

HP Operations Orchestration

for the Windows and Linux operating systems

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HP Integrated Lights Out (iLO) Integration Guide

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1 Introduction

This section includes the following topics:

- [Purpose of the iLO Integration](#)
- [Supported Versions](#)
- [Downloading OO Releases and Documents on HP Live Network](#)

Purpose of the iLO Integration

With this integration, administrators can build HP Operations Orchestration (OO) flows that are integrated into Integrated Lights Out (iLO) management processors for HP Proliant Servers.

This document explains how this integration has been implemented and how the operations included communicate between OO and iLO.

Supported Versions

Table 1 Supported Versions

Operations Orchestration Version	Proliant iLO Version	Proliant iLO 2 Version	Proliant iLO 3 Version
Content Pack 7	1.94 or greater	1.60 or greater	1.26 or greater

Downloading OO Releases and Documents on HP Live Network

HP Live Network provides an **Operations Orchestration Community** page where you can find and download supported releases of OO and associated documents.

To download OO releases and documents, visit the following site:

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1. On the left-hand side, click **Operations Orchestration Content Packs**.
2. In the **Operations Orchestration Content Packs** box, click **Content**. The HP Passport and sign-in page appears.
3. Enter your user ID and Password to access to continue.
4. Click **HP Operations Orchestration 9.00**.
5. Search for HP Operations Orchestration Content Pack 7

2 Getting Started with the iLO Integration

This section includes the following topics:

- [iLO – OO Architecture](#)
- [iLO Use Cases](#)

iLO — OO Integration Architecture

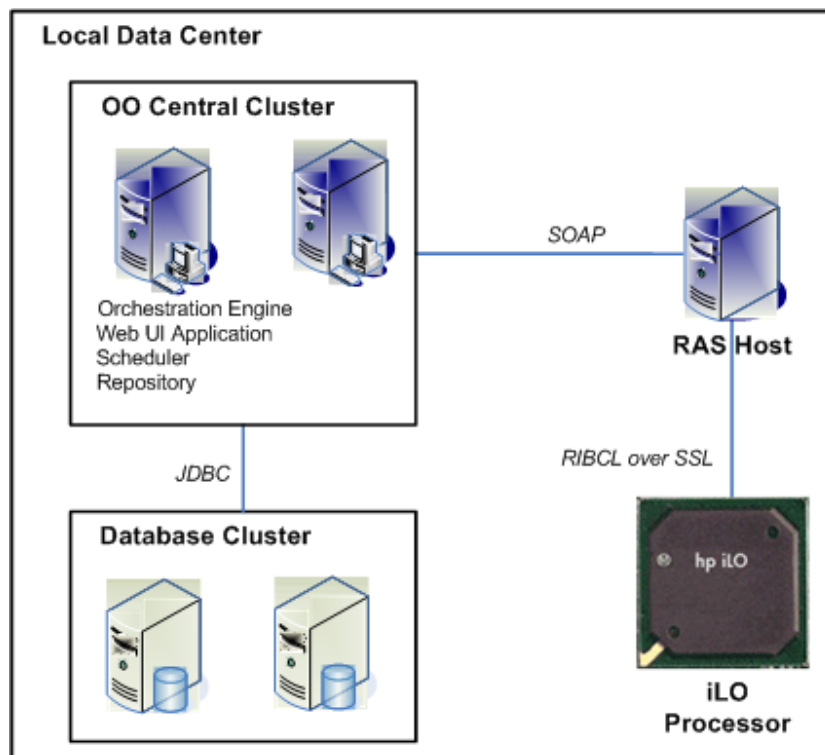


Figure 1 - HP Proliant iLO Architecture

iLO Use Cases

Following are the major use cases for the iLO integration, and the operations and flows that you can use to implement them.

- 1 Samples to show how to use the **Execute RIBCL** operation:
 - Activate iLO License
 - Deactivate iLO License
 - Get Auto Power On
 - Get iLO Firmware Version
 - Set Unit ID Light State
- 2 Manipulate iLO user accounts from a flow:
 - Create User
 - Delete User
 - Modify User
- 3 Manipulate the physical system's power state:
 - Host Power Status

- Power On Host
- Get Power Cap Values
- Restart Host
- Restart iLO Processor
- Set Auto Power On
- Set Power Saver Mode
 - Enables you to set low power, dynamic power, high power, and OS controlled power on supported hardware.
- Set Power Cap
- 4 Manipulate iLO virtual media:
 - Insert Virtual Media
 - Eject virtual media
- 5 Manipulate host data:
 - Get Host Data
- 6 Run RIBCL script:
 - Execute RIBCL Script
- 7 Manage firmware update
 - Update Firmware
- 8 Manage SNMP and Insight Manager (IM) Configuration
 - Get SNMP IM Settings
 - Modify SNMP IM Settings

3 Using the iLO – OO Integration

This section includes the following topics:

- [Location of iLO Integration Operations and Flows in OO Studio](#)
- [Common Inputs in the Integration](#)
- [Descriptions of iLO Integration Operations and Flows](#)

Location of iLO Integration Operations and Flows in OO Studio

The HP Proliant iLO integration includes the following operations and flows in the OO Studio Library/Integrations/Hewlett-Packard/Proliant iLO/ folder.

The operations and flows apply to the original iLO version, iLO 2, and iLO 3 unless otherwise noted.

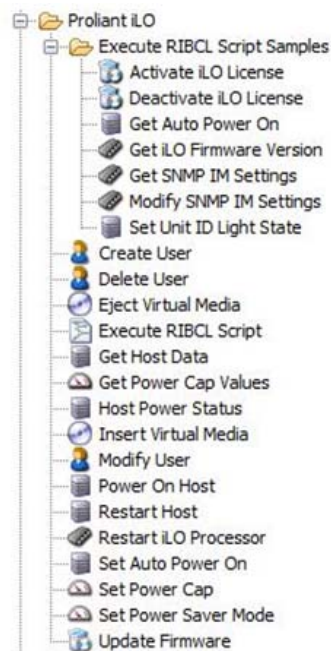


Figure 2 – Location of iLO Integration Operations and Flows

Common Inputs in the Integration

The following inputs are used consistently throughout the integration's operations and flows.

host

The hostname or IP address that is assigned to the target iLO processor.

username

The login name for the user account that has privileges on the target iLO processor.

password

The password for the iLO user account.

port

The SSL port to connect to on the target iLO processor. This is the same SSL port that is used for the iLO Web interface. The default is **443**.

Descriptions of iLO Integration Operations and Flows

This section describes the HP Proliant iLO integration's operations and flows, including any operation- and flow-specific inputs.

Execute RIBCL Script Samples

The following sample flows are examples of how to use the **Execute RIBCL Script** operation.

Activate iLO License

The **Activate iLO License** flow applies a license key to enable iLO advanced features using the **Execute RIBCL Script** operation.

Inputs

All of the flow's inputs except the following are described in *Common Inputs in the Integration*.

`licenseKey`

The license key to apply to the iLO processor.

Results

The flow returns the following results:

`returnResult`

The task or operation result.

Deactivate iLO License

The **Deactivate iLO License** flow deactivates iLO advanced features on a Proliant iLO processor using the **Execute RIBCL Script** operation.

Inputs

All of the flow's inputs are described in *Common Inputs in the Integration*.

Results

The flow returns the following results:

`returnResult`

The task or operation result.

Get Auto Power On

The **Get Auto Power On** flow retrieves the current auto power on (APO) setting for the host via a Proliant iLO processor using the **Execute RIBCL Script** operation.

Inputs

All of the flow's inputs are described in [Common Inputs in the Integration](#).

Results

The flow returns the following results:

`autoPowerOn`

The current auto power on setting for the host.

Get iLO Firmware Version

The **Get iLO Firmware Version** flow retrieves the current running firmware version of a Proliant iLO processor using the **Execute RIBCL Script** operation.

Inputs

All of the flow's inputs are described in [Common Inputs in the Integration](#).

Results

The flow returns the following results:

`firmwareVersion`

The running firmware version of a Proliant iLO processor.

`managementProcessor`

The management processor style (for example, iLO).

Get SNMP IM Settings

The **Get SNMP IM Settings** flow retrieves the current SNMP and Insight Manager (IM) settings of a Proliant iLO processor.

Inputs

All of the flow's inputs are described in [Common Inputs in the Integration](#).

Results

The flow returns the following results:

`returnResult`

This is the primary output.

iloAlert

Corresponds to the current state of RIB_TRAPS. This option specifies whether iLO alerts are sent to the trap receiver or not. The values can be Yes or No.

imAlert

Corresponds to the current state of OS_TRAPS. This option specifies whether IM alerts are sent to the trap receiver or not. The values can be Yes or No.

imDataReturn

Corresponds to the current state of CIM_SECURITY_MASK. This option controls the flow of information to the Insight Manager requests. The value of 1 disabled the iLO from responding to the IM requests. The value of 3 enabled the iLO to respond to the IM requests. The other values -- 0, 2, and 4 -- have been deprecated.

imWebAgentAddress

The address to enable access to the Insight Management Web Agents from iLO.

snmpAddress1

The address of a remote system to receive SNMP traps from iLO. Up to 3 SNMP trap receivers are allowed.

snmpAddress2

See snmpAddress1.

snmpAddress3

See snmpAddress1.

snmpPassThru

Enables or disables the capability of the iLO to receive and to send SNMP requests to and from the host OS. The values can be Yes or No.

Modify SNMP IM Settings

The Modify SNMP IM Settings flow is used to modify the SNMP and Insight Manager (IM) settings of a Proliant iLO processor. All the SNMP or IM parameters are optional. If a parameter is not specified, then the parameter value for the specified setting is preserved except for the following:

For iLO and iLO2, if the current value for imDataReturn (CIM_SECURITY_MASK) is Disable (1) and if no change is specified for this parameter, the iLO firmware will set this value to Enable (3) upon the completion of this flow.

Inputs

All of the flow's inputs except the following are described in [Common Inputs in the Integration](#)host - The target Proliant iLO processor.

snmpAddress1

The address of a remote system to receive SNMP traps from iLO. Up to 3 SNMP trap receivers are allowed. If left empty, no changes will be made. To clear the entry, use the blank or space character for the entry.

snmpAddress2

See snmpAddress1.

snmpAddress3

See snmpAddress1.

iloAlert

Corresponds to the current state of RIB_TRAPS. This option specifies whether iLO SNMP alerts are sent to the trap receiver or not. The values can be No Change, Yes (Enable), or No (Disable).

imAlert

Corresponds to the current state of OS_TRAPS. This option specifies whether to forward Insight Manager Agent SNMP alerts to the trap receiver. The values can be No Change, Yes (Enable), or No (Disable).

snmpPassThru

Enables or disables the capability of the iLO to receive and to send SNMP requests to and from the host OS. The values can be No Change, Yes (Enable), or No (Disable).

imWebAgentAddress

The address to enable access to the Insight Management Web Agents from iLO. If left empty, no changes will be made. To clear the entry, use the blank or space character for the entry.

imDataReturn

Corresponds to the current state of CIM_SECURITY_MASK. This option controls the flow of information to the Insight Manager requests. The value of 1 disabled the iLO from responding to the IM requests. The value of 3 enabled the iLO to respond to the IM requests. The other values -- 0, 2, and 4 -- have been deprecated. The valid values for this parameter are No Change, Disable (1), and Enable (3).

Results

The operation returns the following results:

returnResult

This is the primary output.

Set Unit ID Light State

The **Set Unit ID Light State** flow sets the Unit ID (UID) light state on a Proliant iLO processor using the **Execute RIBCL Script** operation.

Inputs

All of the flow's inputs except the following are described in *Common Inputs in the Integration*.

`uidState`

Specifies whether to turn the UID light on. The valid values are **Yes** and **No**.

Results

The flow returns the following results:

`returnResult`

The task or operation result.

Create User

The **Create User** operation creates a new user on a Proliant iLO processor.

Inputs

All of the operation's inputs except the following are described in *Common Inputs in the Integration*.

`userFullName`

The full name (real name) of the new user.

`userLogin`

The login name of the new user.

`userPassword`

The password for the new user login.

`adminPrivileges`

Specifies whether to allow the new user to administer user accounts. The valid values are **Yes** and **No** (the default is **No**).

`remoteConsolePrivileges`

Specifies whether to allow the new user to access the remote console. The valid values are **Yes** and **No** (the default is **No**).

`resetServerPrivileges (optional)`

Specifies whether to allow the new user to switch server power and reset the server. The valid values are **Yes** and **No** (the default is **No**).

`virtualMediaPrivileges (optional)`

Specifies whether to allow the new user to access virtual media. The valid values are **Yes** and **No** (the default is **No**).

`configureIloPrivileges` (optional)

Specifies whether to allow the new user to configure other iLO settings (such as global settings and networking). The valid values are **Yes** and **No** (the default is **No**).

Results

The operation returns the following results:

`returnResult`

The task or operation result.

Delete User

The **Delete User** operation deletes an existing user on a Proliant iLO processor.

Inputs

All of the operation's inputs except the following are described in *Common Inputs in the Integration*.

`userLogin`

The login name of the user to delete.

Results

The operation returns the following results:

`returnResult`

The task or operation result.

Eject Virtual Media

The **Eject Virtual Media** operation ejects the virtual media for the selected virtual media device on a Proliant iLO processor.

Inputs

All of the operation's inputs except the following are described in *Common Inputs in the Integration*.

`device`

The virtual media device to eject. The valid values are **CDROM** and **FLOPPY**.

Results

The operation returns the following results:

`returnResult`

The task or operation result.

Execute RIBCL Script

The **Execute RIBCL Script** operation executes an RIBCL script on a Proliant iLO processor.

Inputs

All of the operation's inputs except the following are described in *Common Inputs in the Integration*.

ribclScript

The XML of the script to execute without the **RIBCL** or **LOGIN** elements. This operation wraps the script with the **RIBCL** and **LOGIN** elements based on the username and password inputs.

Results

The operation returns the following results:

returnResult

The RIBCL script result if the operation fails.

rawResponse

The raw XML response from the Proliant iLO processor.



RIBCL is XML scripting for iLO processors. For more information about RIBCL scripting, read the *HP Integrated Lights-Out Management Processor Scripting and Command Line Resource Guide* available here:

<http://bizsupport1.austin.hp.com/bc/docs/support/SupportManual/c00294268/c00294268.pdf>

Sample scripts can be found here:

<ftp://ftp.hp.com/pub/softlib2/software1/pubsw-windows/p1507541202/v60710/windows-LOsamplescripts3.00.0-2.zip>

Get Host Data

The **Get Host Data** operation gets host data about the Proliant server from the Proliant iLO processor.

Inputs

All of the operation's inputs are described in *Common Inputs in the Integration*.

Results

The operation returns the following results:

`returnResult`

The task or operation result.

`biosDate`

The date of the running BIOS image.

`biosFamily`

The BIOS family for the host.

`productName`

The descriptive model name of the host.

`embedNIC1MAC`

The MAC address of the first embedded NIC.

`embedNIC2MAC`

The MAC address of the second embedded NIC.

`iloNICMAC`

The MAC address of the iLO NIC.

`serialNumber`

The serial number of the host.

`uuid`

The UUID of the host.

Get Power Cap Values

The **Get Power Cap Values** operation gets the minimum and maximum values of the power supply for a Proliant iLO 2 managed host and the current power cap value for iLO 2 and iLO 3 hosts. Note that the minimum and maximum values of the power supply are not available for iLO 3.

Inputs

All of the operation's inputs are described in *[Common Inputs in the Integration](#)*.

Results

The operation returns the following results:

`returnResult`

The operation result.

`maxWatts`

The maximum power cap value (iLO 2 only).

minWatts

The minimum power cap value (iLO 2 only).

currentPowerCap

The current power cap value.

Host Power Status

The **Host Power Status** operation retrieves the host power state using Proliant.

Inputs

All of the operation's inputs are described in *Common Inputs in the Integration*.

Results

The operation returns the following results:

returnResult

The task or operation result.

Insert Virtual Media

The **Insert Virtual Media** operation inserts and configures the mount behavior of virtual media images on a Proliant iLO processor.

Inputs

All of the operation's inputs except the following are described in *Common Inputs in the Integration*.

url

The HTTP URL of the virtual media image.

Examples:

- **http://hostname/image.iso**
- **http://username:password@hostname:port/image.bin**

device

The virtual media device to use. The valid values are **CDROM** and **FLOPPY**. Use **FLOPPY** for USB key drive images.

virtualMediaBootOption

Specifies how virtual media behaves during the boot phase of the server. The following options are available:

- **CONNECT** – The virtual media is connected immediately and stays connected through subsequent server boot cycles (this is the default).

- **BOOT_ALWAYS** – The virtual media device is connected on the next and subsequent server boot cycles.
- **BOOT_ONCE** – The virtual media device is connected on the next server boot cycle and disconnected on subsequent boot cycles.

virtualMediaWriteProtect

Specifies whether to write-protect the virtual media. This is only applicable to a **FLOPPY** device. The valid values are **Yes** and **No** (the default is **Yes**).

Results

The operation returns the following results:

returnResult

The task or operation result.

Modify User

The **Modify User** operation modifies an existing user on a Proliant iLO processor. Optional parameters that are left empty are not modified for the target user.

Inputs

All of the operation's inputs except the following are described in *Common Inputs in the Integration*.

userLogin

The login name of the user to modify.

userFullName

The new full name (real name) of the user.

userPassword

The new password for the user.

adminPrivileges

Specifies whether to allow the user to administer user accounts. The valid values are **Yes** and **No**.

remoteConsolePrivileges

Specifies whether to allow the user access to the remote console. The valid values are **Yes** and **No**.

resetServerPrivileges

Specifies whether to allow the user to switch server power and reset the server. The valid values are **Yes** and **No**.

virtualMediaPrivileges

Specifies whether to allow the user access to virtual media. The valid values are **Yes** and **No**.

`configureIloPrivileges`

Specifies whether to allow the user to configure other iLO settings (such as global settings, and networking). The valid values are **Yes** and **No**.

Results

The operation returns the following results:

`returnResult`

The task or operation result.

Power On Host

The **Power On Host** operation switches the host power on or off via a Proliant iLO processor.

Inputs

All of the operation's inputs except the following are described in *Common Inputs in the Integration*.

`hostPower`

The desired power state for the host. The valid values are **Yes** (on) and **No** (off). If the power is on and `hostPower` is no, an ACPI signal is initiated to start a graceful shutdown of the operating system (the same as momentary press of the power button).

`force`

Specifies whether to force the power state change by using the virtual power press and hold method. The valid values are **Yes** and **No** (the default value is **No**).

Results

The operation returns the following results:

`returnResult`

The task or operation result.

Restart Host

The **Restart Host** operation performs a warm boot of the server if it is currently on via the Proliant iLO processor.

Inputs

All of the flow's inputs are described in *Common Inputs in the Integration*.

Results

The operation returns the following results:

`returnResult`

The task or operation result.

Restart iLO Processor

The **Restart iLO Processor** operation restarts the Proliant iLO processor.

Inputs

All of the flow's inputs are described in *Common Inputs in the Integration*.

Results

The operation returns the following results:

`returnResult`

The task or operation result.

Set Auto Power On

The **Set Auto Power On** operation sets automatic power on and power on delay settings for the host via a Proliant iLO processor. This configures whether or not the host automatically powers on when power has been restored after a power outage. This can be configured with a variable delay for hosts with iLO 2.

Inputs

All of the operation's inputs except the following are described in *Common Inputs in the Integration*.

`autoPowerOn`

The desired auto power on setting. Possible values include:

- **yes** – Enables automatic power on with a minimum delay.
- **no** – Disables automatic power on.
- **15** – Enables automatic power on with a 15-second delay.
- **30** – Enables automatic power on with a 40-second delay.
- **45** – Enables automatic power on with a 45-second delay.
- **60** – Enables automatic power on with a 60-second delay.
- **random** – Enables automatic power on with a random delay of up to 60 seconds



The original iLO firmware only supports **yes** and **no** values.

Results

The operation returns the following results:

`returnResult`

The task or operation result.

Set Power Cap

The **Set Power Cap** operation sets the power cap for the hosts via the Proliant iLO 2 or iLO 3 processor. Use the **Get Power Cap Values** operation to determine a valid range for the watts input for this operation in iLO 2. For iLO 3, the value is submitted to the iLO processor without validation. iLO 3 returns an invalid error message if the value is out of range or is not acceptable.

Inputs

All of the operation's inputs except the following are described in *Common Inputs in the Integration*.

`watts`

The desired power cap value. The valid values are numeric. Use zero (0) to disable the power cap.

Results

The operation returns the following results:

`returnResult`

The task or operation result.

Set Power Saver Mode

The **Set Power Saver Mode** operation sets the power saver mode for the host via the Proliant iLO processor.

Inputs

All of the operation's inputs except the following are described in *Common Inputs in the Integration*.

`powerSaverMode`

The desired power saver mode. The valid values are:

- 1 – Operating system control mode (disables the power saver).
- 2 – HP static low power mode.
- 3 – HP dynamic power savings mode.

- 4 – HP static high performance mode (not valid for the original iLO processor).

Results

The operation returns the following results:

`returnResult`

The task or operation result.

Update Firmware

The Update Firmware operation copies the specific firmware file to the target iLO processor, starts the upgrade process, and reboots the board after the image has been successfully flashed.

If the iLO contains the Trusted Platform Module (TPM) and if it is enabled, note the following caution:

CAUTION: A Trusted Platform Module (TPM) has been detected in this system. Failure to perform proper OS encryption procedures will result in loss of access to your data if recovery key is not available. Recommended procedure for Microsoft Windows(R) BitLocker(TM) is to "suspend" BitLocker prior to System ROM or Option ROM firmware flash. If you do not have your recovery key or have not suspended BitLocker, exit this flash. Failure to follow these instructions will result in loss of access to your data.

To override this caution and continue the firmware update, specify "Yes" to the `tpmOverride` parameter.

Inputs

All of the operation's inputs except the following are described in *Common Inputs in the Integration*.

`firmwareFileLocation`

The full path to the iLO firmware that the RAS can access.

`tpmOverride`

Specify "Yes" to override the TPM caution to continue updating the firmware on the iLO.

Results

The operation returns the following results:

`returnResult`

The task or operation result.

4 Troubleshooting

This section includes the following topics:

- [Troubleshooting Overview](#)
- [General Troubleshooting Procedures and Tools](#)
- [Error Messages](#)

Troubleshooting Overview

This section provides troubleshooting procedures and tools that you can use to solve problems you may encounter while using this integration. It also includes a list of the error messages you may receive while using the integration and offers descriptions and possible fixes for the errors.

General Troubleshooting Procedures and Tools

The best troubleshooting tools are the iLO Web interface and the iLO online configuration utility (HPONCFG). This integration uses the same protocol and scripting language as the HPONCFG utility.

Error Messages

Failed to Connect

Could not establish a connection to the iLO system with the provided host name.

Invalid Login

The specified iLO username and/or password are incorrect.

This feature requires an installed license key

Virtual media and power cap features are enabled with the Proliant iLO Advanced Pack.

An invalid Virtual Media option has been given

The only valid options are **CDROM** and **FLOPPY**.

Unsupported Feature

The feature requested is not supported for the specified system. Different generations of HP Proliant systems have different power saving capabilities.

The Value specified is invalid.

The submitted value for the **Set Power Cap** operation is not acceptable or is out of range.

The firmware image file is not valid.

The firmware image file is not the right one for the targeted iLO

Firmware flash failed.

One cause for this error on iLO 3 is that a bad firmware image file was given for the **Update Firmware** operation.

Improper IP address

The given DNS or IP address is invalid.

5 Security

This section includes the following topic:

- [About iLO Security](#)

About iLO Security

HP Proliant iLO and iLO 2 are accessed via the RIBCL XML Scripting interface over SSL. HP Proliant iLO 3 is accessed via the RIBCL XML Scripting interface over HTTP/1.1 using SSL. The SSL server certificates on the iLO processor are not verified. This is the same method used by the HPONCFG utility that is included with the Proliant Support Pack.

6 OO Tools

This section includes the following topic:

- [OO Tools You Can Use with the iLO Integration](#)

OO Tools You Can Use with the iLO Integration

Following are OO tools that you can use with the iLO integration:

- **RSFlowInvoke.exe and JRSFlowInvoke.jar**

RSFlowInvoke (RSFlowInvoke.exe or the Java version, JRSFlowInvoke.jar) is a command-line utility that allows you to start a flow without using Central (although the Central service must be running). RSFlowInvoke is useful when you want to start a flow from an external system, such as a monitoring application that can use a command line to start a flow.

- **Web Services Wizard (wswizard.exe)**

When you run the Web Services Wizard, you provide it with the WSDL for a given Web service. The WSDL string you provide as a pointer can be a file's location and name or a URL. The Web Services Wizard displays a list of the methods in the API of the Web service that you specify. When you run the wizard, pick the methods you want to use, and with one click for each method you have selected, the wizard creates an HP OO operation that can execute the method. This allows you to use the Web Services Wizard to create operations from your monitoring tool's API.

These tools are available in the Operations Orchestration home folder in /Studio/tools/.