • <CalcMultiThreshold>
<Name>	Required.	Specifies the name of the calculation rule.
<CalcMostCritical>	Required.	Specifies the most critical status calculation rule. This is the default.
<CalcSingleThreshold>	Required.	Specifies the single threshold calculation rule. It contains the following tags: <ul style="list-style-type: none"> • <Absolute> • <Relative> • <Threshold> • <SetTo>
<CalcMultiThreshold>	Required.	Specifies a multiple threshold calculation rule. It contains the following tags: <ul style="list-style-type: none"> • <Absolute> • <Relative> • <Calc> • <Threshold> • <SetTo>
<Absolute>	Optional.	Specifies an absolute value for <Threshold>.
<Relative>	Optional.	Specifies a percentage value for <Threshold>.
<Threshold>	Required.	Specifies the threshold value. If an absolute threshold is specified, an integer value must be used. If a relative threshold is specified, a floating point value between 0.0 (0%) and 1.0 (100%) must be used.

Table B-7 The Calculation Rule Tags (Continued)

Tag	Required?	Description
<SetTo>	Optional.	Specifies a severity which the service adopts. Contains one of the following tags: <ul style="list-style-type: none"> • <Normal> • <Warning> • <Minor> • <Major> • <Critical>
<Calc>	Any number possible.	Specifies a value for each severity. It contains the following tags: <ul style="list-style-type: none"> • <Warning> • <Minor> • <Major> • <Critical> • <Threshold> • <SetTo>
<Normal>	Required.	Specifies the severity normal.
<Warning>	Required.	Specifies the severity warning.
<Minor>	Required.	Specifies the severity minor.
<Major>	Required.	Specifies the severity major.
<Critical>	Required.	Specifies the severity critical.

Table B-8 The Propagation Rule Tags

Tag	Required?	Description
<PropRule>	Any number possible.	Specifies a propagation rule. It contains the following tags: <ul style="list-style-type: none"> • <Name> • <Prop>
<Name>	Required.	Specifies the name of the propagation rule.
<Prop>	Any number possible.	Specifies the single threshold calculation rule. It contains the following tags: <ul style="list-style-type: none"> • <Normal> • <Warning> • <Minor> • <Major> • <Critical>
<Normal>	Optional.	Specifies the severity normal. It contains the following tags: <ul style="list-style-type: none"> • <Increase> • <Decrease> • <Unchanged> • <Ignore> • <SetTo>
<Warning>	Optional.	Specifies the severity warning. It contains the following tags: <ul style="list-style-type: none"> • <Increase> • <Decrease> • <Unchanged> • <Ignore> • <SetTo>
<Minor>	Optional.	Specifies the severity minor. It contains the following tags: <ul style="list-style-type: none"> • <Increase> • <Decrease> • <Unchanged> • <Ignore> • <SetTo>

Table B-8 The Propagation Rule Tags (Continued)

Tag	Required?	Description
<Major>	Optional.	Specifies the severity major. It contains the following tags: <ul style="list-style-type: none"> • <Increase> • <Decrease> • <Unchanged> • <Ignore> • <SetTo>
<Critical>	Optional.	Specifies the severity critical. It contains the following tags: <ul style="list-style-type: none"> • <Increase> • <Decrease> • <Unchanged> • <Ignore> • <SetTo>
<Increase>	Required.	Defines the number of severity levels by which a given severity is increased.
<Decrease>	Required.	Defines the number of severity levels by which a given severity is decreased
<Unchanged>	Required.	Defines that severity of the subservice is not changed. This is the default.
<Ignore>	Required.	Defines that the severity is ignored in terms of status propagation.
<SetTo>	Required.	Specifies the severity which the service adopts. Contains one of the following tags: <ul style="list-style-type: none"> • <Normal> • <Warning> • <Minor> • <Major> • <Critical>

See “What is the Status of a Service?” on page 29 for more information about the concept behind calculation and propagation rules.

Defining Service Actions

The following lines define actions that can be assigned to services. Service actions are started by a popup menu.

Table B-9 The Service Action Tags

Tag	Required?	Description
<Action>	Any number possible.	Specifies a service action.
<Name>	Required.	Specifies the name of the service action.
<Label>	Optional.	Specifies the label of the service action. The label is displayed in the popup menu of the Service Navigator GUI.
<Description>	Optional.	Specifies the description of the service action. A detailed description can be useful for future reference.
<Program>	Required.	<p>Specifies the command to be executed when the service action is started. Note that you can only run the following type of actions:</p> <ul style="list-style-type: none"> • output-only applications • X-applications if they are redirected to the GUI client <p>Contains the following tags:</p> <ul style="list-style-type: none"> • <Command> • <User> • <ServiceNodes> • <ServerNode> • <LocalNode> • <NodeRef
<URL>	Required.	Specifies the URL of the web application to be started by the service action. The application is displayed in a separate window.
<Command>	Required.	Specifies the command to be executed when the service action is started.
<User>	Required.	Specifies the user who executes the service action. Must be specified for <Program> actions.

Table B-9 **The Service Action Tags (Continued)**

Tag	Required?	Description
<ServiceNodes>	Optional.	Executes the service action on the nodes defined in <Service>.
<ServerNode>	Optional.	Executes the service action on the HP Operations management server.
<LocalNode>	Optional.	Executes the service action on the computer where the Service Navigator is running.
<NodeRef>	Any number possible.	Specifies the nodes on which the service action is to be executed.

Assigning Services to Operators

The following are descriptions of the operator tags.

Table B-10 **The Operator Tags**

Tag	Required?	Description
<Operator>	Any number possible.	Specifies an operator-to-service assignment. Contains the following tags: <ul style="list-style-type: none"> • <Name> • <Label> • <Description> • <Title> • <Icon> • <Depth> • <Background> • <ServiceRef>
<Name>	Required.	Specifies the name of the operator, for example <code>opc_op</code> .
<Label>	Optional.	Specifies the label of the toplevel service that is assigned to the operator. The label is displayed in the Service Navigator GUI.
<Description>	Optional.	Specifies the description of the service assignment. A detailed description can be useful for future reference.
<Title>	Optional.	Specifies the title of the service window in the Service Navigator GUI. If <Title> is not used, <Label> is displayed.
<Icon>	Optional.	Specifies an icon for the toplevel service that is being assigned.
<Depth>	Optional.	Specifies the number of hierarchical levels displayed in the Service Navigator GUI. By default, two levels are displayed: the service itself and one more level. The number must be an integer, for example 3.
<Background>	Optional.	Specifies a background graphic for the content pane in the Service Navigator GUI. Graphics are defined through URLs or can be called from the filesystem on the management server. If <Background> is not used, a default white background is used.
<ServiceRef>	Any number possible.	Specifies the service (defined in <Service>) for which the operator is responsible. If <ServiceRef> is not defined, the toplevel service is assigned.

Reserved Service Attributes

The following attribute names are reserved for internal use by Service Navigator. They are used to achieve special effects in the GUI, for example for enhancing service submaps and for labeling service icons dynamically.

Attribute name: **ov_label<n>**

Description: Defines additional labels for service icons.

<n> determines the position of the label below the service icon. Must be a positive integer.

Attribute value: The value of the attribute can be one of the following:

- *<string>*
Specifies label text.
- *ov_image:<image>*
Specifies an image to be displayed as label.
<image> must either be the full path to the image in the file system on the management server or a URL (http or ftp).

Example:

```
<Attribute>
  <Name>ov_label1</Name>
  <Value>First Label</Value>
  <Name>ov_label2</Name>
  <Value>ov_image:/opt/OV/www/htdocs/\
    ito_op/images/second_label.gif</Value>
</Attribute>
```

Attribute name: **ov_background**

Description: Defines an image to be displayed on the background of the submap of a service.

Value: `<image>`
`<image>` must either be the full path to the image in the file system on the management server or a URL (http or ftp).

Example: `<Attribute>`
 `<Name>ov_background</Name>`
 `<Value>/etc/opt/OV/share/\`
 `backgrounds/italy.gif</Value>`
`</Attribute>`

Attribute name: **ov_map_width**

Description: Defines the width of a submap background in pixels.

Value: `<string>`
`<string>` must be a positive integer. The value is defined in pixels.

Example: `<Attribute>`
 `<Name>ov_map_width</Name>`
 `<Value>100</Value>`
`</Attribute>`

Attribute name: **ov_map_height**

Description: Defines the height of a submap background in pixels.

Value: `<string>`
`<string>` must be a positive integer. The value is defined in pixels.

Example: `<Attribute>`
 `<Name>ov_map_height</Name>`
 `<Value>100</Value>`
`</Attribute>`

Attribute name: **ov_posX**

Description: Defines the position of the service icon on the x axis of the submap of the parent service (in pixels).

Value: `<string>`
`<string>` must be a positive integer. The value is defined in pixels.

Example:
`<Attribute>`
 `<Name>ov_posX</Name>`
 `<Value>50</Value>`
`</Attribute>`

Attribute name: **ov_posY**

Description: Defines the position of the service icon on the y axis of the submap of the parent service (in pixels).

Value: `<string>`
`<string>` must be a positive integer. The value is defined in pixels.

Example:
`<Attribute>`
 `<Name>ov_posY</Name>`
 `<Value>50</Value>`
`</Attribute>`

The `opcservice` Command

The command `opcservice` adds, replaces, and deletes service configurations. It lets you assign services to operators as part of their responsibilities, and de-assign services if they are no longer responsible. It is located in the following directory:

```
/opt/OV/bin/OpC/opcservice
```

The `opcservice` command interprets the character set of its command line arguments by the locale setting. Therefore, before calling `opcservice`, make sure that the locale set for your terminal window corresponds to the system startup language. You can determine the system startup language by reading the following files:

- ❑ on HP-UX: `/etc/rc.config.d/LANG`
- ❑ on Sun Solaris: `/etc/default/init`

If `LANG` is not set in these files, `C` is used by default.

The output of the `opcservice` command is in the external character set, that is, the character set in which the command was started. The `-xml` option is one exception: if you call `opcservice -xml`, the output is in the external character set UTF-8.

Note that there is also a wrapper `/opt/OV/bin/OpC/opcservice.sh` which is linked to `/usr/bin/opcservice` and first calls `opcsvconv` to convert the configuration files to the new syntax, if necessary.

opcservice has the following command line options (which can also be abbreviated):

```
opcservice

    [-help] |
    [-verbose] |
    [-xml] |
    -list
    [[-services] [-all] [-recursive|-subentity] [-full]
    [<service_name>...]]
    [-actions [<action_name>...]]
    [-calcrules [<calculation_rule_name>...]]
    [-proprules [<propagation_rule_name>]]
    [-operators [<operator>...]] |
    -add <configuration_file>
    [[-services] [<service_name>...]]
    [-actions [<action_name>...]]
    [-calcrules [<calculation_rule_name>...]]
    [-proprules [<propagation_rule_name>]]
    [-operators [<operator>...]]
    [-overwrite] |
    -replace <configuration_file>
    [[-services] [<service_name>...]]
    [-actions [<action_name>...]]
    [-calcrules [<calculation_rule_name>...]]
    [-proprules [<propagation_rule_name>]]
    [-operators [<operator>...]] |
    -remove [[-services] [<service_name>...]]
    [-actions [<action_name>...]]
    [-calcrules [<calculation_rule_name>...]]
    [-proprules [<propagation_rule_name>]]
    [-operators [<operator>...]] |
    -check <configuration_file> |
    -assign <operator> <service_name>[<service_name>...] |
    -deassign <operator> [<service_name>...] |
    -assignments <service_name> [<service_name>...] |
```



```
-operators [<operator>...] |  
-services [<service_name>...] |  
-actions [<action_name>...] |  
-proprules [<propagation_rule_name>...] |  
-calcrules [<calculation_rule_name>...] |  
-logs <service_name>[<service_name>...] |  
-log_enable [-recursive|-depth <number>]  
<service_name>[<service_name>...] |  
-log_disable [<service_name>...] |  
-validate <file_name> |  
-commit |  
-dump <file_name> |
```

Note that the following options are deprecated:

```
-remove_action  
-remove_calcrule  
-remove_proprule  
-globals  
-subentity
```

Where:

-help	Prints usage message for opcservice; all other options are ignored.
-verbose	Creates verbose output and displays all messages on standard output.
-xml	Causes opcservice to output pure XML format in the code set UTF-8.
-list	Lists the services defined in the service repository. If <code>-recursive</code> is specified, the services are listed recursively. If <code>-full</code> is specified, the referenced objects are listed. <code>-all</code> lists the entire configuration.
-add	Adds the service input file <code><configuration_file></code> to the service repository file. A list of objects can be specified. If an object with the same name already exist, errors are issued and the existing objects remain unchanged. If <code>-overwrite</code> is used, there will be no warning that a service already exists.
-replace	Replaces existing objects defined in <code><configuration_file></code> or else adds new objects to the service repository file. Objects can be specified by name.
-remove	Removes existing objects defined in <code><configuration_file></code> the service repository file. A objects can be specified. If nothing is specified, everything is removed.
-check	Checks that the XML syntax in <code><configuration_file></code> is correct and consistent. It also issues warnings for duplicate names.
-assign	Assigns the service with <code><service_name></code> to the operator specified in <code><operator></code> . This service and all contained/used subservices are then visible to the operator.

-deassign	De-assigns the service with <code><service_name></code> from the operator specified in <code><operator></code> . The operator can no longer see this service and its subservices. If you do not specify a service, all assigned services are deassigned.
-assignments	Lists all operators who are assigned to the service specified in <code><service_name></code> . If you do not specify a service name, all operators who have a service assigned are listed.
-operators	Lists all assignments to all operators. If you specify an operator, only the assignments of that operator are listed.
-services	Lists all services. If you specify a service, only that service is listed.
-actions	Lists all actions that are defined in the service configuration file. If you do not specify an action name, all actions are listed.
-proprules	Lists all propagation rules that are defined in the service configuration file. If you do not specify a propagation rule, all propagation rules are listed.
-calcrules	Lists all calculation rules that are defined in the service configuration file. If you do not specify a calculation rule, all calculation rules are listed.
-logs	Lists all services whose status is currently logged in the database.
-log_enable	Enables logging of service status changes in the database.
-log_disable	Disables logging of service status changes in the database.
-validate	Validates a given XML input against the XML schema referenced in the header of the input file.
-commit	Updates the service repository with all pending configuration changes.
-dump	Outputs the current content of the service engine in XML format. This is useful for troubleshooting purposes.

The opcservice Command

Multiple options can be specified for one command; for example, `opcservice -remove - operators -list - operators`, first removes all operators and then attempts to list them. See also the man page *opcservice(1M)*.

HPOM Variables

This section lists and defines the variables that can be used with Service Navigator.

HPOM Variables in Service Names

See the *HPOM Administrator's Reference* for a list of variables that can be used in the Service Name fields of the policy and condition windows and the Regroup Condition No. window.

HPOM Variables in Tools and Service Actions

The following variables can be used in the command string when defining a service action in the service configuration file:

`$OPC_SERVICE_LABEL` Returns the label of a service.

`$OPC_SERVICE_MAPPINGS_SVC_COUNT`

Returns the number of “service name in message” properties of a service.

Sample output:

17

`$OPC_SERVICE_MAPPINGS_SVC [n]`

Returns the *n*th “service name in message” of a service.

Sample output:

SAP:applsv02

`$OPC_SERVICE_MAPPINGS_SVCS`

Returns all “service name in message” properties of a service. The names are separated by spaces.

Sample output:

SAP:applsv01 SAP:applsv02

HPOM Variables

\$OPC_SERVICE_NAME

Returns the name of the current service.

\$OPC_SERVICE_NODE

Returns the name of the node service attribute, if set.

\$OPC_SERVICE_ORIGINAL_ID

Returns the original ID of a service.

Sample output:

node_fred

\$OPC_SERVICE_VALUE[name]

Returns the value of the service parameter with name <name> for the selected service; returns an empty string if not set.

NOTE

All these HPOM variables can also be used with tools.

HPOM Variables in URL Definitions

The following variables can be used when defining a URL:

<code>\$LANG</code>	Returns the language setting of the user who is running a Service Navigator GUI.
<code>\$OPC_GUI_CLIENT</code>	Returns the hostname of the client the GUI is currently running on.
<code>\$OPC_MGMTSV</code>	Returns the hostname of the HP Operations management server.

Service Navigator Man Pages

This section provides a list of all man pages available for Service Navigator. To refer to the man pages, call them from the command line by using: `man <manpagename>`. If you want to print the man pages, use the command:

```
man <manpagename> | col -1b | lp -d printer_name
```

The man pages are also available in HTML format; open your Internet browser at the following URL:

```
http://<management_server>:3443/ITO_MAN
```

where <management_server> is the fully qualified hostname of your management server.

Man Page

Summary

opcservice(1M)

Configure HP Operations Service Navigator.

opcsvattr(1M)

Add, change or remove service attributes.

opcsvconv(1M)

Convert service configuration files of HP Operations Service Navigator from the proprietary syntax used with version A.05.xx to XML.

opcsvdwn(1M)

Download service status logs of HP Operations Service Navigator to a file.

opcsvcterm(1M)

Emulates an interface to HP Operations Service Navigator which inputs XML into stdin and outputs XML to stdout.

opcsvcupl(1M)

Upload service status logs of HP Operations Service Navigator into the HPOM database.

Service Navigator Product Bundles

The Service Navigator principle bundle is a hierarchical structure made up of associated bundles, products, and filesets. You can view these software components using the `swinstall` GUI of SD-UX (HP-UX only).

Table B-11 Service Navigator Software Bundles

Product	Fileset	Product
HPOvOUser	HPOVOUSVCENG	Service Navigator Localized Files - English
	HPOVOUSVCJPN ^a	Service Navigator Localized Files - Japanese
	HPOVOUSVCKOR	Service Navigator Localized Files - Korean
	HPOVOUSVCMGR	Service Navigator Manager
	HPOVOUSVCSCH	Service Navigator Localized Files - Simplified Chinese
	HPOVOUSVCSPA	Service Navigator Localized Files - Spanish

Glossary

service A customer-based or user-oriented capability provided by one or more hardware or software components within a computing environment (for example, Email, Network Bandwidth, application access).

service attributes Attributes specified for the service by the HPOM administrator. Service attributes can be defined in the service configuration file and dynamically added, changed or removed at runtime through the `opcsvcattr` command or through the `opcmsg` policy. Reserved attributes are used for service labeling and enhanced service submap presentation.

service hierarchy The ordered dependency relationships between services.

service level agreement A business agreement between a service provider and a service consumer that defines the service level objectives (performance, availability, and so on) and the cost for the service.

severity level A property of an object indicating the status of the object. Severity level is based on the impact of events or messages associated with the object.

Smart Plug-In Prepackaged software that installs into a management console and provides management capabilities specific to a given type of business application, database, operating system, or service, such as SAP/R3.

status calculation Process used to determine the status of a service or object based on the status of the source objects that contribute to the status of the service or object. In HPOM for Windows, status calculation determines the status of a service based on the severity level(s) of subservice(s).

status propagation The way that the status of a status source is represented for status calculation of a superordinate object or service.

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