Deploying Multi-tier Applications with HP OneView and Helion OpenStack Technology in a Multi-tenant Environment

Executive Summary
In this document we demonstrate how to set up a multi-tenant environment with HP Helion CloudSystem Enterprise and Helion OpenStack® and deploy software-as-a-service (SaaS). This SaaS example deploys a physical server using integration with HP OneView and a virtual machine using Helion OpenStack and Chef for application deployment. This document describes how to create an HP Helion CloudSystem Enterprise Topology Service Design that will deploy both physical and virtual servers and application software via Chef.

Target audience: This document is intended for system integrators and administrators of HP Helion CloudSystem Enterprise. The reader should be familiar with HP Helion CloudSystem and HP Cloud Service Automation.

HP Helion CloudSystem 9.0 Overview
Introducing HP Helion CloudSystem
HP Helion CloudSystem is the industry’s most complete, fully-integrated, end-to-end private cloud solution, delivering automation, orchestration and control, across multiple clouds. Over 3,000 customers, worldwide, are using HP Helion CloudSystem today for quickly deploying IT services, managing or developing applications, streamlining operations, and more. From basic infrastructure cloud services to the most advanced application cloud services, HP Helion CloudSystem 9.0 offers enterprises and service providers a clear path to hybrid cloud.

With the incorporation of HP Helion OpenStack and the HP Helion Development Platform (HDP) into the new HP Helion CloudSystem 9.0 offering, we’ve integrated a more complete OpenStack-based software offering directly into the product and added Cloud Foundry® technology allowing you to create a modern developer environment in which to develop and deploy cloud native applications. HP Helion CloudSystem works in a heterogeneous environment and includes hybrid cloud management software, and based on the customer’s unique needs may also include servers, storage and networking, combined with installation services, making it even more efficient to deploy a private cloud.

HP Helion CloudSystem comes in two editions: HP Helion CloudSystem Foundation and HP Helion CloudSystem Enterprise.
Technical White Paper: Deploying Multi-tier Applications with HP OneView & Helion

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HP Helion CloudSystem Foundation
If your organization needs a platform that supports basic cloud infrastructure services—then you will need the easy-to-deploy HP Helion CloudSystem Foundation, which targets simple IaaS and is delivered in the form of a virtual appliance. In addition to being a strong choice when simple infrastructure service delivery is the primary cloud objective, the small network footprint, and lower price of HP Helion CloudSystem Foundation software make it useful as a door opening offer for customers just getting started with cloud. It is built on HP Helion OpenStack and includes the HP Helion Development Platform (HPD) to enable the development of cloud-native applications. With HP Helion CloudSystem Foundation you benefit from:

- **Open APIs for both administrative and cloud service functions, including OpenStack-based APIs, enabling highly automated cloud delivery**
- **Added support for OpenStack Swift object storage expands the scope of storage-centric use cases and environments to provision**
- **Includes the HP Helion Development Platform (HPD), which leverages leading open source technologies such as Cloud Foundry, Docker, and OpenStack providing greater support for cloud native application development**
- **Easier installation via a software appliance delivery model**
- **Support for deployment of services to VMware®, Red Hat® KVM and Microsoft® Hyper-V host environments provides a more enterprise-friendly tool to provision virtualized environments in the cloud**
- **Enhanced networking with support for DVR and VXLAN for improved multi-tenancy**
- **Intelligently target workload to infrastructure through support of availability zones and host aggregates improves separation of usage by different groups and services**

HP Helion CloudSystem Enterprise
If you need a more robust, advanced cloud solution, then you are ready for HP Helion CloudSystem Enterprise. HP Helion CloudSystem Enterprise enables the broadest range of use cases and supports delivery of IaaS, PaaS, and SaaS models. These services are delivered through the inclusion of software such as HP Cloud Service Automation (CSA) and HP Operations Orchestration (OO). In addition, it includes HP Helion CloudSystem Foundation as well as HP Matrix Operating Environment (OE) as an alternate infrastructure provider that enables the delivery of a broad range of cloud services.

HP Helion CloudSystem Enterprise is also delivered in the form of a virtual appliance. HP Helion CloudSystem Enterprise provides all the capabilities and value of HP Helion CloudSystem Foundation plus:

- **Advanced infrastructure and application service delivery in minutes**
- **Support for public cloud resource providers through CSA enable enterprise-class lifecycle management for hybrid cloud services**
- **Expanded support of physical server provisioning via HP OneView integration allows you to leverage HP OneView profiles to create physical service designs in CSA**
- **CSA adds the ability to orchestrate through a self-service marketplace portal, allows both easier service lifecycle management and for IT consumers to request cloud services**
- **Investment protection for HP Matrix OE users; manage new OpenStack-based resource pools alongside your existing HP Matrix OE resource pools**

For More Information .................
Enhanced drag-and-drop topology designer allows for rapid definition and orchestration of new multi-tier cloud services

Improved Amazon Web Services (AWS) provider to support repatriating workload to HP Helion Eucalyptus private cloud

Configuring Multi-tenancy Support in CloudSystem Foundation

Adding OpenStack Users and Services to Active Directory

The HP Helion CloudSystem 9.0 Administrator Guide describes the steps necessary to configure Open-LDAP or Active Directory for OpenStack user portal authentication. The example in this solution describes an Active Directory configuration. The Active Directory server must be accessible from the Management Appliance (ma1) and cloud controllers.

The first step to configure multi-tenancy support is to add all of the service users and internal users to Active Directory. The Administrator Guide details the exact steps required to retrieve the passwords for all of the required service users and internal users with the password utility (password-config). Once you have obtained the usernames and passwords they are added to Active Directory. Figure 1 shows the configuration for the opsconsole user in Active Directory.

Once you have added all of the service users to Active Directory, verify you can log in to the OpenStack user portal with each username and password. The next step is to use the Operations Console to configure the OpenStack Keystone service to use an external authentication directory service.

From the Operations Console main menu, select System Summary and in the Security pane select Update Security Settings. The example in Figure 2 is not using SSL. HP recommends using the opsconsole username and password for authentication. The password for this account is obtained using the password-config command and must not be changed.

Once you have entered the Security settings, click Test Settings and Save to test the connection to the directory service. If the directory service is configured correctly you will see three green check marks. Click Save Changes.

The steps to create projects from the OpenStack User Portal will be performed after we have configured the organizations and users in LDAP which will be used to log in to the CSA Marketplace portal.

FIGURE 1. Active Directory Configuration for OpenStack Service

FIGURE 2. OpsConsole Security Settings
Configuring Multi-tenancy Support in CloudSystem Enterprise

The requirement for multi-tenancy support in a CloudSystem 9 environment is that the users for CSA and OpenStack are configured in the same LDAP or Active Directory. In the previous section we added the required OpenStack service users to Active Directory. In this section we will show how to add the CSA users who will order OpenStack services from the CSA Marketplace portal.

Configuring CSA Organizations and Users

Organizations and users for Cloud Service Automation must also be defined in LDAP or Active Directory. In this example we define each CSA organization as an Active Directory Group. We have defined multiple groups and members of each group. Figure 3 shows the four Active Directory Groups we will use as Organizations in CSA and the details for the Engineering group.

Ensure that the manager of each group is specified in the Managed By tab as shown in Figure 4. This is needed if you want to use approvals for services requested from the CSA Marketplace portal. In our example, engradmin is the manager for the Engineering group. A separate group has also been created for the administrators of each group. The engradmin user is a member of both the Engineering group and the Engineering_Administrators group.

After the groups are defined in Active Directory you can define the corresponding organizations in Cloud Service Automation. From the CSA admin portal select the Organizations tile.

Create organizations in CSA which match the groups you created in LDAP. Figure 5 and Figure 6 display the LDAP settings for the Engineering organization.
FIGURE 5. CSA Organization LDAP Settings

FIGURE 6. CSA Organization LDAP Settings Continued
Next add the Access Control settings for both the organization administrator and users. Members of the Engineering Administrators group will be able to log in to the Engineering organization Marketplace portal and they can manage the service offerings and catalogs for that organization. Members of the Engineering group will be allowed to log in to the Engineering organization CSA Marketplace portal.

**Create Environments for CSA Providers**

From the Cloud Service Automation admin portal select the Providers tile. Change the By Type dropdown to By Environment. If you have not already created an Environment for your resource providers, create one now. At this point you should at least add HP Helion CloudSystem to your environment. You can add the Chef, OneView and Insight Control server provisioning (ICsp) providers before you add components from those providers to your service design. In our example we will only configure a single Environment but you can define multiple environments and use Environment settings to determine where CSA services are provisioned.
Configuring Organization Catalogs

An organization catalog is automatically created for each organization you create.

1. Select the Catalogs tile to display all of the catalogs as shown in Figure 9.

2. Select the catalog for your organization and select the Access Control tab as shown in Figure 10.

3. Add the same access control for the catalog which you added for Service_Consumer access for your organization.

4. Select the Environments tab.

5. Click Select Environments and add the environment you created in Create Environments for CSA Providers and click Save.

NOTE: You can create multiple catalogs for each organization and specify different access controls for each catalog if desired.
Completing the Multi-tenancy Setup in CloudSystem Foundation

Creating Projects and Assigning Users in OpenStack

Now that the organizations and user access have been created in CSA, we will create the corresponding projects with the same users in OpenStack. Note this is not the only way to configure multi-tenancy but is a simple way to use the same projects in OpenStack as organizations in CSA. Additional details on other possibilities are in Appendix E: Additional Multi-tenant Configurations.

1. Log in to the OpenStack User Portal as the admin user with the password you configured during the First Time Installation.

2. Under Identity, select Projects and click Create Project.

3. Enter the Project Name using the same name you used to create Organizations in CSA.

4. From the Project Members tab, add all the users for your organization to the project as shown in Figure 12. In this example we have added the engadmin user with both member and admin privileges.

---

**FIGURE 11. Helion OpenStack Project Creation**

**FIGURE 12. Helion OpenStack Add Project Members**
5. Create Projects for all of your CSA Organizations and assign the users and administrators for your projects. Figure 13 shows all of the Projects created in the OpenStack Portal which correspond to our CSA organizations.

This document does not provide detailed instructions for CloudSystem 9 network setup. The networks shown in Figure 14 were defined in HP OneView. See Appendix D: HP OneView Configuration for the network configuration used for this solution.

Once you have configured the users and administrators for each project you will log in to the OpenStack User Portal as an administrator of the project and create the networks for each project.

For example:

6. Log in to the OpenStack User Portal as *engadmin* user.

7. Create the required networking components for the Engineering project. Tenant networks and Routers are created for exclusive use by a project. Provider networks can be shared across projects and the external network is shared among all projects.

Each project requires a router which connects the Tenant and Provider networks to the External network as shown in Figure 15. It is not required to configure all Tenant networks with an interface to the External network. This is only required for any Tenant networks you wish to assign a Floating IP.

Every user that will log in to the CSA Marketplace portal to request service to Helion OpenStack must have a
unique key pair for their use. Now that you have added all your users to projects they can use their Active Directory credentials to log in to the OpenStack User Portal for their assigned project. Each user must perform the following steps:

1. Log in to the Helion OpenStack User portal, select the Compute dropdown and Access & Security.
2. Select the Key Pairs tab.
3. Click Create Key Pair and create a key pair that can be used to log in to virtual machines deployed to your OpenStack environment as shown in Figure 16.
4. The key pair is automatically downloaded after creation. Save this key pair in a safe location. Users will utilize this key pair to access the deployed OpenStack VM via ssh.
CloudSystem Enterprise Service Design Creation

Creating a Simple Service Design in CSA to Deploy an OpenStack Service

In this section we will create a CSA service design in phases in order to verify that our basic deployment of an OpenStack server with networking works correctly before adding in a Chef provider to deploy an Apache web server. Once we are successful at deploying an OpenStack virtual machine with a Chef cookbook we will create a service design to deploy a physical server using OneView and Insight Control server provisioning and then add in Chef to deploy a MySQL database.

Before you can create and deploy a service to OpenStack you must have an image available. The solution described in this paper has special requirements to enable application provisioning via Chef. Appendix A: Requirements for Red Hat Linux Image provides the details on the image used for this solution.

Using the CSA admin portal we will create a topology service design to deploy an OpenStack instance.

1. From the CSA admin portal select Designs →Topology →Designer. For this solution we will start with an HP supplied Topology design and modify it to meet our needs.

2. Locate the OpenStack Basic Compute, Storage and Network service design and click 15.08.0000 to open the existing design.

3. Click Save As and supply a new name for your service design.

We will create our new design one step at a time. For our simple design we won’t require additional volumes.

4. Select the OpenStack Volume component and select the delete icon. The design should look like Figure 17.

FIGURE 17. CSA Service Design to Deploy OpenStack Service
This design has already been configured with Subscriber Options which allow the Marketplace portal user to select networks, router, security group, image and more. By configuring these as subscriber options we can make this design available to users in multiple organizations. This design also allows you to select to deploy more than one instance including the networking. The Green group incorporates all the components necessary to deploy multiple OpenStack instances successfully.

5. Select the Subscriber Options tab. The Server and Volume Group Option set is the subscriber option which allows a user to deploy multiple instances in one CSA service request.


7. Select Server, Volume and Network Specification. In the right pane we can modify the properties visible in the Marketplace portal. Not all the properties are visible in Figure 18.

### Server, Volume and Network Specification

<table>
<thead>
<tr>
<th>No.</th>
<th>Property</th>
<th>Type</th>
<th>Editable</th>
<th>Dynamic</th>
<th>Bindings</th>
</tr>
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<tr>
<td>a01</td>
<td>Enable User Impersonation Mode</td>
<td>Boolean</td>
<td>False</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a11</td>
<td>Region</td>
<td>String</td>
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<td>Dynamic</td>
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<tr>
<td>a21</td>
<td>Server Name Prefix</td>
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<td>1 Binding</td>
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<tr>
<td></td>
<td>Demo</td>
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<td></td>
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</tr>
<tr>
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<td></td>
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</tr>
</tbody>
</table>

FIGURE 18. CSA Subscriber Options
The `enableUserContext` property allows us to use this service design in multi-tenant mode. The user information is included in the request to OpenStack so that the resulting service is deployed to the corresponding OpenStack Project. Without this property set to True, all deployments using this design will be made to the default demo project and we would be unable to select the appropriate networks specific for each project.

8. Select the property name Enable User Impersonation Mode to edit the property.

9. Clear the checkbox next to Editable.

10. Change the List Items default to True and click Done to save the changes.

![Edit Property](image)

**Edit Property**

**Property Type**

- List

**Name**

- `enableUserContext`

**Display Name**

- Enable User Impersonation Mode

**Description**

Flag to enable/disable user impersonation mode. A true value will use Keystone Trust ID to execute OpenStack operations.

**Service Offering and Marketplace Settings**

- **Editable**: Off

**List Selection Type**

- Single-Select
- Multi-Select

**List Items**

| False | False |
| True | True |

FIGURE 19. Set Impersonation Mode
There are many properties we do not need for our simple service design.

11. Select the delete icon to remove the following properties from the list. Confirm each property deletion and click Save after all deletions are complete.
   - Region
   - Availability Zone
   - Volume Name Prefix
   - Volume Description
   - Volume Size in GB
   - Volume Device
   - Volume Type

Since this is a multi-tenant enabled environment we won't be able to test this using the Test Run capability. We will publish the design and create a service offering to test it.

12. Select the Overview tab and select Publish.
13. Confirm the Publish request.

Create a CSA Service Offering

Next we will create a Service Offering from our Service Design and publish it to a catalog so that it can be ordered from an organization Marketplace portal.

1. From the CSA Admin portal select the Offerings tile.
2. Select Create, choose your newly created Service Design from the list and click Select.
3. Specify a Display Name, Version Name and Description.
4. Change the Image if desired.
5. Select the Publishing tab and click Publish.
6. Select one of your Organization catalogs and choose a Category as shown in Figure 20.
7. Click Publish.

FIGURE 20. Publish CSA Service Offering
Ordering a Service from the CSA Marketplace Portal

Once our offering is published, an organization user can order it from their Marketplace portal. There is a unique URL for each organization. You can find the URL for your organization from the Organizations tile, select your Organization and then the General Information link as shown in Figure 21.

1. Log in to the Marketplace portal as an organization user and select Start Shopping to view the list of services available.

2. Select your newly created service. All of the subscriber options we defined in the design are visible to the user in the Marketplace portal. Currently we have left all of the selections available to the end user. We can also set defaults in the design if we want to limit the choices available to the end user. The tradeoff is having designs specific for each organization where the networking is selected in the design or having the design flexible and support multiple organizations which requires users to select networking at deployment time.

3. Click Checkout after you have selected all the options. Note that your OpenStack project administrator must have configured the networking for your organization and the Marketplace portal user must have created a key pair in the OpenStack Portal before you can order a service as an organization user.

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FIGURE 21. Organization Marketplace Portal URL
FIGURE 22. Ordering the OpenStack Service from Organization Marketplace Portal
Once the deployment is complete, you can view your deployed service. If your deployment was not successful determine why it failed before continuing to the next step which will be to add a Chef provider and deploy a Chef cookbook on your deployed OpenStack virtual machine. You must be able to access your deployed virtual machine using the floating IP before proceeding to the next step.

**Adding a Chef Provider and Importing Chef Components**

**Chef Server setup and Import of Cookbooks**

Details on setting up a Chef Server can be found in the [HP CSA Topology Components Guide](#). An HP Passport is required to access this document.

Use the knife command to download cookbooks from the Chef site either to the Chef Server itself or a Chef Workstation running the chef-client.

1. Create a default.rb file in the same folder location as the automatically downloaded client.rb and server.rb file. The default.rb file should look like this:

```ruby
package 'mysql-libs' do
  action :remove
end

package 'MySQL-server' 'MySQL-client'

#enable the service
service 'mysql'
do
  action [:enable, :start]
end
```

1. knife cookbook site download apache2

1. knife cookbook site download mysql

A few changes are needed to the default mysql cookbook to install it on a Red Hat server.
Configure Chef Provider and Import Cookbooks

1. From the CSA Admin portal select the Providers tile.
2. Select Chef and click Create.
3. Provide the service access point and login credentials for your Chef Server as shown in Figure 24. The credentials on the provider definition page allow CSA to connect to the server where Chef is running via SSH.
4. Click Save.
5. Select the Properties tab and configure the chefClient and chefClient-Key values.

- chefClient is the client/username configured on the Chef server. This name is used for access to the Chef API
- chefClientKey is a private key securing the ChefClient user
6. Select the Environments tab.
7. Select the plus icon to select a Resource Environment for the Chef Provider.
8. In the Create Environments for CSA Providers section you created an Environment for the HP Helion CloudSystem provider. Click Select and add your Chef provider to the same Environment.
9. Select the Components tab and click Manage to import chef cookbooks.
10. Click Import, select Chef as the Import Source and select the apache2 and mysql cookbooks.

Once the components are imported they are available to use in your Service Design. The next step is modifying our service design to include a Chef component.

![Edit Resource Provider](image)

FIGURE 24. Chef Provider for CSA
Adding Chef component to an OpenStack Service Design

1. Open your service design and from the Overview tab select New Version to create a new version of your service design.
2. Select the Designer tab. The newly added Chef cookbooks are available in the left pane as Topology Components.
3. Drag the Chef component into your design.
4. Connect the apache2 component to the OpenStack Server
5. Select the apache2 component in the design and select the Edit icon to add the component to the existing group.
6. After the apache component is added, the design should look similar to Figure 25.
7. Select the OpenStack Server component. Properties for the OpenStack Server are visible in the right pane.
8. Set username to `chefuser`.
9. Set password to the value you configured when you set the password for `chefuser` in your OpenStack virtual machine image.
10. Save your changes.
11. From the Overview tab click Publish.
12. From the CSA admin portal home page select the Offerings tile.
13. From Offerings select your existing service offering and select New Version.
14. Change the Base Offering On to use your updated Service Design and select Done.
15. Select the Publishing tab and click Publish to publish your updated service offering to an organization catalog.

The deployment of Chef cookbooks to OpenStack virtual machine deployments is done over the Floating IP address in the External network. Your deployed virtual machines must be able to reach your Chef server over the External network.

Follow the same procedures as you did in Ordering a Service from the CSA Marketplace Portal to request your new offering including Chef from the Marketplace portal for your organization. If the service deployment is successful, proceed to the next section where you will add in the OneView and Insight Control server provisioning providers and provision a physical server.

FIGURE 25. Adding a Chef Component to OpenStack Service
Adding Physical Servers to the Service Design

Solution Networking Overview
An overview of the networking for the full solution is shown in Figure 26. Not all networks are shown in this diagram, only those relevant to the successful deployment of the solution.

CSA as a component of CloudSystem Enterprise, uses the Data Center Management network to communicate to the Chef, OneView and ICsp providers. The deployed physical server communicates with OneView and ICsp over the Data Center Management network but communicates with Chef over the External network.

The OpenStack deployed virtual machine communicates with Chef over the External (Floating IP) network.

Configuring a Service to Deploy Physical Servers
The HP OneView Managed Server Provisioning document provides detailed instructions to apply labels to servers to mark them as available, create OneView server profiles, and create Insight Control server provisioning (ICsp) build plans for use in Topology Service Designs. The OneView and ICsp content capsules have been pre-installed in CloudSystem 9.0 so you can skip over the download and installation steps provided in this document.

Follow the instructions in the HP OneView Managed Server Provisioning document to add the OneView and ICsp providers and create a service design including a mysql Chef component. Be sure to add the OneView and ICsp providers to the same Environment you created for Chef and HP Helion CloudSystem. The document also includes instructions on how to create a custom ICsp OS build plan to work with Chef. Additional information about the Chef settings used for this solution is found in Appendix B: Additional Chef Settings.

The OneView server profile used for this solution must include a network that can connect from the deployed physical server to the ICsp server as well as a connection on the External network. Both networks require a DHCP server to allocate IP addresses to the provisioned physical server. Appendix C: Chef Settings for Physical Server Deployment provides details on the kickstart file used for server deployment.
Be sure you can successfully deploy a service that deploys a physical server with an OS before you add the physical server deployment to your OpenStack design. Figure 27 is an example of a service design to deploy a physical server with Red Hat Linux® and the mysql Chef cookbook. The OS username and OS password properties for the ICsp component must be set to the values set in the ICsp OS Build plan for the Chef cookbook deployment to be successful.

Creating a Multi-tier Service Design
After you have successfully deployed a physical server with an OS and Chef cookbook, create a new version of your OpenStack service and add in the components to deploy a physical server with a customized build plan which supports Chef and the mysql chef component for the database tier.

Figure 28 is an example of a service design to deploy a 2 tier application. The components have been grouped into an OpenStack application tier and a Physical server database tier.
Next we will create a new option set which allows the user to order more than one physical server from the Marketplace portal.

1. Select the Subscriber Options tab.
2. Click Add Option Set.
3. Change the Display Name to Physical Server Option Set.
4. Select the Modifiable during service modification checkbox and click Save.
5. Click Physical Server Option Set and then Add Option.
6. Change the Display Name to Number of Physical Servers.
7. Click Add Property.
8. Set the Property Type to Integer as shown in Figure 29.
9. Set the Name to DBInstanceCount.
10. Set the Display Name to No. of OneView deployed DB servers.
11. Set the Value Range as 1 to 10, the Default Value to 1 and click Done.

FIGURE 28. Multi-Tier Application Deployment Service Design

FIGURE 29. Create Option Set for Physical Server DB Tier
12. In the right pane, click the Configure Bindings Link next to No. of OneView deployed DB servers. The Configure bindings selection window is displayed as shown in Figure 30.

13. Select the Physical Server DB Tier group.

14. The Instance Count is the only property available. Click the plus sign to add the binding as shown in Figure 31 and click Done.

15. Click Save to save your changes.

FIGURE 30. Configure Bindings

FIGURE 31. Add Binding for Instance Count
Follow the same procedure in Create a CSA Service Offering to create a new offering. In the Service Offering select the Pricing tab to assign prices to your services.

Once you have completed making changes for the new design, click Publish from the Overview tab.

If desired set an Approval Policy for your deployment as shown in Figure 32. Approval Policy requires that you have configured the manager for each user as shown in Figure 4.

If you set an approval policy, the organization manager must approve the requests by logging into the CSA Marketplace portal and using Review Requests to approve the order as shown in Figure 33.
Now that we have published the service we will log in to the Marketplace portal as a user in the Engineering Organization and order the service.

1. From the Dashboard, select Start Shopping and then select your newly published multi-tier service.

2. Select the correct Environment for each provider as shown in Figure 34.

FIGURE 34. Ordering the Multi-tenant Service
3. Set the web server instance count and select the image and networking details.

4. Set a Server Name Prefix and the number of physical servers you wish to deploy. In this example we have set a price for the number of servers.

5. Select Checkout to proceed.

6. Set a subscription name and description. You can also set a limit on the subscription period.

7. Click Submit Request.

FIGURE 35. Ordering Multi-tenant Service Continued
Order Information

Subscription Name: DB and Web server deployment
Description: deploy 2 tier DB and Web server

Group Ownership is Off

Subscription Period
- Recurring Subscription
- Termination Subscription
Start Date: 9/24/15
End Date: Pick Date

Attach Documents
- Security Rating: Please make sure the files you upload are free of viruses and other threats. Defects may lead to legal consequences.
- Attach File

Summary

The service configuration options you’ve chosen. You can always make changes before checkout.

Multi-Tier Application Deployment (1,2,3)
Published on Sep 29, 2015 3:36:47 PM

Your Configuration
- OpenStack Nova and Controller Selection
  - HP Enterprise
    - Providers (HP Helion Deployment: Engineering)
- OpenStack Networking Option Set
  - OpenStack Networking Option Set
    - RH Network (OpenStack1, OpenStack2)
    - IaaS Network (OpenStack1, OpenStack2)
- Security Group (OpenStack1, OpenStack2)

Attach Files
- OpenStack Nova and Controller Selection
  - No. (1) OpenStack Web server instance (1)
- OpenStack Networking Option Set
  - OpenStack Networking Option Set
    - RH Network (OpenStack1, OpenStack2)
    - IaaS Network (OpenStack1, OpenStack2)
- Security Group (OpenStack1, OpenStack2)

$240.00 and $208.00 yearly

FIGURE 36. Service Checkout
Once the service has deployed successfully it can be managed from the Marketplace portal.

Lifecycle actions are available for the OpenStack and physical servers.

FIGURE 38. Lifecycle Actions on Deployed Servers
A topology view of the multi-tier service is shown in Figure 39.

The service design in this example deployed a MySQL database to the physical server and apache web server to the OpenStack deployed VM. Both the mysql and httpd services are automatically started by the cookbooks. A default web page can be configured by modifying the apache cookbook.
Summary

HP Helion CloudSystem enables consumers to deploy anything from basic infrastructure cloud services to the most advanced application cloud services. This paper has described how to configure a service to deploy both physical and virtual resources in a single service design. The flexible multi-tenancy support illustrated in this solution demonstrates the ability to segment resources and associate LDAP based users with CSA Service Offerings and HP CloudSystem Helion projects and resources. The step-by-step process detailed in this paper provides administrative users the information they need to get started on their journey to provide cloud based application solutions to end-users.

Appendix A: Requirements for OpenStack Red Hat Linux Image

1. Create a RHEL 6.4 or 6.5 image for your compute hypervisor of choice.

2. The solution described in this paper requires that you have installed the cloud-init package.

   ```
   yum install cloud-init
   ```

3. Create a chefuser account as part of the wheel group. The chefuser account is used to deploy chef cookbooks on the deployed virtual machine. Use the passwd command to set a password for your chefuser. Remember this password as it will be used in the CSA service design as a property of OpenStack server component.

   ```
   useradd -g10 chefuser
   passwd chefuser
   ```

4. Edit the /etc/cloud/cloud.cfg file to enable sudo privileges for the cloud-user account and allow a new user chefuser to use ssh with user and password credentials to deploy chef cookbooks on the virtual machine. Change the following:

   ```
   ssh_pwauth: 0 to ssh_pwauth: true
   ```

Modify this section to enable sudo access as cloud-user:

```
system_info:
  distro: Rhel
  default_user:
    name: cloud-user
    sudo: ALL=(ALL) NOPASSWD: ALL
paths:
  cloud_dir: /var/lib/cloud
  template_dir: /etc/cloud/
  templates
ssh_svcname: sshd
```

5. Use visudo to edit the /etc/sudoers file:

   ```
   Change Defaults requiretty to Defaults !requiretty
   ```

6. Edit /etc/ssh/sshd_config file:

   A. Change #PasswordAuthentication yes to PasswordAuthentication yes

   B. Add the following line to the end of the file:

   ```
   AllowUsers chefuser
   ```

7. Before shutting down the virtual machine to save it as an image check the following: Verify /etc/sysconfig/network-scripts/ifcfg-eth0 settings:

   ```
   DEVICE="eth0"
   BOOTPROTO="dhcp"
   IPV6INIT="no"
   NM_CONTROLLED="yes"
   ONBOOT="yes"
   TYPE="Ethernet"
   ```

Be sure to remove any HWADDR or UUID entries in ifcfg-eth0.


9. Upload this image into OpenStack to make it available for deployment.
Appendix B: Additional Chef Settings

Chef can be configured to use a local repository. The local repository must be available using an address on the External network because the OpenStack virtual machine must be able to access it via a floating IP address.

A customized knife.rb file on your chef server (~/.chef/knife.rb) that allows for a local repository is as follows:

```bash
bash -c '<< EOP
<%=

knife[:template_file] = "'/home/builder/templates/chef.tmpl"
log_level :info
log_location STDOUT
node_name 'root'
client_key '/root/.chef/root.pem'
validation_client_name 'chef-validator'
validation_key '/etc/chef-server/chef-validator.pem'
chef_server_url 'https://<your chef external IP>: 433'
syntax_check_cache_path '/root/.chef/syntax_check_cache'

if ![ -f /usr/bin/che-client ]; then
    wget $PACKAGE_URL -0 /tmp/chef-client-package.rpm
    yum -y install /tmp/chef-client-package.rpm
fi

mkdir -p /etc/chef

<% validation_key %>
EOP
chmod 0600 /etc/chef/validation.pem
<% encrypted_data_bag_secret %>
EOP
chmod 0600 /etc/chef/encrypted_data_bag_secret
<% end %>

<% first_boot.to_json %>
EOP

<% start_chef %>

Service sshd restart

1. Edit /etc/ssh/sshd.config:
   « Change #StrictModes no to StrictModes no
2. Restart the ssh service:
   « Service sshd restart

The chef.tmpl file referenced in the knife.rb file points at a local repository where you have copied the chef client rpm that works with your version of Chef Server. The knife.rb file shown in the example above expects this file in /home/builder/templates.

The chef.tmpl file referenced in the knife.rb file points at a local repository where you have copied the chef client rpm that works with your version of Chef Server. The knife.rb file shown in the example above expects this file in /home/builder/templates.

The Chef server settings for sshd may need to be modified to allow connection to the Chef managed servers.
Appendix C: Chef Settings for Physical Server Deployment

The kickstart file used in the deployment for physical servers adds steps to enable Chef deployment. This installation expects access to a local repository server to install the chef client. The following lines were added in the %post section of the kickstart file in ICsp for a Red Hat Linux scripted installation:

```bash
# start Chef customization
sed -i "s/requiretty$/\t!requiretty/" /etc/sudoers

echo "AllowUsers root admin" >> /etc/sshd_config

cat "EOF" >> /etc/yum.repos.d/local.repo

[local]
name= local Repo - $basearch
baseurl = http://<your repo server IP>/repofiles
enabled=1

gpgcheck=0
protect=1

EOF

cd/tmp

yum -y install chef

sed -i "s/ONBOOT=no$/ONBOOT=yes/" /etc/sysconfig/network-scripts/ifcfg-eth1

ifdown eth1

ifup eth1
```

Appendix D: HP OneView Configuration

The configuration of HP OneView networks is not detailed in this paper. Figure 40 shows the network configuration used during development of this solution. All networks were created in OneView prior to being added in the HP Helion OpenStack portal.

![FIGURE 40. HP OneView Network Configuration]
Appendix E: Additional Multi-tenant Configurations

A one-to-one mapping of Organizations in CSA to Projects in OpenStack is not required for multi-tenant deployments. It is required to create at least one CSA Organization and one CSA Environment as was shown in Create Environments for CSA Providers. It is also required to add all Active Directory groups you want to be able to use an Organization Catalog under the Access Control tab for that catalog.

The following scenario is possible:

Create an Organization in CSA. An Organization catalog is created for you. Set the Access Control for the Organization Catalog to include any Active Directory user or group you want to be able to deploy services from the CSA Marketplace portal as shown in Figure 41.

Create projects in OpenStack. Add the same list of users given access to the CSA Organization catalog as members of the OpenStack project. Users may be added to more than one project. If a user is added to more than one OpenStack project, they will be presented with a list of OpenStack projects in the CSA Marketplace portal when they request to deploy a service.

In this example, user23 is defined as a member of 3 projects, Engineering, HPDemoProject and Sales. User23 is defined in AD as a member of Enterprise Admins group. The Enterprise Admins group was given access to the Engineering Catalog as shown in Figure 41. User23 can log in to the Engineering Marketplace portal and can request a service be deployed to one of the three OpenStack projects they are a member of as shown in Figure 42. Once they select the project, the valid option set values for that project are available for user selection.
For more information

For more information on HP Helion CloudSystem please visit: HP Helion CloudSystem Solutions, hp.com/go/cloudsystem
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