

HP Operations Orchestration

For the Windows and Linux operating systems

Software Version: Content Pack 8

OpenStack Integration Guide

Document Release Date: April 2012

Software Release Date: April 2012



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Chapter 1

Introduction

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About OpenStack Integration

This integration enables administrators to create HP Operations Orchestration (OO) flows that are integrated with OpenStack. The OpenStack integration uses the REST API (via OO's HTTP Client) to integrate with OO.

OpenStack is a global collaboration of developers and cloud computing technologists producing the ubiquitous open source cloud computing platform for public and private clouds. The project aims to deliver solutions for all types of clouds by being simple to implement, massively scalable, and feature rich. The technology consists of a series of interrelated projects delivering various components for a cloud infrastructure solution.

Founded by Rackspace Hosting and NASA, OpenStack has grown to be a global software community of developers collaborating on a standard and massively scalable open source cloud operating system. Rackspace contributed their "Cloud Files" platform (code) to power the Object Storage part of the OpenStack, while NASA contributed their "Nebula" platform (code) to power the Compute part. OpenStack enables organizations to create and offer cloud computing services running on standard hardware.

There are four main OpenStack components:

- Compute Infrastructure (Nova)
- Storage Infrastructure (Swift)
- Imaging Service (Glance)
- Identity (Keystone)

The OpenStack Integration allows users to easily integrate and interact from **HP Operations Orchestration** to **HP Cloud Services**.

The **HP Cloud** offers you freedom to choose, experiment and grow. From a variety of languages to third-party services, you choose how you develop in the cloud. Our new public cloud is developer

friendly and backed by exceptional customer support. That's the advantage of HP. Focus on your business, and let HP Cloud Services handle your infrastructure and platform needs.

For more information on **HP Cloud Services**, visit the official hpcloud.com website.

Audience

This guide is intended for system administrators who establish and maintain the implementation of integration between OpenStack and HP OO. This guide assumes that you have administrative access to both systems.

Prerequisites

To use this integration successfully, you should have administrator-level knowledge of the OpenStack environment, the Web service or services used by the integration, and the Compute, Object Storage, Image Service and Identity REST API to integrate with OO.

OpenStack Supported Versions

Operations Orchestration Version	OpenStack
OO Content Pack 8	Diablo Release 2011.3 and Essex Release 2012.1 or versions compatible with the APIs listed below OpenStack Compute Developer Guide API 2 OpenStack Image Service Developer Guide API 1.0 OpenStack Object Storage Developer Guide API 1.0 OpenStack Identity Service Developer Guide API 2.0

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:

<https://hpln.hp.com/>

Note: This site requires that you register for an HP Passport and sign-in.

To register for an HP Passport ID:

1. Go to: <http://h20229.www2.hp.com/passport-registration.html>

Or

Click the **New users - please register** link on the HP Passport login page.

2. On the HP Live Network page, click **Operations Orchestration Community**. The Operations Orchestration Community page contains links to announcements, discussions, downloads, documentation, help, and support.
3. On the left-hand side, click **Operations Orchestration Content Packs**.
4. In the **Operations Orchestration Content Packs** box, click **Content**. The HP Passport and sign-in page appears.
5. Enter your user ID and Password to access to continue.
6. Click **HP Operations Orchestration 9.00**.
7. Search for the required HP Operations Orchestration Content Pack.

Related Documents

This section contains a list of OpenStack documents that may be helpful when using this integration.

- **OpenStack Compute Developer Guide**. Located at: <http://docs.openstack.org/api/openstack-compute/2/content/>.
- **Object Storage Developer Guide**. Located at: <http://docs.openstack.org/api/openstack-object-storage/1.0/os-objectstorage-devguide-1.0.pdf>.
- **Image Service Developer Guide**. Located at: <http://docs.openstack.org/api/openstack-image-service/1.0/os-image-service-devguide-1.0.pdf>.
- **Identity Developer Guide**. Located at: <http://docs.openstack.org/api/openstack-identity-service/2.0/identity-dev-guide-2.0.pdf>

Chapter 2

Getting Started

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Installing and Configuring the Integration

No special installation and configuration instructions are required for the integration other than a working OpenStack environment.

The OpenStack environment has a number of different installation options. Instructions for the different installations can be found at: <http://docs.openstack.org/bexar/openstack-compute/admin/content/ch03s02.html>.

OpenStack Use Cases

The following use cases are developed using OO flows only and can be modified without changing the java code.

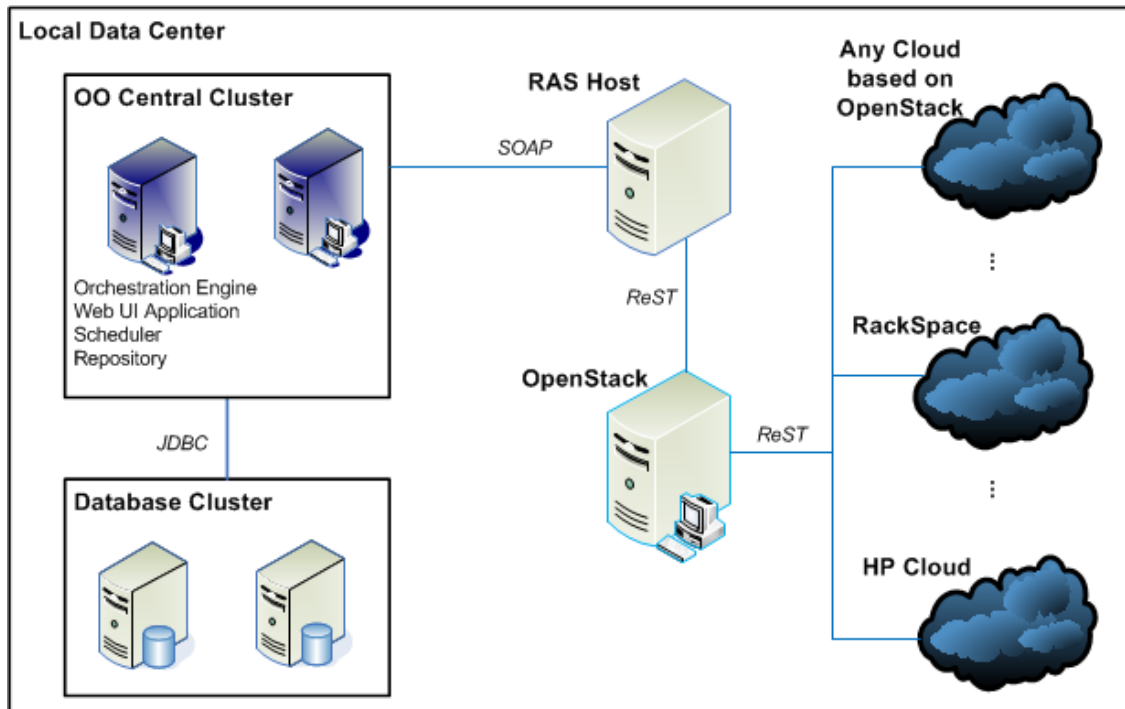
1. OpenStack Compute Integration - Flavors (OpenStack\Compute\Flavors)
 - Get Flavor Details
 - Get Flavors Detail List
 - Get Flavors List
2. OpenStack Compute Integration - Images (OpenStack\Compute\Images)
 - Delete Image
 - Get Image Details
 - Get Images Detail List
 - Get Images List
3. OpenStack HP Cloud extension - Key Pairs (OpenStack\Compute\Key Pairs)

- Create Key Pair
 - Delete Key Pair
 - Get Key Pairs List
4. OpenStack Compute Integration - Servers Metadata (OpenStack\Compute\Server Metadata)
- Delete Image Metadata Item
 - Delete Server Metadata Item
 - Get Image Metadata Item
 - Get Image Metadata List
 - Get Server Metadata Item
 - Get Server Metadata List
 - Set Image Metadata
 - Set Image Metadata Item
 - Set Server Metadata
 - Set Server Metadata Item
 - Update Image Metadata
 - Update Server Metadata
5. OpenStack HP Cloud extension - Security Groups (OpenStack\Compute\Security Groups)
- Create Security Group
 - Create Security Group Rule
 - Delete Security Group
 - Delete Security Group Rule
 - Get Security Group Details
 - Get Security Group List
6. OpenStack Compute Integration - Server Actions (OpenStack\Compute\Server Actions)
- Change Server Admin Password
 - Confirm Resize Server
 - Create Image
 - Reboot Server Hard
 - Reboot Server Soft
 - Rebuild Server
 - Resize Server
 - Revert Resize Server
7. OpenStack HP Cloud extension - Floating IPs (OpenStack\Compute\Server Addresses)

- Add Floating IP Address to a Server
 - Create Floating IP Address
 - Delete Floating IP Address
 - Get Addresses List
 - Get Addresses List by Network
 - Get Floating IP Address Details
 - Get Floating IP Address List
 - Remove Floating IP Address from a Server
8. OpenStack Compute Integration - Servers (OpenStack\Compute)
- Create Server
 - Delete Server
 - Get Server Details
 - Get Servers Detail List
 - Get Servers List
 - Update Server Name
 - Update Server IPv4 Access Address
 - Update Server IPv6 Access Address
9. OpenStack Identity Service Integration (OpenStack\Identity Service)
- Get Tenant List
10. OpenStack Image Service Integration
- Add a Member to an Image
 - Add a Member to an Image with Can Share
 - Download VM Image
 - Get Image Memberships
 - Get Public VM Images Detail List
 - Get Public VM Images List
 - Get Shared Images
 - Get VM Image Detailed Metadata
 - Remove a Member from an Image
 - Replace a Membership List for an Image
 - Update VM Image
 - Upload VM Image

11. OpenStack Object Storage Integration - Storage Container Services (OpenStack\Object Storage\Storage Container)
 - Create Container
 - Delete Container
 - Get Container List
 - Get Container Metadata
 - Get Container Object List
12. OpenStack Object Storage Integration - Storage Object Services (OpenStack\Object Storage\Storage Object)
 - Copy Storage Object
 - Create or Update Storage Object
 - Delete Storage Object
 - Get Storage Object Metadata
 - Retrieve Storage Object
 - Update Storage Object Metadata
13. Utility flows (OpenStack/Utilites)
 - Add to Name Value Lists
 - Select HTTP Client Error
14. OpenStack
 - Get Auth Token
 - Get Unscoped Auth Token
 - OpenStack REST Delete
 - OpenStack REST Get
 - OpenStack REST Get to File
 - OpenStack REST Head
 - OpenStack REST Post
 - OpenStack REST Put
15. OpenStack/Compute
 - OpenStack Dashboard

OpenStack - OO Integration Architecture



OpenStack Terminology

The following terms are used in the OpenStack Integration Guide.

Compute. OpenStack Compute is a compute service that provides server capacity in the cloud. Compute Servers come in different flavors of memory, disk space, and CPU, and can be provisioned in minutes. Interactions with Compute Servers can occur programmatically via the OpenStack Compute API or the Dashboard.

Nova. Project name for the Compute service that provisions and manages large networks of virtual machines, creating a redundant and scalable cloud computing platform.

Swift. Project name for the Object Storage software that creates redundant, scalable object storage using clusters of standardized servers to store petabytes of accessible data. Swift is used as an inexpensive bulk storage system for programmatic object storage.

Glance. Project name for the Image Service software, which is the main image repository piece of OpenStack, it is the place where you will be uploading your images as well as the place from which they will be consumed by the rest of the OpenStack system.

Keystone. Project name for the Identity service software, which offers an integrated identity management system for OpenStack. Initially using token-based authentication, but eventually supporting plug-in modules for identity storage (LDAP, DB, file, PAM, Active Directory, etc...), protocols (SAML, OAUTH, OpenID, and so forth...)

Server. A server is a virtual machine instance in the compute system. Flavor and image are requisite elements when creating a server.

Flavor. Flavor is an available hardware configuration for a server. Each flavor has a unique combination of disk space, memory capacity and priority for CPU time.

Image. Images are your templates for creating new VMs. The project under OpenStack that stores the available images is called Glance.

Rabbit MQ. Provides robust messaging for applications. It is completely open source and based on open standard protocols.

MySQL. Datastore that stores build-time and run-time state for a cloud infrastructure.

Swift Storage Node. The node that runs Account, Container, and Object services.

Swift Proxy Node. The Swift node that runs Proxy services and accepts incoming API requests.

Swift Ring. The Swift Ring is a set of mappings of OpenStack Object Storage data to physical devices.

Keypairs. These are simple ssh keys and are your credentials for accessing any running instances. Keypairs are added and managed using the Keypairs section of the user dashboard.

Security Groups. Security groups at this time exist mostly as tags for the servers and can be consumed via the meta-data API via a simple curl command. Security groups can be specified as part of the "personality" of an instance.

Location of OpenStack Integration Operations and Flows in OO Studio

The OpenStack integration includes the following operations and flows in the **OO Studio Library/Integrations/OpenStack** folder.



Ways of Launching Integration Flows and Creating Custom Operations

You can launch an integration flow from OpenStack if it has a console or interface that can accept a command. In order to launch an integration flow, you must obtain its URL.

To obtain a flow's URL:

1. Open OO Central.
2. Click the **Flow Library** tab.
3. Click the flow in the **Flow Library** tab, and then copy the **Guided Run** or **Run All** URL in the Execution Links pane.

There are a number of ways to launch a flow from OpenStack:

- Use the REST service to launch a flow from a command line. The REST command-line tools you can use are:
 - Wget
 - RSFlowInvoke.exe or the Java version JRSFlowInvoke.jar
- Use the WSCentralService SOAP API to access Central features programmatically.

Note: For instructions on using these methods, see the OO Software Development Kit Guide in the documentation set for the current OO release.

Using Wget

Wget is a command-line tool that you can use to download and run flows from the Internet. You can download Wget from the **GNU Wget** Web page. Wget runs the flow you specify in the URL contained in the command line. It can use the HTTP, HTTPS, and FTP protocols.

Using RSFlowInvoke or JRSFlowInvoke

RSFlowInvoke (RSFlowInvoke.exe) or the Java version JRSFlowInvoke (JRSFlowInvoke.jar) is a command-line utility that allows you to start a flow without using OO Central (although the Central service must be running). These tools are available in the Operations Orchestration home directory under the **Studio\tools** folder.

Using the WSCentralService SOAP API

Use the WSCentralService SOAP API to launch and control the execution of integration flows programmatically. This allows you to control the flow execution—including running, pausing, resuming, and canceling a flow, and viewing the status of a flow run.

The WSCentralService SOAP API Java and .NET classes and interfaces are located in the OO SDK home directory, in the **lib** folder. The certificates, keystore, WSDL, and sample code are located in the OO SDK home directory, in the **samples** folder.

Chapter 3

Creating Custom OpenStack Integration Operations

If you need to perform tasks that are not currently supported by the OpenStack integration's operations, you can use OO Studio to create new operations.

This requires that you have knowledge of the OpenStack API.

Using Studio to Create OO Operations

The OpenStack Integration is based on flows that use the HTTP Client to perform operations, and additional flows can be created using the existing OpenStack flows as examples. Refer to the REST Client Operations User Guide for information on how to develop REST-based flows using HP Operation Orchestration, located at <https://hpln.hp.com/>.

For instructions on using the HP Operations Orchestration Studio, see the Studio Guide to Authoring Operations Orchestration Flows in the documentation set for the current OO release.

Chapter 4

Troubleshooting

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Troubleshooting Overview

In general, troubleshooting problems with the OpenStack integration will involve referencing the OpenStack API guide for the operation you are having trouble with, and possibly using a standalone REST client, as described below, to validate the data which OO is returning.

General Troubleshooting Procedures and Tools

REST Client

A standalone Rest Client tool, the Advanced Rest Client available in Google Chrome can be used for an integration of this type. This allows you to perform HTTP requests to verify the APIs you are working with and examine the response status, code headers, and body.

All of the operations in the OpenStack integration should contain a step which uses one of the OpenStack REST <HTTP request> operations, where <HTTP request> can be, GET, POST, DELETE, and so on. The URL to use in a standalone REST client is obtained by combining the endpoint and uri inputs of the OpenStack REST <HTTP request> operation. The request body is obtained from the string input if necessary. There can also be request headers associated with the operation, and these can be seen in the headerNamesList and headerValuesList of the OpenStack REST <HTTP request> step.

Once all of this information has been transposed into the REST client, you send the request, and validate that the data returned is the same as what OO is seeing.

The standalone REST client also makes it easier to modify inputs, and test the results at times.

Network Sniffers

For advanced troubleshooting, you can use a network sniffer, such as Wireshark, to examine exactly what is being sent to, and received from, the OpenStack server. For more information, see the [Wireshark](#) Web site.

Logs

If you encounter problems, the available API logs for the different OpenStack components to help you solve those issues. For more information about the different OpenStack components, refer to the Administration Guide for the problem OpenStack component.

Error Messages

All of the operations in the OpenStack integration return an http response code with a brief description of the error, in the event that an error occurs.

Following is a sample FailureMessage:

```
This server could not verify that you are authorized to access the
document you requested. Either you supplied the wrong credentials
(e.g., bad password), or your browser does not understand how to
supply the credentials required.
```

This message was returned by the **Get Server Details** operation, due to an authentication failure. This means that there is a problem with the authToken supplied to the operation.

In the case that authentication succeeds, the error message returned should be in JSON format, but still have the code and brief description.

Here is an example of this error message:

```
{"itemNotFound": {"message": "The resource could not be found.",
"code": 404}}
```

This error message was also returned from the **Get Server Details** operation, this time due to an invalid server ID being supplied

Chapter 5

Security

Authentication

OpenStack uses the concept of an authorization token to control access to its API. You make an initial request to the OpenStack system with your login credentials, which returns a token that is valid for a selected period of time set by the system administrator. This token is then used for all subsequent API calls.

With the exception of the two operations used to get an auth token, every OpenStack operation has a required `authToken` input. This means that every flow which uses the OpenStack operations, starts with a step to retrieve an auth token, which should remain valid for the duration of the flow. Check the samples listed below for more information on the authentication process.

Identity Service

The current method used to manage access to an OpenStack environment is using the OpenStack Identity Service (codename Keystone). Two operations are provided to interact with the identity server: **Get Auth Token** requires a username, a password and a tenant, while **Get Unscoped Auth Token** requires only a username and a password.

Tenants and Scoped vs. Unscoped Tokens

With the introduction of the identity service to OpenStack, comes the concept of a tenant. A tenant is basically a group of resources, such as compute and object storage. Each user login can be granted access to any number of tenants, and multiple logins can be granted access to the same tenant. This makes it possible for a group of developers to each have their own login, and share a common tenant, or a single manager who has control over a number of tenants.

The only difference between a scoped and unscoped auth token is that a scoped auth token is tied to a tenant, and an unscoped token is not. What this means is that every OpenStack operation which manages a resource requires a scoped auth token.

The only use for an unscoped token is to retrieve a list of tenants which a particular user has access to, which is done using the operation **OpenStack/Identity Service/Get Tenant List**.

For more information on when you would need an unscoped auth token, and the differences between scoped and unscoped tenants, refer to the following document: <http://api-docs.hpcloud.com/hpcloud-identity-service/1.0/index.html>.

Getting and Using Auth Tokens

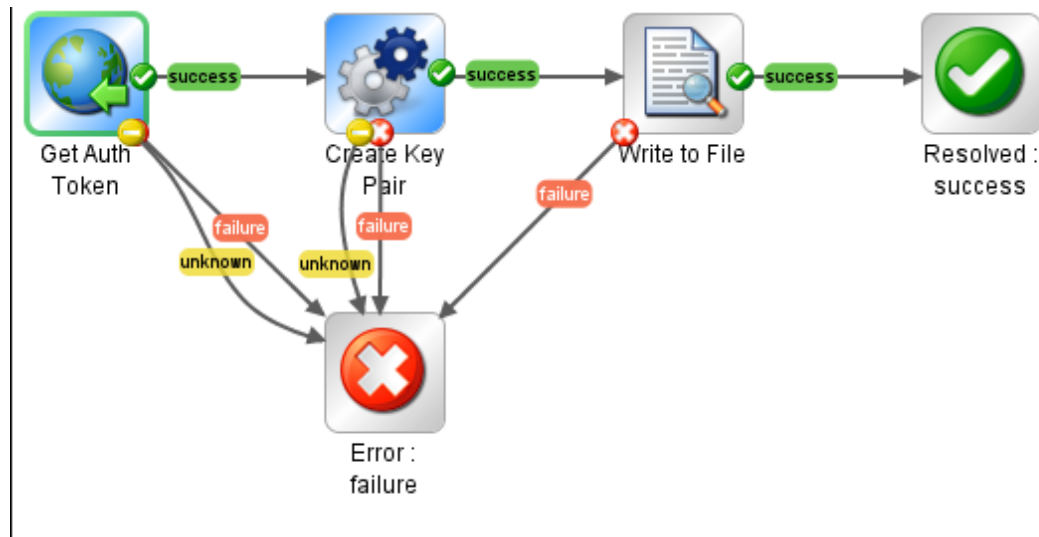
To get an auth token, you must use one of the two operations mentioned previously (**Get Auth Token** and **Get Unscoped Auth Token**). In almost all cases, you will need to use **Get Auth Token**.

The following sample flows demonstrate the use of **Get Auth Token**:

- OpenStack/Compute/Samples/Create Keypair and Save Private Key
- OpenStack/Compute/Samples/Create Web Server Rule Group

- OpenStack/ObjectStorage/Samples/Delete Container with Contents
- OpenStack/ObjectStorage/Samples/Push Filesystem to the Cloud

Following is a Create Keypair and Save Private Key sample .



For an example of how to use an unscoped token, reference the following sample:

OpenStack/Compute/Samples/OpenStack Dashboard Multitenant

Legacy Auth Tokens

Previous to the use of the OpenStack identity service, an auth token was obtained by an http GET request to the nova-api server using request headers which contained an access key and a secret key.

Although this integration is not tested against older versions of OpenStack, the API should be backwards compatible, and it should be possible to create a flow which requests an auth token and generates the API endpoints required by the operations being used. For more information, consult the API guide for the OpenStack version you are using.

Privacy and Other HTTP concerns

Since the OpenStack integration communicates with the OpenStack server using the http protocol, it inherits all of the strengths and weaknesses of the http protocol. As such, the following should be considered:

- Any endpoint used in this integration which does not use the https protocol results in data being sent as clear text.
- Any authentication method supported by the http client, such as basic auth, NTLM, kerberos, SSL client certificate authentication, and so on, can be added on top of the OpenStack auth token authentication mentioned above. This may result in multiple sets of credentials being required.