Cisco Virtualized Infrastructure Manager Administrator Guide, Release 3.4.1

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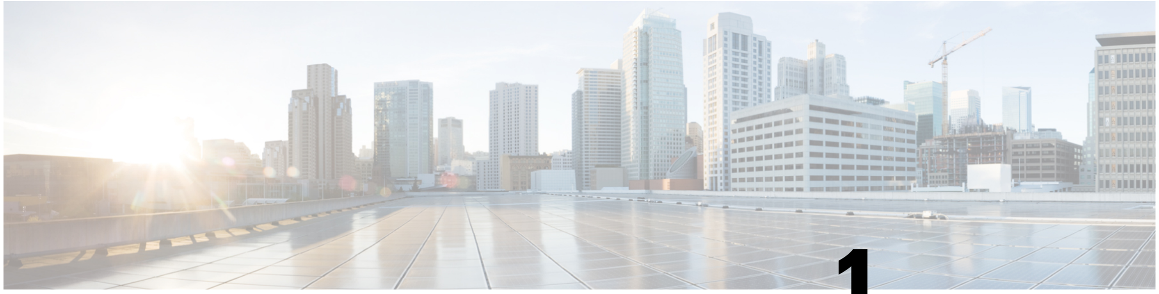


CHAPTER 1

Managing Cisco NFVI

The following topics provide general management procedures that you can perform if your implementation is Cisco VIM by itself or if it is Cisco VIM and Cisco VIM Unified Management.

Managing Cisco NFVI Pods

You can perform OpenStack management operations on Cisco NFVI pods including addition and removal of Cisco NFVI compute and Ceph nodes, and replacement of controller nodes. Each action is mutually exclusive. You can perform only one pod management action at a time. Before you perform a pod action, ensure that the following requirements are met:

- The node is part of an existing pod.
- The node information exists in the setup_data.yaml file, if the pod management task is removal or replacement of a node.
- The node information does not exist in the setup_data.yaml file, if the pod management task is to add a node.

  For more information on operations that can be performed on pods, see the Managing Hosts in Cisco VIM or NFVI Pods , on page 6 section.

General Guidelines for Pod Management

The setup_data.yaml file is the only user-generated configuration file that is used to install and manage the cloud. While many instances of pod management indicate that the setup_data.yaml file is modified, the administrator does not update the system generated `setup_data.yaml` file directly.

Note To avoid translation errors, ensure that you do not copy and paste commands from the documents to the Linux CLI.

Follow these steps to update the `setup_data.yaml` file:

1. Copy the setup data into a local directory:

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cd MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml <my_setup_data.yaml>
```

2. Update the setup data manually:

```
[root@mgmt1 ~]# vi my_setup_data.yaml (update the targeted fields for the setup_data)
```

3. Run the reconfiguration command:

```
[root@mgmt1 ~]# ciscovim --setupfile ~/MyDir/<my_setup_data.yaml>
<pod_management_action>
```

In Cisco VIM, you can edit and enable a selected set of options in the setup_data.yaml file using the reconfigure option. After installation, you can change the values of the feature parameters. Unless specified, Cisco VIM does not allow you to undo the feature configuration.

The following table provides the list of features that you can reconfigure after installing a pod.

Features Enabled after post-pod deployment	Comment
Optional OpenStack Services	• Heat: OpenStack Orchestration Program • LDAP: Works only with Keystone v3. Full or partial reconfiguration can be done. Except for domain, all attributes are reconfigurable. • Ironic: Baremetal workload post installation • Container: Cloud-native workload
Pod Monitoring	CVIM-MON: monitoring host and service level with or without ui_access NFVIMON: Third-party monitoring from host to service level with aid of Cisco Advance Services.
Export of EFK logs to External Syslog Server	Reduces single point of failure on management node and provides data aggregation.
NFS for Elasticsearch Snapshot	NFS mount point for Elastic-search snapshot is used so that the disk on management node does not get full.
Admin Source Networks	White list filter for accessing management node admin service over IPv4 or IPv6.

Features Enabled after post-pod deployment	Comment
NFVBench	Tool to help measure cloud performance. Management node needs a dedicated 10G/40G Intel NIC (4x10G 710, or 2x40G XL710 Intel NIC).
EFK settings	Enables you to set EFK rotation frequency and size.
OpenStack service password	Implemented for security reasons, so that OpenStack passwords can be reset on-demand.
CIMC Password Reconfigure Post Install	Implemented for security reasons, so that CIMC passwords for C-series pod, can be reset on-demand.
SwiftStack Post Install	Integration with third-party Object-Store. The SwiftStack Post Install feature works only with Keystone v2.
TENANT_VLAN_RANGES and PROVIDER_VLAN_RANGES	Ability to increase or decrease the tenant and provider VLAN ranges on a pod that is up and running. It gives customers flexibility in network planning.
DHCP reservation for VM’s MAC addresses	Allow DHCP reservation for virtual machine MAC addresses, so as to get the same IP address always regardless of the host hypervisor or operating system they are running.
Enable TRUSTED_VF on a per (SR-IOV) compute basis	Allows virtual functions to become trusted by the physical function and to perform some privileged operations such as enabling VF promiscuous mode and changing VF MAC address within the guest.
Support of ,multiple external syslog servers	Ability to offload the OpenStack logs to a maximum of four external Syslog servers post-installation.
Replace of failed APIC Hosts and add more leaf nodes	Ability to replace failed APIC Hosts, and add more leaf nodes to increase the fabric influence.
Make Netapp block storage end point secure	Ability to move the Netapp block storage endpoint from Clear to TLS post-deployment
Auto-backup of Management Node	Ability to enable/disable auto-backup of Management Node. It is possible to unconfigure the Management Node.
VIM Admins	Ability to configure non-root VIM Administrators. Ability to configure VIM admins authenticated by LDAP.
EXTERNAL_LB_VIP_FQDN	Ability to enable TLS on external_vip through FQDN.
EXTERNAL_LB_VIP_TLS	Ability to enable TLS on external_vip through an IP address.

Features Enabled after post-pod deployment	Comment
http_proxy and/or https_proxy	Ability to reconfigure http and/or https proxy servers.
Admin privileges for VNF Manager (ESC) from a tenant domain	Ability to enable admin privileges for VNF Manager (ESC) from a tenant domain.
SRIOV_CARD_TYPE	Mechanism to switch between 2-X520 and 2-XL710 as an SRIOV option in Cisco VIC NIC settings at a global and per compute level through reconfiguration. In the absence of per compute and global level, X520 card type is set by default.
NETAPP	Migrate NETAPP transport protocol from http to https.
Reset of KVM console passwords for servers	Aids to recover the KVM console passwords for servers.
Horizon behind NAT or with DNS alias(es)	Ability to host Horizon behind NAT or with DNS alias(es)
Login banner for SSH sessions	Support of configurable login banner for SSH sessions
Ability to add Layer 3 BGP session	Ability to switch BGP sessions from Layer 2 to Layer 3 in the presence of VXLAN configuration.
Add/remove of head-end-replication option	Ability to add or remove head-end-replication option, in the presence of VXLAN configuration
Enabling Cloud settings	Ability to set horizon and keystone settings as reconfigurable.
Vault	Ability to enable vault on day-2.

Identifying the Install Directory

If you are an administrator and want to use CLI to manage the pods, you must know the location of the installer directory. To identify the installer directory of a pod, execute the following commands:

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# ls -lrt | grep openstack-configs
lrwxrwxrwx.  1 root root      38 Mar 12 21:33 openstack-configs ->
/root/installer-<tagid>/openstack-configs
```

From the output, you can understand that the OpenStack-configs is a symbolic link to the installer directory.

Verify that the REST API server is running from the same installer directory location, by executing the following commands:

```
# cd installer-<tagid>/tools
#./restapi.py -a status
Status of the REST API Server:   active (running) since Thu 2016-08-18 09:15:39 UTC; 9h ago
REST API launch directory: /root/installer-<tagid>/
```

Managing Hosts in Cisco VIM or NFVI Pods

In Cisco VIM, a node can participate in multiple roles based on the pod type. The following rules apply for hardware management of a node:

1. If a node is a Micropod node that acts as controller, compute, and Ceph, the node can only go through the action of replace controller for its swap. You can perform this action on one node at a time.
2. If a node is a hyper-converged node (that is, acting as both compute and Ceph), the node is treated as a ceph node from hardware management point of view and the node can only go through the action of add or remove of Ceph. This action can be done only on one node at a time.
3. If a node is a standalone compute node, the node can only go through the action of add or remove of compute. You can add or remove multiple nodes at a time, but you cannot operate the pod with zero compute at any given time.
4. If a node is a dedicated controller node, the node can only go through the action of replace controller for its swap. This action can be done only on one node at a time.
5. If a node is a dedicated Ceph node, the node can only go through the action of add or remove of Ceph. This action can be done only on one node at a time and you cannot have a pod with less than two node Ceph at a time.

Based on the prceding rules, to perform hardware management actions on the pod, run the commands specified in the following table. If you log in as root, manually change the directory to /root/installer-xxx to get to the correct working directory for these Cisco NFVI pod commands.

Table 1: Cisco NFVI Pod Management

Action	Steps	Restrictions

Remove block_storage or compute node	1. Remove the node information from the ROLES and SERVERS section of the setup_data.yaml file for the specific node.
	2. Enter one of the following commands.
	For compute nodes:
	`ciscovim remove-computes --setupfile ~/MyDir/my_setup_data.yaml <"compute-1,compute-2"> [--force]`
	For storage nodes:
	`ciscovim remove-storage --setupfile ~/MyDir/my_setup_data.yaml <"storage-1"> [--force]`
		You can remove multiple compute nodes and only one storage at a time;
		The pod must have a minimum of one compute and two storage nodes after the removal action.
		In Cisco VIM, the number of Ceph OSD nodes vary from 3 to 20. You can remove one OSD node at a time as part of the pod management.
		Note
		• On a Micro or edge pod expanded with standalone computes, only the standalone compute nodes can be removed. Pod management operation for storage node is not supported for Micro or edge pod
		• Compute management operations are not supported for hyper-converged nodes
		• In UMHC or NGENAHC pod, if a VM is running on the storage node, remove-storage operation fails in pre-validation and gives a warning to the user about running VM's. Use force option to forcefully remove the storage node.
		• In Ceph pod, pod management operations for compute is not supported. Removal of storage node is only allowed for servers that are exclusively available with cephosd roles.

Action	Steps	Restrictions

Add block_storage or compute node	1. Add the node information from the ROLES and SERVERS section of the setup_data.yaml file for the specific node.
	2. Enter one of the following commands.
	For compute nodes:
	`ciscovim add-computes --setupfile ~/MyDir/my_setup_data.yaml <"compute-1,compute-2"> [--skip_vmtp]`
	For storage nodes:
	`ciscovim add-storage --setupfile ~/MyDir/my_setup_data.yaml <"storage-1"> [--skip_vmtp]`
		You can add multiple compute nodes and only one storage node at a time.
		The pod must have a minimum of one compute, and two storage nodes before the addition action.
		In Cisco VIM the number of ceph OSD nodes can vary from 3 to 20. You can add one OSD node at a time as part of the pod management.
		Note • On a Micro or edge pod expanded with standalone computes, you can add only the standalone compute nodes. Pod management operation for storage node is not supported.
		• In hyper-converged mode, compute management operations are not supported for hyper-converged nodes.

Action	Steps	Restrictions
Replace controller node	1. If the controller node is in a rack based deployment (UCS C-Series or Quanta based pod), update the CIMC info node in the SERVERS section of the setup_data.yaml file for the specific node 2. For B-series only update the blade and chassis info 3. Enter the following command: `ciscovim replace-controller --setupfile ~/MyDir/my_setup_data.yaml <"control-1"> [--force] [--skip_vmtp]`	You can replace only one controller node at a time. The pod can have a maximum of three controller nodes. In Cisco VIM, the replace controller node operation is supported in Micro-pod. **Note** • While replacing the controller node, the IP address and hostname are reused. So, do not update any other controller information other than CIMC access and hardware information for C-series, and blade and chassis information for B-series • For Micro, edge and Ceph pod, this operation is supported on the AIO (all in one), compute-control, and cephcontrol nodes, respectively. In a Micro or edge pod, If a VM is running on the controller node, the replace controller operation fails during pre-validation and gives a warning to the user about running VM's. Use force option to forcefully replace the controller.

When you add a compute or storage node to a rack based pod (UCS C-Series or Quanta), you can increase the management/provision address pool. Similarly, for a UCS B-Series pod, you can increase the Cisco IMC pool to provide routing space flexibility for pod networking. Along with server information, these are the only items you can change in the setup_data.yaml file after the pod is deployed. To make changes to the management or provisioning sections and/or CIMC (for UCS B-Series pods) network section, you must not change the existing address block as defined on day 0. You can add only to the existing information by adding new address pool block(s) of address pool as shown in the following example:

```
NETWORKING:
  :
  :

  networks:
  -
    vlan_id: 99
    subnet: 172.31.231.0/25
    gateway: 172.31.231.1
    ## 'pool' can be defined with single ip or a range of ip
    pool:
      - 172.31.231.2, 172.31.231.5 -→ IP address pool on Day-0
      - 172.31.231.7 to 172.31.231.12 -→ IP address pool ext. on Day-n
      - 172.31.231.20
    segments:
    ## CIMC IP allocation. Needs to be an external routable network
      - cimc
  -
    vlan_id: 2001
    subnet: 192.168.11.0/25
    gateway: 192.168.11.1
    rt_prefix: < Local to POD > #optional, only for segment management/provision, storage,
 tenant and ToR-type NCS-5500
    rt_suffix: < Region>:< pod_region_number > #optional, only for segement
management/provision, storage, tenant and ToR-type NCS-5500

    ## 'pool' can be defined with single ip or a range of ip
    pool:
      - 192.168.11.2 to 192.168.11.5   -→ IP address pool on Day-0
      - 192.168.11.7 to 192.168.11.12  → IP address pool on day-n
      - 192.168.11.20 → IP address pool on day-n
    segments:
    ## management and provision goes together
      - management
   - provision
  :
  :
```

The IP address pool is the only change allowed in the networking space of the specified networks management/provision and/or CIMC (for B-series). The overall network must have enough address space to accommodate for future enhancement on day-0. After making the changes to servers, roles, and the corresponding address pool, you can execute the add compute/storage CLI shown above to add new nodes to the pod.

For C-series M5 pods, with Cisco NCS 5500 as ToR with splitter cable connection onto the server, along with the server (cimc_ip), and connection (tor_info, dp_tor_info, sriov_tor_info) details, you have to adjust the entry for the splitter_opt_4_10 in respective SWITCHDETAILS for the Cisco NCS 5500 ToR pairs.

For example, to add compute or storage with Cisco NCS 5500 as ToR with splitter cable, add the following entry to the respective Cisco NCS 5500:

```
TORSWITCHINFO:
CONFIGURE_TORS: true # Mandatory
TOR_TYPE: NCS-5500   # Mandatory
ESI_PREFIX:91.<Pod_number>.<podregion_number>.00.00.00.00 #optional - only for NCS-5500
SWITCHDETAILS: -
hostname: <NCS-5500-1> # hostname of NCS-5500-1
username: admin
password: <ssh_password of NCS-5500-1>
...
splitter_opt_4_10: 'FortyGigE<C/D/X/Y>,HundredGigE<E/F/A/B>, …' # Optional for NCS-5500,
only when
     splitter is needed on per switch basis (i.e. the peer switch may or may not have the
entry)

ESI_PREFIX:91.<Pod_number>.<podregion_number>.00.00.00.00 #optional for NCS-5500 only
```

To remove a compute or a storage, delete the respective information. To replace the controller, swap the relevant port information from which the splitter cables originate.

Note For replace controller, you can change only a subset of the server information. For C-series, you can change the server information such as CIMC IP, CIMC Username, CIMC password, rack_id, and tor_info. For B-series, you can change the rack_id, chassis_id, and blade_id, but not the server hostname and management IP during the operation of replace controller.

Recovering Cisco NFVI Pods

This section describes the recovery processes for Cisco NFVI control node and the pod that is installed through Cisco VIM. For recovery to succeed, a full Cisco VIM installation must have occurred in the past. Recovery is caused by a failure of one or more of the controller services such as Rabbit MQ, MariaDB, and other services. The management node must be up and running and all the nodes must be accessible through SSH without passwords from the management node. You can also use this procedure to recover from a planned shutdown or accidental power outage.

Cisco VIM supports the following control node recovery command:

```
# ciscovim cluster-recovery
```

The control node recovers after the network partition is resolved.

Note It may be possible that database sync between controller nodes takes time, which can result in cluster-recovery failure. In that case, wait for some time for the database sync to complete and then re-run cluster-recovery.

To make sure Nova services are good across compute nodes, execute the following command:

```
# source /root/openstack-configs/openrc
# nova service-list
```

To check for the overall cloud status, execute the following command:

```
# ciscovim cloud-sanity create test all
```

To view the results of cloud-sanity, use the following command:

```
#ciscovim cloud-sanity show result all –id <uid of the test >
```

In case of a complete pod outage, you must follow a sequence of steps to bring the pod back. The first step is to bring up the management node, and check that the management node containers are up and running using the docker ps –a command. After you bring up the management node, bring up all the other pod nodes. Make sure every node is reachable through password-less SSH from the management node. Verify that no network IP changes have occurred. You can get the node SSH IP access information from /root/openstack-config/mercury_servers_info.

Execute the following command sequence:

- Check the setup_data.yaml file and runtime consistency on the management node:

  ```
  # cd /root/installer-<tagid>/tools
  # ciscovim run --perform 1,3 -y
  ```

- Execute the cloud sanity using ciscovim command:

  ```
  #ciscovim cloud-sanity create test all
  ```

- To view the results of cloud-sanity, use the command `#ciscovim cloud-sanity show result all -id <uid of the test >`
- Check the status of the REST API server and the corresponding directory where it is running:

  ```
  # cd/root/installer-<tagid>/tools
  #./restapi.py -a status
  Status of the REST API Server:  active (running) since Thu 2016-08-18 09:15:39 UTC; 9h
   ago
  REST API launch directory: /root/installer-<tagid>/
  ```

- If the REST API server is not running from the right installer directory, execute the following to get it running from the correct directory:

  ```
  # cd/root/installer-<tagid>/tools
  #./restapi.py -a setup

  Check if the REST API server is running from the correct target directory
  #./restapi.py -a status
  Status of the REST API Server:  active (running) since Thu 2016-08-18 09:15:39 UTC; 9h
   ago
  REST API launch directory: /root/new-installer-<tagid>/
  ```

- Verify Nova services are good across the compute nodes by executing the following command:

  ```
  # source /root/openstack-configs/openrc
  # nova service-list
  ```

If cloud-sanity fails, execute cluster-recovery (ciscovim cluster-recovery), then re-execute the cloud-sanity and nova service-list steps as listed above.

Recovery of compute and OSD nodes requires network connectivity and reboot so that they can be accessed using SSH without password from the management node.

To shut down, bring the pod down in the following sequence:

1. Shut down all VMs, then all the compute nodes. It should be noted that graceful shut down of VMs is important. Check the VM status from the output of "openstack server list --all-projects", which must show that all VMs are in SHUTOFF State before you proceed.
2. Shut down all compute node (s).
3. Shut down all the storage nodes serially.Before proceeding to next step, ensure that you wait until the storage node shutdown is completed.
4. Shut down all the controllers, but one at a time. Before proceeding to next step, wait for the controller node shutdown to complete.
5. Shut down the management node.
6. Shut down the networking gears.

Note To shut down a node, SSH to the node or connect to CIMC KVM console and issue the shutdown command

```
# shutdown -h now
```

Bring the nodes up in reverse order, that is:

a. Bring up the networking gears.

b. Bring up the management node.

c. Bring up the control nodes.

d. Bring up the storage nodes.

e. Wait untill the Ceph health reports are fine and then proceed to next step.

f. Bring up the compute nodes.

In each step, ensure that each node type is completely booted up before you move on to the next node type.

Run the cluster recovery command, to bring up the pod post power-outage:

```
# ciscovim cluster-recovery
```

Run cloud sanity using the command `# ciscovim cloud-sanity`.

Execute docker cloudpulse check to ensure that all containers are up:

```
cloudpulse run --name docker_check
```

Validate the Cisco API server by running the following command:

```
# ciscovim run --perform 1,3 -y
```

Bring up all VMs and validate if they are all up (not in shutdown state). If any of the VMs are in down state, bring them up using the Horizon dashboard.

NUMA Pinning of VMs

From release Cisco VIM 3.4.0, NUMA pinning of VMs is supported. To make use of this feature, you must add “hw:pin_to_numa” in their VM’s flavor, and set its value to 0 or 1. When one spawns VM with that flavor, the VM uses only the host CPUs from the NUMA that is specified in the flavor.

Managing Nova Compute Scheduler Filters and User Data

OpenStack Nova is an OpenStack component that provides on-demand access to compute resources by provisioning large networks of virtual machines (VMs). In addition to the standard Nova filters, Cisco VIM supports the following additional scheduler filters:

- ServerGroupAffinityFilter—Ensures that an instance is scheduled onto a host from a set of group hosts. To use this filter, you must create a server group with an affinity policy and pass a scheduler hint using group as the key and the server group UUID as the value. Use the **nova** command-line tool and the **--hint** flag. For example:

  ```
  $ nova server-group-create --policy affinity group-1
  $ nova boot --image IMAGE_ID --flavor 1 --hint group=SERVER_GROUP_UUID server-1
  ```

- ServerGroupAntiAffinityFilter—Ensures that each group instance is on a different host. To use this filter, you must create a server group with an anti-affinity policy and pass a scheduler hint, using group as the key and the server group UUID as the value. Use the **nova** command-line tool and the **--hint** flag. For example:

```
$ nova server-group-create --policy anti-affinity group-1
$ nova boot --image IMAGE_ID --flavor 1 --hint group=SERVER_GROUP_UUID server-1
```

- SameHostFilter—Within an instance set, schedules one instance on the same host as another instance. To use this filter, pass a scheduler hint using **same_host** as the key and a list of instance UUIDs as the value. Use the **nova** command-line tool and the **--hint** flag. For example:

  ```
  $ nova boot --image IMAGE_ID --flavor 1 --hint same_host=INSTANCE_ID server-1
  ```

- DifferentHostFilter—Within an instance set, schedules one instance on a different host than another instance. To use this filter, pass a scheduler hint using **different_host** as the key and a list of instance UUIDs as the value. The filter is the opposite of SameHostFilter. Use the **nova**command-line tool and the **--hint** flag. For example:

  ```
  $ nova boot --image IMAGE_ID --flavor 1 --hint different_host=INSTANCE_ID server-1
  ```

In addition to scheduler filters, you can set up user data files for cloud application initializations. A user data file is a special key in the metadata service that holds a file that cloud-aware applications in the guest instance can access. For example, one application that uses user data is the cloud-init system, an open-source package that is available on various Linux distributions. The cloud-init system handles early cloud instance initializations. The typical use case is to pass a shell script or a configuration file as user data during the Nova boot, for example:

```
$ nova boot --image IMAGE_ID --flavor 1 --hint user-data FILE_LOC server-1
```

Monitoring Cisco NFVI Health with CloudPulse

You can query the state of various Cisco NFVI OpenStack endpoints using CloudPulse, an OpenStack health-checking tool. By default, the tool automatically polls OpenStack Cinder, Glance, Nova, Neutron, Keystone, Rabbit, Mariadb, and Ceph every four minutes. However, you can use a CLI REST API call from the management node to get the status of these services in real time. You can integrate the CloudPulse API into your applications and get the health of the OpenStack services on demand. You can find additional information about using CloudPulse in the following OpenStack sites:

- https://wiki.openstack.org/wiki/Cloudpulse
- https://wiki.openstack.org/wiki/Cloudpulseclient
- https://wiki.openstack.org/wiki/Cloudpulse/DeveloperNotes
- https://wiki.openstack.org/wiki/Cloudpulse/OperatorTests
- https://wiki.openstack.org/wiki/Cloudpulse/APIDocs

CloudPulse has two set of tests: endpoint_scenario (runs as a cron or manually) and operator test (run manually). The supported Cloudpulse tests groups include:

- nova_endpoint
- neutron_endpoint
- keystone_endpoint
- glance_endpoint
- cinder_endpoint

Operator tests include:

- ceph_check—Executes the command, "ceph -f json status" on the Ceph-mon nodes and parses the output. If the result of the output is not “HEALTH_OK” ceph_check the reports for an error.
- docker_check—Finds out if all the Docker containers are in the running state in all the nodes. It the report for an error if any containers are in the Exited state. It runs the command “docker ps -aq --filter 'status=exited'”.
- galera_check—Executes the command, "mysql 'SHOW STATUS;” on the controller nodes and displays the status.
- node_check—Checks if all the nodes in the system are up and online. It also compares the result of “nova hypervisor list” and finds out if all the computes are available.
- rabbitmq_check—Runs the command, “rabbitmqctl cluster_status” on the controller nodes and finds out if the rabbitmq cluster is in quorum. If nodes are offline in the cluster rabbitmq_check the report is considered as failed.

CloudPulse servers are installed in containers on all control nodes. The CloudPulse client is installed on the management node by the Cisco VIM installer. To execute CloudPulse, source the openrc file in the openstack-configs directory and execute the following:

```
[root@MercRegTB1 openstack-configs]# cloudpulse --help
usage: cloudpulse [--version] [--debug] [--os-cache]
                  [--os-region-name <region-name>]
                  [--os-tenant-id <auth-tenant-id>]
                  [--service-type <service-type>]
                  [--endpoint-type <endpoint-type>]
                  [--cloudpulse-api-version <cloudpulse-api-ver>]
                  [--os-cacert <ca-certificate>] [--insecure]
                  [--bypass-url <bypass-url>] [--os-auth-system <auth-system>]
                  [--os-username <username>] [--os-password <password>]
                  [--os-tenant-name <tenant-name>] [--os-token <token>]
                  [--os-auth-url <auth-url>]
                  <subcommand> ...
```

To check the results of periodic CloudPulse, enter the following command:

```
[root@MercRegTB1 openstack-configs]# cloudpulse result
+--------------------------------------+------+-------------------+----------+---------+
| uuid                                 | id   | name              | testtype | state   |
+--------------------------------------+------+-------------------+----------+---------+
| 4f4c619a-1ba1-44a7-b6f8-3a06b5903260 | 7394 | ceph_check        | periodic | success |
| 68b984fa-2edb-4d66-9d9b-7c1b77d2322e | 7397 | keystone_endpoint | periodic | success |
| c53d5f0f-a710-4612-866d-caa896e2d135 | 7400 | docker_check      | periodic | success |
| 988d387c-1160-4601-b2ff-9dbb98a3cd08 | 7403 | cinder_endpoint   | periodic | success |
| 5d702219-eacc-47b7-ae35-582bb8e9b970 | 7406 | glance_endpoint   | periodic | success |
| 033ca2fc-41c9-40d6-b007-16e06dda812c | 7409 | rabbitmq_check    | periodic | success |
| 8476b21e-7111-4b1a-8343-afd634010b07 | 7412 | galera_check      | periodic | success |
| a06f8d6e-7b68-4e14-9b03-bc4408b55b48 | 7415 | neutron_endpoint  | periodic | success |
| ef56b26e-234d-4c33-aee1-ffc99de079a8 | 7418 | nova_endpoint     | periodic | success |
| f60021c7-f70a-44fb-b6bd-03804e5b7bf3 | 7421 | node_check        | periodic | success |
+--------------------------------------+------+-------------------+----------+---------+
```

By default, 25 results are displayed. Use –number argument to get desired number (up to 240) of results. For example,

```
[root@MercRegTB1 openstack-configs]# cloudpulse result –number 100
```

To view all CloudPulse tests:

```
# cd /root/openstack-configs
# source openrc
# cloudpulse test-list
```

To run a CloudPulse test on demand:

```
# cd /root/openstack-configs
# source openrc
# cloudpulse run --name <test_name>
# cloudpulse run  --all-tests
# cloudpulse run --all-endpoint-tests
# cloudpulse run --all-operator-tests
```

To run a specific CloudPulse test on demand:

```
# cloudpulse run --name neutron_endpoint
+------------+--------------------------------------+
| Property   | Value                                |
+------------+--------------------------------------+
| name       | neutron_endpoint                     |
| created_at | 2016-03-29T02:20:16.840581+00:00     |
| updated_at | None                                 |
| state      | scheduled                            |
| result     | NotYetRun                            |
| testtype   | manual                               |
| id         | 3827                                 |
| uuid       | 5cc39fa8-826c-4a91-9514-6c6de050e503 |
+------------+--------------------------------------+
```

To show detailed results of a specific CloudPulse run:

```
#cloudpulse show 5cc39fa8-826c-4a91-9514-6c6de050e503
+------------+--------------------------------------+
| Property   | Value                                |
+------------+--------------------------------------+
| name       | neutron_endpoint                     |
| created_at | 2016-03-29T02:20:16+00:00            |
| updated_at | 2016-03-29T02:20:41+00:00            |
| state      | success                              |
| result     | success                              |
| testtype   | manual                               |
| id         | 3827                                 |
| uuid       | 5cc39fa8-826c-4a91-9514-6c6de050e503 |
+------------+--------------------------------------+
```

To see the CloudPulse options, source the openrc file in openstack-configs dir and execute:

```
#cloudpulse --help
```

The CloudPulse project has a RESTful Http service called the Openstack Health API. Through this API cloudpulse allows the user to list the cloudpulse tests, create new cloudpulse tests and see the results of the cloudpulse results.

The API calls described in this documentation require keystone authentication. From release Cisco VIM 3.0.0 onwards, only keystone v3 is supported.

The Identity service generates authentication tokens that permit access to the Cloudpulse REST APIs. Clients obtain this token and the URL endpoints for other service APIs, by supplying their valid credentials to the authentication service. Each time you make a REST API request to Cloudpulse, you must provide your authentication token in the X-Auth-Token request header.

Note Cloudpulse is not applicable Ceph pod.

Assessing Cisco NFVI Status with Cloud-Sanity

The cloud-sanity tool is designed to give you a quick overall status of the pods health checks. Cloud-sanity can run tests on all node types in the Pod: management, control, compute and ceph storage.

The following are test areas supported in cloud-sanity:

1. RAID Disk health checks.
2. Basic network connectivity between the management node and all other nodes in the Pod.
3. Mariadb cluster size.
4. RabbitMQ operation and status.
5. Nova service and hypervisor list.
6. CEPHMON operation and status.
7. CEPHOSD operation and status.

To run the cloud-sanity tool, login to the management node and run the ciscovim command with the cloud-sanity option

Cloud-Sanity user workflow:

1. Use “ciscovim cloud-sanity create …” command to initiate a test.
2. Use “ciscovim cloud-sanity list …” command to view summary/status of current test jobs.
3. Use “ciscovim cloud-sanity show … --id <ID>” command to view detail test results.
4. Use “ciscovim cloud-sanity delete … --id <ID>” to delete test results no longer needed.

The results are maintained so that you can view them any time.

Note Delete the results which are no longer needed.

Step 1 To run the cloud sanity complete the following steps:

```
# ciscovim help cloud-sanity
usage: ciscovim cloud-sanity [--id <id>] [--skip-disk-checks] [-y]
                             create|delete|list|show test|result
                             all|control|compute|cephmon|cephosd|management

Run cloud-sanity test suite

Positional arguments:
  create|delete|list|show         The control command to perform
  test|result                     The identity of the task/action
  all|control|compute|cephmon|cephosd|management
                                  The sanity check

Optional arguments:
  --id <id>                       ID used to identify specific item to
                                  show/delete.
  --skip-disk-checks              Flag to skip running disk-checks during
                                  cloud-sanity test
  -y, --yes                       Yes option to perform the action
```

Step 2 To run the cloud sanity test, you need to create a test job. Once the test job is created, the system displays a message with the time and the ID when the test job was created.

Run the following command to create a test job:

```
# ciscovim cloud-sanity create test all
+------------+--------------------------------------+
| Field      | Value                                |
+------------+--------------------------------------+
| command    | create                               |
| created_at | 2018-03-07T15:37:41.727739           |
| id         | c000ca20-34f0-4579-a997-975535d51dda |
| result     |                                      |
| status     | not_run                              |
| test_name  | all                                  |
| updated_at | None                                 |
+------------+--------------------------------------+
The user can create different test suites based on target roles.  All, management, control, compute,
 cephmon and cephosd.  Only one test will be run at any time.

Example test create commands:
• ciscovim cloud-sanity create test control
o Runs control node tests only
• ciscovim cloud-sanity create test compute
o Runs compute nodes tests only
• ciscovim cloud-sanity create test management
o Runs management node tests only
• ciscovim cloud-sanity create test cephmon
o Runs cephmon tests only
• ciscovim cloud-sanity create test cephosd
o Runs cephosd tests only
```

The cloud-sanity tests use the disk-maintenance and osd-maintenance tools to assess overall health and status of the RAID disks and OSD status.

Note Failures detected in RAID disk health and CEPHOSD operational status can be future evaluated with the disk-maintenance and osd-maintenance tools. See the sections on those tools for information on their use.

Step 3 The ciscovim cloud-sanity list … command is used to monitor a currently running test or just view all the tests that have been run/completed in the past.

```
# ciscovim cloud-sanity list test all
+--------------------------------------+--------------+----------+---------------------+
| ID                                   | Sanity Check | Status   | Created             |
+--------------------------------------+--------------+----------+---------------------+
| c000ca20-34f0-4579-a997-975535d51dda | all          | Complete | 2018-03-07 15:37:41 |
| 83405cf0-e75a-4ce2-a438-0790cf0a196a | cephmon      | Complete | 2018-03-07 15:52:27 |
| 6beceb00-4029-423b-87d6-5aaf0ce087ff | cephmon      | Complete | 2018-03-07 15:55:01 |
| 2707a2e1-d1b5-4176-8715-8664a86bbf7d | cephosd      | Complete | 2018-03-07 16:11:07 |
| b30e1f49-a9aa-4f90-978a-88ba1f0b5629 | control      | Complete | 2018-03-07 16:14:29 |
| f024ff94-ac3e-4745-ba57-626b58ca766b | compute      | Running  | 2018-03-07 16:16:44 |
+--------------------------------------+--------------+----------+---------------------+
We can filter on cephmon if needed
# ciscovim cloud-sanity list test cephmon
+--------------------------------------+--------------+----------+---------------------+
| ID                                   | Sanity Check | Status   | Created             |
+--------------------------------------+--------------+----------+---------------------+
| 83405cf0-e75a-4ce2-a438-0790cf0a196a | cephmon      | Complete | 2018-03-07 15:52:27 |
| 6beceb00-4029-423b-87d6-5aaf0ce087ff | cephmon      | Complete | 2018-03-07 15:55:01 |
+--------------------------------------+--------------+----------+---------------------+

Example cloud-sanity list commands:
• ciscovim cloud-sanity list control
• ciscovim cloud-sanity list compute
• ciscovim cloud-sanity list management
• ciscovim cloud-sanity list cephmon
• ciscovim cloud-sanity list cephosd
```

Step 4 This functionality allows you to view the details results of the test-sanity. Cloud-sanity test results can be passed, failed, or skipped. A skipped test is one that is not supported on this particular POD (ex. RAID test is only support with Hardware RAID.) A skipped test does not count to the overall pass/fail status.

```
# ciscovim cloud-sanity show test all --id c000ca20-34f0-4579-a997-975535d51dda
Cloud sanity Results
+------------+-------------------------------------------------------------+---------+
| Role       | Task                                                        | Result  |
+------------+-------------------------------------------------------------+---------+
| Management | Management - Disk Maintenance RAID Health ***************** | PASSED  |
|            |                                                             |         |
| Management | Management - Container Version Check ********************** | PASSED  |
|            |                                                             |         |
| Management | Management - Disk Maintenance VD Health ******************* | PASSED  |
|            |                                                             |         |
| Control    | Control - Check RabbitMQ is Running *********************** | PASSED  |
|            |                                                             |         |
| Control    | Control - Check RabbitMQ Cluster Status ******************* | PASSED  |
|            |                                                             |         |
| Control    | Control - Container Version Check ************************* | PASSED  |
|            |                                                             |         |
| Control    | Control - Check MariaDB Cluster Size ********************** | PASSED  |
|            |                                                             |         |
| Control    | Control - Ping All Controller Nodes *********************** | PASSED  |
|            |                                                             |         |
| Control    | Control - Check Nova Service List ************************* | PASSED  |
|            |                                                             |         |
| Control    | Control - Ping Internal VIP ******************************* | PASSED  |
|            |                                                             |         |
| Control    | Control - Disk Maintenance RAID Health ******************** | PASSED  |
|            |                                                             |         |
| Control    | Control - Disk Maintenance VD Health ********************** | PASSED  |
|            |                                                             |         |
| Compute    | Compute - Check Nova Hypervisor List ********************** | PASSED  |
|            |                                                             |         |
| Compute    | Compute - Disk Maintenance RAID Health ******************** | PASSED  |
|            |                                                             |         |
| Compute    | Compute - Ping All Compute Nodes ************************** | PASSED  |
|            |                                                             |         |
| Compute    | Compute - Container Version Check ************************* | PASSED  |
|            |                                                             |         |
| Compute    | Compute - Disk Maintenance VD Health ********************** | PASSED  |
|            |                                                             |         |
| CephOSD    | CephOSD - Ping All Storage Nodes ************************** | PASSED  |
|            |                                                             |         |
| CephOSD    | CephOSD - Check OSD Result Without OSDinfo **************** | PASSED  |
|            |                                                             |         |
| CephOSD    | CephOSD - OSD Overall Status ***************************** | PASSED  |
|            |                                                            |         |
| CephOSD    | CephOSD - Check OSD Result With OSDinfo ****************** | PASSED  |
|            |                                                            |         |
| CephMon    | CephMon - Check Cephmon Status *************************** | PASSED  |
|            |                                                            |         |
| CephMon    | CephMon - Ceph Cluster Check ***************************** | PASSED  |
|            |                                                            |         |
| CephMon    | CephMon - Check Cephmon Results ************************** | PASSED  |
|            |                                                            |         |
| CephMon    | CephMon - Check Cephmon is Running *********************** | PASSED  |
|            |                                                            |         |
+------------+------------------------------------------------------------+---------+
[PASSED] Cloud Sanity All Checks Passed
```

Step 5 To delete the cloud sanity test results run the following command:

```
# ciscovim cloud-sanity delete test all --id c000ca20-34f0-4579-a997-975535d51dda

Perform the action. Continue (Y/N)Y
Delete of UUID c000ca20-34f0-4579-a997-975535d51dda Successful

# ciscovim cloud-sanity list test all
+--------------------------------------+--------------+----------+---------------------+
| ID                                   | Sanity Check | Status   | Created             |
+--------------------------------------+--------------+----------+---------------------+
| 83405cf0-e75a-4ce2-a438-0790cf0a196a | cephmon      | Complete | 2018-03-07 15:52:27 |
| 6beceb00-4029-423b-87d6-5aaf0ce087ff | cephmon      | Complete | 2018-03-07 15:55:01 |
| 2707a2e1-d1b5-4176-8715-8664a86bbf7d | cephosd      | Complete | 2018-03-07 16:11:07 |
| b30e1f49-a9aa-4f90-978a-88ba1f0b5629 | control      | Complete | 2018-03-07 16:14:29 |
| f024ff94-ac3e-4745-ba57-626b58ca766b | compute      | Complete | 2018-03-07 16:16:44 |
+--------------------------------------+--------------+----------+---------------------+
```

The cloud-sanity tests use the disk-maintenance and osd-maintenance tools to assess overall health and status of RAID disks and OSD status.

Note Failures detected in RAID disk health and CEPHOSD operational status can be future evaluated with the disk-maintenance and osd-maintenance tools. See the sections on those tools for information on their use.

Service Catalog URL

The OpenStack Keystone service catalog allows API clients to dynamically discover and navigate to cloud services. Cloudpulse has its own service URL which is added to the Keystone service catalog. You need to send a token request to Keystone to find the service URL of cloudpulse. The token request lists all the catalog of services available.

Get Token from Keystone

To get the token from keystone run the following commands:

Resource URI

Verb	URI
POST	http://<controller_lb_ip>:5000/v2.0/tokens

Example

```
JSON Request
POST / v2.0/tokens
Accept: application/json
{
    "auth": {
        "passwordCredentials":{
                  "username": "admin",
                  "password": "iVP1YciVKoMGId1O"
        }
    }
}

JSON Response
200 OK
Content-Type: application/json
{
  "access": {
    "token": {
      "issued_at": "2017-03-29T09:54:01.000000Z",
      "expires": "2017-03-29T10:54:01Z",
      "id":
"gAAAAABY24Q5TDIqizuGmhOXakV2rIzSvSPQpMAmC7SA2UzUXZQXSH-ME98d3Fp4Fsj16G561a420B4BK0fylcykL22EcO9",
…………
…….. 
}
```

Get Service Catalog URL for Cloudpulse

Resource URI

Verb	URI
GET	http://<controller_ip>:35357/v2.0/endpoints

Example

```
JSON Request
GET /v2.0/endpoints
Accept: application/json

JSON Response
200 OK
Content-Type: application/json
{"endpoints": [
     {"internalurl": "http://<controller>:9999",
      "adminurl": "http://<controller>:9999",
      "publicurl":"http://<controller>:9999"
}]}
}
```

Cloudpulse APIs

The following are a list of APIs and the corresponding functions that the API performs. The cloudpulse APIs is accessed with the X-Auth-Token which contains the token which is received from the Keystone token generation API mentioned in the preceding panel.

List of Cloudpulse Tests

To get the list of cloudpulse tests:

Resource URI

Verb	URI
GET	http://<controller_ip>:9999/cpulse

Example

```
JSON Request
GET /cpulse
Accept: application/json

JSON Response
200 OK
Content-Type: application/json
{
  "cpulses": [
    {
      "name": "galera_check",
      "state": "success",
      "result":"ActiveNodes:16.0.0.37,16.0.0.17,16.0.0.27",
      "testtype": "periodic",
      "id": 4122,
      "uuid": "a1b52d0a-ca72-448a-8cc0-5bf210438d89"
    }]
}
```

Get detailed result of 1 test

To get detailed result of the test.

Resource URI

Verb	URI
GET	http://<controller_ip>:9999/cpulse/<uuid>

Uuid : uuid of the test

Example

```
JSON Request
GET /cpulse/e6d4de91-8311-4343-973b-c507d8806e94
Accept: application/json

JSON Response
200 OK
Content-Type: application/json
```

```
{
      "name": "galera_check",
      "state": "success",
      "result":"ActiveNodes:16.0.0.37,16.0.0.17,16.0.0.27",
      "testtype": "periodic",
      "id": 4122,
      "uuid": " e6d4de91-8311-4343-973b-c507d8806e94"
}
```

Get List of Tests Available

To get a list of available cloudpulse tests:

Resource URI

Verb	URI
GET	http://<controller_ip>:9999/cpulse/list_tests

Example

```
JSON Request
GET /cpulse/list_tests
Accept: application/json

JSON Response
200 OK
Content-Type: application/json
{
  "endpoint_scenario":
"all_endpoint_tests\ncinder_endpoint\nglance_endpoint\nkeystone_endpoint\nneutron_endpoint\nnova_endpoint",

  "operator_scenario":
"all_operator_tests\nceph_check\ndocker_check\ngalera_check\nnode_check\nrabbitmq_check"
}
```

Schedule a manual cloudpulse test:

To schedule a manual test of cloudpulse run the following commands:

Resource URI

Verb	URI
POST	http://<controller_ip>:9999/cpulse

Example

```
JSON Request
POST /cpulse
Accept: application/json
{
"name": "galera_check"
}

JSON Response
200 OK
```

```
Content-Type: application/json
{
      "name": "galera_check",
      "state": "scheduled",
      "result":"NotYetRun",
      "testtype": "manual",
      "id": 4122,
      "uuid": " e6d4de91-8311-4343-973b-c507d8806e94"
}
```

Remove the results of a test

To remove the results of a test.

Resource URI

Verb	URI
DELETE	http://<controller_ip>:9999/cpulse/<uuid>

Uuid : uuid of the test

Example

```
JSON Request
DELETE /cpulse/68ffaae3-9274-46fd-b52f-ba2d039c8654
Accept: application/json

JSON Response
204 No Content
```

Checking Network Connections

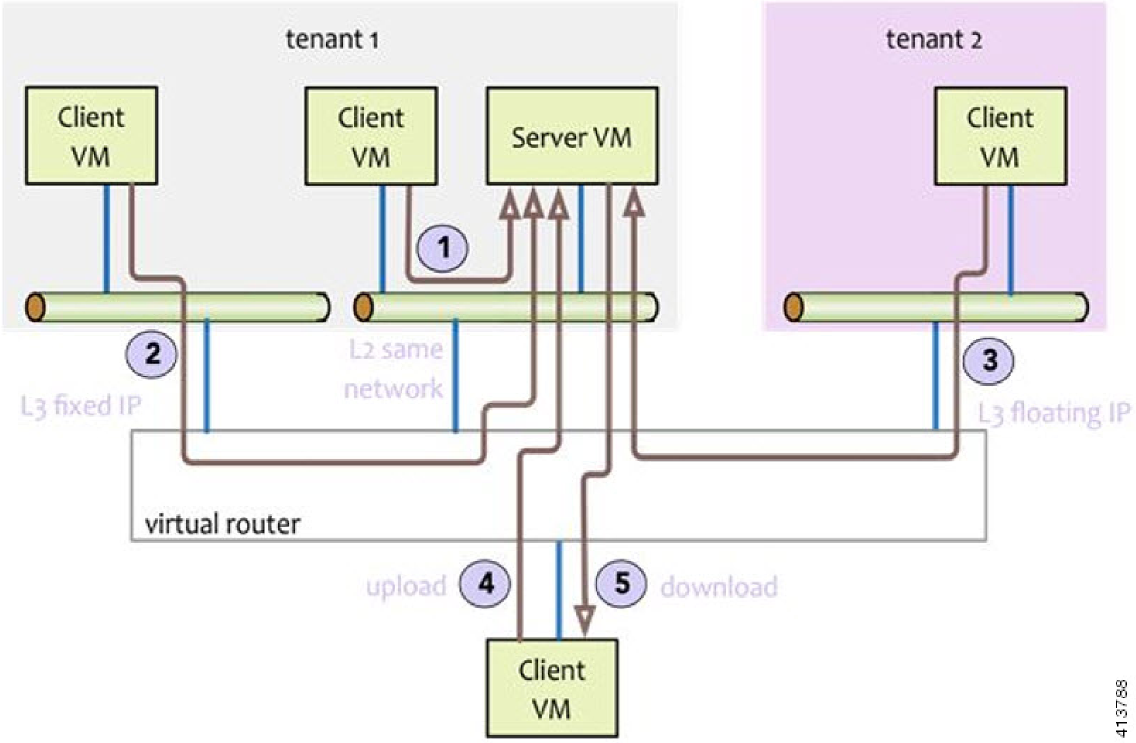
You can use Virtual Machine Through Put (VMTP) to check Layer 2 and Layer 3 data plane traffic between Cisco NFVI compute nodes. VMTP performs ping connectivity, round trip time measurement (latency), and TCP/UDP throughput measurement for the following Cisco NFVI east to west VM-to-VM flows:

- Same network (private fixed IP, flow number 1).
- Different network using fixed IP (same as intra-tenant L3 fixed IP, flow number 2).
- Different network using floating IP and NAT (same as floating IP inter-tenant L3, flow number 3.)
- When an external Linux host is available for testing north to south flows, external host to VM download and upload throughput and latency (L3/floating IP, flow numbers 4 and 5).

The following figure shows the traffic flows VMTP measures. Cloud traffic flows are checked during Cisco VIM installation and can be checked at any later time by entering the following command:

```
$ ciscovim run --perform 8 –y
```

Figure 1: VMTP Cloud Traffic Monitoring



General Scheme of Enabling Optional Services Post Cisco VIM Deployment

Before running the reconfigure option, you must run cloud sanity to ensure that the NFVI is up and running and no faults exists. After successful execution of cloud sanity, take a backup of the setup_data file and update it manually with the configuration details by running the following command:

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/
# update the setup_data to for the targeted change
[root@mgmt1 ~]# cd /root/MyDir/
[root@mgmt1 ~]# vi setup_data.yaml
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile /root/MyDir/setup_data.yaml
```

Enabling NFVBench Post Deployment

NFVBench is a data plane performance benchmark tool for NFVI that can be optionally installed after the pod deployment.

NFVBench is used to:

- Verify that the data plane is working properly and efficiently when using well defined packet paths that are typical of NFV service chains.
- Measure the actual performance of your data plane so that you can estimate what VNFs can expect from the infrastructure when it comes to receiving and sending packets.

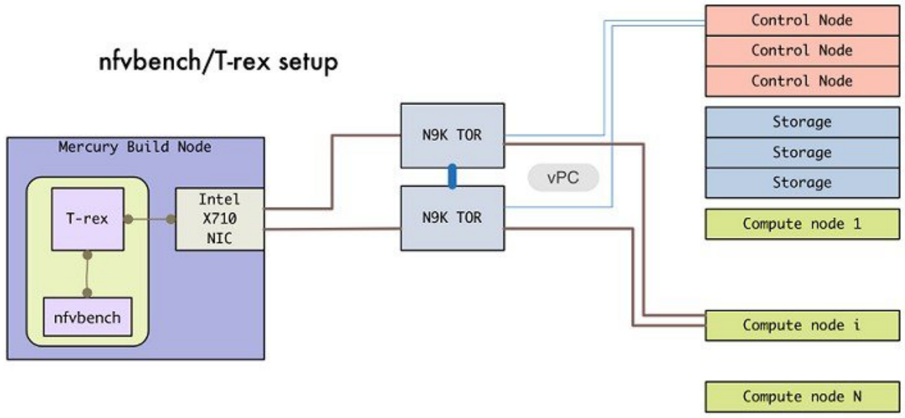
While VMTP only measures VM to VM traffic, NFVBench measures traffic flowing from an integrated software traffic generator (TRex) running on the management node to the ToR switches to test VMs running in compute nodes.

In Cisco VIM, the NFVBench (performance benchmark) is an optional tool. You can deploy NFVBench after the installation of the pod.

Before you begin

- If you are using Quanta servers, see **Installing the Management Node on the Quanta Servers** section of Cisco *Virtualized Infrastructure Manager Installation Guide*, for the day-0 BIOS setting of the management node.
- An extra 10 GE (Intel X710 NIC) or 40GE (Intel XL710 NIC) or 25G (xxv710 for Quanta Server) must be installed on the management node.
- A TRex traffic generator which uses the DPDK interface to interact with Intel NIC and makes use of hardware, instead of software to generate packets. This approach is more scalable and enables NFVBench to perform tests without software limitations.
- Wire two physical interfaces of the Intel NIC to the TOR switches (as shown in the following figure).

Figure 2: NFVBench topology setup



Procedure

	Command or Action	Purpose

Step 1	Enable the NFVBench configuration in the setup_data.yaml file.	Sample configuration files for OVS/VLAN or VPP mechanism driver:
		`NFVBENCH:`
		`   enabled: True    # True or False`
		`   tor_info: {TORa: eth1/42, TORb: eth1/42} #`

	Command or Action	Purpose

```
mandatory
#  tor_info: {TOR: 'eth1/42,eth1/43'} # use if
there is only one TOR switch
#  nic_ports: 3,4    # Optional input, indicates
which 2 of the 4 available ports
                     # of 10G Intel NIC on the
management node is NFVbench tool using
                    # to send and receive traffic.

                     # Defaults to the first 2
ports of NIC (ports 1 and 2) if not specified.
                    # Port number must be between
 1 and 4, one port cannot be used twice.
                     # nic_slot: <int>   #
Optional, defaults to 1st set of unbonded pair of
 NIC ports
                     in an Intel 710 or 520 card
the code finds; Via this option, one can choose
                      to run NFVbench via XL710,
520 or X710 card
                     # Example:
                     # nic_ports: 1,4    # the
first and the last port of Intel NIC are used
                    # nic_slot: 2        # #
Optional, defaults to 1st set of unbonded pair of
 NIC ports in an
                  Intel 710 or 520 card the code
finds; Via this option, one can choose to run
NFVbench
                  via XL710, 520 or X710 card
# nic_slot: Management node slot on which the
NFVbench NIC card is anchored off
# For VTS/VXLAN
#  vteps: "vtep_ip1,vtep_ip2"         # Mandatory
 and needed only for VTS/VXLAN. Specify separated
 IP pairs in tenant network and not in the tenant
 pool, reconfigurable
#
# For VXLAN over vxlan-tenant network
#  vteps: "vtep_ip1,vtep_ip2"        # Mandatory,
 specify separated IP pairs in vxlan-tenant network
 and not in the vxlan-tenant pool, reconfigurable
#  vnis: "vni_id1, vni_id2"          # Mandatory,
 specify the VNI range to be used for all vxlan
networks created by NFVbench for benchmarking
```

Sample configuration for VTS mechanism driver:

```
NFVBENCH:
   enabled: True    # True or False
   tor_info: {TORa: eth1/42, TORb: eth1/42} #
mandatory
   vtep: "ip1, ip2" # Mandatory and needed only
for VTS/VXLAN.
                    # Specify any pair of unused
VLAN ids to be used
                    # for VLAN to VxLAN
encapsulation in TOR switch.
#  tor_info: {TOR: 'eth1/42,eth1/43'} # Use if
there is only one TOR switch.
#  nic_ports: 3,4    # Optional input, indicates
which 2 of the 4 available ports
                     # of 10G Intel NIC on the
```

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>management node is NFVbench tool using
                    # to send and receive traffic.

                     # Defaults to the first 2
ports of NIC (ports 1 and 2) if not specified.
                    # Port number must be between
 1 and 4, one port cannot be used twice.
                     # Example:
                     # nic_ports: 1,4   # the
first and the last port of Intel NIC are used
nic_slot: 2   # # Optional, defaults to 1st
 set of unbonded pair of NIC ports in an Intel 710
 or 520 card the code finds; Via this option, one
 can choose to run NFVbench via XL710 or X710 card

Note: if nic_ports are defined, then nic_slot
has to be defined and vice-versa

VTS_PARAMETERS:
   …
VTS_DAY0: '<True|False>’# Required parameter when
 VTS enabled
VTS_USERNAME: '<vts_username>'# Required parameter
 when VTS enabled
VTS_PASSWORD: '<vts_password>'# Required parameter
 when VTS enabled
VTS_NCS_IP: '11.11.11.111'# '<vts_ncs_ip>',
mandatory when VTS enabled
VTC_SSH_USERNAME: 'admin'# '<vtc_ssh_username>',
mandatory for NFVbench
VTC_SSH_PASSWORD: 'my_password'#
'<vtc_ssh_password>', mandatory for NFVbench</td></tr>
<tr><td><b>Step 2</b></td><td>Configuring minimal settings of NFVBench:</td><td># Minimal settings required for NFVbench
TORSWITCHINFO:
   CONFIGURE_TORS: <True or False> # True if
switches should be configured to support NFVbench
   …
   SWITCHDETAILS:
   - hostname: 'TORa'   # Hostname matching
'tor_info' switch name.
     username: 'admin'   # Login username for
switch user.
    password: 'my_password' # Login password for
 switch user.
    ssh_ip: '172.31.230.123' # SSH IP for switch.

   - hostname: 'TORb'
     username: 'admin'
     password: 'my_password'
     ssh_ip: '172.31.230.124'

TOR switches will be configured based on information provided in tor_info. Two ports specified by interfaces are configured in trunk mode. It is not required to set 'CONFIGURE_TORS' to 'True', but then manual configuration is necessary.

With VTS as mechanism driver additional settings are needed. NFVBench needs access to VTS NCS to perform</td></tr>
</table>

	Command or Action	Purpose
		cleanup after it detaches the traffic generator port from VTS. Also a pair of VTEP VLANs is required for VLAN to VxLAN mapping. Value can be any pair of unused VLAN ID.

Step 3	Reconfigure Cisco VIM to start or restart the NFVBench container. To reconfigure add necessary configuration to the setup_data.yaml file, run the reconfigure command as follows.	`[root@mgmt1 ~]# cd /root/`
		`[root@mgmt1 ~]# mkdir MyDir`
		`[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/`
		`[root@mgmt1 ~]# cd /root/`
		`[root@mgmt1 ~]# # update the setup_data to include NFVBENCH section`
		`[root@mgmt1 ~]# cd /root/MyDir/`
		`[root@mgmt1 ~]# vi setup_data.yaml`
		`[root@mgmt1 ~]# cd ~/installer-xxxx`
		`[root@mgmt1 ~]# ciscovim reconfigure --setupfile /root/MyDir/setup_data.yaml`
		After the reconfiguration, you can see that the NFVBench container is up and ready for use.
		Note Use the below command to source the openrc before using the nfvbench.
		`source ~/openstack-configs/openrc`

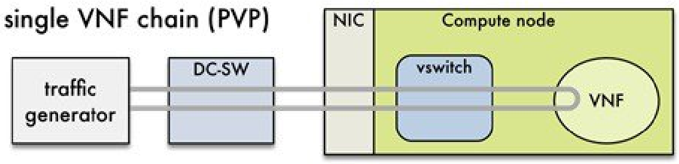
NFVBench Usage

Built-in packet paths

NFVBench can setup and stage three different packet paths.

The default packet path is called **PVP** (Physical - VM - Physical) and represents a typical service chain made of 1 VNF/VM:

Figure 3: Single VNF chain (PVP)



The traffic generator runs inside the NFVBench container on the management node. DC-SW represents the top of rack switch(es). The VNF is a test VM that contains a fast L3 router based on FD.io VPP. This VNF image can also be configured to run an L2 forwarder based on DPDK testpmd (both options generally yield roughly similar throughput results).

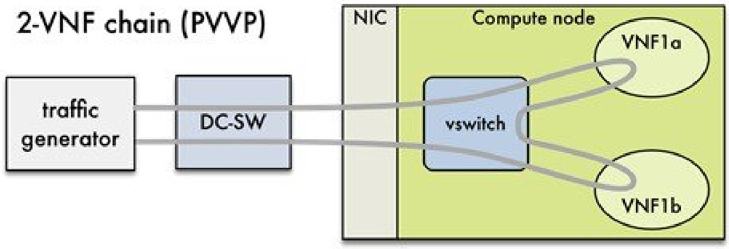
Traffic is made of UDP packets generated on the 2 physical interfaces (making it a bi-directional traffic). Packets are forwarded by the switch to the appropriate compute node before arriving to the virtual switch, then to the VNF before looping back to the traffic generator on the other interface. Proper stitching of the traffic on the switch is performed by NFVbench by using the appropriate mechanism (VLAN tagging for VLAN based deployments, VxLAN VTEP in the case of VTS deployments).

The performance of the PVP packet path provides a very good indication of the capabilities and efficiency of the NFVi data plane in the case of a single service chain made of 1 VNF/VM.

NFVBench also supports more complex service chains made of 2 VM in sequence and called PVVP (Physical-VM-VM-Physical).

In a PVVP packet path, the 2 VMs reside on the same compute node (PVVP intra node).

Figure 4: 2-VNF chain (PVVP)



NFVBench Command-Line Options and Status

You can execute most of the benchmark variants using CLI options from the shell promp on the management node. The common NFVBench command-line options are displayed using the --help option:

```
[root@mgmt1 ~]# nfvbench --help
```

Use the --status option to check the NFVbench version and see if benchmark is running:

```
[root@mgmt1 ~]# nfvbench –status
2018-12-19 20:29:49,656 INFO Version: 3.X.X
2018-12-19 20:29:49,656 INFO Status: idle
2018-12-19 20:29:49,704 INFO Discovering instances nfvbench-loop-vm...
2018-12-19 20:29:50,645 INFO Discovering flavor nfvbench.medium...
2018-12-19 20:29:50,686 INFO Discovering networks...
2018-12-19 20:29:50,828 INFO No matching NFVbench resources found
```

Using NFVBench Configuration File

More advanced use-cases require passing a yaml NFVbench configuration file. You can get the default NFVbench configuration file by using the -show-default-config option.

Navigate to the host folder mapped to a container `(/root/nfvbench)` and copy the default NFVBench configuration by using the following command:

```
[root@mgmt1 ~]# cd /root/nfvbench
[root@mgmt1 ~]# nfvbench --show-default-config > nfvbench.cfg
```

Edit the configuration file to remove all the properties that are not changed and retain the properties that are required. You can then pass the edited file to NFVbench using the -c option.

Ensure that you use a container visible pathname as this file is read from the container. The `/root/nfvbench` folder on the host is mapped to the `/tmp/nfvbench` folder in the container, so that the configuration file stored under `/root/nfvbench` can be referenced as `/tmp/nfvbench/<file>` in the CLI option.

For example:

```
[root@mgmt1 ~]# nfvbench -c /tmp/nfvbench/nfvbench.cfg
```

Control Plane Verification

If you are trying NFVbench for the first time, verify that the tool can stage the default packet path properly without sending any traffic.

The --no-traffic option exercises the control plane by creating a single test service chain with one VM, but does not send any traffic.

The following command stages only the default PVP packet path (but does not generate any traffic):

```
[root@mgmt1 ~]# nfvbench --no-traffic
```

Fixed Rate Run Test

The data plane traffic test is done to generate traffic at a fixed rate for a fixed duration. For example, you can generate a total of 10000 packets per second (which is 5000 packets per second per direction) for the default duration (60 seconds), with the default frame size of 64 bytes using the following configuration:

```
[root@mgmt1 ~]# nfvbench
```

Packet Sizes

You can specify any list of frame sizes using the -frame-size option (pass as many as desired), including IMIX.

Following is an example, to run a fixed rate with IMIX and 1518 byte frames:

```
[root@mgmt1 ~]# nfvbench --rate 10kpps --frame-size IMIX --frame-size 1518
```

NDR and PDR Test

NDR and PDR test is used to determine the performance of the data plane in terms of throughput at a given drop rate.

- No Drop Rate(NDR) is the highest throughput achieved while allowing zero packet drop (allows a very low drop rate usually lesser than 0.001%).
- Partial Drop Rate (PDR) is the highest throughput achieved while allowing most at a given drop rate (typically less than 0.1%).

NDR is always less or equal to PDR.

To calculate the NDR and PDR for your pod, run the following command:

```
[root@mgmt1 ~]# nfvbench --rate ndr_pdr
```

Multi-chain Test

In multi-chain test, each chain represents an independent packet path symbolizing real VNF chain. You can run multiple concurrent chains and better simulate network conditions in real production environment. Results with single chain versus with multiple chains usually vary because of services competing for resources (RAM, CPU, and network).

To stage and measure multiple service chains at the same time, use *--service-chain-count* flag or shorter *-scc* version.

The following example shows how to run the fixed rate run test with ten PVP chains:

```
[root@mgmt1 ~]# nfvbench -scc 10 --rate 100kpps
```

The following example shows how to run the NDR/PDR test with ten PVP chains:

```
[root@mgmt1 ~]# nfvbench -scc 10 --rate ndr_pdr
```

Multi-Flow Test

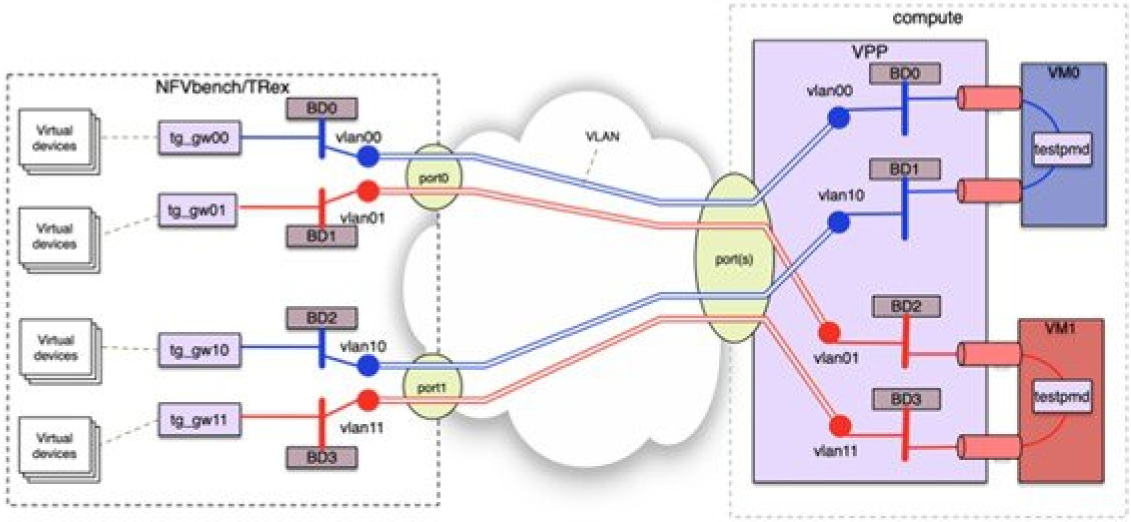
In Multi-flow test, one flow is defined by a source and destination MAC/IP/port tuple in the generated packets. It is possible to have many flows per chain. The maximum number of flows that are supported is in the order of 1 million flows per direction.

The following command runs three chains with a total of 100K flows per direction (for all chains):

```
[root@mgmt1 ~]# nfvbench -scc 3 -fc 100k
```

Encapsulation

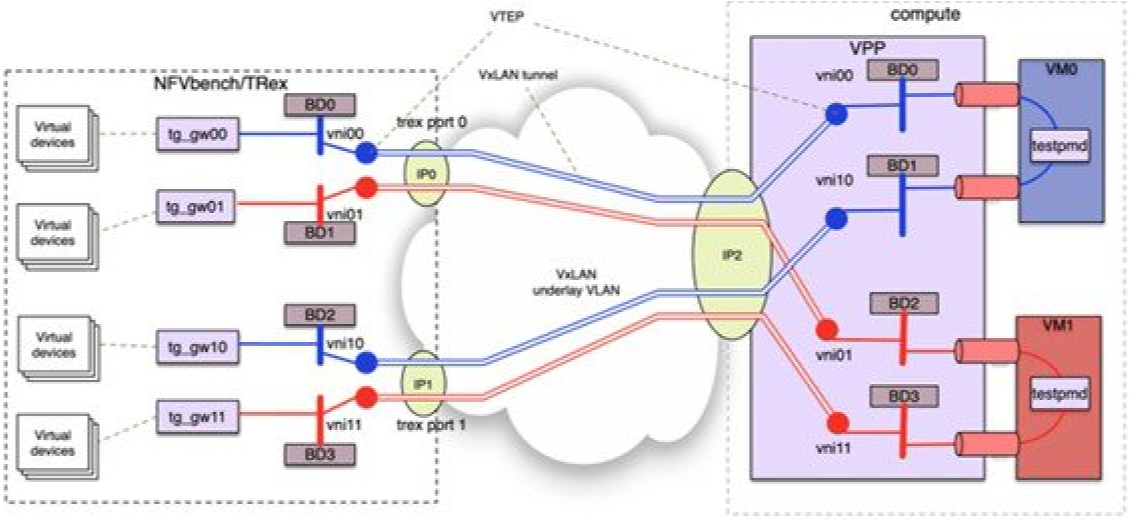
By default, NFVbench uses vlan tagging for the generated traffic and directs the traffic to the vswitch in the target compute node (OVS or VPP). The following diagram illustrates an example of NFVBench execution with two chains using VLAN and when VPP is vswitch.



If VxLAN is enabled, it is possible to force the use of VxLAN using the –vxlan CLI option.

The provision of custom configuration allows you to specify more VxLAN options such as specific VNIs to use. For more details, check the default configuration file.

The following diagram illustrates an example of NFVBench execution with two chains using VxLAN and when VPP is vswitch.



SR-IOV

If SR-IOV is deployed, NFVbench can support to send the traffic to the test VMs that use SR-IOV instead of vswitch.

To test SR-IOV, you must have compute nodes configured to support one or more SR-IOV interfaces (also knows as PF or physical function) and OpenStack to support SR-IOV.

You need to know:

- The name of the physical networks associated with the SR-IOV interfaces (this is a configuration in Nova compute).
- The VLAN range that can be used on the switch ports that are wired to the SR-IOV ports. Such switch ports are normally configured in trunk mode with a range of VLAN ids enabled on that port.

For example, if two SR-IOV ports exist per compute node, two physical networks are generally configured in OpenStack with a distinct name.

The VLAN range to use is is also allocated and reserved by the network administrator and in coordination with the corresponding top of rack switch port configuration.

To enable SR-IOV test, you must provide the following configuration options to NFVbench in the configuration file.

This example instructs NFVbench to create the left and right networks of a PVP packet flow to run on two SRIOV ports named "phys_sriov0" and "phys_sriov1" using resp. segmentation_id 2000 and 2001:

```
sriov: true
internal_networks:
       left:
           segmentation_id: 2000
           physical_network: phys_sriov0
```

```
        right:
            segmentation_id: 2001
            physical_network: phys_sriov1
```

The segmentation ID fields must be different.

In case of PVVP, the middle network must be provisioned properly. The same physical network can also be shared by the virtual networks, but with different segmentation IDs.

External Chain Test

NFVBench measures the performance of chains that are pre-staged (using any means external to NFVBench). These chains can be real VNFs with L3 routing capabilities or L2 forwarding chains.

The external chain test is used when you want to use NFVBench only for traffic generation. In this case, NFVBench sends traffic from traffic generator and reports results without performing any staging or configuration.

Ensure that the setup is staged externally prior to running NFVbench by creating networks and VMs with a configuration that allows generated traffic to pass. You need to provide the name of the two edge neutron networks to which the traffic generators are to be attached, during configuration so that NFVbench can discover the associated segementation ID (VLAN or VNI).

If the external chains support only L2 forwarding, the NFVBench configuration must specify the destination MAC to use in each direction for each chain

If the external chains support IPv4 routing, the NFVBench configuration must specify the public IP addresses of the service chain end points (gateway IP) that are used to discover destination MAC using ARP.

To measure performance for external chains, use the *--service-chain EXT* (or *-sc EXT*) option:

```
[root@mgmt1 ~]# nfvbench -sc EXT
```

NFVBench Results

You can store the NFVBench detailed results in JSON format using the below command, if you pass the --json option with a destination file name or the --std-json option with a destination folder pathname to use the standard file name generated by NFVBench.

```
[root@mgmt1 ~]# nfvbench -scc 3 -fc 10 -fs 64 --json /tmp/nfvbench/my.json
```

The above command stores the results in JSON file in `/tmp/nfvbench` container directory, which is mapped to the host `~/nfvbench` directory. The first file is named as my.json.

Examples of NFVIBench Result Execution

VLAN Fixed Rate

The following example shows the generation of the default frame size (64B) over 100Kpps for the default duration (60s) with the default chain type (PVP), default chain count (1) and default flow count (10k):

```
# nfvbench –rate 100kpps -fs IMIX
```

The summary of NFVBench result is shown below:

```
Date: 2018-12-19 21:26:26
NFVBench version 3.0.4.dev2
```

```
Openstack Neutron:
  vSwitch: VPP
  Encapsulation: VLAN
Benchmarks:
> Networks:
  > Components:
    > Traffic Generator:
        Profile: trex-local
        Tool: TRex
    > Versions:
      > Traffic_Generator:
          build_date: Nov 13 2017
          version: v2.32
          built_by: hhaim
          mode: STL
          build_time: 10:58:17
      > VPP: 18.07
      > CiscoVIM: 2.4.3-15536
  > Service chain:
    > PVP:
      > Traffic:
          Profile: custom_traffic_profile
          Bidirectional: True
          Flow count: 10000
          Service chains count: 1
          Compute nodes: [u'nova:c45-compute-2']
```

The following NFVBench Result Execution Summary table provides the drop rate measured (in this example no drops) and latency measurements in micro-seconds (time for a packet to be sent on one port and receive back on the other port)

Table 2: NFVBench Result Execution Summary

L2 Frame Size	Drop Rate	Avg Latency (usec)	Min Latency (usec)	Max Latency (usec)
IMIX	0.0000%	28	20	330

The following NFVBench Result Configuration table provides the mode details for both forward and reverse directions, where:

- Requested TX Rate is the rate that is requested in bps and pps.
- Actual TX Rate is the actual rate achieved by the traffic generator. It can be lower than the requested rate if there is not enough CPU.
- RX Rate is the rate of packets received.

Table 3: NFVBench Result Configuration

Direction	Requested TX Rate (bps)	Actual TX Rate (bps)	RX Rate (bps)	Requested TX Rate (pps)	Actual TX Rate (pps)	RX Rate (pps)
| Forward	152.7333 Mbps	152.7334 Mbps	152.7344 Mbps	50,000 pps	50,000 pps	50,000 pps
Reverse	152.7333 Mbps	152.7334 Mbps	152.7344 Mbps	50,000 pps	50,000 pps	50,000 pps

Direction	Requested TX Rate (bps)	Actual TX Rate (bps)	RX Rate (bps)	Requested TX Rate (pps)	Actual TX Rate (pps)	RX Rate (pps)
Total	305.4667 Mbps	305.4668 Mbps	305.4688 Mbps	100,000 pps	100,000 pps	100,000 pps

The Forward and Reverse Chain Packet Counters and Latency table shows the number of packets sent or received at different hops in the packet path, where:

- TRex.TX.p0 or p1 shows the number of packets sent from each port by the traffic generator.
- Vpp.RX.vlan.<id> shows the number of packets received on the VLAN subinterface with VLAN id <id> in the VPP vswitch.
- Vpp.TX.veth/<id> shows the number of packets sent to the VM.
- Vpp.RX.veth/<id> shows the number of packets received from the VM.

Table 4: Forward Chain Packet Counters and Latency

Chain	TRex.TX.p0	| vpp.RX.vlan.1547	vpp.TX.veth/2	| vpp.RX.veth/1	vpp.TX.vlan.1511	| TRex.RX.p1	Avg Lat.	Min lat.	Max lat
0	3,000,001	=>	=>	=>	=>	3,000,001	28 usec	20 usec	320 usec

Table 5: Reverse Chain Packet Counters and Latency

Chain	TRex.TX.p1	| vpp.RX.vlan.1511	vpp.TX.veth/1	vpp.RX.veth/2	vpp.TX.vlan.1547	| TRex.RX.p0	Avg Lat.	Min lat.	Max lat
0	3,000,001	=>	=>	=>	=>	3,000,001	28 usec	20 usec	330 usec

Note '=>' indicates that no packets are dropped. Otherwise the value will indicate the number of packets dropped.

VLAN NDR/PDR

Use the following command to meassure NDR and PDR for IMIX, with the default chain type (PVP), default chain count (1) and default flow count (10k):

```
# nfvbench -fs IMIX
```

The summary of the NFVBench result execution is shown below:

```
Date: 2018-12-20 23:11:01
NFVBench version 3.0.5.dev2
Openstack Neutron:
  vSwitch: VPP
  Encapsulation: VLAN
Benchmarks:
> Networks:
  > Components:
    > Traffic Generator:
```

```
    Profile: trex-local
    Tool: TRex
  > Versions:
   > Traffic_Generator:
     build_date: Nov 13 2017
     version: v2.32
     built_by: hhaim
     mode: STL
     build_time: 10:58:17
   > VPP: 18.07
   > CiscoVIM: 2.3.46-17358
 > Measurement Parameters:
   NDR: 0.001
   PDR: 0.1
 > Service chain:
  > PVP:
   > Traffic:
     Profile: custom_traffic_profile
     Bidirectional: True
     Flow count: 10000
     Service chains count: 1
     Compute nodes: [u'nova:a22-mchester-micro-3']
```

The NFVBench Result Execution Summary table shows the following:

- L2 frame size
- Highest throughput achieved in bps and pps below the drop rate thresholds being the sum of TX for both ports.
- Drop rate measured
- Latency measured (average, min, max)

Table 6: NFVBench Result Execution Summary

	L2 Frame Size	Rate (fwd+rev) in Gbps	Rate (fwd+rev) in pps	Avg Drop Rate	Avg Latency (usec)	Min Latency (usec)	Max Latency (usec)
NDR	IMIX	8.5352	2,794,136	| 0.0000%	124	10	245
PDR	IMIX	9.5703	3,133,012	0.0680%	167	10	259

VXLAN Fixed Rate

It is applicable for platforms that support VxLAN only

Example 1:

In this example, default frame size of 64B is sent over 1Mpps on two chains using VxLAN with flow count of 10k:

```
# nfvbench --duration 10 -scc 2 --rate 1Mpps --vxlan
```

The summary of the NFVBench Result is shown below:

```
2018-12-20 23:28:24,715 INFO --duration 10 -scc 2 --rate 1Mpps --vxlan
2018-12-20 23:28:24,716 INFO VxLAN: vlan_tagging forced to False (inner VLAN tagging must
be disabled)
2018-12-20 23:28:24,716 INFO Using default VxLAN segmentation_id 5034 for middle internal
network
2018-12-20 23:28:24,716 INFO Using default VxLAN segmentation_id 5017 for right internal
network
2018-12-20 23:28:24,716 INFO Using default VxLAN segmentation_id 5000 for left internal
network
```

Example 2:

In this example, VxLAN benchmark is ran and 64B frames are sent over 100kpps for the default duration.

```
# nfvbench –rate 100kpps --vxlan


2018-12-18 19:25:31,056 INFO VxLAN: vlan_tagging forced to False (inner VLAN tagging must
be disabled)
2018-12-18 19:25:31,056 INFO Using default VxLAN segmentation_id 5034 for middle internal
network
2018-12-18 19:25:31,056 INFO Using default VxLAN segmentation_id 5017 for right internal
network
2018-12-18 19:25:31,056 INFO Using default VxLAN segmentation_id 5000 for left internal
network
```

The NFVBench result summary is as follows:

```
Date: 2018-12-18 19:26:40
NFVBench version 3.0.5.dev2
Openstack Neutron:
  vSwitch: VPP
  Encapsulation: VxLAN
Benchmarks:
> Networks:
  > Components:
    > Traffic Generator:
        Profile: trex-local
        Tool: TRex
    > Versions:
      > Traffic_Generator:
          build_date: Nov 13 2017
          version: v2.32
          built_by: hhaim
          mode: STL
          build_time: 10:58:17
      > VPP: 18.07
      > CiscoVIM: 2.3.46-17358
  > Service chain:
    > PVP:
      > Traffic:
          Profile: traffic_profile_64B
          Bidirectional: True
          Flow count: 10000
          Service chains count: 1
          Compute nodes: [u'nova:a22-mchester-micro-1']
```

Table 7: NFVBench Result Summary

L2 Frame Size	Drop Rate	Avg Latency (usec)	Min Latency (usec)	Max Latency (usec)
64	| 0.0000%	0	nan	0

Table 8: NFVBench Result Configuration

Direction	Requested TX Rate (bps)	Actual TX Rate (bps)	RX Rate (bps	Requested TX Rate (pps)	Actual TX Rate (pps)	RX Rate (pps)
Forward	33.6000 Mbps	33.6000 Mbps	33.6000 Mbps	50,000 pps	50,000 pps	50,000 pps
Reverse	33.6000 Mbps	33.6000 Mbps	33.6000 Mbps	50,000 pps	50,000 pps	50,000 pps
Total	67.2000 Mbps	67.2000 Mbps	67.2000 Mbps	100,000 pps	100,000 pps	100,000 pps

Table 9: Forward Chain Packet Counters and Latency

Chain	TRex.TX.p0	vpp.RX.vxlan_tunnel0	vpp.TX.veth/0	vpp.RX.veth/1	vpp.TX.vxlan_tunnel1	TRex.RX.p1
0	50,000	=>	=>	=>	=>	50,000

Table 10: Reverse Chain Packet Counters and Latency

Chain	TRex.TX.p1	vpp.RX.vxlan_tunnel1	vpp.TX.veth/1	vpp.RX.veth/0	vpp.TX.vxlan_tunnel0	TRex.RX.p0
0	50,000	=>	=>	=>	=>	50,000

Cisco VIM CLI

An alternate way to NFVBench CLI is to use ciscovimclient. Ciscovimclient is meant to provide an interface that is more consistent with the CiscoVIM CLI and can run remotely while the NFVBench CLI is executed on the management node.

Pass JSON configuration matching structure of the NFVBench config file to start a test:

```
[root@mgmt1 ~]# ciscovim nfvbench --config ‘{“rate”: “10kpps”}
+------------------+--------------------------------------+
| Name             | Value                                |
+------------------+--------------------------------------+
| status           | not_run                              |
| nfvbench_request | {"rate": "5kpps"}                    |
| uuid             | 0f131259-d20f-420f-840d-363bdcc26eb9 |
| created_at       | 2017-06-26T18:15:24.228637           |
+------------------+--------------------------------------+
```

Run the following command with the returned UUID to poll status:

```
[root@mgmt1 ~]# ciscovim nfvbench --stat  0f131259-d20f-420f-840d-363bdcc26eb9
+------------------+--------------------------------------+
| Name             | Value                                |
+------------------+--------------------------------------+
| status           | nfvbench_running                     |
| nfvbench_request | {"rate": "5kpps"}                    |
| uuid             | 0f131259-d20f-420f-840d-363bdcc26eb9 |
| created_at       | 2017-06-26T18:15:24.228637           |
| updated_at       | 2017-06-26T18:15:32.385080           |
+------------------+--------------------------------------+

+------------------+--------------------------------------+
| Name             | Value                                |
+------------------+--------------------------------------+
| status           | nfvbench_completed                   |
| nfvbench_request | {"rate": "5kpps"}                    |
| uuid             | 0f131259-d20f-420f-840d-363bdcc26eb9 |
| created_at       | 2017-06-26T18:15:24.228637           |
| updated_at       | 2017-06-26T18:18:32.045616           |
+------------------+--------------------------------------+
```

When the test is done, retrieve results in a JSON format:

```
[root@mgmt1 ~]# ciscovim nfvbench --json 0f131259-d20f-420f-840d-363bdcc26eb9
{"status": "PROCESSED", "message": {"date": "2017-06-26 11:15:37", …}}
```

NFVBench REST Interface

When enabled, the NFVBench container can also take benchmark request from a local REST interface. Access is only local to the management node in the current Cisco VIM version (that is the REST client must run on the management node).

Details on the REST interface calls can be found in Chapter 2, Cisco VIM REST API Resources.

Enabling or Disabling Autobackup of Management Node

Cisco VIM supports the backup and recovery of the management node. By default, the feature is enabled. Auto snapshot of the management node happens during pod management operation. You can disable the auto backup of the management node.

To enable or disable the management node, update the setup_data.yaml file as follows:

```
# AutoBackup Configuration
# Default is True
#autobackup: <True or False>
```

Take a backup of **setupdata** file and update it manually with the configuration details by running the following command:

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/
[root@mgmt1 ~]# # update the setup_data to change autobackup
[root@mgmt1 ~]# cd /root/MyDir/
[root@mgmt1 ~]# vi setup_data.yaml
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile /root/MyDir/setup_data.yaml
```

Forwarding ELK logs to External Syslog Server

Cisco VIM supports backup and recovery of the management node. To keep the process predictable and to avoid loss of logs, the software supports the capability of forwarding the ELK logs to multiple external syslog servers (Minimum 1 and Maximum 4). The capability is introduced to enable this feature after the pod is up and running, with Cisco VIM, through the reconfigure option.

The Syslog Export reconfigure option supports the following options:

- Enable forwarding of ELK logs to External Syslog Server on a pod that is already up and running.
- Reconfigure existing External Syslog Setting to point to a different syslog cluster.

The following section needs to be configured in the setup_data.yaml file.

```
###################################
## SYSLOG EXPORT SETTINGS
###################################
SYSLOG_EXPORT_SETTINGS:
  -
    remote_host: <Syslog_ipv4_or_v6_addr> # requiredIP address of the remote syslog
    server protocol : udp # defaults to udp
    facility : <string> # required; possible values local[0-7]or user
    severity : <string; suggested value: debug>
    port : <int>; # defaults, port number to 514
    clients : 'ELK' # defaults and restricted to ELK;

remote_host: <Syslog_ipv4_or_v6_addr> #
  required
  protocol : udp # defaults to udp
  facility : <string> # required; possible values local[0-7]or user
  severity : <string; suggested value: debug>
  port : <int>; # defaults, port number to 514
                          clients : 'ELK' # defaults and restricted to ELK;
```

Take a backup of the setupdata file and update the file manually with the configuration listed in the preceeding section. Then run the reconfiguration command as follows:

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/
[root@mgmt1 ~]# # update the setup_data to include Syslog Export info
[root@mgmt1 ~]# cd /root/MyDir/
[root@mgmt1 ~]# vi setup_data.yaml
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile /root/MyDir/setup_data.yaml
```

With this configuration, you should now be able to use export ELK logs to an external syslog server. On the remote host, verify if the logs are forwarded from the management node.

Adding and Reconfiguring VIM Administrators

Cisco VIM supports management of the VIM Administrators.VIM administrator has the permission to log in to the management node through SSH or the console using the configured password. By configuring to one VIM admin account, administrators do not have to share credentials. Administrators have individual accountability.

To enable one or more VIM administrators, perform the following steps:

Step 1 Take a backup of the setupdata file and update the file manually with the configurations listed as,

```
vim_admins:
- vim_admin_username: <username>
  vim_admin_password_hash: <sha512-password-hash>
- vim_admin_username: <username>
  vim_admin_password_hash: <sha512-password-hash>
- vim_admin_username: <username>
  vim_admin_password_hash: <sha512-password-hash>

The value of password hash must be in the standard sha512 format. # To generate the hash
```

```
admin_password_hash should be the output from on the management node
#  python -c "import crypt; print crypt.crypt('<plaintext password>')"
```

Step 2 Run the following reconfiguration commands:

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/

# update the setup_data to include vim_admin info
[root@mgmt1 ~]# cd /root/MyDir/
[root@mgmt1 ~]# vi setup_data.yaml
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile /root/MyDir/setup_data.yaml
```

Note Cisco VIM administrators can manage their own passwords using the Linux passwd command. You can add or remove Cisco VIM administrator through the reconfigure option, while the passwords for their existing accounts remain unchanged.

Enabling Root Login Post Cisco VIM Installation

To complement the management of VIM administrators, Cisco VIM supports an option to enable/disable root access at login. By default, this option is set to True. You can optionally disable this facility through reconfiguration.

Following are the steps to enable te root login:

Step 1 Take a backup of the setupdata file and update the file manually with the configurations listed below:

```
permit_root_login: <True or False>  # if set to false, one has to use su to drop down to root and
execute administrator functionalities.
```

Step 2 Run the following reconfiguration commands:

```
[root@mgmt1 ~]# cd /root/ [root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/

# update the setup_data to include vim_admin info
[root@mgmt1 ~]# cd /root/MyDir

[root@mgmt1 ~]# vi setup_data.yaml [root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim --setupfile /root/MyDir/setup_data.yaml reconfigure
```

Adding Read-Only OpenStack Role

By default, Cisco VIM's deployment of OpenStack supports two roles: admin and user. The admin can view and change all OpenStack resources including system and project resources. The user can view and change only the project resources.

Cisco VIM, optionally provides OpenStack user role, which is the read-only administrator or **readonly**. The read-only user can view project resources, but cannot make any changes.

To enable read-only OpenStack role and create read-only OpenStack administrator, perform the following steps

Step 1 Take a backup of the setupdata file and update the file manually with the configuration given below:

```
ENABLE_READONLY_ROLE: True
```

Step 2 Enable the OpenStack user role, by executing the following reconfiguration commands:

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/

# update the setup_data to include vim_admin info
[root@mgmt1 ~]# cd /root/MyDir/
[root@mgmt1 ~]# vi setup_data.yaml [root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile /root/MyDir/setup_data.yaml
```

When the feature is enabled, an OpenStack administrator can create new user accounts that will have the special privileges of a Read-Only user.

Step 3 From the management node, load the OpenStack authentication variables:

```
[root@management-server-cisco ~]# source ~/openstack-configs/openrc
```

Step 4 Create a new user account with a strong password.

```
[root@management-server-cisco images]# openstack user create --password-prompt reader
User Password:
Repeat User Password:
+----------+----------------------------------+
| Field    | Value                            |
+----------+----------------------------------+
| email    | None                             |
| enabled  | True                             |
| id       | e2f484de1e7d4faa9c9de2446ba8c3de |
| name     | reader                           |
| username | reader                           |
+----------+----------------------------------+
```

Step 5 Assign the project and role to that user account:

```
[root@management-server-cisco images]# openstack role add --project admin --user reader
readonly
+-----------+----------------------------------+
| Field     | Value                            |
+-----------+----------------------------------+
| domain_id | None                             |
| id        | ed2fb5b2c88e4241918573624090174b |
| name      | readonly                         |
+-----------+----------------------------------+
```

Alternatively, the OpenStack admin logged into the Horizon dashboard can perform the above steps. The actions corresponding to the CLI commands can be done on the Identity/Users panel in the dashboard.

The OpenStack read-only user can:

- Access the project and identity dashboards, but not the admin dashboard.
- View all the project resources, but cannot make any changes to them.

Note If the ENABLE_READONLY_ROLE is False (the default value), the readonly role will have no special permissions or restrictions. It has create, update, and delete permissions to project resources, similar to that of the project member. You need to assign users to the role of readonly, when ENABLE_READONLY_ROLE is set to True.

Reconfiguration of Proxy Post Install

During post-install you can update the http/https proxy server information that is listed in NETWORKING section of the setup_data.yaml.

To update the proxy in the post-VIM install follow these steps:

Step 1 Take a backup of the setupdata file and update the file manually with the configuration listed below:

```
http_proxy_server: <a.b.c.d:port> # optional, needed if install is through internet, and the pod is
 behind a proxy
and/or
https_proxy_server: <a.b.c.d:port> # optional, needed if install is through internet, and the pod is
 behind a proxy
```

Step 2 Run the following command to reconfigure:

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/

# update the setup_data to update the proxy info
[root@mgmt1 ~]# cd /root/MyDir/
[root@mgmt1 ~]# vi setup_data.yaml
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile /root/MyDir/setup_data.yaml
```

Reconfiguring NTP

During post-installation, you can update the NTP server information that is listed in NETWORKING section of the `setup_data.yaml`.

To update NTP server information post-installation, follow the below steps:

Step 1 Take a backup of the setupdata file and update the file manually with the configuration listed below:

```
ntp_servers: [a.b.c.d, ‘v6_end_point’]
```

Step 2 Run the following reconfiguration commands:

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/

# update the setup_data to update the ntp_server info
[root@mgmt1 ~]# cd /root/MyDir/
[root@mgmt1 ~]# vi setup_data.yaml
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim --setupfile /root/MyDir/setup_data.yaml reconfigure
```

Note Maximum number of DNS servers that can be configured is three.

Reconfiguring DNS

During post-installation, you can update the Domain Name Server (DNS) information that is listed in NETWORKING section of the `setup_data.yaml.`

To update the domain name server information post VIM installation, follow the below steps:

Step 1 Take a backup of the setupdata file and update the file manually with the configuration listed below:

```
domain_name_servers: [a.b.c.d, ‘v6_end_point’]
```

Step 2 Run the following reconfiguration commands:

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/

update the setup_data to update the domain_name_server info
[root@mgmt1 ~]# cd /root/MyDir/
[root@mgmt1 ~]# vi setup_data.yaml
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim --setupfile /root/MyDir/setup_data.yaml reconfigure
```

Note Maximum number of NTP servers that can be configured is four.

Reconfiguring Sever KVM Console Password Post Install

You need the reconfigure option to reset the KVM console password for the servers, if the administrator forgets the KVM console password post cloud installation. The risk of forgetting the password leads to the failure of SSH connectivity to the server and the option of debugging through KVM console.

During post-install, you can update the admin_password_hash information that is listed in COBBLER section of the setup_data.yaml.

To update the password post-install, follow the below steps:

Step 1 Take a backup of the setupdata file and update the file manually with the configuration listed below:

```
COBBLER:
       admin_password_hash: <$6…> # <Please generate the admin pwd hash via the command below; verify
 the output starts with $6>
 # execute the following on the management node to get the admin_password_hash
       # python -c 'import crypt; print crypt.crypt("<plaintext_strong_password>")'
```

Step 2 Run the following reconfiguration command:

```
[root@mgmt1 ~]# cd /root/ [root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/

# update the setup_data to update the proxy info [root@mgmt1 ~]# cd /root/MyDir/
[root@mgmt1 ~]# vi setup_data.yaml [root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile /root/MyDir/setup_data.yaml
```

Enabling Head-End Replication Option

For the releases Cisco VIM 2.4.9 and later, the multi-VXLAN EVPN based design optionally supports the static implementation of VXLAN technology using head-end replication (HER). HER helps leverage the VXLAN technology, regardless of the hardware or software limitation of the VXLAN feature set at the remote end of the VTEP tunnel.

With the static information defined in the HER`setup_data`, VPP performs the head-end replication to all defined remote VTEPs and the Layer-2 Forwarding Information Base (L2FIB) MAC-IP table is populated based on flood and learn. When EVPN coexists with HER, Cisco VIM considers them as two different sets of BGP speakers each giving the information which ends up in the same etcd FIB table.

In Cisco VIM, the EVPN acts as the primary mechanism and HER as the fallback methodology. You can add or remove HER to or from an existing EVPN pod through Cisco VIM reconfigure option.

Following are the assumptions for the HER feature:

- VNIs can be allowed in the range of 1 to 65535.
- VNIs can be repeated across two or more remote POD VTEPs for HA.
- VNIs cannot be repeated for the same remote POD VTEP.
- Within the same network segment, no remote POD VTEPs IP address can be repeated.

Step 1 Ensure that multi-VXLAN feature exists in day-0 configuration of the setup_data. Add a new section called head-end-replication under the NETWORK_OPTIONS -> vxlan -> vxlan-ecn and vxlan-tenant sections.

```
NETWORK_OPTIONS:
  vxlan:
```

```
  vxlan-tenant:
  head_end_replication: # Optional and reconfigurable
     -  vtep_ips: vni_id1:vni_id2, vni_id3, … (upto as many remote POD vteps as required)

  vxlan-ecn:
  head_end_replication: # Optional and reconfigurable
      - vtep_ips: vni_id1:vni_id2, vni_id3, … (upto as many remote POD vteps as required)

Update all compute nodes with vtep_ip information under the SERVERS section:
SERVERS:
  Compute1:
    …
For head-end-replication option, define vtep_ips on all servers that act as control and compute nodes

# vtep_ips: {vxlan-tenant: <ip address>, vxlan-ecn: <ip address>} # These IPs must belong to the
             associated IP pool of vxlan-tenant and vxlan-ecn networks, and must match the existing

              assigned vtep_ip for EVPN as they are brought in as part of reconfiguration.
```

Step 2 To determine the respective vtep_ip on a per segment and server basis, run the following reconfiguration commands:

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/

[root@mgmt1 ~]# cd /root/installer-<x.y.z>/tools
[root@mgmt1 ~]#./vtep_ip_server_mapping.py
# Update the setup_data to include the HER section and vtep_ip corresponding to the network segment
 for the respective servers


[root@mgmt1 ~]# cd /root/MyDir/
[root@mgmt1 ~]# vi setup_data.yaml
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile /root/MyDir/setup_data.yaml
```

Enabling Layer BGP Adjacency Between Controllers and Peering Route Reflector

From release Cisco VIM 2.4.9 onwards, the Layer 2 or Layer 3 BGP adjacency with the peering route-reflector is supported.

Note For releases prior to Cisco VIM 2.4.9, only Layer 2 BGP adjacency is supported.

Following are the assumptions made to move a pod from a Layer 2 BGP adjacency to that of Layer 3:

- The controllers with the bgp_speaker_addresses peer with the route-reflector over Layer 3.
- This option is only available when vxlan is enabled as NETWORK_OPTIONS.
- Every vxlan segment (vxlan-ecn and vxlan-tenant) will have its own IPs.

- IPs are picked up from management subnet, but they do not belong in the management pool.
- Switching from Layer 2 to Layer 3 peering is only supported, but not vice-versa.
- Once enabled, the only way to change the bgm_mgmt_address is through a replace controller.

Step 1 Update all controller nodes with bgp_mgmt_address where the IPs reside in the management subnet, but not in the management IP pool.

Note

- VXLAN feature must exists in day-0 configuration of the setup_data.
- One unique IP must be available per VXLAN segment.

```
SERVERS:
  Control1:
    …
# bgp_mgmt_address: {vxlan-tenant: <ip address>, vxlan-ecn: <ip address>} # These IPs must belong to
 the
                         management segment, but not in the management IP pool.
```

Step 2 Run the following reconfiguration commands:

```
[root@mgmt1 ~]# cd /root/ [root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/

# update the setup_data to include HER section and vtep_ips info
[root@mgmt1 ~]# cd /root/MyDir/
[root@mgmt1 ~]# vi setup_data.yaml [root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile /root/MyDir/setup_data.yaml
```

Enabling Custom Policy for VNF Manager Post Install

During the post-installation of a cloud, Cisco VIM helps to enable a VNF Manager (such as ESC) to operate and manage tenant VMs in the OpenStack cloud, with additional privileged features.

Following are the steps to enable the custom policy for VNF Manager:

Step 1 Take a backup of the setupdata file and update the file manually with the configurations listed as,

```
ENABLE_ESC_PROV: True
```

Step 2 Run the following commands to reconfigure:

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/

# update the setup_data to update the proxy info
[root@mgmt1 ~]# cd /root/MyDir/
[root@mgmt1 ~]# vi setup_data.yaml
```

```
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile /root/MyDir/setup_data.yaml
```

Migrate SRIOV from 2-X520 to 2-XL710 in a VIC/NIC POD

To use this feature, ensure that both the card types are available on the SRIOV compute nodes of the pod and with one of the card type participating in SRIOV as part of installation, and then execute the following steps:

Before you begin

In Cisco VIM, you can redeploy the SRIOV ports between 2-X520 and 2-XL710, in a Cisco VIM pod where the control and data plane are running OFF Cisco VIC. This is driven through an optional parameter SRIOV_CARD_TYPE listed in the setup_data.yaml.

It is assumed that all computes participating in SRIOV has two sets of card types. Reconfiguration fails if the card type with a total of 4 ports is not available. Cisco recommends you to have two of each of the card type inserted on a per-compute basis, so that the correct network ports from the target network cards are picked by the orchestrator. However, if the SRIOV_CARD_TYPE is present during the fresh install or during add compute, the SRIOV_CARD_TYPE parameter is given preference for the target/configured card type.

You can define the SRIOV_CARD_TYPE at a per-compute level, to override the global definition. This option allows some computes to run with XL-710, while others to run with X-520 for SRIOV ports. It should be noted that computes without SRIOV can co-exist in this pod.

Step 1 Take a backup of the setupdata file and update the file manually with the configuration listed below:

```
SRIOV_CARD_TYPE: <X520 or XL710>
and/or update the hardware_info at a per compute level (see example below)
compute-xx:
  hardware_info: {SRIOV_CARD_TYPE: <XL710 or X520>}
```

Step 2 Run the following reconfiguration commands:

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/
# update the setup_data to include the target SRIOV card type
[root@mgmt1 ~]# cd /root/MyDir/
[root@mgmt1 ~]# vi setup_data.yaml
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile /root/MyDir/setup_data.yaml
```

Augmenting Cisco VIM M4 VIC/(10/40G) NIC pods with M5-based 40G VIC/NIC Computes

From release Cisco VIM 2.4.9 onwards, the augmentation of an existing M4 VIC/NIC based pod (some computes have X520, while others have XL710 for SRIOV), with the M5-based VIC/NIC (40G) computes is supported. To use this augmentation feature, you must define the SRIOV_CARD_TYPE at a per compute level (default is X520).

You can add M5-based 40G VIC/NIC computes into the pod in the following scenarios:

Use Case 1: If you run a pod with M4-based computes having only X520 cards, execute the reconfiguration operation and define the SRIOV_CARD_TYPE as XL710 under the hardware_info section of the target compute, to add the compute of M5 with 40G Cisco VIC and two XL710 cards,.

Use Case 2: If you run the pod with M4-based VIC/NIC computes having XL710 cards, execute the add compute operation and define the SRIOV_CARD_TYPE as XL710 for the target compute, to add M5-based compute nodes with XL710 cards.

Note The following steps 1 through 3 are not applicable for Use Case 2, and you can directly add/remove compute when required.

Before you begin

Identify if the pod has M4 computes running with two XL710 or not, that is, whether the pod is running with **Use Case 1** or **Use Case 2**.

Step 1 If the pod is running with **Use Case 1**, execute the following command:

```
# ciscovim reconfigure
```

Step 2 Take a backup of the setupdata file and update the file manually with the configuration listed below:

```
Update the hardware_info at a per compute level (see example below)
compute-xx:
hardware_info: {SRIOV_CARD_TYPE: <XL710 or X520>}
```

Step 3 Run the following reconfiguration commands:

```
[root@mgmt1 ~]# cd /root/ [root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/ # update the setup_data to
include the target SRIOV card type [root@mgmt1 ~]# cd /root/MyDir/
[root@mgmt1 ~]# vi setup_data.yaml [root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim --setupfile /root/MyDir/setup_data.yaml add-computes <m5compute1, …>
```

Adding and Reconfiguring VIM Administrators Authenticated with External LDAP Server

Cisco VIM supports management of the VIM administrators whose access to the management node can be authenticated through an external LDAP server. For the users to obtain sudo access, you need to manually add the root user or any user with root privileges to the wheel group in the external LDAP server. Also, you must enable the pod with external TLS. To enable VIM administrators with LDAP authentication, perform the following steps:

Step 1 Take a backup of the setupdata file and update the file manually with the configuration listed below:

```
vim_ldap_admins:
  - domain_name: corp_ldap1
    ldap_uri: "ldaps://10.30.116.253:636,ldaps://10.30.116.254:636"
    ldap_search_base: "dc=cisco,dc=com"
    ldap_schema: rfc2307  # Optional
    ldap_user_object_class: posixAccount  # Optional
    ldap_user_uid_number: uidNumber       # Optional
    ldap_user_gid_number: gidNumber       # Optional
    ldap_group_member: memberUid          # Optional
```

Note Multiple entries of the LDAP domain are allowed. For each entry, only domain_name and ldap_uri info are mandatory. Ensure that the ldap_uri is secured over ldaps. As part of reconfiguration, you can add new domain_name, but cannot change the domain_name once it is configured.

.

Step 2 To reconfigure the VIM administrator, run the following commands:

```
[root@mgmt1 ~]# cd /root/ [root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/

# update/include the vim_ldap_admin in the setup_data
[root@mgmt1 ~]# cd /root/MyDir/
[root@mgmt1 ~]# vi setup_data.yaml [root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile /root/MyDir/setup_data.yaml
```

Hosting Horizon through NAT/DNS Alias

Cisco VIM supports hosting of the Horizon dashboard through NAT or with a DNS alias.

To host Horizon, perform the following steps:

Step 1 Take a backup of the setupdata file and update the file manually with the configuration listed below:

```
HORIZON_ALLOWED_HOSTS:
  - <NAT_IP1>
  - <NAT_IP2>
```

Step 2 Run the following commands for reconfiguration:

```
[root@mgmt1 ~]# cd /root/ [root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/

# update/include the vim_ldap_admin in the setup_data
[root@mgmt1 ~]# cd /root/MyDir/
[root@mgmt1 ~]# vi setup_data.yaml [root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile /root/MyDir/setup_data.yaml
```

Enabling Banner During SSH Login

Cisco VIM supports enabling of banner during ssh login to the management node. To enable banner during login, perform the following steps:

Step 1 Take a backup of the setupdata file and update the file manually with the configuration listed below:

```
ssh_banner:
  <your Banner Text>
```

Step 2 Run the following commands for reconfiguration:

```
[root@mgmt1 ~]# cd /root/ [root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/

# update/include the vim_ldap_admin in the setup_data
[root@mgmt1 ~]# cd /root/MyDir/
[root@mgmt1 ~]# vi setup_data.yaml [root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile /root/MyDir/setup_data.yaml
```

Enabling DHCP Reservation for VM’s MAC Address

From release Cisco VIM 3.2.0 onwards, you can have DHCP reservations for virtual machine MAC addresses, so as to get the same IP address always regardless of the host hypervisor or operating system they are running. To avail this optional feature, few restrictions exist.

If the MAC address ends with 00:00, then

- First entry of the first octect must be a Hex
- Second entry of the first octect must be 2, 6, a or e

For example, the MAC address entry can be [a-f][2,6,a,e]:yz:uv:ws:00:00.

To enable this feature, follow the below steps:

Step 1 Take a backup of the setupdata file and update the file manually with the configuration listed below:

```
BASE_MACADDRESS: <[a-f][2,6,a,e]:yz:uv:ws:00:00>
```

Step 2 Run the following commands for reconfiguration:

```
[root@mgmt1 ~]# cd /root/ [root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/

# update/include the vim_ldap_admin in the setup_data [root@mgmt1 ~]# cd /root/MyDir/
[root@mgmt1 ~]# vi setup_data.yaml [root@mgmt1 ~]# cd ~/installer-xxxx

[root@mgmt1 ~]# ciscovim reconfigure --setupfile /root/MyDir/setup_data.yaml
```

Enabling Red Hat Identify Management System

Cisco VIM supports integration with Red Hat Identity Management System which is based on Identity, Policy, Audit (IPA) technology. To enable this feature, follow the below steps:

Step 1 Take a backup of the setupdata file and update the file manually with the configuration listed below:

```
IPA_INFO:
  ipa_servers:
    - hostname: <fqdn_of_ipa_server_1>
      ipaddresses:    # ---□ Optional
        - ‘<ipv4_address>’
        - '<ipv6_address>'
    - hostname: <fqdn_of_ipa_server_1>
      ipaddresses:  ---□ Optional
        - ‘<ipv4_address>’
        - '<ipv6_address>'
  enroller_user: <enroller_username>
  enroller_password: <enroller_password>
  ipa_domain_name: <ipa_domain_name>
```

Step 2 Run the following reconfiguration commands:

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/

# update/include the IPA_INFO in the setup_data
[root@mgmt1 ~]# cd /root/MyDir/
[root@mgmt1 ~]# vi setup_data.yaml
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile /root/MyDir/setup_data.yaml
```

Note You can change all the parameters other than ipa_domain_name via reconfiguration post installation. Also, you cannot reconfigure IPA in conjunction with any other reconfiguration operation.

For pods using short hostnames (non FQDN), the integration of IPA brings in additional challenge when this feature is enabled as part of reconfiguration operation. During the IPA registration of host clients, the IPA server updates the system hostname of the client to a hostname with FQDN. This can break Cisco VIM operations like cluster recovery where hostnames are used as defined in setup_data. As a workaround, automation is done to flip the `hostname` to that defined in the setup_data. As a precautionary measure, you can perform the following apart from Cisco VIM orchestration using the below command:

- Restore hostnames for all the hosts in the cluster to that defined in setup_data.
- Unregister/unenroll all the hosts from the cluster. This unenrollment process does not have any impact to Cisco VIM functionality but the access is lost for all IPA users.
- Use enroll feature to perform role of an installation or reconfiguration operation.

```
# cd </root/installer-n.n>
# ./tools/manage_ipa.sh -h
manage_ipa.sh : Cisco VIM Manage IPA ops
-----------------------------------------
usage: ./manage_ipa.sh [-h]

-r : Restore hostname based on setup_data.yaml
-u : Un-enroll all IPA clients from the IPA Server
-e : Enroll all IPA clients to the IPA Server
-h : To display this help
```

Enabling Vault on Day-2 in Cisco VIM Pod

Cisco VIM supports Vault as a reconfiguration option.

Step 1 To enable Vault on a pod running Cisco VIM 3.4.1 or higher, update the setup_data.yaml file as follows

```
#Vault:
  enabled: True  # optional, default if not defined is false
```

Step 2 Take a backup of setupdata file and update it manually with the configuration details by running the following command:

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/
[root@mgmt1 ~]# # update the setup_data to enable vault
[root@mgmt1 ~]# cd /root/MyDir/
[root@mgmt1 ~]# vi setup_data.yaml
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile /root/MyDir/setup_data.yaml
```

Enabling Ironic Post Installation

Cisco VIM supports enabling of reference architecture of Ironic to host baremetal workloads. The ironic service can be brought in day-0 or as a reconfiguration option. Once enabled, it cannot be disabled. Ironic support is only available with Cisco UCS C baremetal servers and when Cisco VIM is deployed with OVS as the mechanism driver. The ironic interface to be used on the baremetal servers for Openstack can be either an MLOM interface, an Intel NIC, or the onboard 1G LOM port. Ironic supports only the configuration of a single interface on the baremetal server.

You must have one separate network segment that is used for ironic_management and ironic inspector. The inspector is a service used to automate the creation of the openstack baremetal port with switch interface, for example, eth 1/39 and MAC address information of both the switch MAC and server interface MAC, apart from automatically adding the deploy image information to the ironic node.

Note Ensure that the ironic management, ironic inspector, Cisco VIM management, and Ironic CIMC networks are routed to each other.

The Cisco VIM management network must be able to reach:

- Ironic management network and vice-versa.
- CIMC network of the ironic nodes. This allows the Cisco VIM controller servers to directly reach the CIMC IP of the ironic servers

To enable network reachability, follow one of the below conditions:

- All three networks such as Cisco VIM management, Ironic management and CIMC must be private networks with SVI interfaces on the ToR.
- Routed network must be deployed for all three network segments. In this case, the need for SVI interface on ToR is eliminated.

You must include ironic-management/ironic-inspector VLANs on the ToR interfaces that are connected to the mercury controller servers. This must be manually configured at present.

To enable ironic into an existing pod running Cisco VIM 3.2.0 or higher with provider network segment defined from the day-0 installation, perform the following steps:

Step 1 Take a backup of the setupdata file and update the file manually with the configuration listed below:

```
# Optional Services:
OPTIONAL_SERVICE_LIST:
 - ironic

IRONIC:
   IRONIC_SWITCHDETAILS: #  list of switches off which the ironic servers are hanging. This is mainly
 used to provide ironic switch details to neutron
  - {hostname: <switch_name>, password: <password>, ssh_ip: <ssh_ip>, username: <switch_admin_username>,
 switch_type: <"Nexus", "ACI", or "BypassNeutron">}


NETWORKING:
……

  - gateway: <gateway_information> # Mandatory if ironic is present
    pool: [<ip_start1 to ip_end1]
    segments: [ironic]
    subnet: <subnet with/mask>
    vlan_id: <unique vlan id across the pod>
    inspector_pool: [ip_add_1 to ip_add_2, ip_add_3 to ip_add_4, ip_add_5 to ip_add_6] (# of entry
pool : 3, same network as ironic but doesn’t overlap with the pool of IPs defined in the ironic
segment)
#   alternate format for pool (# of entry pool : 3)
      - ip_add_1 to ip_add_2
      - ip_add_3 to ip_add_4
      - ip_add_5 to ip_add_6
```

Step 2 While deploying ironic, you need to follow the below steps before performing VIM reconfiguration:

a) Create a separate `ironic_inventory.yaml` with CIMC/ IPMI details of the servers to be used as ironic baremetals. For example:

   `/root/installer-XXX/openstack-configs/ironic_inventory.yaml.`

b) Save this file with your ironic server details in `/root/installer-XXX/openstack-configs/ironic_inventory.yaml`

c) Specify the ironic management/ ironic inspector VLAN in all control interfaces of the mercury controller servers. This is essential to perform ironic introspection, to transfer the images from the controller to the baremetal server.

d) If ironic is deployed in Nexus mode of ToR, ensure that no existing configuration is available on the interface of the ToR connected to the baremetal. The interface is in ACCESS mode. Only the ironic inspector VLAN must be set as the access VLAN.

e) If ironic is deployed in an ACI mode testbed, you must ensure that ironic management network VLAN and all the tenant VLANs from setup_data are configured on the interface of the ToR connected to the baremetal the ironic inspector VLAN. The interface is in TRUNK mode. You need to set the ironic inspector network as the native VLAN.

f) Verify whether the following are done in the baremetal server CIMC before proceeding:

   - Check if IPMI connections are allowed over LAN.
   - In BIOS configured Boot order, only pxeboot is present and available as the first option.
   - PXE is enabled in VNIC adapters.
   - Set the VLAN mode on the VNIC being used as TRUNK.
   - Turn ON the baremetal node, to have access to all parameters of CIMC. VIM installer verifies the node at Step 1.
   - Disable LLDP on Cisco VIC Adaptor of all the servers used for ironic by doing the following and rebooting the server:

```
sh admin@X.X.X.X (CIMC IP)
C240-FCH1832V1HW# scope chassis
C240-FCH1832V1HW /chassis # show adapter
C240-FCH1832V1HW /chassis # scope adapter <PCI slot>
C240-FCH1832V1HW /chassis/adapter # set lldp disabled
C240-FCH1832V1HW*# commit
C240-FCH1832V1HW /chassis/adapter # show detail <To Verify LLDP is disabled>
```

Step 3 Run the following commands for reconfiguration:

```
[root@mgmt1 ~]# cd /root/ [root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/

# update/include the vim_ldap_admin in the setup_data
[root@mgmt1 ~]# cd /root/MyDir/
[root@mgmt1 ~]# vi setup_data.yaml
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile /root/MyDir/setup_data.yaml
```

If you need to troubleshoot the server before launching the baremetal instance and need to login into the packaged ironic deploy images, the credentials are – devuser/ Lab1234!

For more information, see Launching OpenStack Baremetal Instances

Hosting Container Workload Post-Installation

Cisco VIM supports enabling of container workload by hosting Cisco Container Platform as an application in VMs. For assumptions on container workload options, see Container Support section of *Cisco Virtualized Infrastructure Manager Installation Guide*. Before installing Cisco Container Platform, ensure that **lbaas** is enabled as part of **optional_service_list**.

1. To enable lbaas, use the following commands:

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/
[root@mgmt1 ~]# # update the setup_data with lbaas under the OPTIONAL_SERVICE_LIST section
[root@mgmt1 ~]# cd /root/MyDir/
[root@mgmt1 ~]# vi setup_data.yaml
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile /root/MyDir/setup_data.yaml
```

2. Generate a ssh key of ecdsa type using the command:

```
# ssh-keygen -f /root/ecdsa-key -t ecdsa -b 521 (Press Enter till keys are generated)
```

3. Establish the networking type (tenant or provider) based on which the CCP_DEPLOYMENT section is defined in the setup_data.

4. Update a copy of the setup_data with the following information. Ensure that care is taken to the items that are needed for tenant or provider network environment.

```
CCP_DEPLOYMENT: # Parameters for CCP Deployment Optional services, LBAAS mandatory
   CCP_CONTROL: # Installer creates a new tenant in Openstack based on information below
 and set all quotas in that tenant
    UI_PASSWORD: <UI_PASSWORD> # password for CCP UI (required)
    ccp_subnet_cidr: <ip_address/mask> # subnet to create to deploy CCP control plane
(required for tenant network, but must be removed for provider network)
    installer_subnet_cidr: <ip_address/mask> # subnet to create for bootstrap installer
 (required for tenant network, but must be removed for provider network)
    installer_subnet_gw: <ip_address>  # gateway to use for bootstrap installer (required
 for tenant network, but must be removed for provider network)
    password: <password> # password for the Openstack tenant (required)
    private_key: <absolute path for ed25519 based key> # private key to be used to SSH
to VM must be ed25519 (required)
    project_name: <tenant_name> # Tenant name to create for CCP control plane installer
 will create this Openstack tenant (required)
    public_key: <absolute path for ed25519 based public key> # Public key for CCP VMs,
e.g. /root/ecdsa-key.pub
    username: <string> # username for the CCP control plane tenant (required)
  CCP_INSTALLER_IMAGE: <qcow2 absolute image path> # Pointer to the CCP installer image
 (required)
  CCP_TENANT: # Test only option not supported in production to create demo tenant cluster
 using CCP API (Optional NA in production)
    password: <password> # password for tenant (required)
    project_name: <project_name> # tenant name to create in Openstack to host tenant
cluster (required)
```

```
        username: <username> # username for openstack tenant (required)
        workers: 1 # no of kubernetes workers in tenant cluster (required)
        subnet_cidr: <ip_address/mask> # tenant subnet CIDR
      CCP_TENANT_IMAGE: <qcow2 based abs path of tenant cluster image> # Pointer to CCP
    tenant cluster image (required)
      DNS_SERVER: [list of IPv4 based DNS servers] # DNS server to be reachable from cloud
     (required)
      KUBE_VERSION: <x.y.z> # Version of Kubernetes to install (required) normally can be
    deciphered from tenant image name; e.g. 2.3.4
      NETWORK_TYPE: <tenant or provider> # Network Type valid values provider or tenant
    network (required)
      POD_CIDR: <ip_address/mask> # POD CIDR to use for calico network optional if not to
    be changed (optional)
      PUBLIC_NETWORK_UUID: <UUID of Openstack external network or provider network> (optional
     initially but mandatory when ccp is being run)
      CCP_FLAVOR: <flavor> optional initially, but mandatory when NFV_HOSTS is enabled during
     Cisco Container Platform installation
```

Note The PUBLIC_NETWORK_UUID information is obtained from the output of "neutron net-list" after sourcing openrc from `/root/openstack-configs`

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/
[root@mgmt1 ~]# # update the setup_data to update the PUBLIC_NETWORK_UUID and CCP_FLAVOR
information
[root@mgmt1 ~]# cd /root/MyDir/
[root@mgmt1 ~]# vi setup_data.yaml
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ccp install --setupfile /root/MyDir/setup_data.yaml
```

.

5. After the installation is done, execute the following command to see the Cisco Container Platform control plane login URL information:

   ```
   # ciscovim ccp show
   ```

6. You can login to the Cisco Container Platform control plane UI with the credentials provided in the setupdata. The Username defaults to admin and password is available in the setupdata UI_PASSWORD.

Note Running subsequent Cisco Container Platform install operation is not supported. You need to run the cleanup, before running the installation again. The only operation allowed post installation is ccp verify.

Following command initiates Cisco Container Platform verification on the management node:

```
# ciscovim ccp verify
```

Following command initiates Cisco Container Platform upgrade on the management node:

```
# ciscovim ccp upgrade –setupfile /<PATH TO SETUPFILE>
```

Note As the Cisco Container Platform upgrade preserves installation and verification status, you can check them after executing ciscovim ccp show command. The only operation allowed after Cisco Container Platform upgrade are **Verify** and **Cleanup**.

The cleanup involves cleaning the control cluster and deleting the instances, project and users that were created as a part of Cisco Container Platform installation. Copy the orifinal setupfile from openstack-configs and remove the Cisco Container Platform section, and then execute Cisco Container Platform cleanup of control cluster using the following command:

```
# ciscovim ccp cleanup --delete-control –setupfile /<PATH TO SETUPFILE>
```

To verify the status of the Cisco Container Platform cluster, use the command `ciscovim ccp show`. By default, all logs are dumped in the following directory `/var/log/mercury/<random_uuid>..`

For example:

```
/var/log/mercury/7194a863-90aa-41ea-915e-2fb99d4d9b68/ccp_install_mon_jul__1_17:04:53_2019.log
```

Each operation on Cisco Container Platform creates a new UUID. You can view the logs of that specific operation within UUID.

You can execute "ciscovim last-run-status" post each operation, to check which log file got generated in the last operation that is executed on Cisco Container Platform.

Ciscovim Client (ciscovimclient) supports the following actions for Cisco Container Platform:

```
ciscovim help ccp
usage: ciscovim ccp [--delete-control] [-y] [--setupfile <setupdata_file>]
                    <install|upgrade|verify|cleanup|show>
Execute opertaions for CCP
Positional arguments:
  <install|upgrade|verify|cleanup|show>
                                The control command to perform
Optional arguments:
  --delete-control              Destroy CCP Control Cluster.
  -y, --yes                     Yes option to perform the action
  --setupfile <setupdata_file>    User setup_data.yaml required only for install,upgrade,
and cleanup
```

- install : This operation executes control cluster deployment. (--setupfile is a mandatory argument that needs to be passed with install action).
- verify: This operation executes tenant cluster deployment and removes the tenant cluster once completedl.
- cleanup: This operation removes the control cluster user and project from openstack. This also removes the control cluster as well.
- upgrade: This operation upgrades the cluster with latest images and kube version (if changed). The only keys allowed to modify with this operation are the CCP_INSTALLER_IMAGE, CCP_TENANT_IMAGE, and KUBE_VERSION.

  ```
  Host queen
  HostName 172.29.84.114
  User root
  ```

- show: This operation lists down all the operations executed on Cisco Container Platform.

Prerequisites and Assumptions for VIM Update/Upgrade

During Cisco VIM update, ensure that no interference exists with external monitoring services.

To handle the potential of docker corruption post repo/kernel update, you must follow the below steps during VIM update irrespective of the update methodology (connected or disconnected).

- You must disable NFVIMON monitoring for all server CIMC, only if NFVIMON/Zenoss is used. This prevents the failure of VIM update when Cisco VIM is deprived of CIMC login with valid credentials. Once Cisco VIM software update/commit or any other POD management operation is completed, you can re-enable Zenoss monitoring.

- If ACI fabric is integrated with NFVI, you must disable switch policy enforcement that can shutdown the ToR ports to which the NFVI server interfaces are connected, during software update. This is required as MAC-moves for floating IP addresses happen during software update with L3 agent failover due to host package update and/or L3 agent container update. Multiple L3 agent failover can result in several Mac-moves in a short period of time. Fast Mac-moves over a five minute duration can potentially trigger N9K/ACI Mac-move policy violation, thereby causing an immediate shutdown of the server switch port.

Updating Containers in a Running Cisco VIM Cloud

Cisco VIM allows you to update all OpenStack and infrastructure services such as RabbitMQ, MariaDB, HAProxy, and management node containers such as Cobbler, ELK, VMTP and repo containers with almost no impact to the Cisco NFVI implementation. Updates allows you to integrate Cisco VIM patch releases without redeploying the Cisco NFVI stack from the beginning. Updates have minimal service impact because they run serially component by component one node at a time. If an error occurs during an update, auto-rollback is triggered to return the cloud to its pre-update state. After an update you can check for any functional impacts on the cloud. If everything is fine you can commit the update, which deletes the old containers and old images from the nodes. Should you see any functional cloud impact you can perform a manual rollback to start the old containers again.

Before you begin a container update, keep the following in mind:

- Updates are not supported for registry-related containers and authorized_keys.

- You cannot roll back the repo containers on the management node to an older version after they are updated because rollbacks will delete node packages and might cause the cloud to destabilize.

- To prevent double-faults, a cloud sanity check is performed before the update is started. A cloud sanity check is performed as the last step of the update.

The following table provides an overview to the methods to start the OpenStack update using Cisco VIM. The Internet options refer to management node connectivity to the Internet. If your management server lacks Internet access, you must have a staging server with Internet access to download the Cisco VIM installation artifacts to a USB drive. Ensure that you select one method and stay with it for the full pod lifecycle.

Table 11: OpenStack Update Options

	Without Cisco VIM Unified Management	With Cisco VIM Unified Management
Without Internet	• Prepare the USB on a staging server • Plug the USB into the management node. • Follow the update steps in the update without Internet procedure.	• Prepare the USB on a staging server • Plug the USB into the management node. • Follow the update steps in the update without Internet procedure.
With Internet	• Download the .tgz file from the registry. • Follow the update steps in the update with Internet procedure.	• Download the .tgz file from the registry. • Follow the update steps in the update with Internet procedure.

Updating Cisco VIM Software Using a USB

The following procedure describes you how to load the Cisco VIM installation files onto a Cisco NFVI management node that does not have Internet access. Installation files include: buildnode-K9.iso, mercury-installer.tar.gz, nova-libvirt.tar, registry-2.3.1.tar.gz, and respective checksums.

Before you begin

This procedure requires a CentOS 7 staging server (VM, laptop, or UCS server) with a 64 GB USB 2.0 stick. You can save the VIM installation files on a USB stick and then use the USB stick to load the installation files onto the management node. The installation files are around 24 GB in size, downloading them to the USB stick might take several hours, depending on the speed of your Internet connection, so plan accordingly. Before you begin, disable the CentOS sleep mode.

Step 1 On the staging server, use yum to install the following packages:

- PyYAML (yum install PyYAML)
- python-requests (yum install python-requests)

Step 2 Connect to the Cisco VIM software download site using a web browser and login credentials provided by your account representative and download the **getartifacts.py** script from the external registry.

```
# download the new getartifacts.py file (see example below)
curl -o getartifacts.py -u '<username>:<password>'
https//cvim-registry.com/mercury-releases/cvim24-rhel7-osp13/releases/<3.4.0>/getartifacts.py

curl -o getartifacts.py-checksum.txt -u '<username>:<password>'
https//cvim-registry.com/mercury-releases/cvim24-rhel7-osp13/releases/<3.4.0>/getartifacts.py-checksum.txt
# calculate the checksum and verify that with one in getartifacts.py-checksum.txt
sha512sum getartifacts.py
```

```
# Change the permission of getartificats.py
chmod +x getartifacts.py
```

Step 3 Run the **getartifacts.py** script. The script formats the USB 2.0 drive and downloads the installation artifacts. Provide the registry username and password, the tag ID, and the USB partition on the staging server. For example:

Run the getartifacts.py script. The script formats the USB 2.0 drive and downloads the installation artifacts. You will need to provide the registry username and password, the tag ID, and the USB partition on the staging server. For example: To identify the USB drive, execute the lsblk command before and after inserting the USB drive. (The command displays a list of available block devices.) The output delta will help find the USB drive location. Provide the entire drive path in the –d option, instead of any partition.

sudo ./ getartifacts.py -t <tag_id> -u <username> -p <password> -d </dev/sdc>

Note Do not remove the USB stick while the synchronization is going on.

Step 4 Verify the integrity of the downloaded artifacts and the container images:

```
# create a directory
sudo mkdir -p /mnt/Cisco

# /dev/sdc is the USB drive, same as supplied in get artifacts.py python script
sudo mount /dev/sdc1 /mnt/Cisco
cd /mnt/Cisco

# execute the verification script
./test-usb

# failures will be explicitly displayed on screen, sample success output below
# sample output of ./test-usb execution with 3.2.x release [root@mgmtnode Cisco]# /test-usb
INFO: Checking the integrity of this USB stick
INFO: Checking artifact buildnode-K9-13401.iso
INFO: Checking artifact registry-2.6.2-13401.tar.gz
INFO: Checking required layers:
INFO: 605 layer files passed checksum.
[root@mgmtnode Cisco]#
```

Step 5 To resolve download artifact failures, unmount the USB and run the getartifacts command again with the --retry option:

```
sudo ./getartifacts.py -t <tag_id> -u <username> -p <password> -d </dev/sdc> --retry
```

Step 6 Mount the USB and then run the test-usb command to validate all the files are downloaded:

```
# /dev/sdc is the USB drive, same as supplied in get artifacts.py python script
sudo mount /dev/sda1 /mnt/Cisco
cd /mnt/Cisco

# execute the verification script
./test-usb

# In case of failures the out of the above command is explicitly displayed the same on the screen
```

Step 7 After the synchronization finishes, unmount the USB drive:

```
sudo umount /mnt/Cisco
```

Step 8 After the synchronization finishes, remove the USB stick from the staging server then insert it into the management node.

Step 9 Complete the following steps to import the Cisco NFVI installation artifacts onto the management node:

a) Identify the USB on the management node:

```
blkid -L Cisco-VIM
```

b) Mount the USB device on the management node:

```
mount < /dev/sdc > /mnt/
mkdir /root/cvim-update-media
cd /root/cvim-update-media
```

c) Extract the import_artifacts.py script:

```
tar --no-same-owner -xvzf /mnt/Cisco/mercury-installer.tar.gz
```

d) Unmount the USB device:

```
umount /mnt/Cisco/
```

e) Import the artifacts:

```
cd /root/cvim-update-media/installer-<3.x.x>/tools/
./import_artifacts.sh
```

f) Change directory and remove /root/cvim-update-media:

```
cd /root/
rm -fr /root/cvim-update-media
```

Step 10 Execute the update from the old working directory:

```
cd $old_workspace/installer;
ciscovim update --file /var/cisco/artifacts/mercury-installer.tar.gz
```

After the update is complete, use the newly created directory from here onwards (unless a rollback is planned).

Step 11 Commit the update by running the following command:

```
ciscovim commit # from the new workspace
```

Step 12 To revert the update changes before entering the commit command, enter:

```
ciscovim rollback # and then use older workspace
```

Note Do not run any other Cisco VIM actions while the update is in progress.

In Cisco VIM, if updates bring in Kernel changes, then the reboot of the compute node with VNFs in ACTIVE state is postponed. This is done to mitigate the unpredictability of data plane outage when compute nodes go for a reboot for the kernel changes to take effect, during the rolling upgrade process.

At the end of ciscovim update, the Cisco VIM orchestrator displays the following message on the console and logs:

```
Compute nodes require reboot Kernel updated
<compute_1_with_VM_running>
<compute_3_with_VM_running>
<compute_4_with_VM_running>
<compute_12_with_VM_running>
```

After the Kernel update on Management node, reboot the compute node before proceeding. The logs for this run are available in <mgmt._ip_address>:/var/log/mercury/<UUID>

For Micropod, if the VM landed on the server has dual roles (control and compute), reboot the server and run `ciscovim cluster-recovery`

Note As the redundancy in controller and storage nodes are built into the product, the reboot of those nodes are automatic during the software update. Also, computes that does not have any VNFs in ACTIVE state, are automatically rebooted during software update. To monitor and reboot the compute nodes through ciscovim cli, see Managing Reboot of Cisco VIM Nodes and Managing Reboot Status of Cisco VIM Nodes. No pod management operation is allowed until reboot of all Cisco VIM nodes are successful.

Updating Cisco VIM Software Using Network Installation

Step 1 From the download site that is provided by your Cisco account representative, download the mercury-installer.gz

```
curl -o mercury-installer.tar.gz
https://{username}:{password}@cvim-registry.com/
mercury-releases/mercury-rhel7-osp13/releases/{release number}/
mercury-installer.tar.gz
```

The link to the tar ball preceding is an example.

Step 2 Execute the update from the old working directory:

Note Do not run any other Cisco VIM actions while the update is in progress.

```
cd /root/installer-<tagid>
ciscovim update --file /root/mercury-installer.tar.gz
```

After the update is complete, use the newly created directory from here onwards (unless a rollback is planned).

Step 3 Commit the update by running the following command:

```
ciscovim commit
```

Step 4 To revert the update changes before entering the commit command, enter:

```
ciscovim rollback # and then use older workspace
```

In Cisco VIM, if updates bring in Kernel changes, then the reboot of the compute node with VNFs in ACTIVE state is postponed. This is done to mitigate the unpredictability of data plane outage when compute nodes go for a reboot for the kernel changes to take effect, during the rolling upgrade process.

At the end of ciscovim update, the Cisco VIM orchestrator displays the following message on the console and logs:

```
Compute nodes require reboot Kernel updated
<compute_1_with_VM_running>
<compute_3_with_VM_running>
<compute_4_with_VM_running>
<compute_12_with_VM_running>
```

After the Kernel update on the Management node, reboot the compute node before proceeding

The logs for this run are available in <mgmt._ip_address>:/var/log/mercury/<UUID>

Note The redundancy in controller, and storage nodes are built into the product, the reboot of those nodes are automatic during the software update. Also, computes that does not have any VNFs in ACTIVE state, gets automatically rebooted during the software update. To monitor and reboot the compute nodes through ciscovim cli, refer to the sections titled “Managing Reboot of Cisco VIM Nodes: and “Managing Reboot Status of Cisco VIM Nodes”, in the later part of this guide. It should be noted no pod management operation is allowed till reboot of all Cisco VIM nodes are successful.

Upgrading Cisco VIM in a Running Cloud

In Cisco VIM 3.4.1, two aspects of pod upgrade are supported:

1. Type 1: Upgrade from Cisco VIM 2.4.x to Cisco VIM 3.4.1 (x=15, 16 or 17) constitutes the following:
    a. Upgrade of RHEL from 7.4 to 7.6.
    b. Upgrade of OSP from 10.0 (Newton) to 13.0 (Queens).
    c. Upgrade of docker 1.10 (running thin-pool infrastructure) to 1.13 (overlay network).
    d. d. Upgrade of the REST API of the CVIM installer
    e. e. Ceph Upgrade from Jewel to Luminous
2. Type 2: Upgrade from Cisco VIM 3.0.0/3.2.x to Cisco VIM 3.4.1 (x=1, 2 or 3) constitutes the following:
    a. Upgrade within OSP 13.0 (OSP is updated as part of maintenance release)
    b. Upgrade within RHEL 7.6 (kernel is updated).
    c. Upgrade of the REST API of the Cisco VIM installer.

Based on the Cisco VIM image version, the administrator must refer to the appropriate upgrade section.

General Upgrade

Cisco VIM allows you to upgrade all OpenStack services, infrastructure services such as RabbitMQ, MariaDB, HAProxy, and management node containers such as Cobbler, ELK, VMTP and repo containers. You can upgrade to new releases of OpenStack without redeploying the Cisco NFVI stack from the beginning. During upgrade, you can expect complete (Type 1 upgrade) to limited control place (Type 2 upgrade) outage. As part of the upgrade, the REST API server managing the VIM orchestrator also gets upgraded using the script `vim_upgrade_orchestrator.py`. Hence, it is important to execute the upgrade as a foreground process in an environment like a VNC session.

Cisco VIM supports an upgrade from Cisco VIM 3.0.0/3.2.x to the current version of Cisco VIM.

As part of the Cisco VIM cloud upgrade:

- The upgrade script is used to automatically upgrade the REST API server managing the VIM orchestrator.
- The setup_data.yaml file is automatically translated so that the setup_data.yaml file is compatible to the target release version.

Before you begin an upgrade, consider the following:

- For type 1 upgrade:
    - Plan for cloud outage as it entails upgrade of docker infrastructure which is the foundation of Cisco VIM
    - Ensure that your cloud is running with Keystone v3 prior to the upgrade.
    - Post keystonev3 reconfiguration, all custom or user created openrc file must be modified to use keystonev3. In addition, ESC/NSO must be reconfigured to use keystonev3 when connecting to OpenStack endpoint.
- For type 2 upgrade, plan for control plane downtime as the upgrade involves changing the Kernel version.
- Perform a cloud sanity check before initiating the upgrade, to prevent double faults.
- Check CIMC logs for any hardware errors including disk errors.
- No custom (non-CVIM) docker containers must be running on management node or control/compute/storage nodes.
- If Cisco UCS is used, ensure that CIMC of all the servers is 2.0(13n) or greater.
- Use the vim_upgrade_orchestrator.py script available as part of the 3.4.1 artifacts for upgrade. You have to save a copy of the upgrade script to the `/root/ location` before upgrade.
- For disconnected upgrade, one USB 2.0 (64GB) must be pre-populated with 3.4.1 artifacts.
- Upgrade from either type to 3.4.1 is restricted to specific start and end points.
- Upgrade of the cloud is supported in both connected and disconnected modes.
- Upgrade of Unified Management on its standalone node is supported.
- Cisco recommends you to not change the installation mode during upgrade.
- No rollback option is available once upgrade is initiated. Hence, planning must be done before upgrade. If you face any issue after upgrade, reach out to Cisco TAC or BU to recover the cloud.
- Post upgrade keystonev3 is the default authentication mechanism. The keystonev3 in OPTIONAL SERVICES is not available in the system translated setup_data.yaml.
- See the section **Prerequisites and Assumptions for VIM update/upgrade** and ensure that all conditions are met.
- At a high level, the vim_upgrade_orchestrator.py script is broken into two logical steps to abort on failure. In case of failure, reach out to Cisco support for recovery. Cisco does not recommend you to recover the cloud on your own.

The following are the two high level steps into which the vim_upgrade_orchestrator.py script is broken into:

- **Pre-upgrade Check**
    - Registry connectivity (if connected, installation is initiated).
    - Setup_data pre check: No UCSM_PLUGIN, sufficient storage pool size.
    - Backup the setup_data.yaml file, before translation.
    - Check and update INSTALL_MODE in the setup_data.yaml file (connected or disconnected).

  - Run cloud sanity on cloud from current workspace using ciscovim.
  - Check for reachability to all nodes including compute, controller, and storage.
  - Check if cloud is running with KeystoneV3. For clouds running with Cisco VIM 2.4.x, you mus enable keystone v3 via a reconfigure before the upgrade. For information on how to enable keystone v3, see *Cisco Virtualized Infrastructure Administrator Guide, 2.4.x.*
  - No in-progress or failed operation exists in RestAPI database as part of pre-validation
  - If the setup is coming from Cisco VIM 2.2.x to 2.4.y to 3.4.x, the haproxy (self-signed) TLS certificate must be regenerated in 2.4.x workspace followed by ciscovim reconfigure.

- **Upgrade to 3.4.1**
  - Upgrade to 3.4.1 (in a VNC session). Based on the starting release, RHEL, OSP, and Docker are upgraded.
  - Backup the management node.
  - Run sanity test on cloud from 3.4.1.
  - Check for reachability to compute, controller, and storage nodes.

If upgrading from Cisco VIM 2.4.x to Cisco VIM 3.4.1, take the backup of the management node post successful completion of the upgrade, reimage the management node with Cisco VIM 3.4.1 and restore the same.

For upgrade from Cisco VIM 3.2.x, power-cycle the management node to complete the management node upgrade.

For upgrade from Cisco VIM 2.4.x, remove storage nodes or add storage nodes again so that ceph operates in bluestore mode rather than filestore mode. As the Ceph migration take a long time, plan for additional maintenance window post upgrade. Before initiating remove-storage, ensure that the CEPH health is HEALTH_OK.

Harmless traceback are seen in `/var/log/messages` and `/var/log/tuned/tuned.log` post Cisco VIM upgrade. Reboot of management node resolves the traceback. This traceback is not observed post restoration of the management node (from backup taken after successful upgrade).

The following table provides an overview of upgrade methods available to update OpenStack using Cisco VIM. The Internet options refer to management node connectivity to the Internet. If your management server lacks Internet access, you must have a staging server with Internet access to download the Cisco VIM installation artifacts to a USB drive. Ensure that you select one method and stay with it for the full pod lifecycle.

Upgrade Method	Without Cisco VIM Unified Management
Without Internet	• Prepare 2 USB 2.0 (64G) or 2 USB 3.0 (64G) on M4 or M5 staging server respectively and populate them with 3.4.1 artifacts. • Plug both the USB into the management node. • Copy the vim_upgrade_orchestrator.py script and follow the upgrade steps in the *Upgrade without Internet* procedure.

Upgrade Method	Without Cisco VIM Unified Management
With Internet	Copy the vim_upgrade_orchestrator.py script and follow the upgrade steps in the *Upgrade with Internet* procedure.

Note

- The upgrade of VTS from 3.2.x to 3.4.1 is not supported.
- The upgrade from Cisco VIM 3.0.0 to Cisco VIM 3.4.1 is not supported.
- In case of upgrade failure, ensure that you do not try to recover the cloud by yourself. For help and recovery, contact Cisco Support.

Upgrading VIM Software Using a USB

The following procedure describes how to load the Cisco VIM installation files onto a Cisco NFVI management node that does not have Internet access. Installation files include: buildnode-K9.iso, mercury-installer.tar.gz, nova-libvirt.tar, registry-3.4.1.tar.gz, and respective checksums.

Before you begin

This procedure requires a CentOS 7 staging server (VM, laptop, or UCS server) with a 64 GB USB 2.0 stick. You can download the VIM installation files using the staging server with Internet access (wired access is recommended), and save the files to a USB stick. You can use the USB stick to load the installation files onto the management node. The size of the installation files comes to around 24 GB, so downloading them to the USB stick might take several hours, depending on the speed of your Internet connection, so plan accordingly. Before you begin, disable the CentOS sleep mode.

Step 1 On the staging server, use yum to install the following packages:

- PyYAML (yum install PyYAML)
- python-requests (yum install python-requests)

Step 2 Connect to the Cisco VIM software download site using a web browser and login credentials provided by Cisco account representative and download the **getartifacts.py** script from the external registry.

```
# download the new getartifacts.py file (see example below)
curl -o getartifacts.py -u '<username>:<password>'
https//cvim-registry.com/mercury-releases/cvim34-rhel7-osp13/releases/3.4.1/getartifacts.py

curl -o getartifacts.py-checksum.txt -u '<username>:<password>'
https//cvim-registry.com/mercury-releases/cvim34-rhel7-osp13/releases/3.4.1>/getartifacts.py-checksum.txt

# calculate the checksum and verify that with one in getartifacts.py-checksum.txt sha512sum
getartifacts.py

# Change the permission of getartificats.py
chmod +x getartifacts.py
```

Step 3 Run the **getartifacts.py** script. The script formats the USB 2.0 drive and downloads the installation artifacts. Provide the registry username and password, the tag ID, and the USB partition on the staging server.

For example, to identify the USB drive, execute the **lsblk** command before and after inserting the USB stick. (The command displays a list of available block devices.) You can find the USB drive location from the delta output, and provide the entire drive path in the –d option instead of any partition.

sudo ./ getartifacts.py -t <tag_id> -u <username> -p <password> -d </dev/sdc>

Note Do not remove the USB stick during synchronization. Use '-U' option to download Ocata and Pike artifacts. This is applicable only for 2.4.y to 3.4.x upgrade.

Step 4 Verify the integrity of the downloaded artifacts and the container images.

```
# create a directory
sudo mkdir -p /mnt/Cisco
# /dev/sdc is the USB drive, same as supplied in get artifacts.py python script
sudo mount /dev/sdc1 /mnt/Cisco
cd /mnt/Cisco
# execute the verification script
./test-usb

# failures will be explicitly displayed on screen. A sample success output is shown
# sample output of ./test-usb execution with 3.4.1 release

[root@mgmtnode Cisco]# /test-usb
INFO: Checking the integrity of this USB stick
INFO: Checking artifact buildnode-K9-13401.iso
INFO: Checking artifact registry-2.6.2-13401.tar.gz
INFO: Checking required layers:
INFO: 605 layer files passed checksum.
[root@mgmtnode Cisco]#
```

Step 5 To resolve download artifact failures, unmount the USB and run the **getartifacts** command again with the --retry option.

```
sudo ./getartifacts.py -t <tag_id> -u <username> -p <password> -d </dev/sdc> --retry
```

Step 6 Mount the USB and run the **test-usb** command to validate if all the files are downloaded.

```
# /dev/sdc is the USB drive, same as supplied in get artifacts.py python script
sudo mount /dev/sda1 /mnt/Cisco
cd /mnt/Cisco

# execute the verification script
./test-usb

# In case of failures, the output of the above command will explicitly display the failure on the
screen
```

Step 7 After synchronization, unmount the USB drive.

```
sudo umount /mnt/Cisco
```

Step 8 After synchronization, remove the USB drive from the staging server and insert the USB stick into the management node.

Step 9 Insert the pre-populated USBs into the management node of the pod running 3.2.x (x<=3).

Step 10 Copy the vim_upgrade_orchestrator.py script available in Cisco VIM 3.4.1 artifacts in the `/root/` folder, to the management node of the pod running 2.4.y/3.0.0/3.2.x (x<=3 or y =15,16 or 17).

Step 11 Execute the update from the /root/ location:

```
# cd /root/
# chmod +x vim_upgrade_orchestrator.py
# ./vim_upgrade_orchestrator.py –i disconnected -s 3.0.0 -n 3.4.1 [-y] # -y if you don’t want any
interactive mode
# start_image_tag value can be: 2.4.y/3.0.0/3.2.x (x<=3,y=15,16,17)
```

After upgrade, start using the newly created directory.

Note Upgrade process takes several hours (> 6 hours), so execute this process in a VNC. If you do not have a VNC environment, execute the same from KVM console of the management node. Do not run this command in background or with nohup option as the upgrade will fail. Do not run any other Cisco VIM actions during upgrade.

Step 12 Copy the management node backup created during the upgrade, and paste it into a separate server through rsync. For more information, see Managing Backup and Restore Operations, on page 449. For Cisco VIM 2.4.y, reimage the management node with Cisco VIM 3.4.1 and then restore the management node with the backup snapshot taken..

Step 13 For pods getting upgrade from Cisco VIM 2.4.y, Ceph continues to run in filestore mode. Use separated tool ceph_migration_status.py provided in `/installer-3.4.1/tools/` directory to figure out the mode of ceph used..

a) Move each ceph node to bluestore mode by doing remove/add of storage nodes for full on or hyper-converged pod. For Micropod, you can achieve the same by replacing controller.

   Note As this is a long process, it is recommended to take subsequent maintenance window for this activity

b) Ensure CEPH HEALTH_OK before initiating remove-storage operation. Use the tool provided in the installer-3.4.1/tools/ directory to find out the ceph nodes that are pending for migration to bluestore. To execute the tool

```
# cd /root/installer-3.4.1/tools/
 # python ceph_migration_status.py
```

Upgrading Cisco VIM Software Using Network Installation

Step 1 From the software download site provided by your Cisco account representative, download the `vim_upgrade_orchestrator.py curl -o vim_upgrade_orchestrator.py` file.

For example:

```
https://{username}:{password}@cvim-registry.com/mercury-releases/mercury-rhel7-osp10/releases/{release
number}/vim_upgrade_orchestrator.py
```

Step 2 Execute the upgrade from the `/root/` directory:

```
# cd /root/
# chmod +x vim_upgrade_orchestrator.py
# ./vim_upgrade_orchestrator.py –i connected -s 3.0.0 -n 3.4.1
 # start_image_tag value can be: 2.4.y/3.0.0/3.2.x (x<=3, oy y=15,16,17)
```

Note Upgrade process takes several hours (> 6 hours), so execute this process in a VNC. If you do not have a VNC environment, execute the same from KVM console of the management node. Do not run this command in background or with nohup option to avoid upgrade failure. During the upgrade, do not run any other Cisco VIM actions.

After the upgrade, use the newly created directory to continue from step 12 listed in the section Upgrading VIM Software Using a USB. Ensures built-in redundancy for controller and standalone storage nodes. The reboot of these nodes are automatic during the software upgrade from 3.x.

The computes that does not have any VNFs in ACTIVE state are automatically rebooted during the software upgrade. To monitor and reboot the compute nodes through ciscovim cli, see the sections Managing Reboot of Cisco VIM Nodes and Managing Reboot Status of Cisco VIM Nodes.

Note

- No pod management operation is allowed until the reboot of all Cisco VIM nodes is successful.
- In case of upgrade failure, ensure that you do not try to recover the cloud by yourself. For help and recovery, contact Cisco Support.

Supporting RMA of ToRs with Auto-ToR Configuration

When Cisco VIM cloud uses auto-ToR configuration to manage switch ports, you need to replace the existing switches if one malfunctions.

Consider the following assumptions made during RMA of ToR with auto-ToR configuration:

- When a switch is getting RMAed, it is in a virtual port-channel (vPC) mode with another switch to support full switch redundancy.
- You can replace multiple switches through Cisco VIM CLI, but only one switch from each pair.
- Administrator is responsible for manual configuration of the spine connection and L3 Out for the ToR.

Note When replacing the ToR, ensure that you use same server ports to have minimal changes in the setup_data.

To initiate ToR RMA, take a backup of the setupdata file and update it manually with the configuration details by running the following command:

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml /root/MyDir/ update the setup_data
 to include the changes associated to the ToR that needs to be RMAs
[root@mgmt1 ~]# cd /root/MyDir/
[root@mgmt1 ~]# vi setup_data.yaml
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile /root/MyDir/setup_data.yaml  –rma_tors
<”,” separated target ToRs>
```

Launching OpenStack Baremetal Instances

You can use OpenStack Ironic service to launch baremetal instances once it is enabled through Cisco VIM.

Procedure

	Command or Action	Purpose
Step 1	Follow the pre-VIM deployment steps as given in the section Enabling Ironic Post Installation	

	Command or Action	Purpose
Step 2	Deploy VIM.	
Step 3	After the deployment, run the following commands:	# openstack baremetal node list --> Once VIM install has completed, the ironic node will move to available state and is ready for use.
Step 4	(Optional) If you want to add more ironic nodes after VIM installation, execute the steps running from Step 1 given under pre-VIM deployment and then add the nodes. Use correct cimc credentials for $USER, $PASS, and $ADDRESS	# openstack baremetal node create --network-interface neutron --driver pxe_ipmitool --name new-node-$ADDRESS \\ --driver-info ipmi_username=$USER \\ --driver-info ipmi_password=$PASS \\ --driver-info ipmi_address=$ADDRESS # openstack baremetal node manage $NODE_UUID # openstack baremetal node inspect $NODE_UUID Once inspection is completed, run the below commands: openstack baremetal node show $NODE_UUID → to verify node's resources and capabilities set during inspection process openstack baremetal port list --> to verify ports. It should have one port of a baremetal node. openstack baremetal node provide $NODE_UUID --> This PXE boots the deploy image via cleaning and sets node to available once done. Do this for all of the ironic nodes

Deploying Baremetal Instances

Once the ironic nodes are available for use, you can launch an instance on the baremetal using the following steps:

Step 1 Create the Nova baremetal flavor

```
nova flavor-create my-baremetal-flavor auto $RAM_MB $DISK_GB $CPU
nova flavor-key my-baremetal-flavor set capabilities:boot_option="local"
nova flavor-key my-baremetal-flavor set capabilities:disk_label="gpt"
```

The trait name should match with the baremetal node. Here, it is CUSTOM_BAREMETAL.

```
 nova flavor-key my-baremetal-flavor set trait:CUSTOM_BAREMETAL=required
```

Step 2 Add user images into glance. For example, if you are using ubuntu image, use the following commands:

```
IMAGE_OS=ubuntu

MY_VMLINUZ_UUID=$(glance image-create --name user-image-${IMAGE_OS}.vmlinuz --disk-format aki
--container-format aki < user-image-${IMAGE_OS}.vmlinuz | awk '/ id /{print $4}')

MY_INITRD_UUID=$(glance image-create --name user-image-${IMAGE_OS}.initrd --disk-format ari
--container-format ari < user-image-${IMAGE_OS}.initrd | awk '/ id /{print $4}')

glance image-create --name user-image-${IMAGE_OS}.qcow2 --disk-format qcow2 --container-format bare
```

```
 --property kernel_id=$MY_VMLINUZ_UUID --property ramdisk_id=$MY_INITRD_UUID <
user-image-${IMAGE_OS}.qcow2
```

Step 3 Use the following commands, to create the neutron tenant network to be used with the bare metal node:

```
# openstack network create my-tenant-net-name

# openstack subnet create --network my-tenant-net-name --subnet-range X.X.X.X/XX --ip-version 4
my_tenant_subnet_name
```

Step 4 Create a simple cloud-init script to log into the node after the instance is up:

Example

```
#cloud-config
password: Lab1234!
chpasswd: { expire: False }
ssh_pwauth: True
```

If this is an ACI or BypassNeutron mode testbed, add the following to the cloud-init script:

Example

```
#cloud-config
password: Lab1234!
chpasswd: { expire: False }
ssh_pwauth: True
runcmd:
  - ip link add link enp6s0 name enp6s0.3086 type vlan id <3086 - this will be the segment_id of your
 tenant net>
  - ip link set dev enp6s0.<3086> up
  - dhclient enp6s0.<3086>
```

Step 5 Boot the bare metal node using the below command:

```
# openstack server create --flavor <baremetal_flavor uuid> --image <centos/ubuntu image uuid> --nic
 net-id=<tenant network uuid> --config-drive true --user-data user-data.txt <instance-name>
```

Note For the creation of host aggregates, do not include controller servers as part of the aggregate.

When ironic services are deployed, create a separate nova flavor for your VM instances. Do not use the above referenced baremetal flavor. When launching a VM instance, use the VM flavor. Additionally, update your VM flavor to contain the following condition :

```
# nova flavor-key <vm-flavor> set capabilities:hypervisor_type="s!= ironic"
```

VM Resizing

VM resize is the process of changing the flavor of an existing VM. Thus, using VM resize you can upscale a VM according to your needs. The size of a VM is indicated by the flavor based on which the VM is launched.

Resizing an instance means using a different flavor for the instance.

By default, the resizing process creates the newly sized instance on a new node, if more than one compute node exists and the resources are available. By default, the software, allows you to change the RAM size, VDISK size, or VCPU count of an OpenStack instance using **nova resize**. Simultaneous or individual adjustment of properties for the target VM is allowed. If there is no suitable flavor for the new properties of the VM, you can create a new one.

```
nova resize [--poll] <server> <flavor>
```

The resize process takes some time as the VM boots up with the new specifications. For example, the Deploying a Cisco CSR (size in MB) would take approximately 60mins. After the resize process, execute `nova resize-confirm <server>` to overwrite the old VM image with the new one. If you face any issue, you can revert to the old VM using the `nova-resize-revert <server>` command. At this point, you can access the VM through SSH and verify the correct image is configured.

Note The OpenStack **shutdown** the VM before the resize, so you have to plan for a **downtime.**

Note We recommend you not to resize a vdisk to a smaller value, as there is the risk of losing data.

Telemetry for OpenStack

If ceilometer is enabled in setup_data.yaml file, the Telemetry service in Cisco VIM collects the metrics within the OpenStack deployment. This section provides a summary of the metrics that are collected with the Cisco VIM using ceilometer/gnocchi OpenStack REST-API.

OpenStack Compute:

The following metrics are collected for OpenStack Compute:

Name	Type	Unit	Resource	Origin	Note
memory	Gauge	MB	instance ID	Notification	Volume of RAM allocated to the instance
memory.usage	Gauge	MB	instance ID	Pollster	Volume of RAM used by the instance from the amount of its allocated memory
cpu	Cumulative	ns	instance ID	Pollster	CPU time used
cpu.delta	Delta	ns	instance ID	Pollster	CPU time used since previous datapoint
cpu_util	Gauge	%	instance ID	Pollster	Average CPU utilization

Name	Type	Unit	Resource	Origin	Note
vcpus	Gauge	vcpu	instance ID	Notification	Number of virtual CPUs allocated to the instance
disk.read.requests	Cumulative	request	instance ID	Pollster	Number of read requests
disk.read.requests.rate	Gauge	request/s	instance ID	Pollster	Average rate of read requests
disk.write.requests	Cumulative	request	instance ID	Pollster	Number of write requests
disk.write.requests.rate	Gauge	request/s	instance ID	Pollster	Average rate of write requests
disk.read.bytes	Cumulative	B	instance ID	Pollster	Volume of reads
disk.read.bytes.rate	Gauge	B/s	instance ID	Pollster	Average rate of reads
disk.write.bytes	Cumulative	B	instance ID	Pollster	Volume of writes
disk.write.bytes.rate	Gauge	B/s	instance ID	Pollster	Average rate of writes
disk.device.read.requests	Cumulative	request	disk ID	Pollster	Number of read requests
disk.device.read.requests.rate	Gauge	request/s	disk ID	Pollster	Average rate of read requests
disk.device.write.requests	Cumulative	request	disk ID	Pollster	Number of write requests
disk.device.write.requests.rate	Gauge	request/s	disk ID	Pollster	Average rate of write requests
disk.device.read.bytes	Cumulative	B	disk ID	Pollster	Volume of reads
disk.device.read.bytes.rate	Gauge	B/s	disk ID	Pollster	Average rate of reads
disk.device.write.bytes	Cumulative	B	disk ID	Pollster	Volume of writes
disk.device.write.bytes.rate	Gauge	B/s	disk ID	Pollster	Average rate of writes
disk.root.size	Gauge	GB	instance ID	Notification	Size of root disk

Name	Type	Unit	Resource	Origin	Note
disk.ephemeral.size	Gauge	GB	instance ID	Notification	Size of ephemeral disk
disk.capacity	Gauge	B	instance ID	Pollster	The amount of disk that the instance can see
disk.allocation	Gauge	B	instance ID	Pollster	The amount of disk occupied by the instance on the host machine
disk.usage	Gauge	B	instance ID	Pollster	The physical size in bytes of the image container on the host
disk.device.capacity	Gauge	B	disk ID	Pollster	The amount of disk per device that the instance can see
disk.device.allocation	Gauge	B	disk ID	Pollster	The amount of disk per device occupied by the instance on the host machine
disk.device.usage	Gauge	B	disk ID	Pollster	The physical size in bytes of the image container on the host per device
network.incoming.bytes	Cumulative	B	interface ID	Pollster	Number of incoming bytes
network.incoming.bytes.rate	Gauge	B/s	interface ID	Pollster	Average rate of incoming bytes
network.outgoing.bytes	Cumulative	B	interface ID	Pollster	Number of outgoing bytes
network.outgoing.bytes.rate	Gauge	B/s	interface ID	Pollster	Average rate of outgoing bytes
network.incoming.packets	Cumulative	packet	interface ID	Pollster	Number of incoming packets

Name	Type	Unit	Resource	Origin	Note
network.incoming.packets.rate	Gauge	packet/s	interface ID	Pollster	Average rate of incoming packets
network.outgoing.packets	Cumulative	packet	interface ID	Pollster	Number of outgoing packets
network.outgoing.packets.rate	Gauge	packet/s	interface ID	Pollster	Average rate of outgoing packets
network.incoming.packets.drop	Cumulative	packet	interface ID	Pollster	Number of incoming dropped packets
network.outgoing.packets.drop	Cumulative	packet	interface ID	Pollster	Number of outgoing dropped packets
network.incoming.packets.error	Cumulative	packet	interface ID	Pollster	Number of incoming error packets
network.outgoing.packets.error	Cumulative	packet	interface ID	Pollster	Number of outgoing error packets
memory.swap.in	Cumulative	MB	interface ID	Pollster	Memory swap in
memory.swap.out	Cumulative	MB	interface ID	Pollster	Memory swap out
disk.device.read.latency	Cumulative	ns	Disk ID	Pollster	Total time read operations have taken

OpenStack Image

The following metrics are collected for OpenStack Image service:

Name	Type	Unit	Resource	Origin	Note
image.size	Gauge	B	image ID	Notification, Pollster	Size of the uploaded image
image.download	Delta	B	image ID	Notification	Image is downloaded
image.serve	Delta	B	image ID	Notification	Image is served out

OpenStack Block Storage

The following metrics are collected for OpenStack Block Storage:

Name	Type	Unit	Resource	Origin	Note
volume.size	Gauge	GB	Voulume ID	Notification	Size of the volume

Metrics Polling and Retention Policy

Cisco VIM telemetry service polls metrics every 5 minutes and retains the metrics for 48 hours

Nova Migrate

The nova migrate command is used to move an instance from one compute host to another compute host. The scheduler chooses the destination compute host based on the availability of the zone settings. This process does not assume that the instance has shared storage available on the target host.

To initiate the cold migration of the VM, you can execute the following command:

```
nova migrate [--poll] <server>
```

The VM migration can take a while, as the VM boots up with the new specifications. After the VM migration process, you can execute `nova resize-confirm <server>` --to overwrite the old VM image with the new one. If you encounter an problem, use the `nova-resize-revert <server>` command to revert to the old VM image. At this point, access the VM through SSH and verify the correct image is configured.

Note The OpenStack **shutdown** the VM before the migrate, so plan for a **downtime**.

Live Migrate

Live-migrating an instance means moving its virtual machine to a different OpenStack Compute server while the instance continues running. The operator can select which host to live migrate the instance. If the destination host is not selected, the nova scheduler chooses the destination compute based on the availability of the zone settings. Live migration cannot be used without shared storage except a booted from volume VM which does not have a local disk.

To initiate the live migration of the VM, you can execute the following command:

```
openstack server migrate <server>--live
```

The VM migration can take a while. The virtual machine status can be checked with the command:

```
openstack server show < server>
```

Note

1. With NFV_HOST enabled, you must ensure that the vCPUs are available on the destination host to avoid collision. With cold migration, the vCPUs available on the destination host are automatically selected and assigned to the VM.
2. If you are trying to live-migrate a VM with config-drive, it is always considered as cold-migration.
3. In VPP pod, live-migration is not supported as it uses huge pages by default.

Power Management Of Computes (for C-Series)

Before you begin

In Cisco VIM 2.4, the power management function of computes optimizes the overall power consumption of the data center. Powering down the server through an API/CLI helps you to have a power backup.

Step 1 To power off one or more compute nodes, run the following commands:

```
Run ciscovim power-off help command
# ciscovim help power-off
usage: ciscovim power-off --setupfile SETUPFILE [-y] <node1,node2,...>

Power Off compute-nodes

Positional arguments:
  <node1,node2,...>      Power off Compute Nodes

Optional arguments:
  --setupfile SETUPFILE  <setupdata_file>. Mandatory for any POD management
                         operation.
  -y, --yes              Yes option to perform the action
```

Step 2 To list all the nodes in the Openstack Cloud run the following command:

```
# ciscovim list-nodes
```

Step 3 Choose one or more *Active* compute node to be powered off

Step 4 Run the following command:

```
# ciscovim power-off <compute-server-1, compute-server-2, …. > --setupfile <path_setup_data.yaml>
```

Step 5 Run the following command to verify that the computes are power off

```
# ciscovim list-nodes
```

Note The Status for compute nodes that are powered off has to be *InActive* state.

Note To prevent cloud destabilization, you must ensure that at least one compute node is in the Active state.Pod management operation that applies to the entire pod (such as a update, reconfigure, and so on) cannot be performed if one or more compute nodes are powered off. Computes which run VMs or which provide other roles (such as All-in-one (AIO) nodes in a micropod) cannot be powered-off using this API. Power error-handling methods are added to ensure that such cases are handled. As part of the power-off action, internally cloud-sanity is run and if the cloud sanity fails, then the power-off action is aborted.

Power On Compute Nodes

Following are the steps to power on the compute nodes:

Step 1 Run the following command to power onone or more compute nodes

```
Run ciscovim power-on help command
# ciscovim help power-on
usage: ciscovim power-on --setupfile SETUPFILE [-y] <node1,node2,...>

Power On compute-nodes

Positional arguments:
  <node1,node2,...>      Power on Compute Nodes

Optional arguments:
  --setupfile SETUPFILE  <setupdata_file>. Mandatory for any POD management
                         operation.
  -y, --yes              Yes option to perform the action
```

Step 2 To list all the nodes in the Openstack Cloud:

```
# ciscovim list-nodes
```

Step 3 Choose one or more Active compute node to be powered on

Step 4 Run the following command:

```
# ciscovim power-on <compute-server-1, compute-server-2, …. > --setupfile <path_setup_data.yaml>
```

Step 5 Run the following command to verify the compute(s) are powerd on

```
# ciscovim list-nodes
```

Note The Status for compute nodes that were powered on has to be *Active*

Managing Reboot of Cisco VIM Nodes

Cisco VIM 2.4 has a ciscovim CLI to reboot the Cisco VIM nodes. CLI can be used for rebooting the Cisco VIM nodes in general. During software update, core libraries like kernel, glibc, systemd and so on. require rebooting the system to run the latest version. Cisco VIM has the functionality to reboot nodes (if needed) during an update, but we defer the update of compute nodes which are running application VM's.

Reboot the nodes using the CLI before migrating the VM's on another computes as shown in the following steps:

Step 1 Run the following command to Reboot one or more compute nodes:

```
Run ciscovim reboot help command
# ciscovim help reboot
usage: ciscovim reboot [-y] <node1,node2,...>

Reboot compute-nodes

Positional arguments:
  <node1,node2,...>  Reboot Compute Nodes

Optional arguments:
  -y, --yes          Yes option to perform the action
```

Step 2 Run the following command to select one or more compute nodes

```
# ciscovim reboot<compute-server-1, compute-server-2, …. >
```

Note You cannot reboot all the compute nodes simultaneously. At least one node has to be Active to prevent the cloud destabilization. Also, computes on which VMs are running cannot be rebooted, the CLI prevents it (see the following steps on mitigation). The nodes which are associated with multiple roles (For Example: All-in-one (AIO) nodes in a micro-pod or Hyper-converged) can be rebooted one at a time.

Cisco VIM Client Reboot and Remove Compute Using Force Option

When VM's are running on a particular compute node, you cannot reboot or remove that compute node. Cisco VIM installer internally checks for the presence of VM's and aborts the operation, if VM is running on the target compute node.

To execute remove-compute operation without any failure, migrate or terminate VMs running on compute nodes and execute remove or reboot operations using "-f/--force" option in Cisco VIM client.

Note the following before executing reboot or remove compute operations with force option.

- If a remove compute operation is executed with force option, the VMs running on that compute node are deleted.
- If a reboot compute operation is executed with force option, the VMs are restored to last running status post successful reboot of that compute node.

Example of Remove Compute

```
# ciscovim help remove-computes
  usage: ciscovim remove-computes --setupfile SETUPFILE [-y] [-f] <node1,node2,...>
                         Remove compute-nodes from the Openstack cloud

  Positional arguments:
  <node1,node2,...>      Remove compute nodes

  Optional arguments:
  --setupfile SETUPFILE  <setupdata_file>. Mandatory for any POD management
                         operation.
  -y, --yes              Yes option to perform the action
  -f, --force            Force option to remove or reboot
# ciscovim remove-computes --setupfile /tmp/remove_computes_setup_data.yaml gg34-4 -y --force

                         monitoring remove_compute (gg34-4) operation

 ........................
 Cisco VIM Runner logs
 ........................
```

Example of removing multiple computes

```
# ciscovim remove-computes --setupfile /tmp/remove_computes_setup_data.yaml gg34-1, gg34-2
 -y -force
```

If ToR_TYPE is Cisco NCS 5500, you must manually remove all the sub-interfaces that were manually configured on the NCS switch, as the Cisco VIM automation does not unconfigure/configure the sub-interfaces for which the VLANs were not defined in the setup_data.yaml. If sub-interfaces are not removed, it results in remove-compute operation.

Example of reboot compute

```
# ciscovim help reboot
  usage: ciscovim reboot [-y] [-f] <node1,node2,...>

  Reboot compute-nodes

  Positional arguments:
  <node1,node2,...>  Reboot Compute Nodes

 Optional arguments:
 -y, --yes          Yes option to perform the action
  -f, --force        Force option to perform the action

 # ciscovim reboot gg34-4 -y --force

 monitoring reboot (gg34-4) operation

 ........................
 Cisco VIM Runner logs
 ........................
```

Example of rebooting multiple computes

```
# ciscovim reboot gg34-1, gg34-2 -y --force
```

Managing Reboot Status of Cisco VIM Nodes

Cisco VIM 2.4, has a CLI which helps you to find which CVIM nodes require a reboot after an update. Reboot the nodes after an update so that the cloud is running latest host packages.

Note It is mandatory for the operator to reboot nodes to be able to perform next update or pod management operation.

Run the following command to check the reboot pending status for nodes in the pod (post update):

```
Run ciscovim reboot-status help command
# ciscovim help reboot-status
usage: ciscovim reboot-status

List of Openstack Nodes that require a reboot

Sample command execution:
# ciscovim reboot-status

Fetching Nodes that require a Reboot

+--------------------------+-----------------+
|        Node Name         | Reboot Required |
+--------------------------+-----------------+
| sjc04-c33-tb2-micropod-1 |        No       |
| sjc04-c33-tb2-micropod-2 |        No       |
| sjc04-c33-tb2-micropod-3 |        No       |
+--------------------------+-----------------+
```

Cisco UCS Firmware Upgrade

In Cisco VIM 2.4.2, the Cisco Host Upgrade Utility (HUU) tool developed using Cisco Integrated Management Controller (IMC) Python SDK module (imcsdk-0.9.2.0) is leveraged automatically to upgrade all firmware components running on Cisco UCS C-Series servers.

Note The wrapper tool only updates the CIMC bundle packages, as the entire Cisco IMC Software bundle (that includes CIMC, BIOS, adapter and storage controller firmware images through HUU images) is updated by default. Adequate planning is required for CIMC upgrade, as it causes the server to get rebooted.

For Cisco VIM 2.4, the CIMC upgrade tool supports the:

- Upgrade of CIMC bundle images for C-series only.
- Concurrent upgrade of CIMC bundle images on multiple C-series servers.
- Pre-validation check for server type and available HUU images.
- Support of the external http server, Cisco VIM Software Hub, or Cisco VIM Management node for the target CIMC upgrade image mounts.
- Checks if the cloud is deployed successfully, and notifies the user with a proper message.
- Checks if selected hosts have any active VMs running on them and notifies the user with a proper message.
- Generation of consolidated summary on firmware version status, on completing the pre-upgrade and post-upgrade.

Note

- Firmware upgrade is supported only on UCS C-series platform and not on UCS B-series and HP platforms.
- If you upgrade CIMC firmware on an existing cloud deployment, it might impact the cloud functionality as the firmware upgrade reboots the host. Hence, ensure that the cloud is operational, post CIMC firmware upgrade.

To check if the cloud is operational, execute the following steps:

- Run the cloud sanity.
- If cloud sanity failure occurs, run cluster recovery and then re-run cloud sanity.

Also for the upgrade operation to work, ensure that the image has the following syntax: ucs-<server_type>-huu-<version_number>.iso; for example ucs-c220m4-huu-2.0.13n.iso or ucs-c240m4-huu-2.0.13n.iso;

Note Running the UCS Firmware upgrade on host(s) running active VMs results in downtime on those VMs.

Limitations During Cisco IMC Upgrade

The following are the CVIM management operations which are not allowed when the firmware upgrade is in progress:

- POD management operations: Add, Remove or Replace of nodes
- CVIM Software Update
- CVIM Software Upgrade
- Reconfigure of CVIM features

Tools Usage

The CIMC upgrade utility is a standalone python file (ucsc_host_upgrade_utility) which is located under <cvim_install_dir>/tools/ directory.

To use the tool, execute the following command:

```
[root@hiccup-mgmt-228 tools]# python ucsc_host_upgrade_utility.py -h
usage: ucsc_host_upgrade_utility.py [-h] [--file SETUPFILELOCATION]
                                    [--http-server HTTP_SERVER_IP]
                                    [--sds-server SDS_SERVER_NAME]
                                    [--server-uname UNAME]
                                    [--server-pwd PASSWD]
                                    [--huu-image-path HUU_IMAGE_PATH]
                                    [--host HOSTS] [--exclude-hosts E_HOSTS]
                                    [-y]

Script to perform firmware upgrade

optional arguments:
  -h, --help            show this help message and exit
  --file SETUPFILELOCATION, -f SETUPFILELOCATION
                        Optional, if not defined will read the setup_data.yaml
                        in /root/openstack-configs dir for CIMC information of
                        servers; To override, provide a valid YAML file
                        with the CIMC Credentials.
  --http-server HTTP_SERVER_IP, -hs HTTP_SERVER_IP
                        Optional, only needed if a http server is used to host
                        the target CIMC bundle image(s).
  --sds-server SDS_SERVER_NAME, -sds SDS_SERVER_NAME
                        Optional, only needed if a Software Distribution
                        Server (SDS) is used to host the target CIMC bundle
                        image(s).
  --server-uname UNAME, -u UNAME
                        Optional, only needed if a http server is used to host
                        the target CIMC bundle image(s).
  --server-pwd PASSWD, -p PASSWD
                        Optional, only needed if a http server is used to host
                        the target CIMC bundle image(s).
  --huu-image-path HUU_IMAGE_PATH, -path HUU_IMAGE_PATH
```

```
                        Comma separated absolute path of the HUU ISO file(s);
                        In the case of a web server hosting the files,
                        provide the absolute path of the URL that includes the
                        file names; that is, exclude the scheme://host/ part
  --host HOSTS
        Comma separated list of host names targeted for CIMC
                        bundle upgrade defined in the target setup_data.yaml
  --exclude-hosts E_HOSTS, -e E_HOSTS
                        Comma separated list of hostnames excluded for CIMC
                        bundle upgrade defined in the target setup_data.yaml
  -y, -yes
[root@hiccup-mgmt-228 tools]#
```

If the target CIMC upgrade images are available on Cisco VIM Management node, use the below command:

```
  python ucsc_host_upgrade_utility.py [--file <setup_data_test.yaml/cimc_servers.yaml>]
-path <huu_image_paths>
```

If the target CIMC upgrade images are hosted in an external http server that is reachable from the Cisco VIM Management node and CIMC of the servers, use the below command:

```
  python ucsc_host_upgrade_utility.py [--file <setup_data_test.yaml/cimc_servers.yaml>]
-hs <http_server_ip/hostname> -u
   <https_server_un> -path <http_server_pwd> -path <huu_image_paths>
```

If the target CIMC upgrade images are hosted in Ciso VIM Software Hub, use the below command:

```
python ucsc_host_upgrade_utility.py --file [setup_data_test.yaml/cimc_servers.yaml] -sds
[Ciso VIM Software Hub_server_ip/hostname] -u
    [sds_server_un] -path [sds_server_pwd] -path [huu_image_paths]
```

Note Pre-requisites to use Ciso VIM Software Hub for hosting the target CIMC bundle image(s) are:

- Ciso VIM Software Hub server must be reachable from the management node over HTTPS.
- Ciso VIM Software Hub server TLS certificate must be trusted by the management node to make TLS connection in verified context.

If setup_data.yaml file is not available, you can create it using below command:

```
 # UCSC (C-series) sample format of yaml file to specify the CIMC details
 SERVERS:
  server-1:
    cimc_info:
      cimc_ip: "cimc-ip-address"
      cimc_username: "cimc-user-name"
      cimc_password: "cimc-password"
  server-2:
    cimc_info:
      cimc_ip: "cimc-ip-address"
      cimc_username: "cimc-user-name"
      cimc_password: "cimc-password"
  server-3:
    cimc_info:
      cimc_ip: "cimc-ip-address"
      cimc_username: "cimc-user-name"
      cimc_password: "cimc-password"
```

Note As the upgrade of CIMC takes more than an hour, execute this process in a VNC. If you do not have a VNC environment, execute the same from KVM console of the management node. Do not run this command in background or with nohup option.

Quanta Firmware Upgrade

From release Cisco VIM 3.2.1, the Quanta firmware upgrade utility tool developed using redfish-client is used to upgrade BMC, BIOS, and NVM firmware versions on Quanta servers.

Note The wrapper tool only updates the BMC, BIOS and NVM versions based on the provided firmware packages. Adequate planning is required for Quanta firmware upgrade, as it causes the server to get rebooted.

For Cisco VIM 3.2.1, the Quanta firmware upgrade tool supports:

- Upgrade of BMC, BIOS and NVM for Quanta servers only.
- Concurrent upgrade of firmware on multiple Quanta servers.
- Pre-validations if another firmware flashing is in progress.
- Generation of consolidated summary on firmware version status, on completing the pre-upgrade and post-upgrade.

Note If you upgrade Quanta firmware on an existing cloud deployment, it might impact the cloud functionality as the firmware upgrade reboots the host. Hence, ensure that the cloud is operational, post Quanta firmware upgrade.

To check if the cloud is operational, do the following:

1. Run the cloud sanity.
2. If cloud sanity fails, run cluster recovery and then re-run the cloud sanity.

For the upgrade to work, ensure that you specify the proper firmware-package bundle with proper name and version of the components (BMC/BIOS/NVM).

Few examples given below:

- BIOS firmware package file name must start with a prefix BIOS_XXXX.zip.
- BMC firmware package file name must start with a prefix BMC_XXX.zip.
- NVM firmware package file name must contain NVMXXXXX.zip.

Note Running the BMC/BIOS/NVM firmware upgrade on host(s) running active VM results in downtime on those VMs.

Limitations for Quanta firmware Upgrade

The following Cisco VIM management operations are not allowed when the firmware upgrade is in progress:

- Pod management operations: Addition, removal or replacement of nodes.
- Cisco VIM software update.
- Cisco VIM software upgrade.
- Reconfiguration of Cisco VIM features.

Tools Usage

The Quanta upgrade utility is a standalone python file (`quanta_firmware_upgrade.py`) which is located under `<cvim_install_dir>/tools/ directory`.

To use the tool, execute the following command:

```
[[root@qatar-mgmt tools]# python quanta_firmware_upgrade.py -h
usage: quanta_firmware_upgrade.py [-h] [--hosts HOSTS]
 [--exclude-hosts EXCLUDE_HOSTS]
 [--ignore-flash-status] [-v] [-y]
 [--bmc-only | --bios-only | --nvm-only]
 --setupfile SETUPFILE --firmware-package
 FIRMWARE_PACKAGE
Script to update BMC and BIOS firmware on Quanta server
optional arguments:
 -h, --help show this help message and exit
 --hosts HOSTS comma separated list of servers defined in
 setup_data.yaml file target for firmware update
 --exclude-hosts EXCLUDE_HOSTS
 comma separated list of servers defined in
 setup_data.yaml file to exclude for firmware update
 --ignore-flash-status
 ignore flash status, needed for older BMC firmware
 where it lacks the support and continue with BMC
 firmware update
 -v, --verbose enable verbose output
 -y, --yes skip prompt
 --bmc-only update BMC firmware only
 --bios-only update BIOS firmware only
 --nvm-only update Intel Ethernet NVM only
required arguments:
 --setupfile SETUPFILE
 setup_data.yaml file location
 --firmware-package FIRMWARE_PACKAGE
 Firmware package ZIP file location
[root@qatar-mgmt tools]#
```

For upgrade BMC only, use the below command:

```
python quanta_firmware_upgrade.py --setupfile <setup-data.yaml> --firmware-package
<bmc/bios_update_package.zip>
           --bmc-only
```

For upgrade BIOS only, use the below command:

```
python quanta_firmware_upgrade.py --setupfile <setup-data.yaml> --firmware-package
<bmc/bios_update_package.zip>
           --bios-only
```

For upgrade NVM only, use the below command:

```
python quanta_firmware_upgrade.py --setupfile <setup-data.yaml> --firmware-package
<nvm_update_package.zip>
           --nvm-only
```

Note

- If you do not specify any option for particular component with specified BIOS/BMC firmware package, the utility upgrades in the order of BMC followed by BIOS but not NVM.
- If you are planning to update both the BMC and the BIOS separately, always update the BMC first and then the BIOS.
- To upgrade NVM, you need to specify --nvm-only option with NVM firmware package, otherwise upgrade fails.
- NVM firmware upgrade does not reboot the servers by default. You need to reboot the nodes manually to complete the upgrade process.

As some of the servers running old firmware are upgrading to latest firmware, password might be reset to default.

You need to manually reset the password by following the below steps:

1. Login to the UI using the factory default **`admin`** and **`cmb9.admin`**
2. Once logged-in, you are prompted with a message **First Login or Password Expired. You need to change your password**.

You need `--ignore-flash-status` option for older BMC firmware, where it lacks the support and continue with BMC firmware update.

Few examples below:

```
python quanta_firmware_upgrade.py --setupfile <setup-data.yaml> --firmware-package
<bmc_update_package.zip> --bmc-only --ignore-flash-status
```

Note As the upgrade of BIOS/BMC takes more than 30 minutes, it is imperative to execute this process in a VNC. If you do not have a VNC environment, execute the same from KVM console of the management node. Do not run this command in background or with nohup option.

Intel FPGA Programmable Acceleration Card N3000 Firmware Update

To host virtualized Radio Access Network (vRAN) workloads in the edge pod off Quanta hardware, the selected computes (also called accelerated computes) are installed with Intel N3000 cards for hardware offload. Cisco VIM provides a utility script to update the firmware and other relevant packages associated with N3000 cards present on the accelerated compute nodes. The utility script checks the presence of N3000 cards on the target compute node and updates the necessary packages if there is a match. The utility requires an actively deployed Cisco VIM edge pod.

For releases from Cisco VIM 3.2.1, the utility script is available at `/root/ installer-xxx/tools/ directory`.

To run the utility, install and deploy the edge pod with Cisco VIM 3.2.1 or later:

```
#cd installer-xxx/tools/
#./intel-fpga-n3000-firmware-update.py [--with-rsu]
```

Note

- The utility is designed to power-cycle the accelerated computes after a firmware/package update, if `--with-rsu` is not specified.
- If hyper-threading is disabled on the accelerated compute, it may take up to 60 minutes to complete the flash process with two cards. If hyper-threading is enabled, the flash process takes about 25-30 minutes for completion.

.

Tools Usage

To use the tool, execute the following command:

```
[root@mgmt-node tools]# ./intel-fpga-n3000-firmware-update.py -h

usage: intel-fpga-n3000-firmware-update.py [-h] [--hosts HOSTS] [-n] [-f] [-r]
 [-y] [-v]
Script to update Intel FPGA N3000 firmware on all Compute node
optional arguments:
 -h, --help show this help message and exit
 --hosts HOSTS comma separated list of Compute node defined in
 setup_data.yaml file target for Intel FPGA N3000
 firmware update
 -n, --dry-run do not perform any updates, just a dry run
 -f, --force-update flash all images regardless of version matching or not
 -r, --with-rsu after update perform RSU command to avoid the need to
 power-cycle
 -y, --yes skip prompt
 -v, --verbose enable verbose output
```

Sample Output

Following is the sample output:

```
[root@mgmt-node tools]# ./intel-fpga-n3000-firmware-update.py
```

```
Starting Intel FPGA N3000 update script
Full log can be found at
/var/log/mercury/intel_n3000_super_rsu_update-20190506112000514524.log
Checking Intel FPGA N3000 firmware on accelerated compute node(s)
+------------------+---------------+---------------------+------------------+
| Server           | Management    | Accelerated Compute | Update Available |
+------------------+---------------+---------------------+------------------+
| quincy-control-1 | 172.29.86.248 | No                  | No               |
| quincy-control-2 | 172.29.86.249 | No                  | No               |
| quincy-control-3 | 172.29.86.250 | No                  | No               |
| quincy-compute-1 | 172.29.86.246 | No                  | No               |
| quincy-compute-2 | 172.29.86.247 | No                  | No               |
| quincy-compute-3 | 172.29.86.251 | Yes                 | Yes              |
| quincy-compute-4 | 172.29.86.252 | Yes                 | Yes              |
+------------------+---------------+---------------------+------------------+
Following accelerated compute node(s) may be impacted as part of firmware update:
quincy-compute-4,quincy-compute-3

Would you like to continue? <y|n> y

Starting Intel FPGA N3000 firmware update process, this may take an hour!!!
Successfully executed Intel FPGA N3000 firmware update script

Following compute node(s) require power-cycle:
quincy-compute-3,quincy-compute-4
```

Note As the upgrade of FPGA firmware takes approximately an hour per card, it is imperative to execute this process in a VNC. If you do not have a VNC environment, execute the same from KVM console of the management node. Do not run this command in background or with nohup option.

Supporting Management/Storage IP

From release Cisco VIM 3.2.2 onwards, along with server management IP (v4 and v6), you can also statically define the server storage IP during pod installation. To help in the transition ,Cisco created a tool that helps to update the setup_data with the server storage IP information of a pod that is already up and running.

To run the utility, ensure that the pod is up and running Cisco VIM 3.2.2 or later:

```
#cd installer-xxx/tools/
#./update_static_addrs.sh
```

On success, a message "Static Address updates in setup_data.yaml complete" is displayed at the end of the run.

CHAPTER 2

Cisco VIM REST API

The following topics explain how to use the Cisco VIM REST API to manage Cisco NFVI.

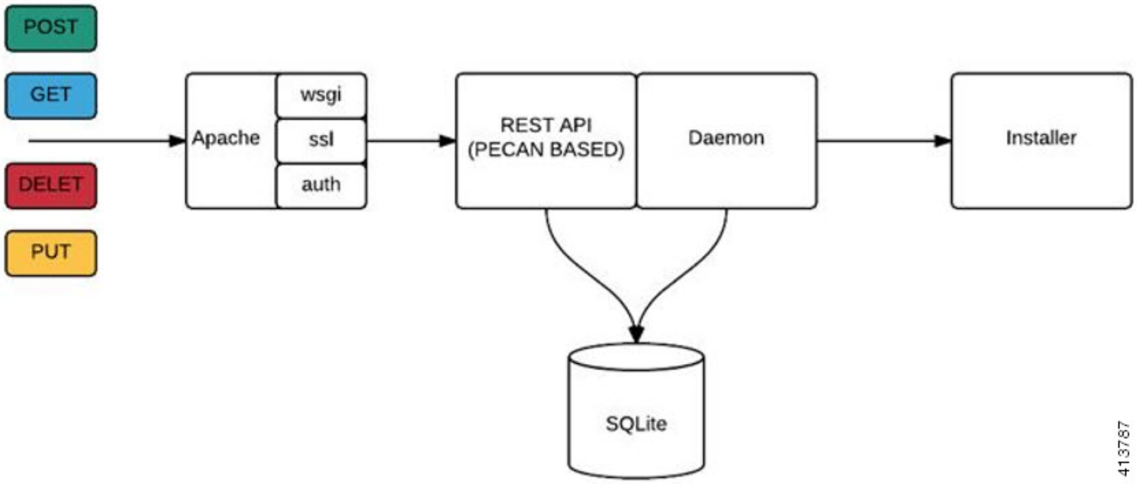
Overview to Cisco VIM REST API

Cisco VIM provides a Representational State Transfer (REST) API that is used to install, expand, and update Cisco VIM. Actions performed using the REST APIs are:

- Install Cisco VIM on Cisco NFVI pods
- Add and delete pods to and from Cisco NFVI installations
- Update Cisco VIM software
- Replace controller nodes
- Perform cloud maintenance operations
- Run cloud validations using Virtual Machine ThroughPut (VMTP), a data path performance measurement tool for OpenStack clouds

The following figure shows the workflow of Cisco VIM REST API.

Figure 5: Workflow of Cisco VIM REST API



The Cisco VIM REST API security is provided by the Secure Sockets Layer (SSL) included on the Apache web server. The Pecan-based web application is called by mod_wsgi, which runs the Rest API server. The Pecan REST API server requires a username and password to authorize the REST API server requests. Apache handles the authorization process, which authorizes the request to access the Pecan web application. Use the Cisco VIM API to upload a new setup_data.yaml file, and start, stop, and query the state of the installation. You can use it to manage the cloud, add and remove compute and Ceph nodes, and replace the controller nodes. A REST API to launch VMTP (L2/L3 data plane testing) and CloudPulse is also provided.

The Cisco VIM REST API is enabled by default in the management node if you are using the supplied Cisco VIM buildnode.iso. You can access API server on the br_api interface on port 8445. Authentication is enabled by default in the web service.

You can access the API end points using the following URL format:

```
https://<Management_node_api_ip>:8445
```

By default, basic authentication is enabled for the API endpoints in the management node. You can find the authentication credentials in the following file in the management node:

```
/opt/cisco/ui_config.json
```

The following code shows a `sample ui_config.json` file.

```
{
  "Kibana-Url": "http://10.10.10.10:5601",
  "RestAPI-Url": "https:// 10.10.10.10:8445",
  "RestAPI-Username": "admin",
  "RestAPI-Password": "a96e86ccb28d92ceb1df",
  "RestDB-Password": "e32de2263336446e0f57",
  "BuildNodeIP": "10.10.10.10"
}
```

For more information on the Rest API for an end-point, see the *Ciscovim Client RestAPI* section in Troubleshooting, on page 463.

Cisco VIM REST API Resources

Setupdata

REST wrapper for setupdata. Provides methods for listing, creating, modifying, and deleting setupdata.

Retrieving the setupdata

Resource URI

Verb	URI
GET	/v1/setupdata

Example

JSON Request

```
GET /v1/setupdata
Accept: application/json
```

JSON Response

```
200 OK
Content-Type: application/json
{"setupdatas": [{
     "status": "Active",
     "name":"GG34",
     "uuid": "123"
     "meta":{
           "user":"root"
     },
     "jsondata":{
       .......
     }
 }]}
```

Creating the setupdata

Resource URI

Verb	URI
POST	/v1/setupdata

Example

JSON Request

```
POST /v1/setupdata
Accept: application/json

{
    "name":"GG34",
    "uuid": "123"
    "meta":{
         "user":"root"
  },
  "jsondata":{
    .......
  }
}
```

JSON Response

```
201 OK
Content-Type: application/json
{
     "status": "Active",
     "name":"GG34",
     "uuid": "123"
     "meta":{
         "user":"root"
  },
  "jsondata":{
    .......
  }
}

400 Bad Request
Content-Type: application/json
{
    "debuginfo": null
    "faultcode": "Client"
    "faultstring": "Error"
}

409 CONFLICT
Content-Type: application/json
{
     "debuginfo": null
     "faultcode": "Client"
     "faultstring": "Error"
}
```

Retrieving a single setupdata

Resource URI

Verb	URI
GET	/v1/setupdata/(id)

Property:

id—The ID of the setupdata that you want to retrieve.

Example

JSON Request

```
GET /v1/setupdata/123
Accept: application/json
```

JSON Response

```
200 OK
Content-Type: application/json
{
     "status": "Active",
     "name":"GG34",
     "uuid": "123"
     "meta":{
         "user":"root"
  },
  "jsondata":{
    .......
  }
}

404 NOT FOUND
Content-Type: application/json
{
     "debuginfo": null
     "faultcode": "Client"
     "faultstring": "Setupdata could not be found."
}
```

Updating a setupdata

Resource URI

Verb	URI
PUT	/v1/setupdata/(id)

Property:

id—The ID of the setupdata that you want to update.

Example

JSON Request

```
PUT /v1/setupdata/123
Accept: application/json
```

JSON Response

```
200 OK
Content-Type: application/json
{
     "status": "Active",
     "name":"GG34",
     "uuid": "123"
     "meta":{
         "user":"root"
  },
  "jsondata":{
    .......
  }
}

404 NOT FOUND
Content-Type: application/json
{
     "debuginfo": null
     "faultcode": "Client"
     "faultstring": "Setupdata could not be found."
}
```

Deleting a setupdata

Resource URI

Verb	URI
DELETE	/v1/setupdata/(id)

Property:

id—The ID of the setupdata that you want to delete.

Example

JSON Request

```
DELETE /v1/setupdata/123
Accept: application/json
```

JSON Response

```
204 NO CONTENT
Returned on success

404 NOT FOUND
Content-Type: application/json
{
    "debuginfo": null
    "faultcode": "Client"
    "faultstring": "Setupdata could not be found."
}
400 BAD REQUEST
Content-Type: application/json

{
     "debuginfo": null
     "faultcode": "Client"
     "faultstring": "Setupdata cannot be deleted when it is being used by an installation"
}
```

Install resource

REST wrapper for install. Provides methods for starting, stopping, and viewing the status of the installation process.

Return a list of installation

Resource URI

Verb	URI
GET	/v1/install

Example

JSON Request

```
GET /v1/install
Accept: application/json
```

JSON Response

```
200 OK
Content-Type: application/json
```

```
{"installs": [{
      "ceph": "Skipped",
      "uuid": "123",
      "setupdata": "345",
      "vmtpresult": "{
         "status": "PASS",
         "EXT_NET": []
      }",
      "baremetal": "Success",
      "orchestration": "Success",
      "validationstatus": "{
         "status": "PASS",
         "Software_Validation": [],
         "Hardware_Validation": []
      }",
      "currentstatus": "Completed",
      "validation": "Success",
      "hostsetup": "Success",
      "vmtp": "Skipped"
    }]
}
```

Create an installation

Resource URI

Verb	URI
POST	/v1/install

Example

JSON Request

```
GET /v1/install
Accept: application/js
{
     "setupdata": "123",
     "stages": [
       "validation",
       "bootstrap",
       "runtimevalidation",
       "baremetal",
       "orchestration",
       "hostsetup",
       "ceph",
       "vmtp"
     ]
}
```

JSON Response

```
201  CREATED
Content-Type: application/json
{
    "ceph": "Skipped",
    "uuid": "123",
    "setupdata": "345",
    "vmtpresult": "{
       "status": "PASS",
       "EXT_NET": []
    }",
    "baremetal": "Success",
    "orchestration": "Success",
    "validationstatus": "{
       "status": "PASS",
       "Software_Validation": [],
       "Hardware_Validation": []
    }",
     "currentstatus": "Completed",
     "validation": "Success",
     "hostsetup": "Success",
     "vmtp": "Skipped"
 }


409 CONFLICT
Content-Type: application/json
{
     "debuginfo": null
     "faultcode": "Client"
     "faultstring": "Install already exists"
}
```

Retrieve the installation

Resource URI

Verb	URI
GET	/v1/install/{id}

Property:

id—The ID of the installation that you want to retrieve.

Example

JSON Request

```
GET /v1/install/345
Accept: application/js
```

JSON Response

```
200  OK
Content-Type: application/json
{
    "ceph": "Skipped",
    "uuid": "123",
    "setupdata": "345",
    "vmtpresult": "{
       "status": "PASS",
       "EXT_NET": []
    }",
    "baremetal": "Success",
    "orchestration": "Success",
    "validationstatus": "{
      "status": "PASS",
      "Software_Validation": [],
      "Hardware_Validation": []
    }",
    "currentstatus": "Completed",
    "validation": "Success",
    "hostsetup": "Success",
    "vmtp": "Skipped"
}


404 NOT FOUND
Content-Type: application/json
{
     "debuginfo": null
     "faultcode": "Client"
     "faultstring": "Install doesn’t exists"
}
```

Stop the installation

Resource URI

Verb	URI
DELETE	/v1/install/{id}

Property:

id—The ID of the installation that you want to stop.

Example

JSON Request

```
DELETE /v1/install/345
Accept: application/js
```

JSON Response

```
204 NO CONTENT
Content-Type: application/json

404 NOT FOUND
Content-Type: application/json
{
     "debuginfo": null
     "faultcode": "Client"
     "faultstring": "Install doesn’t exists"
}
```

Nodes

Getting a list of nodes

Resource URI

Verb	URI
GET	/v1/nodes

Example

JSON Request

```
Get /v1/nodes
Accept: application/js
```

JSON Response

```
200 OK
Content-Type: application/json
{
    "nodes": [
        [
           "status": "Active",
           "uuid": "456",
           "setupdata": "123",
           "node_data": "{
             "rack_info": {
                "rack_id": "RackA"
             },
             "cimc_info": {
               "cimc_ip": "10.10.10.10"
             },
             "management_ip": "7.7.7.10"
             }",
             "updated_at": null,
             "mtype": "compute",
             "install": "345",
             "install_logs": "logurl",
             "created_at":"2016-0710T06:17:03.761152",
             "name": " compute-1"
             }
          ]
}
```

Add New Nodes

The nodes are in compute or block_storage type. Before adding the nodes to the system, the name of the nodes and other necessary information like cimc_ip and rackid must be updated in the setupdata object. If the setupdata object is not updated, the post call does not allow you to add the node.

Resource URI

Verb	URI
POST	/v1/nodes

Example

JSON Request

```
POST /v1/nodes
Accept: application/js
{
    "name" : "compute-5"
}
```

JSON Response

```
201 CREATED
Content-Type: application/json
{
     "status": "ToAdd",
     "uuid": "456",
     "setupdata": "123",
     "node_data": "{
        "rack_info": {
        "rack_id": "RackA"
        },
        "cimc_info": {
         "cimc_ip": "10.10.10.10"
        },
        "management_ip": "7.7.7.10"
        }",
        "updated_at": null,
        "mtype": "compute",
        "install": "345",
        "install_logs": "logurl",
        "created_at":"2016-0710T06:17:03.761152",
        "name": " compute-1"
}
```

Retrieve information about a particular node

Resource URI

Verb	URI
GET	/v1/nodes{id}

Property:

id—The ID of the node that you want to retrieve.

Example

JSON Request

```
POST /v1/nodes
Accept: application/js
```

JSON Response

```
200 OK
Content-Type: application/json
{
     "status": "Active",
     "uuid": "456",
     "setupdata": "123",
     "node_data": "{
       "rack_info": {
        "rack_id": "RackA"
       },
       "cimc_info": {
         "cimc_ip": "10.10.10.10"
       },
       "management_ip": "7.7.7.10"
       }",
       "updated_at": null,
       "mtype": "compute",
       "install": "345",
       "install_logs": "logurl",
       "created_at":"2016-0710T06:17:03.761152",
       "name": " compute-1"
}

404 NOT FOUND
```

```
Content-Type: application/json
{
    "debuginfo": null
    "faultcode": "Client"
    "faultstring": "Node doesn’t exists"
}
```

Remove a Node

The node that must be deleted must be removed from the setupdata object. Once the setupdata object is updated, you can safely delete the node. The node object cannot be deleted until it calls the remove node backend and succeeds.

Resource URI

Verb	URI
DELETE	/v1/nodes{id}

Property:

id—The ID of the node that you want to remove.

Example

JSON Request

```
DELETE /v1/nodes/456
Accept: application/js
```

JSON Response

```
204 ACCEPTED
Content-Type: application/json

404 NOT FOUND
Content-Type: application/json
{
     "debuginfo": null
     "faultcode": "Client"
     "faultstring": "Node doesn’t exists"
}
```

To clear the database and delete the entries in the nodes, the delete API is called with special parameters that are passed along with the delete request. The JSON parameters are in the following format.

JSON Request

```
DELETE /v1/nodes/456
Accept: application/js
{
    "clear_db_entry":"True"\
}
```

JSON Response

```
204 ACCEPTED
Content-Type: application/json
```

```
404 NOT FOUND
Content-Type: application/json
{
    "debuginfo": null
    "faultcode": "Client"
    "faultstring": "Node doesn’t exists"
}
```

Note This is done only if the node is deleted from the REST API database. The failure reason of the node must be rectified manually apart from the API. True is a string and not a boolean in the preceding line.

Replace a controller

Resource URI

Verb	URI
PUT	/v1/nodes{id}

Property:

id—The ID of the controller that you want to replace.

Example

JSON Request

```
PUT /v1/nodes/456
Accept: application/js
```

JSON Response

```
200 OK
Content-Type: application/json

404 NOT FOUND
Content-Type: application/json
{
    "debuginfo": null
    "faultcode": "Client"
    "faultstring": "Node doesn’t exists"
}
```

Offline validation

REST wrapper does the offline validation of setupdata. Rest Wrapper does only the Software Validation of the input setupdata.

Create an offline validation operation

Resource URI

Verb	URI
POST	/v1/offlinevalidation

Example

JSON Request

```
POST /v1/offlinevalidation
Accept: application/json
{
      "jsondata": ".. .. .."
}
```

JSON Response

```
201 CREATED
Content-Type: application/json
{
     "status": "NotValidated",
     "uuid": "bb42e4ba-c8b7-4a5c-98b3-1f384aae2b69",
     "created_at": "2016-02-03T02:05:28.384274",
     "updated_at": "2016-02-03T02:05:51.880785",
     "jsondata": "{}",
     "validationstatus": {
        "status": "PASS",
        "Software_Validation": [],
        "Hardware_Validation": []
      }
}
```

Retrieve the results of offline validation

Resource URI

Verb	URI
GET	/v1/offlinevalidation

Property:

id—The ID of the node you want to retrieve.

Example

JSON Request

```
GET /v1/offlinevalidation/789
Accept: application/json
```

JSON Response

```
200 OK
Content-Type: application/json
{
    "status": " ValidationSuccess",
    "uuid": "bb42e4ba-c8b7-4a5c-98b3-1f384aae2b69",
    "created_at": "2016-02-03T02:05:28.384274",
    "updated_at": "2016-02-03T02:05:51.880785",
    "jsondata": "{}",
    "validationstatus": {
       "status": "PASS",
       "Software_Validation": [],
       "Hardware_Validation": []
     }
}
```

Update

Start an Update Process

Resource URI

Verb	URI
POST	/v1/update

Parameters:

- fileupload - "tar file to upload"
- filename - "Filename being uploaded"

Example

JSON Request

```
curl -sS -X POST --form
"fileupload=@Test/installer.good.tgz" --form
"filename=installer.good.tgz"
https://10.10.10.8445/v1/update
```

Note This curl request is done as a form request.

JSON Response

```
200 OK
Content-Type: application/json
{
    "update_logs": "logurl",
    "update_status": "UpdateSuccess",
    "update_filename": "installer-4579.tgz",
    "created_at": "2016-07-10T18:33:52.698656",
    "updated_at": "2016-07-10T18:54:56.885083"
}

409 CONFLICT
Content-Type: application/json
{
    "debuginfo": null
    "faultcode": "Client"
    "faultstring": "Uploaded file is not in tar format"
 }
```

Roll back an update

Resource URI

Verb	URI
PUT	/v1/update

Example

JSON Request

```
PUT /v1/update
Accept: application/json
{
     "action":"rollback"
}
```

JSON Response

```
200 OK
Content-Type: application/json
{
    "update_logs": "logurl",
    "update_status": "ToRollback",
    "update_filename": "installer-4579.tgz",
    "created_at": "2016-07-10T18:33:52.698656",
    "updated_at": "2016-07-10T18:54:56.885083"
}
```

Commit an update

Resource URI

Verb	URI
PUT	/v1/update

Example

JSON Request

```
PUT /v1/update
Accept: application/json
{
"action":"commit"
}
```

JSON Response

```
200 OK
Content-Type: application/json
{
    "update_logs": "logurl",
    "update_status": "ToCommit",
    "update_filename": "installer-4579.tgz",
    "created_at": "2016-07-10T18:33:52.698656",
    "updated_at": "2016-07-10T18:54:56.885083"
}
```

Retrieve the details of an update

Resource URI

Verb	URI
GET	/v1/update

Example

JSON Request

```
GET /v1/update
Accept: application/json
```

JSON Response

```
200 OK
Content-Type: application/json
{
    "update_logs": "logurl",
    "update_status": "UpdateSuccess",
    "update_filename": "installer-4579.tgz",
    "created_at": "2016-07-10T18:33:52.698656",
    "updated_at": "2016-07-10T18:54:56.885083"
}
```

Secrets

Retrieve the list of secrets that are associated with the OpenStack Setup

You can retrieve the set of secret password that are associated with the OpenStack setup using the preceding api. This gives the list of secrets for each service in OpenStack.

Resource URI

Verb	URI
GET	/v1/secrets

Example

JSON Request

```
GET /v1/secrets
Accept: application/json
```

JSON Response

```
200 OK
Content-Type: application/json
{
"HEAT_KEYSTONE_PASSWORD": "xxxx",
"CINDER_KEYSTONE_PASSWORD": "xxxxx",
….
….
"RABBITMQ_PASSWORD": "xxxxx"
}
```

OpenStack Configs

Retrieve the list of OpenStack configs associated with the OpenStack Setup

You can retrieve the set of OpenStack configs associated with the OpenStack setup using the preceding api. This gives the current settings of different configs such as verbose logging, debug logging for different OpenStack services.

Resource URI

Verb	URI

GET	/v1/openstack_config

Example

JSON Request

```
GET /v1/openstack_config
Accept: application/json
```

JSON Response

```
200 OK
Content-Type: application/json
{
"CINDER_DEBUG_LOGGING": false,
"KEYSTONE_DEBUG_LOGGING": false,
….
….
"NOVA_VERBOSE_LOGGING": true
}
```

Version

Retrieve the version of the Cisco Virtualized Infrastructure Manager.

Resource URI

Verb	URI
GET	/v1/version

Example

JSON Request

```
GET /v1/version
Accept: application/json
```

JSON Response

```
200 OK
Content-Type: application/json
{"version": "1.9.1"}
```

Health of the Management Node

Retrieve the health of the Management node

This API is used to retrieve the health of the management node. It checks various parameters such as partitions, space and so on.

Resource URI

Verb	URI
GET	/v1/health

Example

JSON Request

```
GET /v1/health
Accept: application/json
```

JSON Response

```
200 OK
Content-Type: application/json
{
 "status": "PASS",
 "pod_status": {
 "color": "BLUE",
 "version": "<VERSION_NO.>"
 },
 "insight_version": "<VERSION_NO.>"
}
```

Color signifies the health of the pod for Insight:

- Grey signifies that no installation is kicked off on the pod.
- Green signifies that everything is in Good state and cloud installation is active.
- Blue signifies that some operation is running on the pod.
- Red signifies that the pod is in critical state and you might need TAC support to recover the pod.
- Amber indicates a warning if a pod management (Add/Remove/Replace) operation failed.

Hardware Information

REST wrapper to query hardware information of setupdata. This returns the hardware information of all hardware available in the setupdata.

Create a HWinfo operation

Resource URI

Verb	URI
GET	/v1/hwinfo

Example

JSON Request

```
POST /v1/hwinfo
Accept: application/json
{
       "setupdata":"c94d7973-2fcc-4cd1-832d-453d66e6b3bf"
}
```

JSON Response

```
201 CREATED
Content-Type: application/json
{
  "status": "hwinfoscheduled",
  "uuid": "928216dd-9828-407b-9739-8a7162bd0676",
  "setupdata": "c94d7973-2fcc-4cd1-832d-453d66e6b3bf",
  "created_at": "2017-03-19T13:41:25.488524",
  "updated_at": null,
  "hwinforesult": ""
}
```

Retrieve the results of Hwinfo Operation

Resource URI

Verb	URI
GET	/v1/hwinfo/{id}

Property:

id—The ID of the node you want to query.

Example

JSON Request

```
GET /v1/hwinfo/789
Accept: application/json
```

JSON Response

```
200 OK
Content-Type: application/json
{
  "status": "hwinfosuccess",
  "uuid": "928216dd-9828-407b-9739-8a7162bd0676",
  "setupdata": "c94d7973-2fcc-4cd1-832d-453d66e6b3bf",
  "created_at": "2017-03-19T13:41:25.488524",
  "updated_at": "2017-03-19T13:42:05.087491",
  "hwinforesult": "{\"172.29.172.73\": {\"firmware\": …………..
  …………
  ……………..
}
```

Release mapping Information

This api is used to see the list of Features included and list of options which can be reconfigured in the Openstack Setup.

Retrieve the release mapping information

Resource URI

Verb	URI
GET	/v1/releasemapping

JSON Request

```
GET /v1/releasemapping
Accept: application/json
```

JSON Response

```
200 OK
Content-Type: application/json
[
  {
    "SWIFTSTACK": {
      "feature_status": true,
      ],
      "desc": "swift stack feature"
    }
  },……..
  …………..
}
```

POST Install operations

The following are the post install operations that can be performed, after the successful installation of OpenStack. It uses a common api. Following is an Example:

1. reconfigure
2. reconfigure -regenerate passwords
3. reconfigure -setpasswords,setopenstack_configs
4. reconfigure -alertmanager_config, -alerting_rules_config
5. check-fernet-keys
6. resync-fernet-keys
7. rotate-fernet-keys

Create a post install operation

Resource URI

Verb	URI
POST	/v1/misc

Examples:

JSON Request

```
POST /v1/misc
Accept: application/json
{"action": {"reconfigure": true}}
```

JSON Response

```
201 CREATED
Content-Type: application/json
{
  "uuid": "7e30a671-bacf-4e3b-9a8f-5a1fd8a46733",
  "created_at": "2017-03-19T14:03:39.723914",
  "updated_at": null,
  "operation_status": "OperationScheduled",
  "operation_logs": "",
  "operation_name": "{"reconfigure": true}"
}
```

JSON Request

```
POST /v1/misc
Accept: application/json
{"action": {"reconfigure": true, “alertmanager_config”: <json_config>}}
```

JSON Response

```
201 CREATED
Content-Type: application/json

{
  "uuid": "68b67265-8f09-480e-8608-b8aff77e0ec7",
  "created_at": "2019-01-09T16:42:11.484604+00:00",
  "updated_at": null,
  "operation_status": "OperationScheduled",
  "operation_logs": "",
  "operation_name": "{"alertmanager_config": <json_config>, "reconfigure": true}"
}
```

Retrieve a status of the post install operation

Resource URI

Verb	URI
GET	/v1/misc

Example

JSON Request

```
GET /v1/misc
Accept: application/json
```

JSON Response

```
201 CREATED
Content-Type: application/json
{
  "uuid": "7e30a671-bacf-4e3b-9a8f-5a1fd8a46733",
  "created_at": "2017-03-19T14:03:39.723914",
  "updated_at": "2017-03-19T14:03:42.181180",
  "operation_status": "OperationRunning",
  "operation_logs": "xxxxxxxxxxxxxxxxx",
  "operation_name": "{\"reconfigure\": true}"
}
```

In VIM Rest APIs exist to support NFVBench, query hardware information and to get a list of optional and mandatory features that the pod supports.

Following are the API details:

NFVBench Network Performance Testing

Create NFVBench Run

Starts the network performance test with provided configuration.

REST API To Create Fixed Rate Test

Verb	URI
Post	v1/nfvbench/ create_ndr_pdr_test

Example

JSON Request

```
POST Request URL
/v1/nfvbench/create_fixed_rate_test
JSON Request:
{“nfvbench_request”:
{
    "duration_sec": 20,
    "traffic_profile":  [
         {
            "name": "custom",
            "l2frame_size": [
               "64",
               "IMIX",
               "1518"
            ]
         }
   ],
   "traffic": {
      "bidirectional": true,
      "profile": "custom"
   },
   "flow_count": 1000
}
}
```

JSON Response

```
201 CREATED
Content-Type: application/json
 {
      "status": "not_run",
"nfvbench_request":
'{
    "duration_sec": 20,
    "traffic_profile":  [
         {
            "name": "custom",
            "l2frame_size": [
               "64",
               "IMIX",
               "1518"
            ]
         }
    ],
    "traffic": {
       "bidirectional": true,
       "profile": "custom"
    },
    "flow_count": 1000
}',
"created_at": "2017-08-16T06:14:54.219106",
"updated_at": null,
"nfvbench_result": "",
"test_name": "Fixed_Rate_Test"
}
```

Status Polling

Polling of NFVbench run status which is one of nfvbench_running, nfvbench_failed, nfvbench_completed.

Resource URI

Verb	URI
GET	v1/nfvbench/<test_name>

REST API To Get Fixed Rate Test Result

```
GET Request URL
/v1/upgrade/get_fixed_rate_test_result
JSON Response:
 Check If NFVbench Test is running
  200 OK
  Content-Type: application/json
```

```
{
     "status": "nfvbench_running",
     "nfvbench_request": '{"traffic": {"bidirectional": true, "profile": "custom"},
"rate": "1000000pps",
"traffic_profile": [{"l2frame_size": ["1518"], "name": "custom"}], "duration_sec": 60,
"flow_count": 1000}',
"nfvbench_result": ""
     "created_at": "2017-05-30T21:40:40.394274",
        "updated_at": "2017-05-30T21:40:41.367279",
}

Check If NFVbench Test is completed
  200 OK
  Content-Type: application/json
   {
"status": "nfvbench_completed",
"nfvbench_request": '{"traffic": {"bidirectional": true, "profile": "custom"},
 "rate": "1000000pps",
"traffic_profile": [{"l2frame_size": ["1518"], "name": "custom"}], "duration_sec": 60,
"flow_count": 1000}',
"nfvbench_result": '{"status": "PROCESSED", "message": {"date": "2017-08-15 23:15:04",
"nfvbench_version": "0.9.3.dev2", ….}
"created_at": "2017-05-30T21:40:40.394274",
"updated_at": "2017-05-30T22:29:56.970779",
   }
```

REST API to create NDR/PDR Test

```
POST Request URL
/v1/nfvbench/create_ndr_pdr_test

Accept: application/json
{“nfvbench_request”:
{
    "duration_sec": 20,
    "traffic_profile":  [
         {
            "name": "custom",
            "l2frame_size": [
               "64",
               "IMIX",
               "1518"
            ]
         }
   ],
   "traffic": {
      "bidirectional": true,
      "profile": "custom"
   },
   "flow_count": 1000
}
}

JSON Response
201 CREATED
Content-Type: application/json
 {
    "status": "not_run",
“nfvbench_request”:
‘{
    "duration_sec": 20,
    "traffic_profile":  [
         {
            "name": "custom",
            "l2frame_size": [
               "64",
               "IMIX",
               "1518"
            ]
         }
   ],
   "traffic": {
      "bidirectional": true,
      "profile": "custom"
   },
   "flow_count": 1000
}'

"created_at": "2017-08-16T07:18:41.652891",
"updated_at": null,
     "nfvbench_result": "",
     "test_name": "NDR_PDR_Test"
}
```

REST API To Get NDR/PDR Test Results

```
GET Request URL
/v1/ nfvbench/get_ndr_pdr_test_result

JSON Response:
 If NFVbench NDR/PDR test is running
    200 OK
    Content-Type: application/json
{
     "status": "nfvbench_running",
 "nfvbench_request": '{"duration_sec": 20,
 "traffic": {"bidirectional": true, "profile": "custom"},
 "traffic_profile": [{"l2frame_size": ["64", "IMIX", "1518"], "name": "custom"}],
"flow_count": 1000}',
 "nfvbench_result": ""
"created_at": "2017-08-16T07:18:41.652891",
"updated_at": "2017-09-30T22:29:56.970779",

}

If NFVbench NDR/PDR test is completed
  200 OK
  Content-Type: application/json
{
 "status": "nfvbench_completed",
 "nfvbench_request": '{"duration_sec": 20,
"traffic": {"bidirectional": true, "profile": "custom"},
"traffic_profile": [{"l2frame_size": ["64", "IMIX", "1518"], "name": "custom"}], "flow_count":
 1000}',
     "nfvbench_result": '{"status": "PROCESSED",...}'
"created_at": "2017-08-16T07:18:41.652891",
"updated_at": "2017-09-30T22:29:56.970779",

}
```

REST API to Get Node Hardware Information

Rest API helps you to get the hardware information of all the nodes in the POD through CIMC/UCSM.

- Total Memory
- Firmware Info (Model, Serial Number)
- CIMC IP

```
GET Request URL
/v1/hwinfo
Output Response
{
    "hwinforesult": "{"control-server-2": {"memory": {"total_memory": "131072"},
    "firmware": {"serial_number": "FCH1905V16Q", "fw_model": "UCSC-C220-M4S"},
    "cimc_ip": "172.31.230.100", "storage": {"num_storage": 4},
    "cisco_vic_adapters": {"product_name": "UCS VIC 1225"},
     "cpu": {"number_of_cores": "24"}, "power_supply": {"power_state": "on"}}
    …
 }
```

REST API to Get Mandatory Features Mapping

```
POST Request URL
/v1/releasemapping/mandatory_features_mapping

JSON Response:
{
    "mandatory": {
        "networkType": {
            "C": {
                "feature_status": true,
               "values": [{"name": "VXLAN/Linux Bridge", "value": "VXLAN/Linux Bridge"},],

                "insight_label": "Tenant Network",
                "desc": "Tenant Network"
            },
            "B": {
                "feature_status": true,
               "values": [{"name": "VXLAN/Linux Bridge", "value": "VXLAN/Linux Bridge"},],

                "insight_label": "Tenant Network",
                "desc": "Tenant Network"
            }
        },
        "cephMode": {
            "all": {
                "feature_status": true,
                "values": [{"name": "Central", "value": "Central"},],
                "insight_label": "Ceph Mode",
                "desc": "Ceph Mode"
            }
        },
        "podType": {
            "C": {
                "feature_status": true,
                "values": [{"name": "Fullon", "value": "fullon"},],
                "insight_label": "POD Type",
                "desc": "POD Type"
            },
            "B": {
                "feature_status": true,
                "values": [{"name": "Fullon", "value": "fullon"},],
                "insight_label": "POD Type",
                "desc": "POD Type"
            }
        },
        "installMode": {
            "all": {
                "feature_status": true,
                "values": [{"name": "Connected", "value": "connected"}, ],
                "insight_label": "Install Mode",
                "desc": "Install Mode"
            }
        }
    },
    "platformType": [{"name": "B-series", "value": "B"}, {"name": "C-series", "value":
"C"}],
    "postinstalllinks": {
       "view_cloudpulse": {"alwayson": true, "feature_status": true, "platformtype": "all",
 "insight_label": "Run VMTP", "desc": "Cloudpluse"},
        "password_reconfigure": {"alwayson": true, "feature_status": true, "platformtype":
 "all", "insight_label": "Reconfigure Passwords", "desc": "Reconfigure Passwords"}
    }
}
```

REST API to Get Optional Features Mapping

```
POST Request URL
/v1/releasemapping/optional_features_mapping

JSON Response:
 [
    {
        "SWIFTSTACK": {
            "feature_status": true,
            "insight_label": "Swiftstack",
            "repeated_redeployment": true,
           "reconfigurable": ["cluster_api_endpoint", "reseller_prefix", "admin_password",
 "protocol"],
            "desc": "swift stack feature"
        }
    },
    {
        "heat": {
            "feature_status": true,
            "insight_label": "Heat",
            "repeated_redeployment": false,
            "reconfigurable": ["all"],
            "desc": "Openstack HEAT service"
        }
    },
….. other features
]
```

Cloud sanity information

REST wrapper to run cloud-sanity test suites. The cloud-sanity extension to the VIM REST API enables support for managing cloud-sanity test actions

Create a cloud-sanity test

Verb	URI
Post	/v1/cloud-sanity/create

Example

JSON Request

```
POST /v1/cloudsanity/create
Accept: application/json
'{"cloudsanity_request": {"command": "create",
                          "action": "test",
                          "test_name": "cephmon",
                          "uuid": ""}}'

test_name can be all,management,control,compute,cephmon,cephosd
```

JSON Response

```
201 Created
{
 'cloudsanity_request': "{u'action': u'test', u'command': u'create', u'uuid':
'5dff1662-3d33-4901-808d-479927c01dde',
 u'test_name': u'cephmon'}",
'cloudsanity_result': '',
'created_at': '2018-01-26T20:32:20.436445',
'status': 'not_run',
'test_name': 'cephmon',
'updated_at': ''
}
```

List cloud-sanity test results

Verb	URI
GET	/v1/cloud-sanity

JSON Request

```
GET /v1/cloudsanity
```

JSON Response

```
200 OK
{ '0b91746f-90b4-4355-a748-727c2e5c59c5': { 'action': 'test',
                                            'created_at': '2018-01-25 12:08:22',
                                            'status': 'cloudsanity_completed',
                                            'test_name': 'management',
                                          'uuid': '0b91746f-90b4-4355-a748-727c2e5c59c5'},

  '5695cb31-39e4-4be2-9dee-09e7daffc2e7': { 'action': 'test',
                                            'created_at': '2018-01-25 12:03:06',
                                            'status': 'cloudsanity_completed',
                                            'test_name': 'compute',
                                          'uuid': '5695cb31-39e4-4be2-9dee-09e7daffc2e7'},

  '5dff1662-3d33-4901-808d-479927c01dde': { 'action': 'test',
                                            'created_at': '2018-01-26 20:32:20',
                                            'status': 'cloudsanity_completed',
                                            'test_name': 'cephmon',
                                          'uuid': '5dff1662-3d33-4901-808d-479927c01dde'},

  '7946255d-df58-4432-b729-20cf16eb5ba5': { 'action': 'test',
                                            'created_at': '2018-01-25 12:05:56',
                                            'status': 'cloudsanity_completed',
                                            'test_name': 'cephosd',
                                          'uuid': '7946255d-df58-4432-b729-20cf16eb5ba5'},

  '797d79ba-9ee0-4e11-9d9e-47791dd05e07': { 'action': 'test',
                                            'created_at': '2018-01-25 12:05:11',
                                            'status': 'cloudsanity_completed',
                                            'test_name': 'cephmon',
                                          'uuid': '797d79ba-9ee0-4e11-9d9e-47791dd05e07'},

  '962e2c8e-c7b0-4e24-87c1-528cad84002c': { 'action': 'test',
                                            'created_at': '2018-01-26 18:52:31',
                                            'status': 'cloudsanity_completed',
                                            'test_name': 'control',
                                          'uuid': '962e2c8e-c7b0-4e24-87c1-528cad84002c'},

  'd0111530-ee3b-45df-994c-a0917fd18e11': { 'action': 'test',
                                            'created_at': '2018-01-26 18:46:23',
                                            'status': 'cloudsanity_completed',
                                            'test_name': 'control',
                                          'uuid': 'd0111530-ee3b-45df-994c-a0917fd18e11'}}
```

List specific cloud-sanity test results

Verb	URI
GET	/v1/cloud-sanity/list/?test_name={all,management, control,compute,cephmon,cephosd}

JSON Request

```
GET /v1/cloudsanity/list/?test_name=cephmon
Accept: application/json
```

JSON Response

```
200 OK
{ '5dff1662-3d33-4901-808d-479927c01dde': { 'action': 'test',
                                            'created_at': '2018-01-26 20:32:20',
                                            'status': 'cloudsanity_completed',
                                            'test_name': 'cephmon',
                                          'uuid': '5dff1662-3d33-4901-808d-479927c01dde'},

  '797d79ba-9ee0-4e11-9d9e-47791dd05e07': { 'action': 'test',
                                            'created_at': '2018-01-25 12:05:11',
                                            'status': 'cloudsanity_completed',
                                            'test_name': 'cephmon',
                                          'uuid': '797d79ba-9ee0-4e11-9d9e-47791dd05e07'}}
```

Show cloud-sanity test results

Verb	URI
GET	/v1/cloud-sanity/show/?uuid=<uuid>

JSON Request

```
GET /v1/cloudsanity/show/?uuid=d0111530-ee3b-45df-994c-a0917fd18e11
```

JSON Response

```
200 OK
{ 'action': 'test',
  'cloudsanity_request':
      "{u'action': u'test',
        u'command': u'create',
        u'uuid': 'd0111530-ee3b-45df-994c-a0917fd18e11',
        u'test_name': u'control'}",
  'cloudsanity_result':
     '{"status": "PROCESSED",
       "message": {"status": "Pass",
                   "message": "[PASSED] Cloud Sanity Control Checks Passed",
                   "results": {"control": {"ping_all_controller_nodes": "PASSED",
                                           "check_rabbitmq_is_running": "PASSED",
                                           "check_rabbitmq_cluster_status": "PASSED",
                                           "check_nova_service_list": "PASSED",
                                           "ping_internal_vip": "PASSED",
                                           "disk_maintenance_raid_health": "PASSED",
                                           "check_mariadb_cluster_size": "PASSED",
                                           "disk_maintenance_vd_health": "PASSED"}}}}',
  'created_at': '2018-01-26 18:46:23',
  'status': 'cloudsanity_completed',
  'test_name': 'control',
  'updated_at': '2018-01-26 18:47:58',
  'uuid': 'd0111530-ee3b-45df-994c-a0917fd18e11'}
```

Delete cloud-sanity test results

Verb	URI
DELETE	/v1/cloud-sanity/delete/?uuid=<uuid>

JSON Request

```
GET /v1/cloudsanity/delete/?uuid=444aa4c8-d2ba-4379-b035-0f47c686d1c4
```

JSON Response

```
200 OK
{
    "status": "deleted",
    "message": "UUID 444aa4c8-d2ba-4379-b035-0f47c686d1c4 deleted from database",
    "uuid": "444aa4c8-d2ba-4379-b035-0f47c686d1c4",
    "error": "None"
}
```

Disk Maintenance information

REST wrapper to query information about RAID disks on Pod nodes. This returns the RAID disk information of all or a selection of RAID disks available in the Pod.

The disk management extension to the VIM REST API enables support for Disk Management actions

Create a Check disk operation

Resource URI

Verb	URI
POST	/v1/diskmgmt/check_disks

Example

JSON Request

```
POST /v1/diskmgmt/check_disks Accept: application/json
'{"diskmgmt_request": {"command": "create",
                       "action": "check-disks",
                       "role": "control",
                       "locator": "False",
                       "json_display": "False",
                       "servers": "", "uuid": ""}}'
```

JSON Response

```
201 Created
Content-Type: application/json
{
    'action': 'check-disks',
    'created_at': '2018-03-08T02:03:18.170849+00:00',
    'diskmgmt_request': "{u'uuid': '0729bdea-cc19-440f-8339-ab21e76be84b',
                         u'json_display': u'False',
     u'servers': u'',
     u'locator': u'False',
     u'role': u'control',
     u'action': u'check-disks',
     u'command': u'create'}",
    'diskmgmt_result': '',
    'status': 'not_run',
    'updated_at': 'None'
}
```

Create a replace disk operation

Verb	URI
POST	/v1/diskmgmt/replace_disks

Example

JSON Request

```
POST /v1/diskmgmt/replace_disks
Accept: application/json
'{"diskmgmt_request": {"command": "create",
                       "action": "replace-disks",
                       "role": "control",
                       "locator": "False",
                       "json_display": "False",
                       "servers": "", "uuid": ""}}'
```

JSON Response

```
201 Created
Content-Type: application/json
{
  "status": "not_run",
  "diskmgmt_request": "{u'uuid': 'cb353f41-6d25-4190-9386-330e971603c9',
                        u'json_display': u'False',
                        u'servers': u'',
                        u'locator': u'False',
                        u'role': u'control',
                        u'action': u'replace-disks',
                        u'command': u'create'}",
"created_at": "2018-03-09T12:43:41.289531+00:00",
"updated_at": "",
"diskmgmt_result": "",
"action": "replace-disks"}
```

List check disk operation

Verb	URI
GET	/v1/diskmgmt/list/?action= {check-disks,replace-disks \&role={all,management,control,compute}

Example

JSON Request

```
GET /v1/diskmgmt/list/?action=check-disks\&role=all
```

JSON Response

```
200 OK
Content-Type: application/json
{
    '0be7a55a-37fe-43a1-a975-cbf93ac78893': {   'action': 'check-disks',
                                                'created_at': '2018-03-05 14:45:45+00:00',
                                                'role': 'compute',
                                                'status': 'diskmgmt_completed',
                                                'uuid':
'0be7a55a-37fe-43a1-a975-cbf93ac78893'},
    '861d4d73-ffee-40bf-9348-13afc697ee3d': {   'action': 'check-disks',
                                                'created_at': '2018-03-05 14:44:47+00:00',
                                                'role': 'control',
                                                'status': 'diskmgmt_completed',
                                                'uuid':
'861d4d73-ffee-40bf-9348-13afc697ee3d'},
    'cdfd18c1-6346-47a2-b0f5-661305b5d160': {   'action': 'check-disks',
                                                'created_at': '2018-03-05 14:43:50+00:00',
                                                'role': 'all',
                                                'status': 'diskmgmt_completed',
                                                'uuid':
'cdfd18c1-6346-47a2-b0f5-661305b5d160'}
}

}
```

Show a completed diskmgmt operation

Verb	URI
GET	v1/diskmgmt/show/?uuid=<uuid>

Example

JSON Request

```
GET /v1/diskmgmt/show/?uuid=d24036c6-4557-4c12-8695-a92f6f9315ed
```

JSON Response

```
200 OK
Content-Type: application/json
{   'action': 'check-disks',
    'created_at': '2018-03-07 21:46:41+00:00',
    'diskmgmt_request': "{u'uuid': 'd24036c6-4557-4c12-8695-a92f6f9315ed',
                          u'json_display': False,
     u'servers': u'f24-michigan-micro-2',
     u'locator': False,
     u'role': u'compute',
     u'action': u'check-disks',
     u'command': u'create'}",
    'diskmgmt_result': '{"status": "PROCESSED", "message": ["{\'Overall_Status\': \'PASS\',
 \'Result\': {\'fcfg_disks_results_list\': [], \'spare_disks_results_list\': [],
\'raid_results_list\': [{\'RAID level\': \'RAID1\', \'Disk Med\': \'HDD\', \'server\':
\'7.7.7.6\', \'RAID type\': \'HW\', \'host\': \'f24-michigan-micro-2\', \'role\':
\'block_storage control compute\', \'VD health\': \'Optl\', \'Num VDs\': 1, \'Num PDs\':
8, \'RAID health\': \'Opt\'}], \'bad_disks_results_list\': [], \'rbld_disks_results_list\':
 [], \'add_as_spares_disks_results_list\': []}}"]}',
    'role': 'compute',
    'status': 'diskmgmt_completed',
    'updated_at': '2018-03-07 21:47:35+00:00',
    'uuid': 'd24036c6-4557-4c12-8695-a92f6f9315ed'
}
```

Delete a completed diskmgmt operation

Verb	URI
DELETE	v1/diskmgmt/delete/?uuid=<uuid>

Example

JSON Request

```
DELETE /v1/diskmgmt/delete/?uuid=d24036c6-4557-4c12-8695-a92f6f9315ed
```

JSON Response

```
200 OK
Content-Type: application/json
{
 "status": "deleted",
 "message": "UUID d24036c6-4557-4c12-8695-a92f6f9315ed deleted from database",
 "uuid": "d24036c6-4557-4c12-8695-a92f6f9315ed",
 "error": "None"

}
```

OSD Maintenance information

REST wrapper to query information about OSD on Pod storage nodes. This returns to the OSD status information of all or a selection of OSDs available in the Pod.

Create a OSD disk operation

Verb	URI
POST	/v1/osdmgmt/check_osds

Example

JSON Request

```
POST /v1/osdmgmt/osdmgmt/check_osds
'{"osdmgmt_request": {"command": "create",
                      "action": "check-osds",
                      "locator": "False",
                      "json_display": "False",
                      "servers": "",
                      "osd": "None",
                      "uuid": ""}}'
```

JSON Response

```
201 Created
Content-Type: application/json
{
    'action': 'check-osds',
    'created_at': '2018-03-08T21:26:15.329195+00:00',
    'osdmgmt_request': "{u'uuid': '9c64ee52-bed5-4b69-91a2-d589411dd223', u'json_display':
 u'False', u'servers': u'', u'locator': u'False', u'command': u'create', u'action':
u'check-osds', u'osd': u'None'}",
    'osdmgmt_result': '',
    'status': 'not_run',
    'updated_at': 'None'
}
```

Create a replace OSD operation

Verb	URI
POST	v1/osdmgmt/replace_osd

Example

JSON Request

```
POST /v1/osdmgmt/replace_osd
Accept: application/json
'{"osdmgmt_request": {"command": "create",
                      "action": "replace-osd",
                      "locator": "False",
                      "json_display": "False",
                      "servers": "f24-michigan-micro-1",
                      "osd": "osd.9",
                      "uuid": ""}}'
```

JSON Response

```
201 Created
Content-Type: application/json
{
  "status": "not_run",
  "osdmgmt_request": "{u'uuid': '5140f6fb-dca3-4801-8c44-89b293405310', u'json_display':
u'False', u'servers': u'f24-michigan-micro-1', u'locator': u'False', u'command': u'create',
 u'action': u'replace-osd', u'osd': u'osd.9'}",
  "created_at": "2018-03-09T15:07:10.731220+00:00",
  "updated_at": null,
  "action": "replace-osd",
  "osdmgmt_result": ""
}

}
```

List check OSD operation

Verb	URI
GET	v1/osdmgmt/list/?action= {check-osds,replace-osd}

Example

JSON Request

```
GET /v1/osdmgmt/list/?action=check-osds
```

JSON Response

```
200 OK
Content-Type: application/json
{
    '4efd0be8-a76c-4bc3-89ce-142de458d844': {   'action': 'check-osds',
                                                'created_at': '2018-03-08 21:31:01+00:00',
                                                'status': 'osdmgmt_running',
                                                'uuid':
'4efd0be8-a76c-4bc3-89ce-142de458d844'},
    '5fd4f9b5-786a-4a21-a70f-bffac70a3f3f': {   'action': 'check-osds',
                                                'created_at': '2018-03-08 21:11:13+00:00',
                                                'status': 'osdmgmt_completed',
                                                'uuid':
'5fd4f9b5-786a-4a21-a70f-bffac70a3f3f'},
    '9c64ee52-bed5-4b69-91a2-d589411dd223': {    'action': 'check-osds',
                                                 'created_at': '2018-03-08 21:26:15+00:00',
                                                 'status': 'osdmgmt_completed',
                                                 'uuid':
'9c64ee52-bed5-4b69-91a2-d589411dd223'}
}


}
```

Show a completed osdmgmt operation

Verb	URI
GET	v1/osdmgmt/show/?uuid=<uuid>

Example

JSON Request

```
GET /v1/osdmgmt/show/?uuid=9c64ee52-bed5-4b69-91a2-d589411dd223
```

JSON Response

```
200 OK
Content-Type: application/json
{
    'action': 'check-osds',
    'created_at': '2018-03-08 21:26:15+00:00',
    'osdmgmt_request': "{u'uuid': '9c64ee52-bed5-4b69-91a2-d589411dd223', u'json_display':
 u'False', u'servers': u'', u'locator': u'False', u'command': u'create', u'action':
u'check-osds', u'osd': u'None'}",
    'osdmgmt_result': '{"status": "PROCESSED", "message": ["{\'Overall_Status\': \'PASS\',
 \'Result\': {  ommitted for doc }}]}',
    'status': 'osdmgmt_completed',
    'updated_at': '2018-03-08 21:27:16+00:00',
    'uuid': '9c64ee52-bed5-4b69-91a2-d589411dd223'
}

}
```

Delete a completed osdmgmt operation

Verb	URI
DELETE	v1/osdmgmt/delete/?uuid=<uuid>

Example

JSON Request

```
DELETE /v1/osdmgmt/delete/?uuid=9c64ee52-bed5-4b69-91a2-d589411dd223
```

JSON Response

```
200 OK
Content-Type: application/json
{
    'error': 'None',
    'message': 'UUID 9c64ee52-bed5-4b69-91a2-d589411dd223 deleted from database',
    'status': 'deleted',
    'uuid': '9c64ee52-bed5-4b69-91a2-d589411dd223'
}
```

```
}
```

Hardware Management Utility

REST wrapper to control the execution of or query information from the hardware validation utility.

Create a Validate Operation

Verb	URI
POST	/v1/hardwaremgmt/validate

JSON Request

```
POST /v1/hardwaremgmt/validate
'{"hwmgmt_request": {"command": "create",
                     "action": "validate",
                     "hosts": "None",
                     "file": "None",
                     "feature_list": "all",
                     "uuid": ""}}'

feature_list is a comma separated list of valid features for the given POD
```

JSON Reponse

```
201 Created
Content-Type: application/json
{
    'action': 'validate',
    'created_at': '2018-03-08T22:01:22.195232+00:00',
    'hwmgmt_request': "{u'feature_list': u'all', u'command': u'create', u'file': None,
u'action': u'validate', u'hosts': None, u'uuid': '89e094d8-b246-4620-afca-ba3529385cac'}",
    'hwmgmt_result': '',
    'status': 'not_run',
    'updated_at': 'None'
}
```

Create a Validate Operation for Failure

Verb	URI
GET	/v1/hardwaremgmt/resolve_failures

JSON Request

```
POST /v1/hardwaremgmt/resolve_failures
 {
    "hwmgmt_request": {
        "command": "create",
        "action": "resolve-failures",
        "hosts": "None",
        "file": "None",
        "feature_list": "all",
        "uuid": ""}
}
feature_list is a comma separated list of valid features for the given POD
```

JSON Response

```
201 Created
Content-Type: application/json
{
  "status": "not_run",
  "created_at": "2018-03-09T15:47:36.503712+00:00",
  "hwmgmt_request": "{u'feature_list': u'all', u'command': u'create', u'file': None,
u'action': u'resolve-failures', u'hosts': None, u'uuid':
'49dc1dc9-3170-4f68-b152-0f99bd19f7b1'}",
  "updated_at": "",
  "action": "resolve-failures",
  "hwmgmt_result": ""
 }
```

Create a Validate Operation

Verb	URI
GET	v1/hardwaremgmt/list

JSON Request

```
GET /v1/hardwaremgmt/list
```

JSON Response

```
200 OK
Content-Type: application/json
{   '89e094d8-b246-4620-afca-ba3529385cac': {   'action': 'validate',
                                                'created_at': '2018-03-08 22:01:22+00:00',
                                                'feature_list': 'all',
                                                'status': 'hardwaremgmt_completed',
                                                'uuid':
'89e094d8-b246-4620-afca-ba3529385cac'},
    '9f70e872-a888-439a-8661-2d2f36a4f4b1': {   'action': 'validate',
                                                'created_at': '2018-03-08 20:34:32+00:00',
                                                'feature_list': 'all',
                                                'status': 'hardwaremgmt_completed',
                                                'uuid':
'9f70e872-a888-439a-8661-2d2f36a4f4b1'}
}
```

Show a completed hardwaremgmt operation

Verb	URI
GET	/v1/hardwaremgmt/show /?uuid=<uuid>

JSON Request

```
GET /v1/hardwaremgmt/show/?uuid=9f70e872-a888-439a-8661-2d2f36a4f4b
```

JSON Response

```
200 OK
Content-Type: application/json
{
    'action': 'validate',
    'created_at': '2018-03-08 20:34:32+00:00',
    'feature_list': 'all',
    'hwmgmt_request': "{u'feature_list': u'all', u'hosts': None, u'file': None, u'action':
 u'validate', u'command': u'create', u'uuid': '9f70e872-a888-439a-8661-2d2f36a4f4b1'}",
    'hwmgmt_result': '{"status": "PROCESSED", "message": "Validate of all completed",
"results": {"status": "PASS", "results": [{"status": "PASS", "name": "CIMC Firmware Version
 Check", "err": null}, {"status": "PASS", "name": "All Onboard LOM Ports Check", "err":
null}, {"status": "PASS", "name": "PCIe Slot: HBA Status Check", "err": null}, {"status":
```

```
"PASS", "name": "Server Power Status Check", "err": null}, {"status": "PASS", "name": "NFV
 Config Check", "err": null}, {"status": "PASS", "name": "Physical Drives Check", "err":
null}, {"status": "PASS", "name": "PCIe Slot(s) OptionROM Check", "err": null}, {"status":
 "PASS", "name": "Intel Network Adapter Check", "err": null}]}}',
    'status': 'hardwaremgmt_completed',
    'updated_at': '2018-03-08 20:38:02+00:00',
    'uuid': '9f70e872-a888-439a-8661-2d2f36a4f4b1'
```

Delete a completed hardwaremgmt operation

Verb	URI
DELETE	/v1/hardwaremgmt/delete/?uuid=<uuid>

JSON Request

```
DELETE /v1/hardwaremgmt/delete/?uuid=9f70e872-a888-439a-8661-2d2f36a4f4b1
```

JSON Response

```
200 OK
Content-Type: application/json
{
    'error': 'None',
    'message': 'UUID 9f70e872-a888-439a-8661-2d2f36a4f4b1 deleted from database',
    'status': 'deleted',
    'uuid': '9f70e872-a888-439a-8661-2d2f36a4f4b1'
}
```

Cisco VIM REST API Using curl for IPv4

Getting REST API Username & Password

Use the following configuration to get REST API Username and Password:

```
cat /opt/cisco/ui_config.json
{
"Kibana-Url": "http://172.31.231.17:5601",
"RestAPI-Username": "admin",
"RestAPI-Password": "****",
"RestDB-Password": "****",
"RestAPI-Url": "https://172.31.231.17:8445",
"BuildNodeIP": "172.31.231.17"
}
```

CCP APIs and Commands

Get CCP:

Use the following command to get the list of CCP operations executed:

```
curl -i -X GET -H 'Content-Type: application/json' -H 'Authorization: ****' -H 'Accept:
application/json' --cacert /var/www/mercury/mercury-ca.crt https://172.29.84.207:8445/ccp
```

Response

```
HTTP/1.1 200 OK
content-length: 360
x-xss-protection: 1
```

```
x-content-type-options: nosniff
strict-transport-security: max-age=31536000
server: WSGIServer/0.1 Python/2.7.5
cache-control: no-cache, no-store, must-revalidate, max-age=0
date: Mon, 01 Jul 2019 11:22:03 GMT
x-frame-options: SAMEORIGIN
content-type: application/json

{u'ccps': {u'status': u'Success', u'ccp_result': {u'delete_tenant': False}, u'created_at':
 u'2019-07-01T10:50:31+00:00', u'updated_at': u'2019-07-01T11:06:25+00:00', u'op_name':
u'CCP_Verify'}}
```

POST CCP Install:

Use the following command to initiate installation of CCP:

```
curl -i -X POST -H 'Content-Type: application/json' -H 'Authorization: ****' -H 'Accept:
application/ --cacert /var/www/mercury/mercury-ca.crt -d 'None' https://172.29.84.207:8445/ccp
```

Response

```
HTTP/1.1 201 Created
content-length: 133
x-xss-protection: 1
x-content-type-options: nosniff
strict-transport-security: max-age=31536000
server: WSGIServer/0.1 Python/2.7.5
cache-control: no-cache, no-store, must-revalidate, max-age=0
date: Mon, 01 Jul 2019 10:46:18 GMT
x-frame-options: SAMEORIGIN
content-type: application/json

{u'status': u'ToRun', u'ccp_result': u'', u'created_at': u'2019-07-01T10:46:18.106517+00:00',
 u'updated_at': None, u'op_name': u'CCP_Install'}
```

CCP Verify

Execute the following command to execute CCP Verify (Check tenant cluster status):

```
curl -i -X POST -H 'Content-Type: application/json' -H 'Authorization: ****' -H 'Accept:
application/json'  --cacert /var/www/mercury/mercury-ca.crt -d '{u'skip_delete': False}'
https://172.29.84.207:8445/ccp/ccp_verify
```

Response

```
HTTP/1.1 201 Created
content-length: 158
x-xss-protection: 1
x-content-type-options: nosniff
strict-transport-security: max-age=31536000
server: WSGIServer/0.1 Python/2.7.5
cache-control: no-cache, no-store, must-revalidate, max-age=0
date: Mon, 01 Jul 2019 08:04:52 GMT
x-frame-options: SAMEORIGIN
content-type: application/json

{u'status': u'ToRun', u'ccp_result': {u'delete_tenant': False}, u'created_at':
u'2019-07-01T08:04:52.310432+00:00', u'updated_at': None, u'op_name': u'CCP_Verify'}
```

DELETE Control Cluster

Use the following command to delete the deployed control cluster:

```
curl -i -X DELETE -H 'Content-Type: application/json' -H 'Authorization: ****' -H 'Accept:
 application/json' -H 'User-Agent: python-ciscovimclient' --cacert
```

```
/var/www/mercury/mercury-ca.crt -d '{u'delete_tenant': False, u'delete_control': True}'
https://172.29.84.207:8445/ccp
```

Response

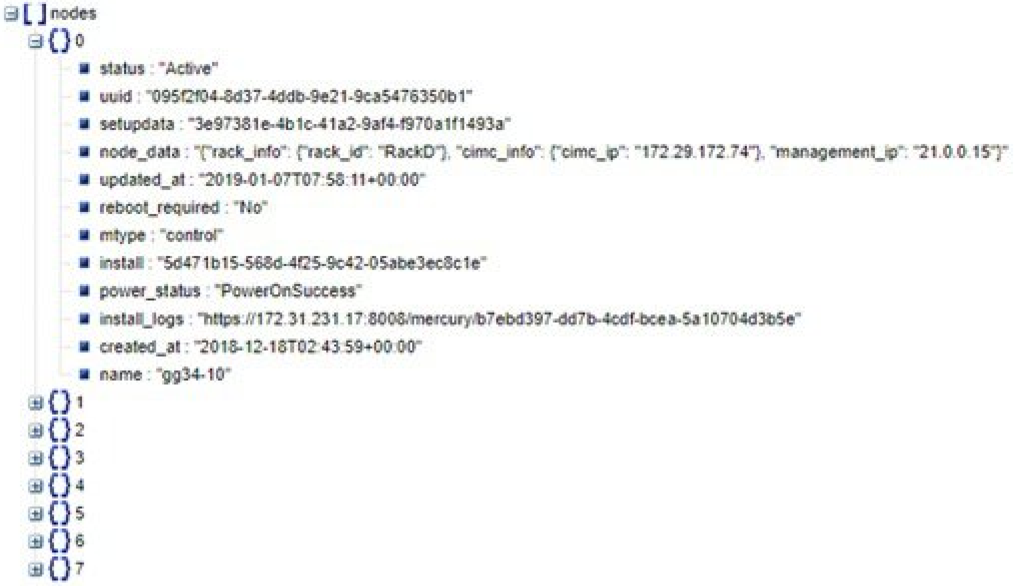
```
HTTP/1.1 204 No Content
x-xss-protection: 1
x-content-type-options: nosniff
strict-transport-security: max-age=31536000
server: WSGIServer/0.1 Python/2.7.5
cache-control: no-cache, no-store, must-revalidate, max-age=0
date: Mon, 01 Jul 2019 11:29:59 GM
x-frame-options: SAMEORIGIN
```

Nodes APIs and Commands

List Nodes

Use the following curl command to get the node's status, power status, reboot status, and mtype information:

```
curl -i -X GET -u admin:**** -H 'Content-Type: application/json' -H 'Accept: application/json'
 --cacert /var/www/mercury/mercury-ca.crt https://172.31.231.17:8445/v1/nodes
```



```
[ ] nodes
   { } 0
      status : "Active"
      uuid : "095f2f04-8d37-4ddb-9e21-9ca5476350b1"
      setupdata : "3e97381e-4b1c-41a2-9af4-f970a1f1493a"
      node_data : "{"rack_info": {"rack_id": "RackD"}, "cimc_info": {"cimc_ip": "172.29.172.74"}, "management_ip": "21.0.0.15"}"
      updated_at : "2019-01-07T07:58:11+00:00"
      reboot_required : "No"
      mtype : "control"
      install : "5d471b15-568d-4f25-9c42-05abe3ec8c1e"
      power_status : "PowerOnSuccess"
      install_logs : "https://172.31.231.17:8008/mercury/b7ebd397-dd7b-4cdf-bcea-5a10704d3b5e"
      created_at : "2018-12-18T02:43:59+00:00"
      name : "gg34-10"
   { } 1
   { } 2
   { } 3
   { } 4
   { } 5
   { } 6
   { } 7
```

Response

```
{"nodes": [{"status": ". . . . "name": "Store-2"}]}
```

Power OFF Nodes

To get the power off status of the nodes, use the below command:

```
curl -i -X POST -H 'Content-Type: application/json' -u admin:**** -H 'Accept:
application/json' --cacert /var/www/mercury/mercury-ca.crt -d '{'status': 'PowerOff',
'force_op': False, 'name': '<Node UUID>'}'
https://172.31.231.17:8445/v1/nodes/node_power_status
```

Note UUID of the node can be found from the above List Nodes command

Power ON Nodes

To get the power ON status of the nodes, use the following command:

```
curl -i -X POST -H 'Content-Type: application/json' -u admin:**** -H 'Accept:
application/json' --cacert /var/www/mercury/mercury-ca.crt -d '{‘status': ‘PowerOn',
‘force_op': False, ‘name': ‘<Node UUID>'}'
https://172.31.231.17:8445/v1/nodes/node_power_status
```

Note UUID of the node can be found from the above List Nodes command

Power Status of Nodes

To get the Live status of the nodes, first send POST request to `/v1/hwinfo`API, and then place the GET request on `v1/hwinfo/get_nodes_power_status` after a minute approximately.

Run the below commands to send the POST request and get the power status:

```
curl -i -X POST -H 'Content-Type: application/json' -u admin:**** -H 'Accept:
application/json' --cacert /var/www/mercury/mercury-ca.crt -d '{}'
https://172.31.231.17:8445/v1/hwinfo
curl -i -X GET -H 'Content-Type: application/json' -u admin:**** -H 'Accept: application/json'
 --cacert /var/www/mercury/mercury-ca.crt
https://172.31.231.17:8445/v1/hwinfo/get_nodes_power_status
```

Response

```
{'Store-3': {'intended_power_state': 'PowerOnSuccess', 'actual_power_state': 'on'},}}
```

Reboot Node

```
curl -i -X POST -H 'Content-Type: application/json' -u admin:**** -H 'Accept:
application/json' --cacert /var/www/mercury/mercury-ca.crt -d '{‘status': ‘Reboot',
‘force_op': False, ‘name': ‘<Node UUID>'}'
https://172.31.231.17:8445/v1/nodes/node_power_status
```

Note UUID of the node can be found from the above List Nodes command

Reboot Status

Use the following two commands, to get the reboot status of the node:

```
curl -i -X POST -H 'Content-Type: application/json' -u admin:**** -H 'Accept:
application/json' --cacert /var/www/mercury/mercury-ca.crt
-d 'None' https://172.31.231.17:8445/v1/nodes/reboot_status

curl -i -X GET -H 'Content-Type: application/json' -u admin:**** -H 'Accept: application/json'
 --cacert /var/www/mercury/mercury-ca.crt https://172.31.231.17:8445/v1/nodes
```

List Openstack Configuration

Command

```
curl -i -X GET -H 'Content-Type: application/json' -u admin:**** -H 'Accept: application/json'
 --cacert /var/www/mercury/mercury-ca.crt https://172.31.231.17:8445/v1/openstack_config
```

Response

```
{"KEYSTONE_VERBOSE_LOGGING": true, "GNOCCHI_VERBOSE_LOGGING": true, . . }
```

List Password Secrets

Command

```
curl -i -X GET -H 'Content-Type: application/json' -u admin:**** -H 'Accept: application/json'
 --cacert /var/www/mercury/mercury-ca.crt https://172.31.231.17:8445/v1/secrets
```

Response

```
{‘HEAT_KEYSTONE_PASSWORD': '****', ‘CINDER_KEYSTONE_PASSWORD': '****' . . }
```

Cluster Recovery

Command

```
curl -i -X POST -H 'Content-Type: application/json' -u admin:**** -H 'Accept:
application/json' --cacert /var/www/mercury/mercury-ca.crt -d '{‘action': {‘cluster-recovery':
 {‘run-disk-checks': False}}}'
https://172.31.231.17:8445/v1/misc
```

Response

```
{‘uuid': ‘ae3be813-4fae-4510-8467-fab09ac60d2b', ‘created_at':
‘2019-01-07T08:17:01.229976+00:00', ‘updated_at': None, ‘operation_status':
‘OperationScheduled', ‘operation_logs': ‘', ‘operation_name': {‘cluster-recovery':
{‘run-disk-checks': False}}}
```

NFVIMON

Command

```
curl -i -X POST -H 'Content-Type: application/json' -u admin:**** -H 'Accept:
application/json' --cacert /var/www/mercury/mercury-ca.crt -d '{‘action': {‘nfvimon': True,
 ‘generate_ssh_keys': '****'}}' https://172.31.231.17:8445/v1/misc
```

Response

```
{‘uuid': ‘d33e534b-b8c7-41c9-b8e4-7b1befe528c8', ‘created_at':
‘2019-01-07T08:27:56.925029+00:00', ‘updated_at': None, ‘operation_status':
‘OperationScheduled', ‘operation_logs': ‘', ‘operation_name': {‘generate_ssh_keys': '****',
 ‘nfvimon': True}}
```

Last-Run-Status

Command

```
curl -i -X GET -H 'Content-Type: application/json' -H 'Authorization: ****' -H 'Accept:
application/json' -H 'User-Agent: python-ciscovimclient' --cacert
/var/www/mercury/mercury-ca.crt
https://172.31.231.17:8445/v1/op_info
```

Response

```
{‘created_at': ‘2019-01-07 08:27:56+00:00', ‘updated_at': ‘2019-01-07 08:28:03+00:00',
‘reboot_required': False, ‘update_status': False, ‘current_op_logs':
‘https://172.31.231.17:8008/mercury/79c402d2-f156-4ba2-8f17-ec109401a538',
‘current_op_status': ‘OperationRunning', ‘insight_monitor_status': ‘Running',
‘current_op_name': ‘Generate_ssh_keys', ‘current_op_monitor': ‘Runner_Op_Generate_ssh_keys'}
```

Reconfigure Regenerate Secrets

Command

```
curl -i -X POST -H 'Content-Type: application/json' -u admin:**** -H 'Accept:
application/json' --cacert /var/www/mercury/mercury-ca.crt -d '{‘action':
{‘regenerate_secrets': '****', ‘reconfigure': True}}' https://172.31.231.17:8445/v1/misc
```

Response

```
{‘uuid': ‘83cf2700-275f-4c18-a900-96c36c4987aa', ‘created_at':
‘2019-01-07T08:36:19.279425+00:00', ‘updated_at': None, ‘operation_status':
‘OperationScheduled', ‘operation_logs': ‘', ‘operation_name': {‘regenerate_secrets': '****',
 ‘reconfigure': True}}
```

Reconfigure Set Password

Command

```
curl -i -X POST -H 'Content-Type: application/json' -u admin:**** -H 'Accept:
application/json' --cacert /var/www/mercury/mercury-ca.crt -d '{‘action': {‘reconfigure':
True, ‘setopenstackconfigs': {‘GNOCCHI_VERBOSE_LOGGING': True}}}'
https://172.31.231.17:8445/v1/misc
```

Response

```
{‘uuid': ‘5f8d0504-d108-4b88-9d63-f9585dc96d38', ‘created_at':
‘2019-01-07T08:48:32.880245+00:00', ‘updated_at': None, ‘operation_status':
‘OperationScheduled', ‘operation_logs': ‘', ‘operation_name': {‘setpassword': '****',
‘reconfigure': True}}
```

Reconfigure Set Openstack Configuration

Command

```
curl -i -X POST -H 'Content-Type: application/json' -u admin:**** -H 'Accept:
application/json' --cacert /var/www/mercury/mercury-ca.crt -d '{‘action': {‘reconfigure':
True, ‘setopenstackconfigs': {‘GNOCCHI_VERBOSE_LOGGING': True}}}'
https://172.31.231.17:8445/v1/misc
```

Response

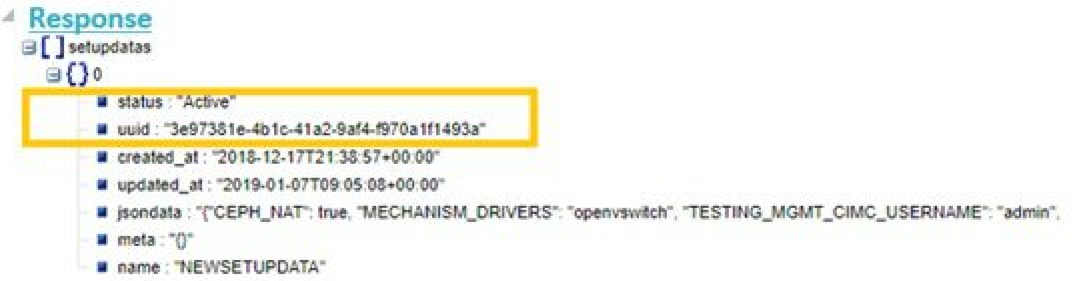
```
{‘uuid': ‘5bbbeff7-76df-4444-a38a-8819a8b579e4', ‘created_at':
‘2019-01-07T08:54:13.733254+00:00', ‘updated_at': None, ‘operation_status':
‘OperationScheduled', ‘operation_logs': ‘', ‘operation_name': {‘setopenstackconfigs':
{‘GNOCCHI_VERBOSE_LOGGING': True}, ‘reconfigure': True}}
```

Reconfigure CIMC Password

1. List down the setupdata and find UUID of active setupdata using the following command:

```
curl -i -X GET -H 'Content-Type: application/json' -u admin:**** -H 'Accept:
application/json' --cacert /var/www/mercury/mercury-ca.crt
https://172.31.231.17:8445/v1/setupdata
```

Response



```
Response
[ ] setupdatas
  { } 0
    status : "Active"
    uuid : "3e97381e-4b1c-41a2-9af4-f970a1f1493a"
    created_at : "2018-12-17T21:38:57+00:00"
    updated_at : "2019-01-07T09:05:08+00:00"
    jsondata : "{"CEPH_NAT": true, "MECHANISM_DRIVERS": "openvswitch", "TESTING_MGMT_CIMC_USERNAME": "admin",
    meta : "{}"
    name : "NEWSETUPDATA"
```

2. Put the content of setupdata with new CIMC Password using the following command:

```
curl -i -X PUT -H 'Content-Type: application/json' -u admin:**** -H 'Accept:
application/json' --cacert /var/www/mercury/mercury-ca.crt -d '{'meta': {}, 'name':
'NEWSETUPDATA', 'jsondata': {'external_lb_vip_address': '172.29.86.9' . . .}, 'uuid':
'3e97381e-4b1c-41a2-9af4-f970a1f1493a'}'
https://172.31.231.17:8445/v1/setupdata/3e97381e-4b1c-41a2-9af4-f970a1f1493a
```

3. Post on Misc API using the below command:

```
curl -i -X POST -H 'Content-Type: application/json' -u admin:**** -H 'Accept:
application/json' --cacert /var/www/mercury/mercury-ca.crt -d '{‘action':
{‘reconfigure_cimc_password': True, ‘reconfigure': True}}' https://172.31.231.17:8445/misc
```

Response

```
{‘uuid': ‘f00e1ae0-5674-4218-b1de-8995c9f9c546', ‘created_at':
‘2019-01-07T09:19:40.210121+00:00', ‘updated_at': None, ‘operation_status':
‘OperationScheduled', ‘operation_logs': ‘', ‘operation_name':
{‘reconfigure_cimc_password': '****', ‘reconfigure': True}}
```

Cisco VIM REST API Using curl for IPv6

Prerequisites

1. You need to copy the certificates from the management node to local machine from where you would launch the APIs.
2. Create a folder in local machine and copy the certificates.

```
# mkdir ~/certificates
```

3. Copy REST API CA Certificates (for mercury commands)

```
# scp root@<Management Node>:/var/www/mercury/mercury-ca.crt ~/certificates
```

Note The key information that you need are br_api and cloud_api (external_lb_vip_ipv6_address).

4. For each POD, get the REST API credentials:

```
 # cat /opt/cisco/ui_config.json
{
"Kibana-Url": "http://[2001:420:293:2440:b696:91ff:fe22:2dd8]:5601",
"RestAPI-Username": "admin",
"RestAPI-Password": "cfb605586d50115333c8",
"RestDB-Password": "744ebc5feee30b733ac8",
"RestAPI-Url": "https://[2001:420:293:2440:b696:91ff:fe22:2dd8]:8445",
"BuildNodeIP": "2001:420:293:2440:b696:91ff:fe22:2dd8" -> br_api
}
```

Offline Validation using curl

1. Create offline validation test

   Request

   ```
   curl -g -i -X POST -H 'Content-Type: application/json' -u admin:46d13357ef15e5482b52 -H
    'Accept: application/json' -H 'User-Agent: python-ciscovimclient' --cacert
   ~/certificates/mercury-ca.crt -d '{"jsondata" : {<SetupData in JSON Format>}}'
   https://[2001:420:293:2440:b696:91ff:fe22:2dd8]:8445/v1/offlinevalidation
   UUID is returned from request
   ```

   Response

   ```
   {"status": "NotValidated", "uuid": "2b8253f4-ad9f-4fbf-b224-a65bd210392a", "created_at":
    "2019-02-28T18:02:36.808740+00:00", "updated_at": null, "jsondata": "{}”}
   ```

2. Get the offline validation test result

   Request

   ```
   Curl -g -i -X GET -H 'Content-Type: application/json' -u admin:46d13357ef15e5482b52 -H
   'Accept: application/json' -H 'User-Agent: python-ciscovimclient' --cacert
   ~/certificates/mercury-ca.crt
   https://[2001:420:293:2440:b696:91ff:fe22:2dd8]:8445/v1/offlinevalidation/2b8253f4-ad9f-4fbf-b224-a65bd210392a
   ```

   Response

   ```
   {"status": "ValidationFailed", "uuid": "2b8253f4-ad9f-4fbf-b224-a65bd210392a",
   "created_at": "2019-02-28T18:02:36+00:00", "updated_at": "2019-02-28T18:02:57+00:00",
   "jsondata": ""}
   ```

Start New Installation

1. Create new setup date before starting new installation, for example:

   ```
   curl -g -i -X POST -H 'Content-Type: application/json' -u admin:46d13357ef15e5482b52 -H
    'Accept: application/json' -H 'User-Agent: python-ciscovimclient' --cacert
   ~/certificates/mercury-ca.crt -d '{u'meta': {}, u'name': u'NEWSETUPDATA', u'jsondata':
   {<SetupData in JSON Format>}}'
   https://[2001:420:293:2440:b696:91ff:fe22:2dd8]:8445/setupdata
   ```

2. To start the installation:

   Request

```
Curl -g -i -X POST -H 'Content-Type: application/json' admin:46d13357ef15e5482b52 -H
'Accept: application/json' -H 'User-Agent: python-ciscovimclient' --cacert
~/certificates/mercury-ca.crt -d '{u'stages': u'vmtp', u'setupdata':
u'8b0d4a46-c67f-4121-99af-32fde52a82eb'}'
https://[2001:420:293:2440:b696:91ff:fe22:2dd8]:8445/install
```

Response

```
{u'uuid': u'6b02c2ab-441e-471a-9dcc-e771136186e1', u'setupdata':
u'8b0d4a46-c67f-4121-99af-32fde52a82eb', u'vmtpresult': u'', u'updated_at': None,
u'validationstatus': u'', u'currentstatus': u'Not Available', u'install_logs': u'',
u'stages': {u'baremetal': u'Scheduled', u'bootstrap': u'Scheduled', u'runtimevalidation':
 u'Scheduled', u'ceph': u'Scheduled', u'orchestration': u'Scheduled', u'validation':
u'Scheduled', u'hostsetup': u'Scheduled', u'vmtp': u'Scheduled'}, u'created_at':
u'2019-03-05T05:22:30.986823+00:00'}
```

3. Get active setupdata with UUID after installation is started

   Request

```
curl -g -i -X GET -H 'Content-Type: application/json' -u admin:46d13357ef15e5482b52 -H
'Accept: application/json' -H 'User-Agent: python-ciscovimclient' --cacert
~/certificates/mercury-ca.crt
https://[2001:420:293:2440:b696:91ff:fe22:2dd8]:8445/setupdata
```

   Response

   It will return in the list format. You must check the status. The status can be **Active**, **Installation Failed**, or **Installing**.

```
{"setupdatas": [{"status": "Active", "uuid": "c5bc5fd9-6f4b-43e7-a61a-a9d409569943",
"jsondata": " {<Setupdata JSON>}‶, "meta": "{}", "name": "NEWSETUPDATA"}]}
```

4. Monitoring the installation using OP-information (current operation information):

   Request

```
curl -g -i -X GET -H 'Content-Type: application/json' -u  admin:46d13357ef15e5482b52 -H
 'Accept: application/json' -H 'User-Agent: python-ciscovimclient' --cacert
~/certificates/mercury-ca.crt
https://[2001:420:293:2440:b696:91ff:fe22:2dd8]:8445/op_info
```

   Response

   Check for the value of key insight_monitor_status. If it is **Running**, it indicates that the last operation is still in running state. Once the Operation is completed, the value is either Success/Failed based on the result.

```
{u'created_at': u'2019-02-25 18:15:00+00:00', u'updated_at': u'2019-02-25 18:15:00+00:00',
 u'reboot_required': False, u'update_status': False, u'current_op_logs':
u'https://[2001:420:293:2440:b696:91ff:fe22:2dd8]:8008/mercury/ae3ed699-2ffe-4ae0-a8ab-83ef7fdce008',
 u'current_op_status': u'Running', u'insight_monitor_status': u'Running',
u'current_op_name': u'install_op Orchestration', u'current_op_monitor':
u'Install_Op_orchestration'}
```

   Sample output information after successful completion is given below:

```
{"created_at": "2019-03-04 21:35:00+00:00", "updated_at": "2019-03-04 21:36:24+00:00",
"reboot_required": false, "update_status": false, "current_op_logs": "",
"current_op_status": "diskmgmt_completed", "insight_monitor_status": "Success",
"current_op_name": "DiskMgmt", "current_op_monitor": ""}
```

Pod Management Operations

Prerequisites

Before performing any pod management operation, you need to update the setup data using PUT method.

Update setup data

1. Get the active setup data UUID using the install API

   Request

   ```
   curl -g -i -X GET -H 'Content-Type: application/json' -u  admin:46d13357ef15e5482b52 -H
    'Accept: application/json' -H 'User-Agent: python-ciscovimclient' --cacert
   ~/certificates/mercury-ca.crt
   https://[2001:420:293:2440:b696:91ff:fe22:2dd8]:8445/install
   ```

   Response

   ```
   {u'installs': {u'uuid': u'6b02c2ab-441e-471a-9dcc-e771136186e1', u'setupdata':
   u'8b0d4a46-c67f-4121-99af-32fde52a82eb', . . .}}
   ```

2. Send PUT request on setup data UUID

   ```
   curl -g -i -X PUT -H 'Content-Type: application/json' -u  admin:46d13357ef15e5482b52 -H
    'Accept: application/json' -H 'User-Agent: python-ciscovimclient' --cacert
   ~/certificates/mercury-ca.crt -d '{u'meta': {}, u'name': u'NEWSETUPDATA', u'jsondata':
   {<Setupdata JSON>}}’
   https://[2001:420:293:2440:b696:91ff:fe22:2dd8]:8445/setupdata/8b0d4a46-c67f-4121-99af-32fde52a82eb
   ```

You can perform the following pod management operations:

- Add compute
- Add storage
- Remove compute
- Remove storage
- Replace controller

Add compute

1. Add the node entry in setup data and update the setup data by following the steps given under prerequisites.

2. POST to nodes to add entry:

   ```
   curl -g -i -X POST -H 'Content-Type: application/json' -u  admin:46d13357ef15e5482b52
   -H 'Accept: application/json' -H 'User-Agent: python-ciscovimclient' --cacert
   ~/certificates/mercury-ca.crt -d '{u'name': u'Compute-4'}'
   https://[2001:420:293:2440:b696:91ff:fe22:2dd8]:8445/nodes/add_compute
   ```

Add storage

1. Add the node entry in setup data and update the setup data by following the steps given under prerequisites.

2. POST to nodes to add entry:

   ```
   curl -g -i -X GET -H 'Content-Type: application/json' -u  admin:46d13357ef15e5482b52 -H
    'Accept: application/json' -H 'User-Agent: python-ciscovimclient' --cacert
   ~/certificates/mercury-ca.crt -d '{u'name': u'Store-4'}'
   https://[2001:420:293:2440:b696:91ff:fe22:2dd8]:8445/nodes/add_storage
   ```

Remove compute

1. List the nodes

   Request

   ```
   curl -g -i -X GET -H 'Content-Type: application/json' -u  admin:46d13357ef15e5482b52 -H
    'Accept: application/json' -H 'User-Agent: python-ciscovimclient' --cacert
   ~/certificates/mercury-ca.crt  https://[2001:420:293:2440:b696:91ff:fe22:2dd8]:8445/nodes
   ```

   Response

   ```
   {"nodes": [{"status": "Active", "uuid": "1929776f-8b77-4b35-b55c-0abd6433b989",
   "setupdata": "8b0d4a46-c67f-4121-99af-32fde52a82eb", "node_data": "{\"rack_info\":
   {\"rack_id\": \"RackC\"}, \"cimc_info\": {\"cimc_ip\": \"172.29.172.81\"},
   \"management_ip\": \"21.0.0.13\"}", "updated_at": "2019-03-04T21:42:38+00:00",
   "reboot_required": "No", "mtype": " block_storage", "install":
   "6b02c2ab-441e-471a-9dcc-e771136186e1", "power_status": "PowerOnSuccess", "install_logs":
    "https://172.31.231.17:8008/mercury/071e79a5-b279-4628-bcf0-df168152cc42", "created_at":
    "2019-03-05T05:42:38+00:00", "name": "compute-3"}, . . . ]}
   ```

2. Remove the node entry in setup data and update the setup data by following the steps given under prerequisites.

3. Send DELETE request on nodes to remove the storage node for that UUID.

   ```
   curl -g -i -X DELETE -H 'Content-Type: application/json' -u  admin:46d13357ef15e5482b52
    -H 'Accept: application/json' -H 'User-Agent: python-ciscovimclient' --cacert
   ~/certificates/mercury-ca.crt -d '{u'force_op': False, u'name':
   u'1929776f-8b77-4b35-b55c-0abd6433b989'}'
   https://[2001:420:293:2440:b696:91ff:fe22:2dd8]:8445/nodes/remove_compute
   ```

Remove storage

1. Get the UUID of the node to be removed by getting the list of nodes

   Request

   ```
   curl -g -i -X GET -H 'Content-Type: application/json' -u  admin:46d13357ef15e5482b52 -H
    'Accept: application/json' -H 'User-Agent: python-ciscovimclient' --cacert
   ~/certificates/mercury-ca.crt  https://[2001:420:293:2440:b696:91ff:fe22:2dd8]:8445/nodes
   ```

   Response

   ```
   {"nodes": [{"status": "Active", "uuid": "0b7b2b6e-305c-48e0-b9f3-0ddb72bd3b3f",
   "setupdata": "8b0d4a46-c67f-4121-99af-32fde52a82eb", "node_data": "{\"rack_info\":
   {\"rack_id\": \"RackC\"}, \"cimc_info\": {\"cimc_ip\": \"172.29.172.81\"},
   \"management_ip\": \"21.0.0.13\"}", "updated_at": "2019-03-04T21:42:38+00:00",
   "reboot_required": "No", "mtype": " block_storage", "install":
   "6b02c2ab-441e-471a-9dcc-e771136186e1", "power_status": "PowerOnSuccess", "install_logs":
    "https://172.31.231.17:8008/mercury/071e79a5-b279-4628-bcf0-df168152cc42", "created_at":
    "2019-03-05T05:42:38+00:00", "name": "Store-3"}, . . . ]}
   ```

2. Remove the node entry in setup data and update the setup data using steps mentioned in the prerequisites.

3. Send DELETE request on nodes, to remove the storage node for that UUID.

   ```
   curl -g -i -X DELETE -H 'Content-Type: application/json' -u  admin:46d13357ef15e5482b52
    -H 'Accept: application/json' -H 'User-Agent: python-ciscovimclient' --cacert
   ~/certificates/mercury-ca.crt -d '{u'force_op': False, u'name':
   u'0b7b2b6e-305c-48e0-b9f3-0ddb72bd3b3f'}'
   https://[2001:420:293:2440:b696:91ff:fe22:2dd8]:8445/nodes/remove_storage
   ```

Replace controller

1. Get the UUID of the node to be removed by getting the list of nodes:

Request

```
curl -g -i -X GET -H 'Content-Type: application/json' -u  admin:46d13357ef15e5482b52 -H
 'Accept: application/json' -H 'User-Agent: python-ciscovimclient' --cacert
~/certificates/mercury-ca.crt  https://[2001:420:293:2440:b696:91ff:fe22:2dd8]:8445/nodes
```

Response

```
{"nodes": [{"status": "Active", "uuid": "79e43c4c-8cbd-4c81-8c22-3aec717298e9",
"setupdata": "8b0d4a46-c67f-4121-99af-32fde52a82eb", "node_data": "{\"rack_info\":
{\"rack_id\": \"RackC\"}, \"cimc_info\": {\"cimc_ip\": \"172.29.172.81\"},
\"management_ip\": \"21.0.0.13\"}", "updated_at": "2019-03-04T21:42:38+00:00",
"reboot_required": "No", "mtype": " control", "install":
"6b02c2ab-441e-471a-9dcc-e771136186e1", "power_status": "PowerOnSuccess", "install_logs":
 "https://172.31.231.17:8008/mercury/071e79a5-b279-4628-bcf0-df168152cc42", "created_at":
 "2019-03-05T05:42:38+00:00", "name": "gg34-10"}, . . . ]}
```

2. Remove the node entry in setup data and update the setup data using steps mentioned in the prerequisites.

3. PUT nodes to replace entry:

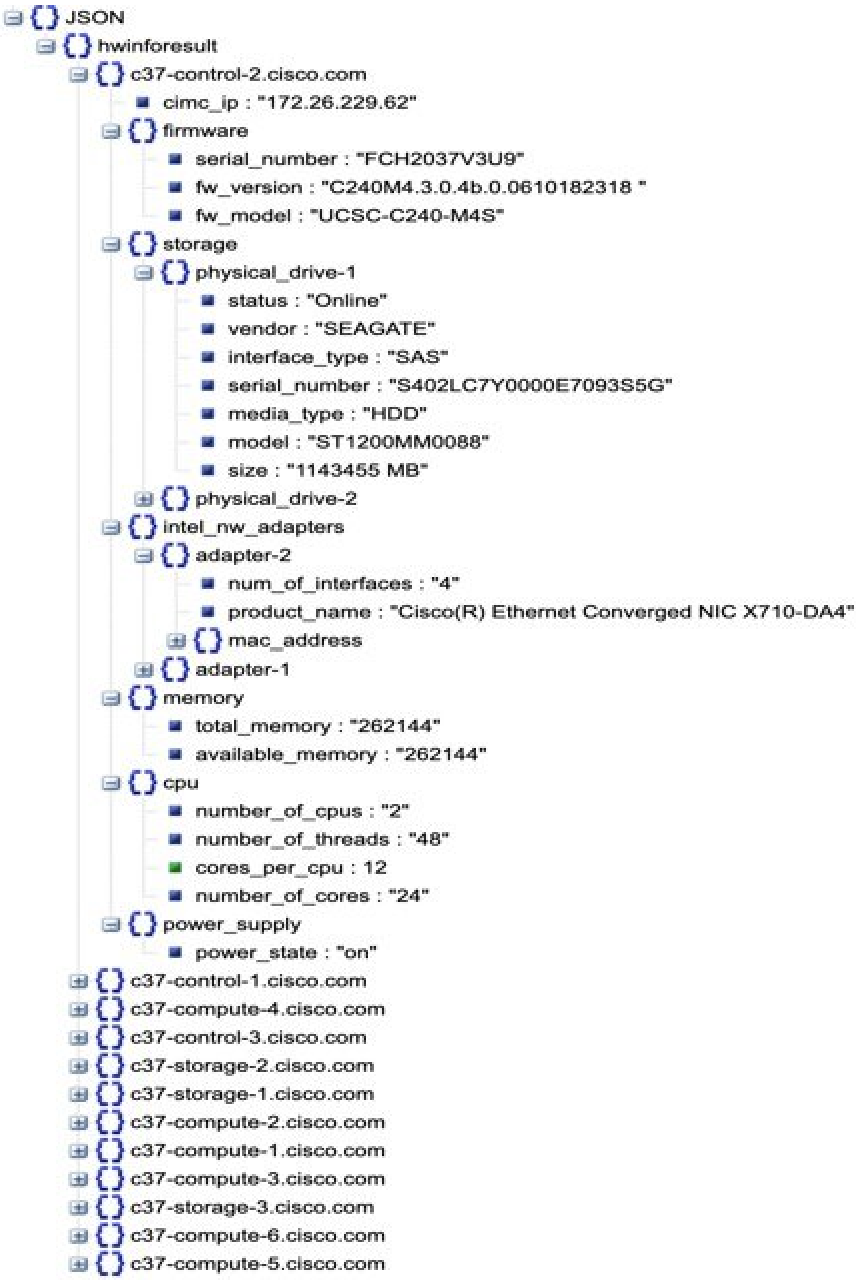
```
curl -g -i -X PUT -H 'Content-Type: application/json' -u  admin:46d13357ef15e5482b52 -H
 'Accept: application/json' -H 'User-Agent: python-ciscovimclient' --cacert
~/certificates/mercury-ca.crt -d '{u'status': u'ToReplace', u'force_op': False, u'name':
 u'gg34-10'}'
https://[2001:420:293:2440:b696:91ff:fe22:2dd8]:8445/nodes/79e43c4c-8cbd-4c81-8c22-3aec717298e9
```

Fetch Hardware Inventory

Request

```
curl -g -i -X GET -H 'Content-Type: application/json' -u  admin:46d13357ef15e5482b52 -H
'Accept: application/json' -H 'User-Agent: python-ciscovimclient' --cacert
~/certificates/mercury-ca.crt  https://[2001:420:293:2440:b696:91ff:fe22:2dd8]:8445/v1/hwinfo
```

Response



```
JSON
  hwinforesult
    c37-control-2.cisco.com
      cimc_ip : "172.26.229.62"
      firmware
        serial_number : "FCH2037V3U9"
        fw_version : "C240M4.3.0.4b.0.0610182318 "
        fw_model : "UCSC-C240-M4S"
      storage
        physical_drive-1
          status : "Online"
          vendor : "SEAGATE"
          interface_type : "SAS"
          serial_number : "S402LC7Y0000E7093S5G"
          media_type : "HDD"
          model : "ST1200MM0088"
          size : "1143455 MB"
        physical_drive-2
      intel_nw_adapters
        adapter-2
          num_of_interfaces : "4"
          product_name : "Cisco(R) Ethernet Converged NIC X710-DA4"
          mac_address
        adapter-1
      memory
        total_memory : "262144"
        available_memory : "262144"
      cpu
        number_of_cpus : "2"
        number_of_threads : "48"
        cores_per_cpu : 12
        number_of_cores : "24"
      power_supply
        power_state : "on"
    c37-control-1.cisco.com
    c37-compute-4.cisco.com
    c37-control-3.cisco.com
    c37-storage-2.cisco.com
    c37-storage-1.cisco.com
    c37-compute-2.cisco.com
    c37-compute-1.cisco.com
    c37-compute-3.cisco.com
    c37-storage-3.cisco.com
    c37-compute-6.cisco.com
    c37-compute-5.cisco.com
```

Glance Image Upload

With Cisco VIM 3.4.0, RestAPIs are introduced to upload and delete multiple images to/from the cloud. Following are the REST API that're available for usage.

POST /upload

This API is responsible for uploading the image to respective Openstack Cloud.

JSON Payload

```
{
        "podsip":[
            "172.31.231.17",
            "10.30.116.244",
        ],
        "images":[
            "Vodafone.iso",
            "Rakuten.qcow2",
        ]
    }
Response
{"Upload":true}
```

CURL Request

Following is an example Curl request:

```
curl -s -k -X POST -d '{"upload": {"podsip":["172.23.105.218",
"172.29.85.78"],"images":["buildnode-internal-20606.iso","CentOS-7-x86_64-GenericCloud-1503.qcow2"]}}'
 -H "Auth: <Token>"  https://172.29.85.78:9001/upload
```

Delete /upload

This API is responsible for deleting the image from respective Openstack Cloud.

JSON Payload

```
{
        "podsip":[
            "172.31.231.17",
            "10.30.116.244",
        ],
        "images":[
            "Vodafone.iso",
            "Rakuten.qcow2",
        ]
    }
```

CURL Request

Following is the example Curl request:

```
curl -s -k -X DELETE -d '{"upload": {"podsip":["172.23.105.218",
"172.29.85.78"],"images":["buildnode-internal-20606.iso","CentOS-7-x86_64-GenericCloud-1503.qcow2"]}}'
 -H "Auth: <Token>" https://172.29.85.78:9001/upload
```

Response

```
{"Delete":true}
```

GET /upload

This API is responsible to get the image list from respective Openstack Cloud.

Following are the query string parameters to be passed with GET URL

1. odsip: It is a comma separated string which represents pod IPs, whose Openstack image list needs to be fetched.
2. images: It is a comma separated string which represents Openstack images whose status needs to be fetched.
3. refresh: Takes the value true or false. Used to get updated Openstack images list.

Following are the CURL request examples:

1.
```
curl -s -k -H "Auth: <Token>"  https://172.29.85.78:9001/upload

This gives the result of pods on which upload/get/delete operation are performed.

{
  "uploaded": {
    "172.29.85.78": {
      "opsinprogress": 0,
      "images": null,
      "error": ""
    },
    "172.23.105.218": {
      "opsinprogress": 0,
      "images": null,
      "error": ""
    }
  }
}
```

2.
```
2. curl -s -k -H "Auth: <Token>"  https://172.29.85.78:9001/upload?"podsip=172.29.85.78”

{
  "uploaded": {
    "172.29.85.78": {
      "opsinprogress": 0,
      "images": [
        {
          "OSStatus": "active",
          "UploadStatus": "UploadSuccess",
          "ErrStatus": "",
          "ID": "c50284d7-191a-42ed-a289-9b52d19b9fd5",
          "Name": "buildnode-internal-20606.iso"
        },
        {
          "OSStatus": "active",
          "UploadStatus": "UploadSuccess",
          "ErrStatus": "",
          "ID": "fee44efc-684e-46ac-aa89-b6e785faf1b4",
          "Name": "CentOS-7-x86_64-GenericCloud-1503.qcow2"
        }
      ],
      "error": ""
    }
  }
}
```

3.
```
curl -s -k -H "Auth: <Token>"
https://172.29.85.78:9001/upload?"podsip=172.29.85.78&refresh=true”

{
  "uploaded": {
    "172.29.85.78": {
      "opsinprogress": 1,
      "images": null,
      "error": ""
    },
}
```

4.
```
curl -s -k -H "Auth: <Token>"  https://172.29.85.78:9001/upload?"podsip=172.29.85.78&
images=buildnode-internal-20606.iso”

{
  "uploaded": {
    "172.29.85.78": {
      "opsinprogress": 0,
      "images": [
        {
          "OSStatus": "active",
          "UploadStatus": "UploadSuccess",
          "ErrStatus": "",
          "ID": "c50284d7-191a-42ed-a289-9b52d19b9fd5",
          "Name": "buildnode-internal-20606.iso"
        }
      ],
      "error": ""
    }
  }
}
```

CHAPTER 3

Monitoring Cisco NFVI Performance

The following topics tell you how to display logs to monitor Cisco VIM performance.

Logging and Monitoring in Cisco NFVI

Cisco VIM uses a combination of open source tools to collect and monitor the Cisco OpenStack services including Elasticsearch, Fluentd, and the Kibana dashboard (EFK).

In VIM, we have moved our platform to use Fluentd, instead of logstash. However, to maintain backwards compatibility, the code, and documentation refers to ELK, instead of EFK at various places. In VIM, these two acronyms are interchangeable, however it refers to the presence of EFK in the offering. OpenStack services that followed by EFK include:

- MariaDB—A relational database management system which is based on MySQL. All the OpenStack components store their data in MariaDB.

- HAProxy—HAProxy is a free open source software that provides a high-availability load balancer, and proxy server for TCP and HTTP-based applications that spreads requests across multiple servers.

- Keystone—Keystone is an OpenStack project that provides identity, token, catalog, and policy services for use specifically by projects in the OpenStack.

- Glance—An OpenStack project that allows you to upload and discover data assets that are meant for use with other services.

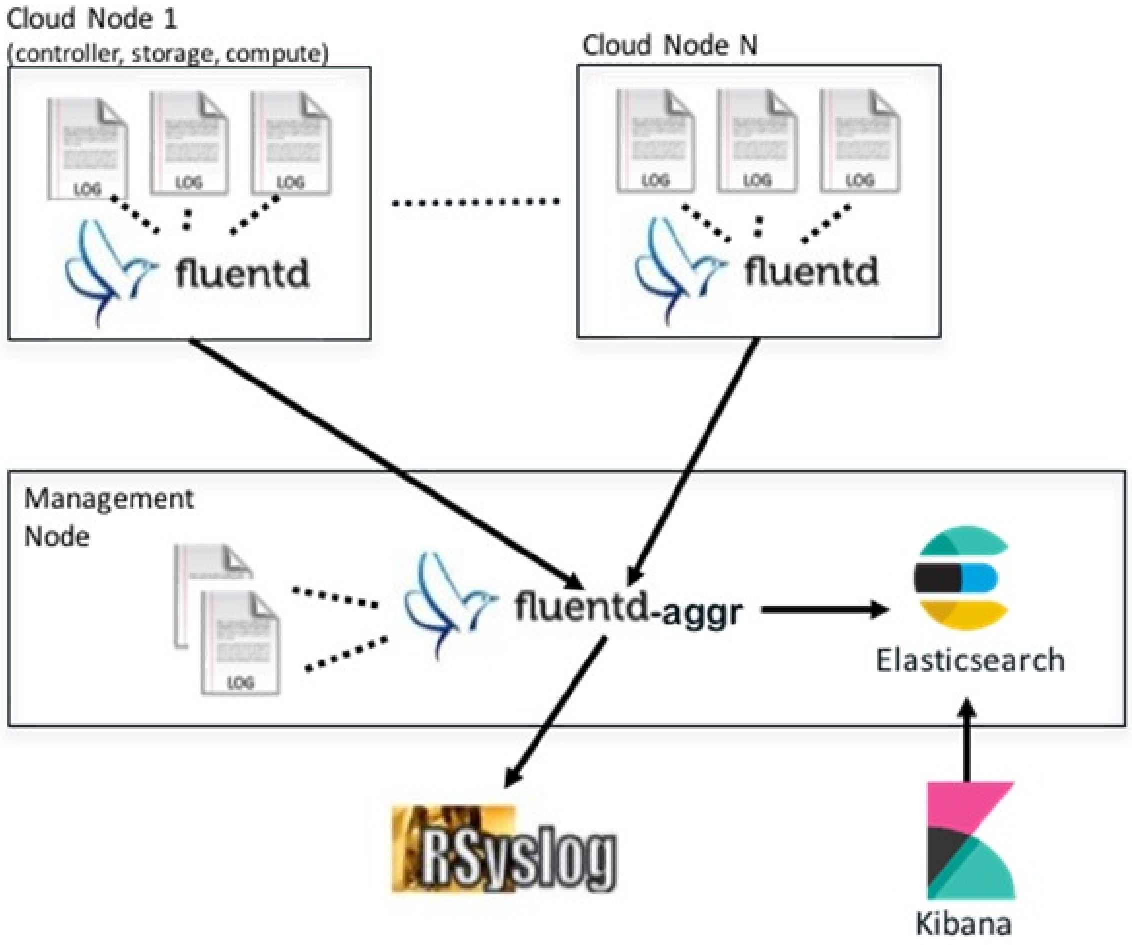
- Neutron—An OpenStack project that provides the network connectivity between interface devices, such as vNICs, managed by other OpenStack services, such as Nova.

- Nova—An OpenStack project that is designed to provide massively scalable, on demand, self-service access to compute resources.
- HTTP—The Apache HTTP server Project, an effort to develop and maintain an open-source HTTP server.
- Cinder—An OpenStack block storage service that is designed to present storage resources to the users that are consumed by the OpenStack compute project (Nova).
- Memcached—A general purpose distributed memory caching system.
- CloudPulse—Is an OpenStack tool that checks the health of the cloud. CloudPulse includes operator and end-point tests.
- Heat—The main OpenStack Orchestration program. Heat implements an orchestration engine to launch multiple composite cloud applications that is based on text file templates.
- Other OpenStack services—RabbitMQ, Ceph, Open vSwitch, Linux bridge, Neutron VTS (optional), and others.
- VMTP—Integrated control and data plane log for testing the cloud.
- NFVBench—Network performance benchmarking tool.

A Fluentd container resides on each control, compute, and storage nodes. They forward log to the Fluentd-aggr server residing on the management node.

The following figure shows a high-level schematic of the Fluent service assurance architecture.

Figure 6: EFK Service Assurance Architecture



The EFK flow includes:

- Fluentd extracts the relevant data from the logs and tags them so that Kibana can use it later to display useful information about those logs.
- Fluentd sends the logs from all the compute, controller, and storage nodes to the Fluentd-aggr server on the management node.
- Fluentd-aggr in the management node sends the structured logs into the Elasticsearch database.
- Elasticsearch stores the data, indexes it, and supports fast queries against a large amount of log data.
- Kibana visualizes the data that is stored in Elasticsearch using a custom dashboard. You can also add filters to the data to visualize interesting fragments of the log data.

Displaying Cisco VIM Log Files Using the CLI

Cisco VIM log file location depends on the node and log type. Installer logs are found in the management node under the /var/log/mercury/<install_uuid>/ directory. The last 20 log directories are tarred and kept in this directory. These files contain logs related to bootstrap, build orchestration, baremetal, common setup, and OpenStack orchestration.

If the installer fails, look at the last tar.gz file for logs, for example:

```
[root@mgmtnode mercury]# ls -lrt
total 20
drwxr-xr-x. 2 root root   80 Jul 19 23:42 573f2b7f-4463-4bfa-b57f-98a4a769aced
drwxr-xr-x. 2 root root 4096 Jul 20 03:29 installer
drwxr-xr-x. 2 root root   79 Jul 20 03:29 e9117bc5-544c-4bda-98d5-65bffa56a18f
drwxr-xr-x. 2 root root   79 Jul 20 04:54 36cdf8b5-7a35-4e7e-bb79-0cfb1987f550
drwxr-xr-x. 2 root root   79 Jul 20 04:55 bd739014-fdf1-494e-adc0-98b1fba510bc
drwxr-xr-x. 2 root root   79 Jul 20 04:55 e91c4a6c-ae92-4fef-8f7c-cafa9f5dc1a3
drwxr-xr-x. 2 root root   79 Jul 20 04:58 1962b2ba-ff15-47a6-b292-25b7fb84cd28
drwxr-xr-x. 2 root root   79 Jul 20 04:59 d881d453-f6a0-448e-8873-a7c51d8cc442
drwxr-xr-x. 2 root root   78 Jul 20 05:04 187a15b6-d425-46a8-a4a2-e78b65e008b6
drwxr-xr-x. 2 root root 4096 Jul 20 06:47 d0346cdd-5af6-4058-be86-1330f7ae09d1
drwxr-xr-x. 2 root root   79 Jul 20 17:09 f85c8c6c-32c9-44a8-b649-b63fdb11a79a
drwxr-xr-x. 2 root root   67 Jul 20 18:09 179ed182-17e4-4f1f-a44d-a3b6c16cf323
drwxr-xr-x. 2 root root   68 Jul 20 18:13 426cb05f-b1ee-43ce-862d-5bb4049cc957
drwxr-xr-x. 2 root root   68 Jul 20 18:13 1d2eec9d-f4d8-4325-9eb1-7d96d23e30fc
drwxr-xr-x. 2 root root   68 Jul 20 18:13 02f62a2f-3f59-46a7-9f5f-1656b8721512
drwxr-xr-x. 2 root root   68 Jul 20 18:14 c7417be9-473e-49da-b6d0-d1ab8fb4b1fc
drwxr-xr-x. 2 root root   68 Jul 20 18:17 b4d2077b-c7a9-46e7-9d39-d1281fba9baf
drwxr-xr-x. 2 root root   68 Jul 20 18:35 21972890-3d45-4642-b41d-c5fadfeba21a
drwxr-xr-x. 2 root root   80 Jul 20 19:17 d8b1b54c-7fc1-4ea6-83a5-0e56ff3b67a8
drwxr-xr-x. 2 root root   80 Jul 20 19:17 23a3cc35-4392-40bf-91e6-65c62d973753
drwxr-xr-x. 2 root root   80 Jul 20 19:17 7e831ef9-c932-4b89-8c81-33a45ad82b89
drwxr-xr-x. 2 root root   80 Jul 20 19:18 49ea0917-f9f4-4f5d-82d9-b86570a02dad
drwxr-xr-x. 2 root root   80 Jul 20 19:18 21589a61-5893-4e30-a70e-55ad0dc2e93f
drwxr-xr-x. 2 root root   80 Jul 20 19:22 6ae6d136-7f87-4fc8-92b8-64cd542495bf
drwxr-xr-x. 2 root root 4096 Jul 20 19:46 1c6f4547-c57d-4dcc-a405-ec509306ee25
drwxr-xr-x. 2 root root   68 Jul 20 21:20 c6dcc98d-b45b-4904-a217-d25001275c85
drwxr-xr-x. 2 root root   68 Jul 20 21:40 ee58d5d6-8b61-4431-9f7f-8cab2c331637
drwxr-xr-x. 2 root root 4096 Jul 20 22:06 243cb0f8-5169-430d-a5d8-48008a00d5c7
drwxr-xr-x. 2 root root 4096 Jul 20 22:16 188d53da-f129-46d9-87b7-c876b1aea70c
```

Cisco VIM autobackup logs are found in the following location:

```
# CVIM autobackup logs (auto-backup enabled by default)
/var/log/mercury/autobackup_3.2.x_2019-03-19_15-11-10.log

# cobbler apache log (may be needed for PXE troubleshooting)
/var/log/cobblerhttpd/access_log
/var/log/cobblerhttpd/error_log

# VMTP logs
/var/log/vmtp/vmtp.log
```

Cisco VIM RestAPI log location

```
# CVIM RestAPI logs
/var/log/mercury_restapi/restapi.log

# CIM RestAPI apache logs (TCP port 8445)
/var/log/httpd/mercury_access.log
/var/log/httpd/mercury_error.log

# CIM RestAPI log-directory logs (TCP port 8008)
/var/log/httpd/access_log
/var/log/httpd/error_log
```

EFK log location

```
# Elasticsearch-fluentd-Kibana
/var/log/elasticsearch/
/var/log/fluentd-aggr/
/var/log/kibana/
/var/log/curator/
```

```
# HAProxy TLS certificate expiration check
/var/log/curator/certchecker.log
```

Viewing Cisco VIM Logs

```
# list logs sorted reverse on time
ls -lrt /var/log/mercury/
# untar logs
tar xvzf /var/log/mercury/<UUID>/mercury_install_2018-3-20_10-2.tar.gz -C /tmp/
```

Cisco VIM Configuration Files

```
# example configuration files
/root/openstack-configs/setup_data.yaml.B_Series_EXAMPLE
/root/openstack-configs/setup_data.yaml.C_Series_EXAMPLE

# system maintained setup files - do not modify directly
# always supply user copy of setup_data.yaml
# when using ciscovim client
/root/openstack-configs/setup_data.yaml

# system inventory in pretty format
/root/openstack-configs/mercury_servers_info

# passwords store
/root/openstack-configs/secrets.yaml

# openstack configuration file
/root/openstack-configs/openstack_config.yaml

# RestAPI password
/opt/cisco/ui_config.json

# Insight password
/opt/cisco/insight/secrets.yaml
```

Enabling debug logs for certain OpenStack Services

```
# openstack config file
/root/openstack-configs/openstack_config.yaml

# help
ciscovim help

# list openstack keys
ciscovim list-openstack-configs

# help on reconfigure sub-command
ciscovim help reconfigure

# how to execute subcommand, example below
# important note: reconfigure requires a maintenance window
ciscovim reconfigure --setopenstackconfig KEYSTONE_DEBUG_LOGGING,CINDER_DEBUG_LOGGING
```

On controller and compute nodes, all services are run within their respective Docker™ containers.

To list the Docker containers in the node, execute the following:

```
[root@control-server-2 ~]# docker ps -a
CONTAINER ID        IMAGE                                                          COMMAND
                  CREATED          STATUS          PORTS      NAMES
258b2ca1d46a        172.31.228.164:5000/mercury-rhel7-osp8/nova-scheduler:4780
"/usr/bin/my_init /no"   25 minutes ago   Up 25 minutes             novascheduler_4780
ffe70809bbe0        172.31.228.164:5000/mercury-rhel7-osp8/nova-novncproxy:4780
"/usr/bin/my_init /st"   25 minutes ago   Up 25 minutes             novanovncproxy_4780
```

```
12b92bcb9dc0        172.31.228.164:5000/mercury-rhel7-osp8/nova-consoleauth:4780
"/usr/bin/my_init /st"   26 minutes ago   Up 26 minutes


……
novaconsoleauth_4780
7295596f5167        172.31.228.164:5000/mercury-rhel7-osp8/nova-api:4780
"/usr/bin/my_init /no"   27 minutes ago   Up 27 minutes              novaapi_4780
```

To view the Docker logs of any container, execute the following on the corresponding host:

```
ls –l /var/log/<service_name>/<log_filename>
e.g. ls -l /var/log/keystone/keystone.log
```

To get into a specific container, execute the following commands:

```
[root@control-server-2 ~]# alias | grep container
     root@control-server-2 ~]# source /root/.bashrc
#execute the alias:
  [root@control-server-2 ~]# novaapi
novaapi_4761 [nova@control-server-2 /]$
 novaapi_4761 [nova@control-server-2 /]$ exit
exit
```

If the Docker status indicates a container is down (based on output of “docker ps –a”), collect the Docker service logs as well:

```
cd /etc/systemd/system/multi-user.target.wants/
ls docker* # get the corresponding service name from the output
systemctl status <service_name> -n 1000 > /root/filename # redirects the output to the file
```

For storage nodes running Ceph, execute the following to check the cluster status:

```
ceph –v # on monitor nodes (controller), show’s ceph version

ceph –s # on monitor nodes (controller), show cluster status

ceph osd lspools #on monitor nodes (controller),list pools

ceph mon stat # summarize monitor status

ceph-disk list # on OSD / storage nodes; List disks, partitions, and Ceph OSDs

rbd list images # on monitor nodes (controller); dump list of image snapshots

rbd list volumes # on monitor nodes (controller); dump list of volumes
```

Logging Into Kibana Dashboard

Kibana is an open source data visualization platform that is used to explore Cisco VIM logs.

To log into the Kibana dashboard:

Step 1 Using a terminal client, use SSH to log into your management node and enter the password to login.

The following command shows that the management node has an IP address of 17.0.0.2:

```
# ssh root@17.0.0.2
root@17.0.0.2's password
```

Step 2 To obtain the password, check whether VAULT feature is enabled. If it is enabled, refer to the Vault section, otherwise locate the line containing KIBANA_PASSWORD in `/root/installer-{tag id}/openstack-configs/secrets.yaml` during SSH terminal session. Note the value of the KIBANA_PASSWORD as it is used in Step 4.

```
cat /root/installer-{tag-id}/openstack-configs/secrets.yaml
...
KIBANA_PASSWORD: <note this value>
...
```

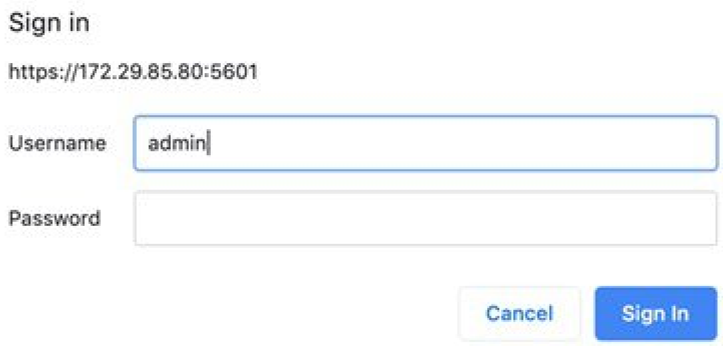
Step 3 Navigate to the http://<management_node_ip_address>:5601.

Note Kibana uses the HTTPS + TLS to provide a secure connection between the browser and the Kibana service.

By default Kibana uses the certificate located at /var/www/mercury/mercury.<crt|key> or you can provide your own certificates in /root/openstack-configs/ directory (using the same mercury.<crt|key> file names).

Note If you are accessing Kibana for the first time, by default it shows self-signed certificate. Some browsers display the warning message *Your connection is not private*. Click **Proceed** to access the Kibana link. A window dialog box appears.

Step 4 Enter the **Username** and **Password**:



Username: admin

Password:

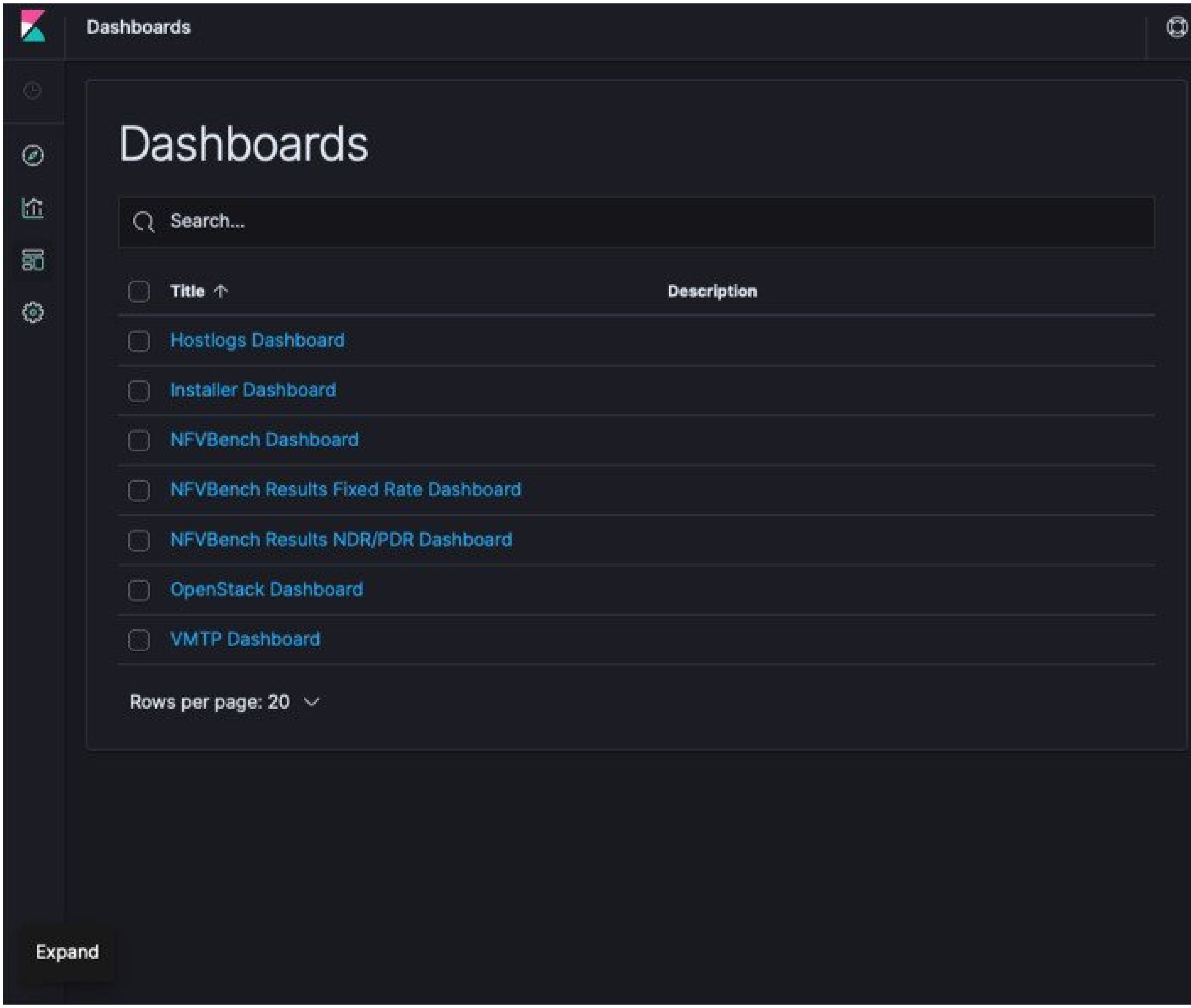
User Name: admin

Password: <value of ELK_PASSWORD from Step 2>. The Kibana dashboard appears which displays the Cisco VIM service and installer logs.

Step 5 Choose the desired dashboard from the list.

Note Ensure that you do not use Management option on the left side.

Figure 7: Lists of Dashboards



Dashboards

Title	Description
Hostlogs Dashboard	
Installer Dashboard	
NFVBench Dashboard	
NFVBench Results Fixed Rate Dashboard	
NFVBench Results NDR/PDR Dashboard	
OpenStack Dashboard	
VMTP Dashboard	

Rows per page: 20

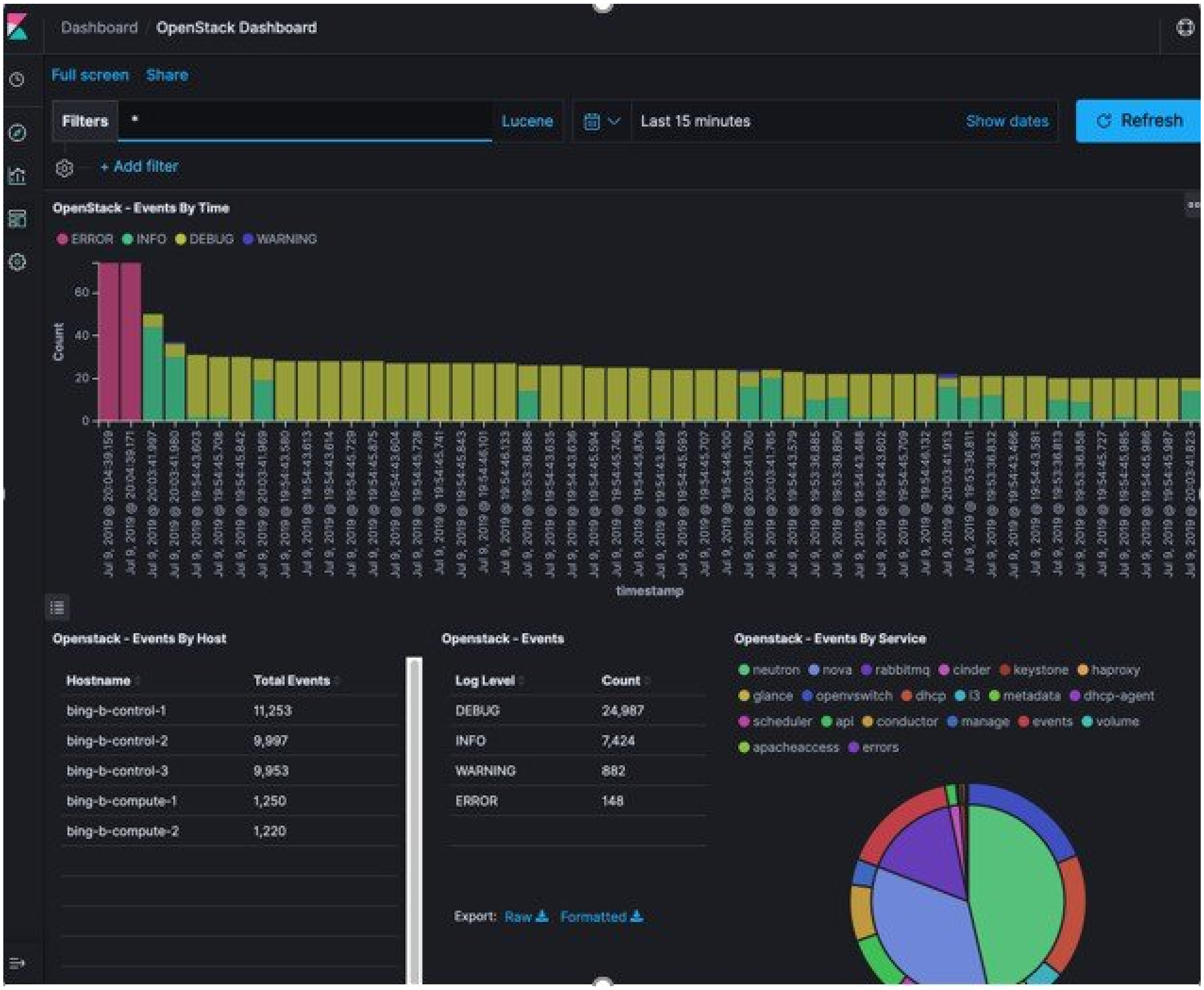
The following are the list of dashboards:

- Hostlogs Dashboard: Provides log information of the system for the cloud nodes. This displays entries from the host logs-* index in Elasticsearch. It contains the log from /var/log/messages file on each server.
- Installer Dashboard: Provides information about the management node and the installation process. It can only read uncompressed files. Hence, it reads the files prior to the cloud installation. This displays entries from the installer-* index in Elasticsearch.
- OpenStack Dashboard: (openstack-* index) Provides log information about all the OpenStack processes. This displays entries from the openstack-* index in Elasticsearch.

- VMTP Dashboard: Provides log information about the VMTP runs performed against the cloud. It displays entries from the vmtp-* index in Elasticsearch

For example, if you click **OpenStack Dashboard** link, the following screen appears.

Figure 8: OpenStack Dashboard


Dashboard / OpenStack Dashboard
Full screen
Share
Filters
*
Lucene
Last 15 minutes
Show dates
Refresh
+ Add filter
OpenStack - Events By Time
ERROR
INFO
DEBUG
WARNING
Count
60
40
20
0
Jul 9, 2019 @ 20:04:39.159
Jul 9, 2019 @ 20:04:39.171
Jul 9, 2019 @ 20:03:41.997
Jul 9, 2019 @ 20:03:41.980
Jul 9, 2019 @ 19:54:43.603
Jul 9, 2019 @ 19:54:45.708
Jul 9, 2019 @ 19:54:45.842
Jul 9, 2019 @ 20:03:41.969
Jul 9, 2019 @ 19:54:43.580
Jul 9, 2019 @ 19:54:43.613
Jul 9, 2019 @ 19:54:43.614
Jul 9, 2019 @ 19:54:45.729
Jul 9, 2019 @ 19:54:45.875
Jul 9, 2019 @ 19:54:43.604
Jul 9, 2019 @ 19:54:45.728
Jul 9, 2019 @ 19:54:45.741
Jul 9, 2019 @ 19:54:45.843
Jul 9, 2019 @ 19:54:46.101
Jul 9, 2019 @ 19:54:46.133
Jul 9, 2019 @ 19:53:36.888
Jul 9, 2019 @ 19:54:43.635
Jul 9, 2019 @ 19:54:43.636
Jul 9, 2019 @ 19:54:45.594
Jul 9, 2019 @ 19:54:45.740
Jul 9, 2019 @ 19:54:45.876
Jul 9, 2019 @ 19:54:43.489
Jul 9, 2019 @ 19:54:45.593
Jul 9, 2019 @ 19:54:45.707
Jul 9, 2019 @ 19:54:46.100
Jul 9, 2019 @ 20:03:41.780
Jul 9, 2019 @ 20:03:41.765
Jul 9, 2019 @ 19:54:43.579
Jul 9, 2019 @ 19:53:36.885
Jul 9, 2019 @ 19:53:36.890
Jul 9, 2019 @ 19:54:43.488
Jul 9, 2019 @ 19:54:43.602
Jul 9, 2019 @ 19:54:45.709
Jul 9, 2019 @ 19:54:46.132
Jul 9, 2019 @ 20:03:41.913
Jul 9, 2019 @ 19:53:36.811
Jul 9, 2019 @ 19:53:36.832
Jul 9, 2019 @ 19:54:43.466
Jul 9, 2019 @ 19:54:43.581
Jul 9, 2019 @ 19:53:36.813
Jul 9, 2019 @ 19:53:36.858
Jul 9, 2019 @ 19:54:45.727
Jul 9, 2019 @ 19:54:45.985
Jul 9, 2019 @ 19:54:45.986
Jul 9, 2019 @ 19:54:45.987
Jul 9, 2019 @ 20:03:41.823
timestamp
Openstack - Events By Service
neutron
nova
rabbitmq
cinder
keystone
haproxy
glance
openvswitch
dhcp
l3
metadata
dhcp-agent
scheduler
api
conductor
manage
events
volume
apacheaccess
errors

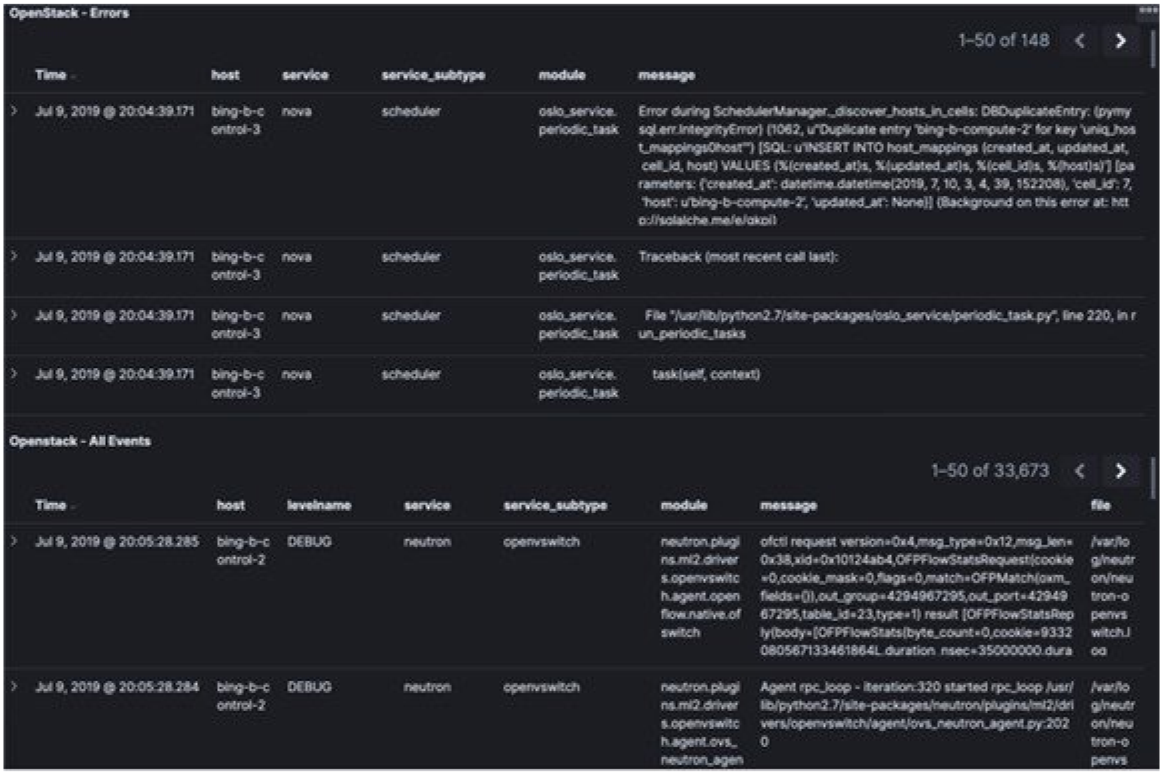
Openstack - Events By Host

Hostname	Total Events
bing-b-control-1	11,253
bing-b-control-2	9,997
bing-b-control-3	9,953
bing-b-compute-1	1,250
bing-b-compute-2	1,220

Openstack - Events

Log Level	Count
DEBUG	24,987
INFO	7,424
WARNING	882
ERROR	148

Export: Raw Formatted



OpenStack - Errors

1–50 of 148

Time	host	service	service_subtype	module	message
Jul 9, 2019 @ 20:04:39.171	bing-b-control-3	nova	scheduler	oslo_service.periodic_task	Error during SchedulerManager._discover_hosts_in_cells: DBDuplicateEntry: (pymysql.err.IntegrityError) (1062, u"Duplicate entry 'bing-b-compute-2' for key 'uniq_host_mappings0host'") [SQL: u'INSERT INTO host_mappings (created_at, updated_at, cell_id, host) VALUES (%(created_at)s, %(updated_at)s, %(cell_id)s, %(host)s)'] [parameters: {'created_at': datetime.datetime(2019, 7, 10, 3, 4, 39, 152208), 'cell_id': 7, 'host': u'bing-b-compute-2', 'updated_at': None}] (Background on this error at: http://sqlalche.me/e/gkpj)
Jul 9, 2019 @ 20:04:39.171	bing-b-control-3	nova	scheduler	oslo_service.periodic_task	Traceback (most recent call last):
Jul 9, 2019 @ 20:04:39.171	bing-b-control-3	nova	scheduler	oslo_service.periodic_task	File "/usr/lib/python2.7/site-packages/oslo_service/periodic_task.py", line 220, in run_periodic_tasks
Jul 9, 2019 @ 20:04:39.171	bing-b-control-3	nova	scheduler	oslo_service.periodic_task	task(self, context)

Openstack - All Events

1–50 of 33,673

Time	host	levelname	service	service_subtype	module	message	file
Jul 9, 2019 @ 20:05:28.285	bing-b-control-2	DEBUG	neutron	openvswitch	neutron.plugins.ml2.drivers.openvswitch.agent.openflow.native.ofswitch	ofctl request version=0x4,msg_type=0x12,msg_len=0x38,xid=0x10124ab4,OFPFlowStatsRequest(cookie=0,cookie_mask=0,flags=0,match=OFPMatch(oxm_fields={}),out_group=4294967295,out_port=4294967295,table_id=23,type=1) result [OFPFlowStatsReply(body=[OFPFlowStats(byte_count=0,cookie=9332080567133461864L,duration_nsec=35000000,dura	/var/log/neutron/neutron-openvswitch.log
Jul 9, 2019 @ 20:05:28.284	bing-b-control-2	DEBUG	neutron	openvswitch	neutron.plugins.ml2.drivers.openvswitch.agent.ovs_neutron_agen	Agent rpc_loop - iteration:320 started rpc_loop /usr/lib/python2.7/site-packages/neutron/plugins/ml2/drivers/openvswitch/agent/ovs_neutron_agent.py:2020	/var/log/neutron/neutron-openvs

You can switch on from one dashboard to another by selecting the appropriate dashboard from the right top bar menu.

All dashboards have generic and specific fields.

The generic ones are:

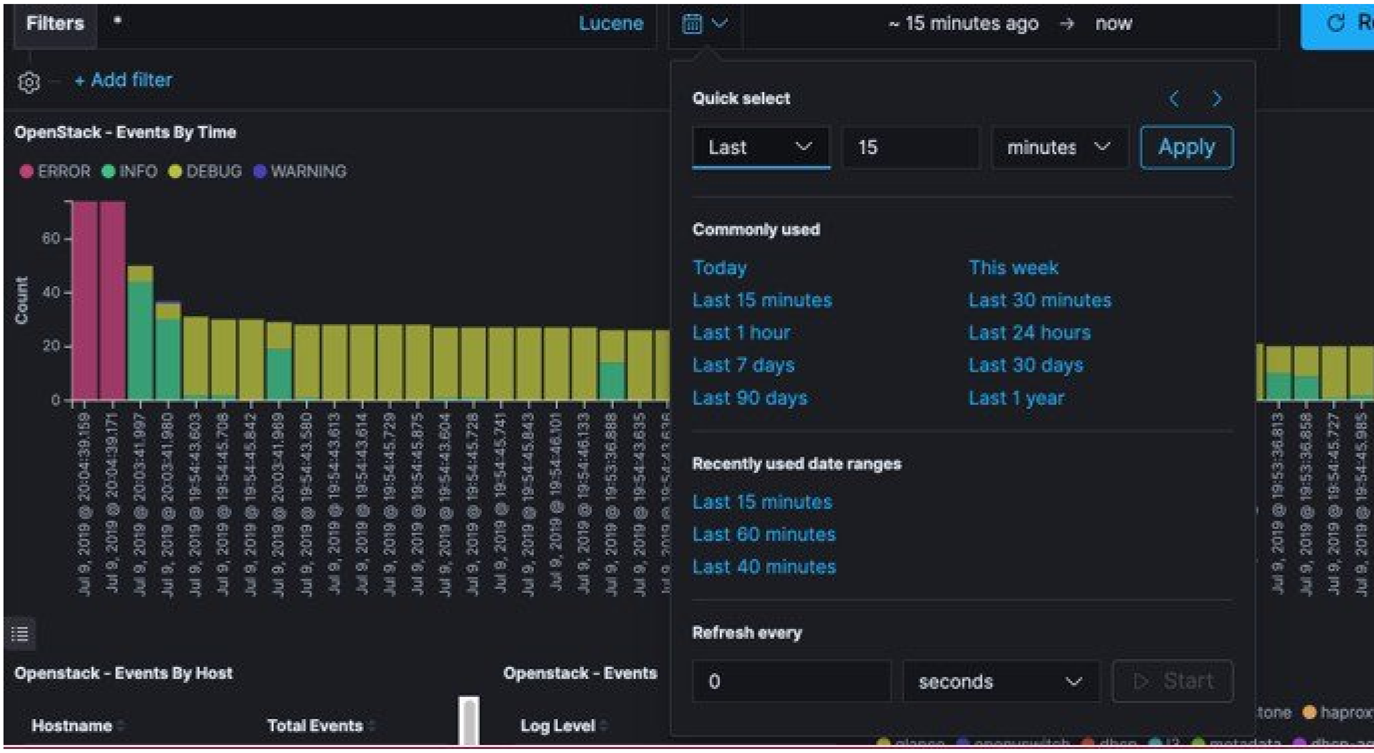
- Title: It is seen at the top left of the page. Ite shows which dashboard is being displayed. For example: OpenStack Dashboard.
- Filter bar : It is an input field where you can enter a query in the Lucene syntax format to filter the logs by specific fields (which depend on the fields for the index being selected).
- Time bar: Time is seen at the top right of the page. Time indicates the time schedule for the log information. You can modify the time to indicate absolute, relative time in the past or specify automatically refresh rates.
- Add a filter tab: Use this tab to introduce filters graphically.

For more information on using Kibana, see the *Kibana documentation* (Version 7.2).

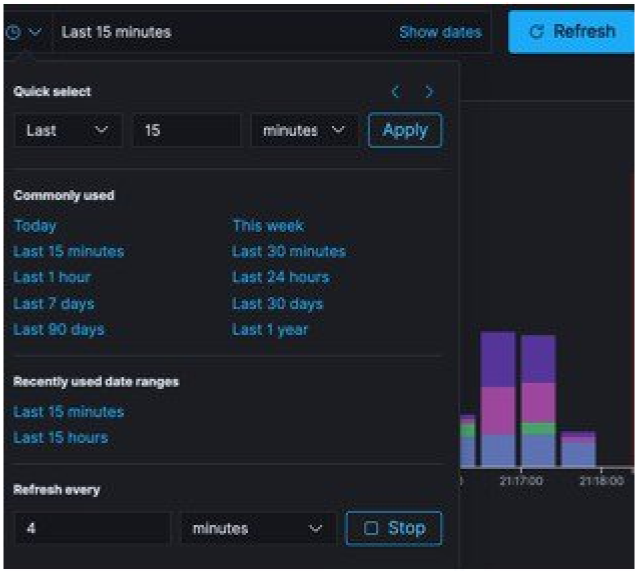
Cisco VIM stores the OpenStack logs in Elasticsearch. The Elasticsearch snapshots all the indices (where the data is stored) which are rotated on a periodic basis. You may not see the older data in Kibana if the data is rotated out and/or deleted.

Logs keep being visualized in Kibana as they are being updated in Elasticsearch on the Discover tab. To debug something on kibana, you can program the Kibana dashboard to auto-refresh at specific intervals (by default is off). To enable auto-refresh, click the Calendar drawing at the top right corner of the dashboard and program on **Refresh every** with desired value. Configure the desired value by clicking the Start and Auto-refresh.

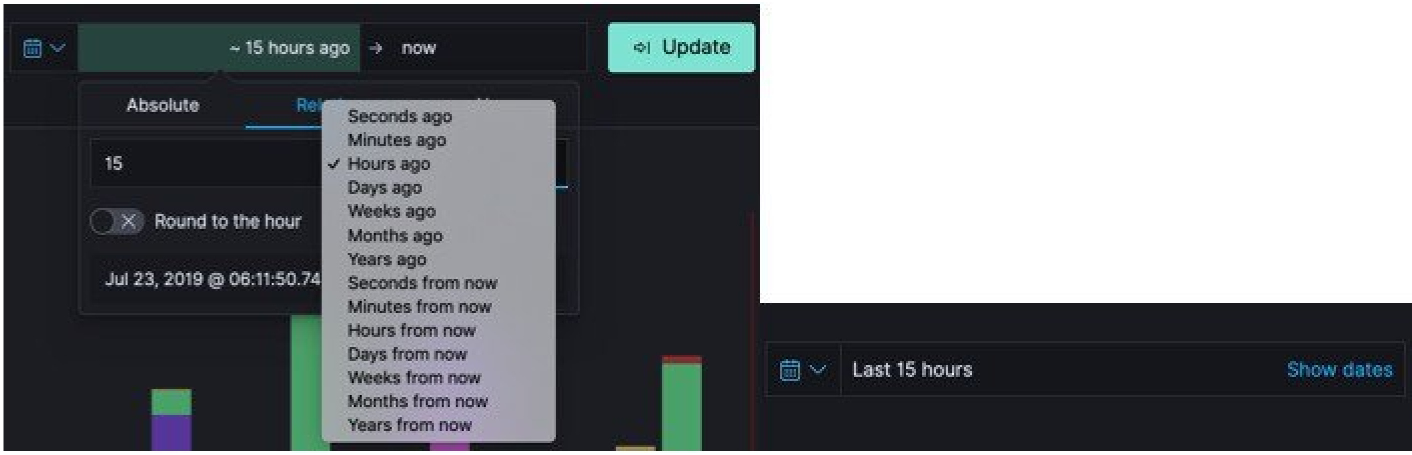
Figure 9: Auto-Refresh



Once you program a Auto-refresh, the Calendar drawing is replaced by a Clock. Then you can click **Stop** button on the top navigator bar to pause the refreshing of logs events. You can also select intervals that you want to see the logs from.



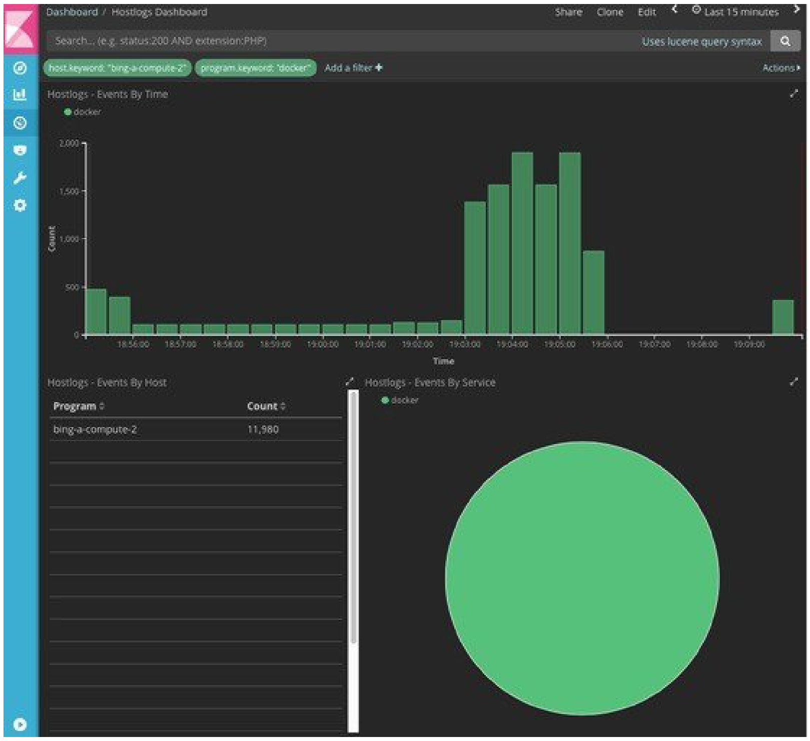
Also you can select an absolute or relative interval:



a) Few examples on usage of filters in Openstack dashboard to gather useful information

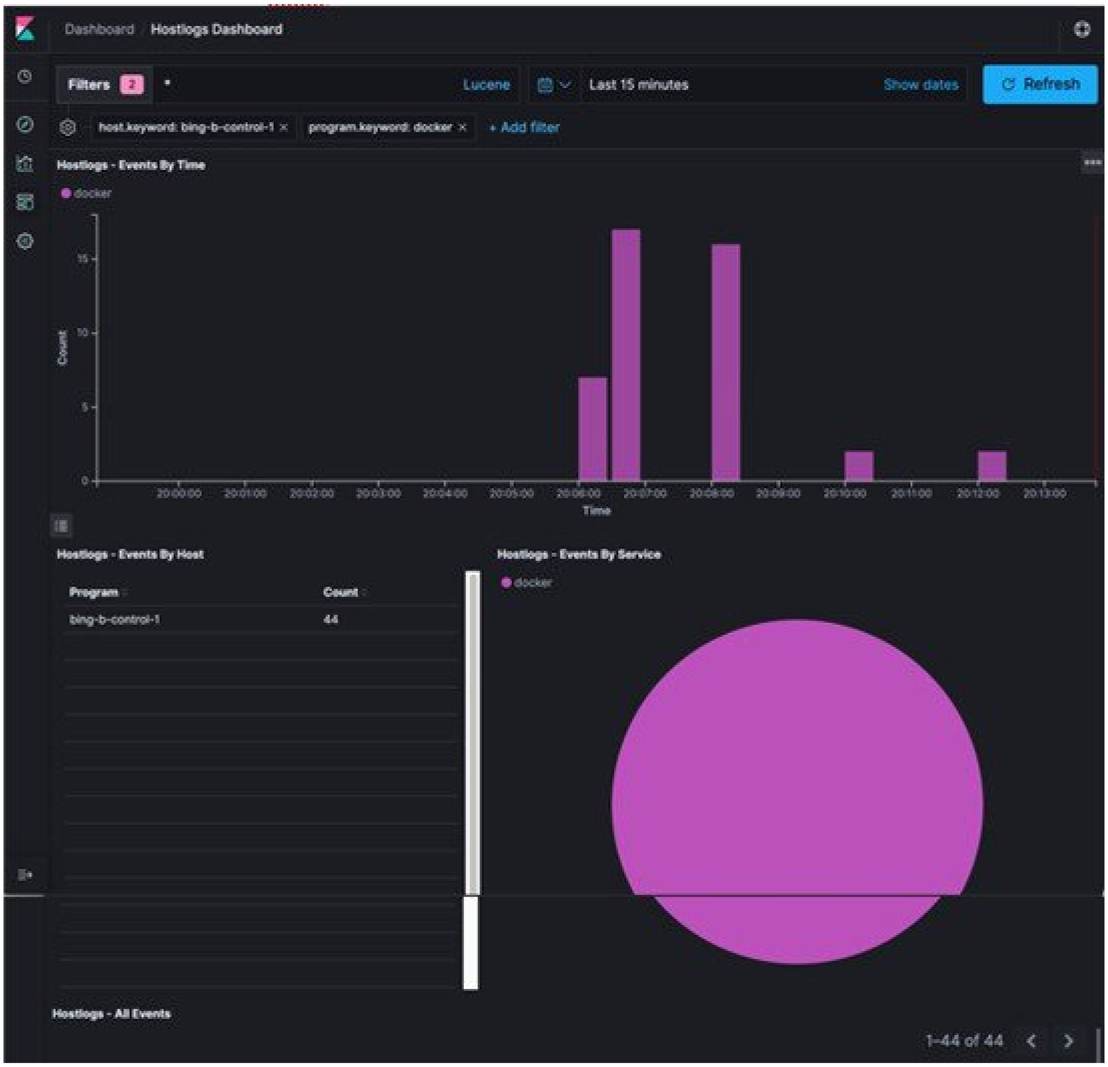
- • On the Hostlogs Dashboard, in the Events by Host panel, choose a hostname and click the + or - symbol that appears close to the hostname to include or exclude that server from the filter. Then, click the desired slice on the Events By Service panel to add the docker service to the section.

  • Under the **Filter** field, you see included sections in green and excluded sections in red.



Program	Count
bing-a-compute-2	11,980

Figure 10: Hostlogs Dashboard



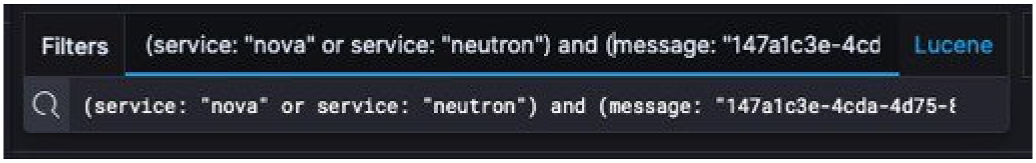
Program	Count
bing-b-control-1	44

b) To know the log events in the Openstack for a given VM by writing the filter directly on the Search field:

Note The uuid of the VM is identified by executing openstack nova list or looking at the horizon website.

- Write the Lucene query (service: nova and service: neutron and message:<uuid>) in the **Search** field which is on top of the Dashboard. <uuid> is the number got from Horizon or nova list for the identifier of the instance VM.

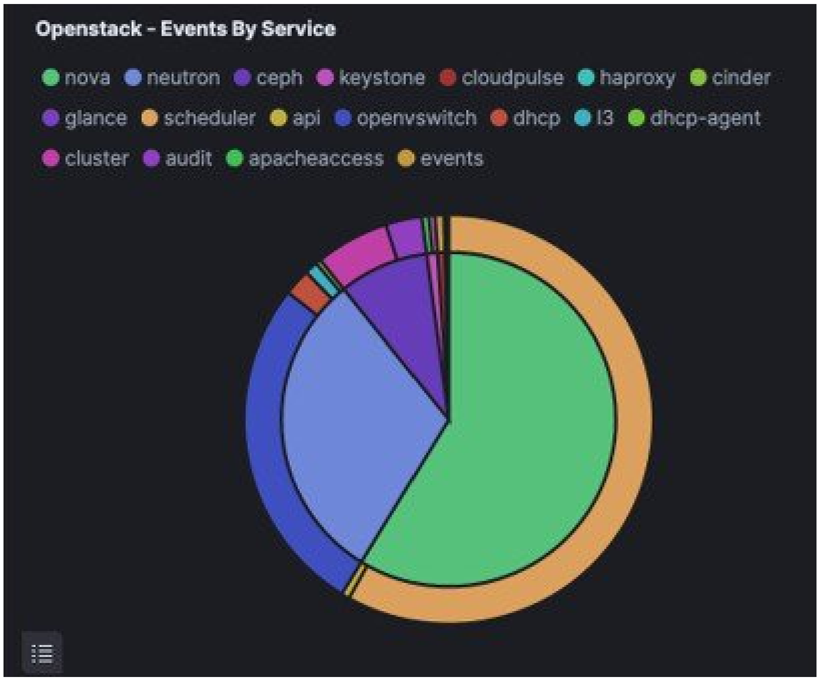
Figure 11: Search Query Page



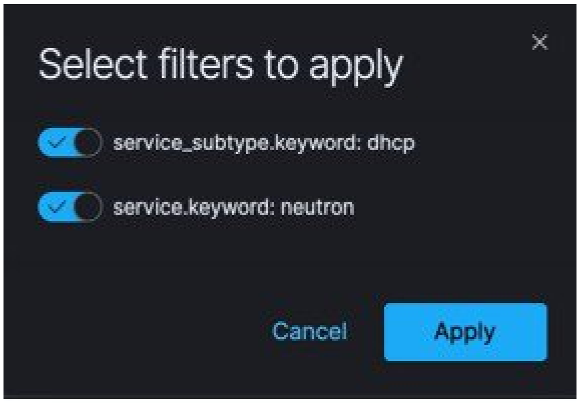
```
(service: "nova" or service: "neutron") and (message: "147a1c3e-4cd
(service: "nova" or service: "neutron") and (message: "147a1c3e-4cda-4d75-8
```

- For example, if you want to know the DHCP events of the Openstack Neutron, select the filters by clicking outer circle of pie chart:
    - On the OpenStack Dashboard, the Openstack - Events By Service panel has a pie chart with the inner section for the services and the outer sections for the service_subtypes. To add filters for selecting all the events in a service (for example, neutron), click on the inner section of the pie. To add filters for selecting the service_subtypes (for example, dhcp), click on the outer circle of the pie.

Figure 12: Events by Service

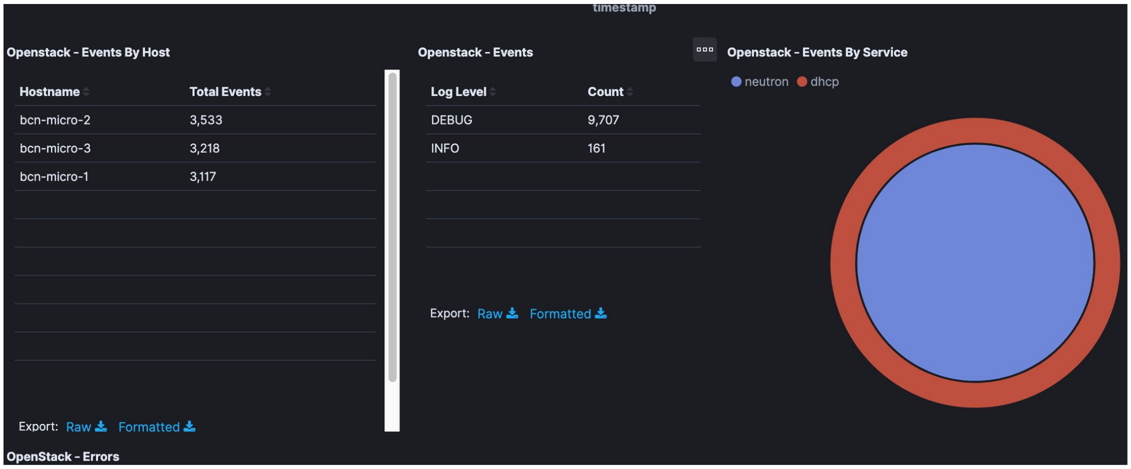


    - In the following window, click on **Apply**:


Select filters to apply

service_subtype.keyword: dhcp

service.keyword: neutron



timestamp

Openstack - Events By Host

Hostname	Total Events
bcn-micro-2	3,533
bcn-micro-3	3,218
bcn-micro-1	3,117

Export: Raw Formatted

Openstack - Events

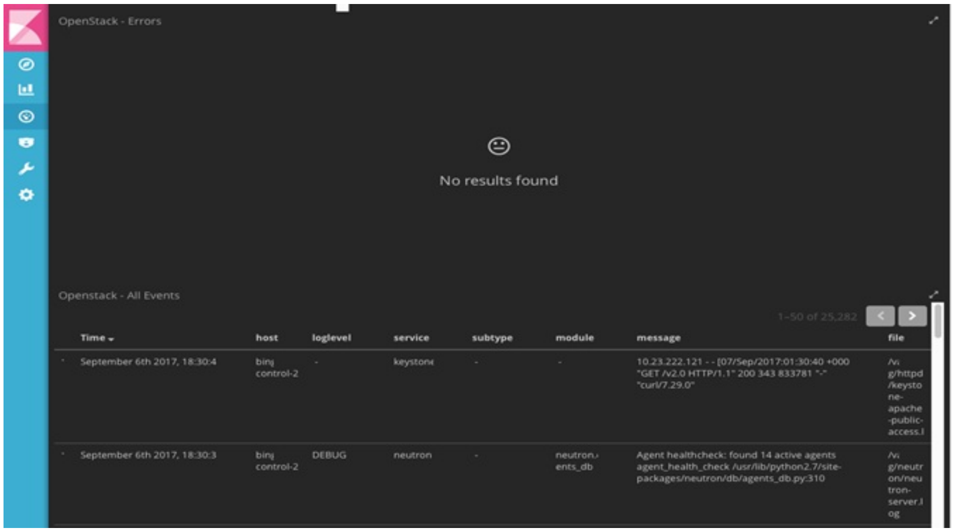
Log Level	Count
DEBUG	9,707
INFO	161

Export: Raw Formatted

Openstack - Events By Service

OpenStack - Errors

- You can scroll down the OpenStack Dashboard to see the OpenStack - Errors and the OpenStack - Events panel.. The OpenStack - Errors panel displays the error messages. If there are no errors, the **No results found** message is displayed.



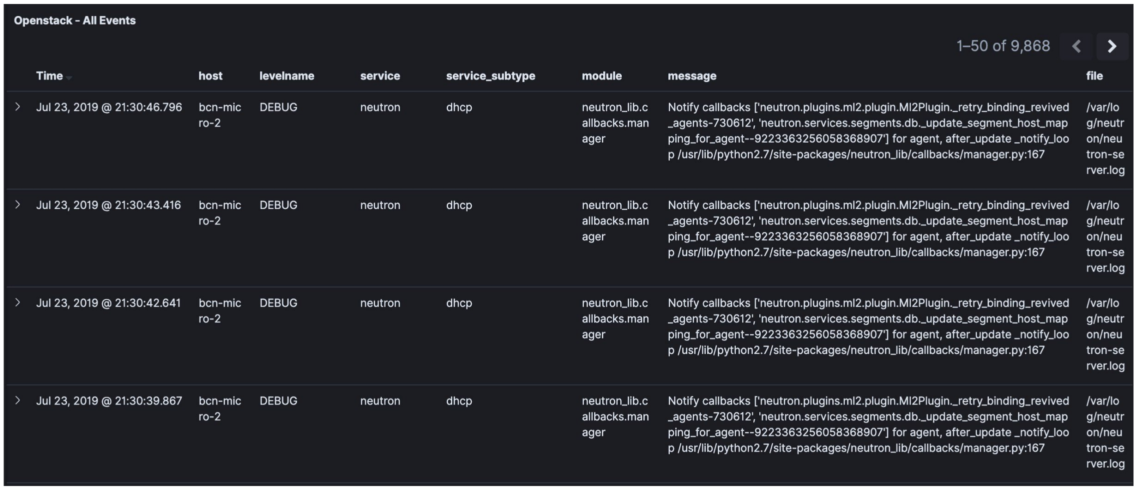
OpenStack - Errors

No results found

Openstack - All Events

1-50 of 25,282

	Time	host	loglevel	service	subtype	module	message	file
˅	September 6th 2017, 18:30:4	binj control-2	-	keystone	-	-	10.23.222.121 - - [07/Sep/2017:01:30:40 +000 "GET /v2.0 HTTP/1.1" 200 343 833781 "-" "curl/7.29.0"	/va g/httpd /keystone-apache -public-access.l
˅	September 6th 2017, 18:30:3	binj control-2	DEBUG	neutron	-	neutron.agents_db	Agent healthcheck: found 14 active agents agent_health_check /usr/lib/python2.7/site-packages/neutron/db/agents_db.py:310	/va g/neutron/neutron-server.log



Openstack - All Events

1–50 of 9,868

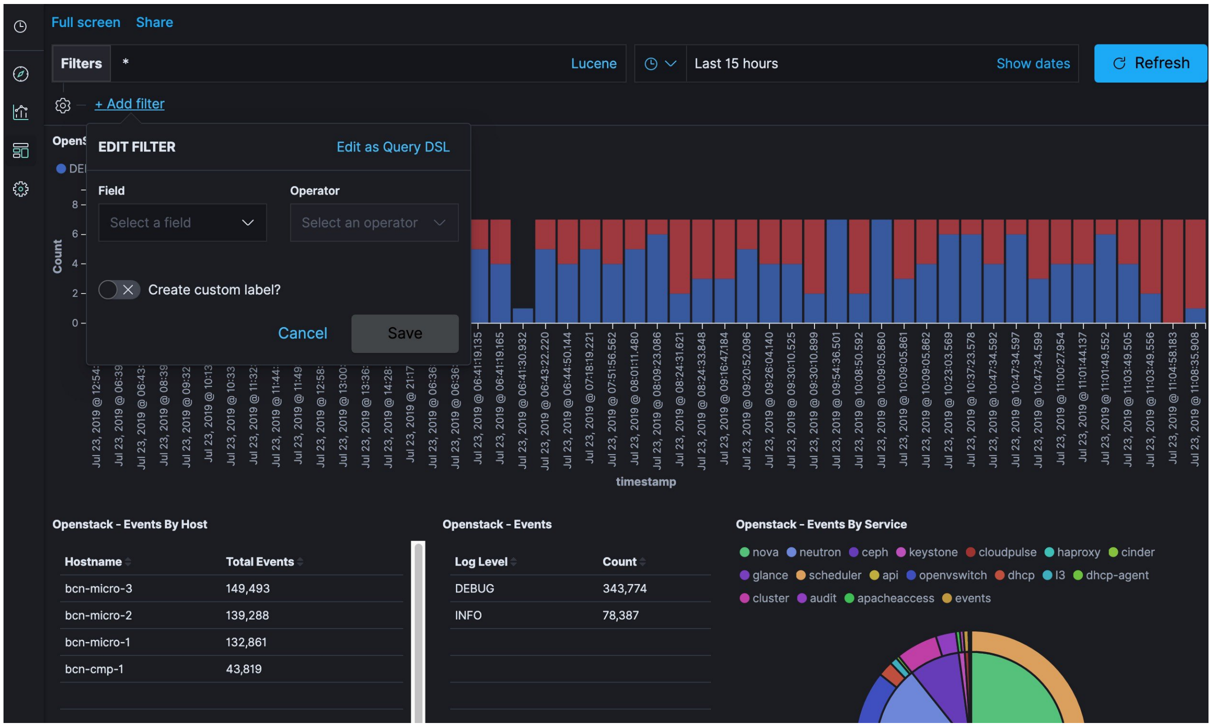
Time	host	levelname	service	service_subtype	module	message	file
Jul 23, 2019 @ 21:30:46.796	bcn-micro-2	DEBUG	neutron	dhcp	neutron_lib.callbacks.manager	Notify callbacks ['neutron.plugins.ml2.plugin.Ml2Plugin._retry_binding_revived_agents-730612', 'neutron.services.segments.db._update_segment_host_mapping_for_agent--9223363256058368907'] for agent, after_update _notify_loop /usr/lib/python2.7/site-packages/neutron_lib/callbacks/manager.py:167	/var/log/neutron/neutron-server.log
Jul 23, 2019 @ 21:30:43.416	bcn-micro-2	DEBUG	neutron	dhcp	neutron_lib.callbacks.manager	Notify callbacks ['neutron.plugins.ml2.plugin.Ml2Plugin._retry_binding_revived_agents-730612', 'neutron.services.segments.db._update_segment_host_mapping_for_agent--9223363256058368907'] for agent, after_update _notify_loop /usr/lib/python2.7/site-packages/neutron_lib/callbacks/manager.py:167	/var/log/neutron/neutron-server.log
Jul 23, 2019 @ 21:30:42.641	bcn-micro-2	DEBUG	neutron	dhcp	neutron_lib.callbacks.manager	Notify callbacks ['neutron.plugins.ml2.plugin.Ml2Plugin._retry_binding_revived_agents-730612', 'neutron.services.segments.db._update_segment_host_mapping_for_agent--9223363256058368907'] for agent, after_update _notify_loop /usr/lib/python2.7/site-packages/neutron_lib/callbacks/manager.py:167	/var/log/neutron/neutron-server.log
Jul 23, 2019 @ 21:30:39.867	bcn-micro-2	DEBUG	neutron	dhcp	neutron_lib.callbacks.manager	Notify callbacks ['neutron.plugins.ml2.plugin.Ml2Plugin._retry_binding_revived_agents-730612', 'neutron.services.segments.db._update_segment_host_mapping_for_agent--9223363256058368907'] for agent, after_update _notify_loop /usr/lib/python2.7/site-packages/neutron_lib/callbacks/manager.py:167	/var/log/neutron/neutron-server.log

- Without knowing the Lucene Syntax, you can set the filter criteria in the **Search** field using the **Add a filter** + option.

  Following are the steps to add a filter:

  - Click Add a filter (+).
  - Set the filter criteria by choosing appropriate label and operators from the drop-down lists, and entering keywords and click Save.

Figure 13: Add Filters Page



Full screen
Share
Filters
*
Lucene
Last 15 hours
Show dates
Refresh
+ Add filter
EDIT FILTER
Edit as Query DSL
Field
Select a field
Operator
Select an operator
Create custom label?
Cancel
Save
Count
0
2
4
6
8
timestamp
Jul 23, 2019 @ 06:41:19.135
Jul 23, 2019 @ 06:41:19.165
Jul 23, 2019 @ 06:41:30.932
Jul 23, 2019 @ 06:43:22.220
Jul 23, 2019 @ 06:44:50.144
Jul 23, 2019 @ 07:18:19.221
Jul 23, 2019 @ 07:51:56.562
Jul 23, 2019 @ 08:01:11.480
Jul 23, 2019 @ 08:09:23.086
Jul 23, 2019 @ 08:24:31.621
Jul 23, 2019 @ 08:24:33.848
Jul 23, 2019 @ 09:16:47.184
Jul 23, 2019 @ 09:20:52.096
Jul 23, 2019 @ 09:26:04.140
Jul 23, 2019 @ 09:30:10.525
Jul 23, 2019 @ 09:30:10.899
Jul 23, 2019 @ 09:54:36.501
Jul 23, 2019 @ 10:08:50.592
Jul 23, 2019 @ 10:09:05.860
Jul 23, 2019 @ 10:09:05.861
Jul 23, 2019 @ 10:09:05.862
Jul 23, 2019 @ 10:23:03.569
Jul 23, 2019 @ 10:37:23.578
Jul 23, 2019 @ 10:47:34.592
Jul 23, 2019 @ 10:47:34.597
Jul 23, 2019 @ 10:47:34.599
Jul 23, 2019 @ 11:00:27.954
Jul 23, 2019 @ 11:01:44.137
Jul 23, 2019 @ 11:01:49.552
Jul 23, 2019 @ 11:03:49.505
Jul 23, 2019 @ 11:03:49.556
Jul 23, 2019 @ 11:04:58.183
Jul 23, 2019 @ 11:08:35.908
Openstack - Events By Service
nova
neutron
ceph
keystone
cloudpulse
haproxy
cinder
glance
scheduler
api
openvswitch
dhcp
l3
dhcp-agent
cluster
audit
apacheaccess
events

Openstack - Events By Host

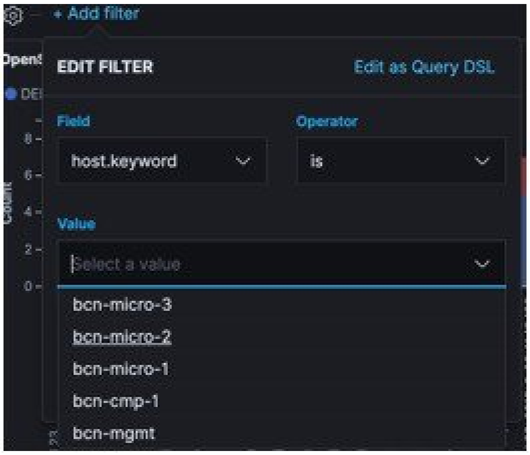
Hostname	Total Events
bcn-micro-3	149,493
bcn-micro-2	139,288
bcn-micro-1	132,861
bcn-cmp-1	43,819

Openstack - Events

Log Level	Count
DEBUG	343,774
INFO	78,387

Set the filter criteria by choosing appropriate label and operators from the drop-down lists, and entering keywords.

Figure 14: Choosing Appropriate Labels



Field: host.keyword
Operator: is
Value:
bcn-micro-3
bcn-micro-2
bcn-micro-1
bcn-cmp-1
bcn-mgmt

Rotation of the Cisco VIM Logs

Cisco VIM stores all logs in Elasticsearch. Elasticsearch indices are rotated on a periodic basis to prevent the disk space overflow by creating snapshots. The following lists show the Snapshots that are defined in openstack_config.yaml:

```
# vi ~/openstack-configs/openstack_config.yaml
…
# Elk rotation parameters
elk_rotation_frequency: "monthly"  # Available: "daily", "weekly", "fortnightly", "monthly"
elk_rotation_size: 2                # Unit is in Gigabytes (float is allowed)
elk_rotation_del_older: 10         # Delete older than 10 units (where units depends on the
 value set on elk_rotation_frequency)
…
```

You can change the frequency of the rotation by changing the values. For more information on how to set the Elasticsearch parameters through VIM API or CLI, refer to the section *Reconfiguring Passwords and OpenStack Configurations*.

Cisco VIM uses the open source Elasticsearch Curator tool to manage the Elasticsearch indices and snapshots. For more information about Elasticsearch handles snapshots, look at the official information on Elastic.co (Version 5.4) https://www.elastic.co/guide/en/elasticsearch/client/curator/5.4/index.html.

Snapshot Manager Tool for Elasticsearch

The snapshot_mgr.sh tool wraps up the Elasticsearch Curator APIs. This tool helps you to access the snapshots of the logs that are maintained by the Elasticsearch.

Run the following command to view the snapshot logs which is in the tools directory of the installer.

```
# ./tools/snapshot_mgr.py --help
usage: snapshot_mgr.py [options]

Snapshot Manager handles snapshot logs maintained by Elasticsearch
```

```
optional arguments:
  -h, --help            show this help message and exit
  --list                display all snapshots in Elasticsearch
  --display GET_SS      get details of the snapshot called <GET_SS>
  --create              create a snapshot
  --restore RESTORE_SS  restore snapshot named <RESTORE_SS>
  --delete DELETE_SS    delete the snapshot called <DELETE_SS>
  --autodelete threshold_warning threshold_low threshold_high
                        autodelete snapshots until reach a disk space
                        threshold
```

Snapshot list gives you the details of the snapshot performed on the system like the UUID, the name the snapshot, end time of the snapshot, the state and the indices where it was snapshorted:

```
# ./snapshot_mgr.py --list
+---------+---------+--------+---+---------------------------------------------------+----+
|          uuid          |      snapshot_name       | time_snapshot_ended |  state   |
indices_snapshoted
                                        | failures |
+---------+---------+--------+---+---------------------------------------------------+----+
| 6WGVUnKjQbGtZYzfC0yeEg | curator-20180304140002 | 2018-03-04 14:00:04 | SUCCESS |
hostlogs-2018.03.02
                                        |    -     |
| U4IVWJNnQW6PdFWxpRUc-A | curator-20180304150001 | 2018-03-04 15:00:04 | SUCCESS |
hostlogs-2018.03.03
                                        |    -     |
| 5RxDuhnETC6TW4XSPDNZlw | curator-20180304160001 | 2018-03-04 16:00:24 | SUCCESS |
installer-2018.03.03, installer-2018.03.01, installer-2018.03.02, openstack-2018.03.02,
hostlogs-2018.03.04, installer-2018.03.04 |    -     |
| k2gZYwLeRPO98bJZslI2pw | curator-20180305040002 | 2018-03-05 04:00:32 | SUCCESS |
openstack-2018.03.03, hostlogs-2018.03.04, installer-2018.03.04
                                        |    -     |
+---------+---------+--------+---+---------------------------------------------------+----+
```

To view the details of the individual snapshot run the display option command.:

```
# ./tools/snapshot_mgr.py --display curator-20180304140002
{ 'duration_in_millis': 1944,
  'end_time': '2018-03-04T14:00:04.019Z',
  'end_time_in_millis': 1520172004019,
  'failures': [],
  'indices': ['hostlogs-2018.03.02'],
  'shards': { 'failed': 0, 'successful': 5, 'total': 5},
  'snapshot': 'curator-20180304140002',
  'start_time': '2018-03-04T14:00:02.075Z',
  'start_time_in_millis': 1520172002075,
  'state': 'SUCCESS',
  'uuid': '6WGVUnKjQbGtZYzfC0yeEg',
  'version': '6.0.0',
  'version_id': 6000099}
```

To create a snapshot run the following command:

```
# ./tools/snapshot_mgr.py --create
Executing: curl PUT
http://localhost:9200/_snapshot/es_backup/3a9b90c2979b46bf9c7b3f9223074d5d?wait_for_completion=true
 -d
{'indices': 'installer-*,hostlogs-*,openstack-*,vmtp-*', 'ignore_unavailable': 'true',
'include_global_state': 'false'}
Response: {u'snapshot': {u'uuid': u'BSznQj1SQ9mjxxk9swTirQ', u'duration_in_millis': 46496,
 u'start_time':
 u'2018-03-06T16:37:49.774Z', u'shards': {u'successful': 35, u'failed': 0, u'total': 35},
u'version_id': 6000099,
 u'end_time_in_millis': 1520354316270, u'state': u'SUCCESS', u'version': u'6.0.0',
 u'snapshot': u'3a9b90c2979b46bf9c7b3f9223074d5d', u'end_time': u'2018-03-06T16:38:36.270Z',
 u'indices': [u'installer-2018.03.06', u'vmtp-2018.03.02', u'hostlogs-2018.03.06',
u'hostlogs-2018.03.05',
 u'installer-2018.03.05', u'openstack-2018.03.05', u'openstack-2018.03.06'],
 u'failures': [], u'start_time_in_millis': 1520354269774}}
```

Run the following command to delete a snapshot:

```
# ./tools/snapshot_mgr.py --delete 3a9b90c2979b46bf9c7b3f9223074d5d
Executing: curl DELETE
http://localhost:9200/_snapshot/es_backup/3a9b90c2979b46bf9c7b3f9223074d5d -d None
Response: {u'acknowledged': True}
```

Restore the indices of a snapshot back to the Elasticsearch database by using the restore option. Run the following command to restore:

```
# ./snapshot_mgr.py --restore curator-20180306050001
Executing: curl POST
http://localhost:9200/hostlogs-2018.03.04,installer-2018.03.05,installer-2018.03.04,
openstack-2018.03.04,hostlogs-2018.03.05,openstack-2018.03.02/_close -d None
```

Remote NFS Backup for Elasticsearch Snapshots

Cisco VIM 2.4 supports remote NFS backup of the Elasticsearch snapshots. This allows you to empty the disk space in the Elasticsearch snapshots. You can use the snapshot manager tool to manually create, list, show, and delete snapshots.

Remote NFS backup of the Elasticsearch snapshots feature can be configured by adding the following section to the setup_data.yaml configuration file:

```
  ES_REMOTE_BACKUP:   # Set if Elasticsearch backups can use a remote host
   service: 'NFS'    # Set if an remote NFS server is used
   remote_host: <ip_addr>   # IP of the NFS server
   remote_path: /root/es_remote  # Path of location of the backups in the remote server
```

Important considerations about the remote NFS directory on the remote server (specified by the remote_path config option):

- This directory allows the elasticsearch user (pid number 2020) and group mercury (pid 500) to read, and write. Otherwise, Curator cannot copy the snapshots to the remote NFS directory.
- It is good if the folder is empty and is used only by Cisco VIM.
- Cisco VIM does not delete the information in this directory after unbootstrap.

You can enable or disable this feature by running reconfiguration. With reconfiguration, you can change the remote_host ip or remote_path.

Network Performance Test with NFVBench

NFVBench is a network performance benchmarking tool integrated with Cisco VIM. For more details, refer to NFVBench section of *Chapter 1* in the admin guide for details.

Customizing CVIM-MON Dashboard

With CVIM-MON, you can create and modify dashboards.You must save the created or edited dashboards in Grafana, and use CLI command on the management node to make the dashboards persistent across reboots. Though the modifications to built-in dashboards does not persist, you can customize the dashboards by exporting them and importing back as a new dashboard.

The command “ciscovim help cvimmon-dashboard” provides all the details associated with CVIMMON dashboard customization.

Following are the steps to get the Grafana edits in sync with the management node repository so that it persists (also called Persistence workflow).

Step 1 Create a new Dashboard or edit a custom dashboard on grafana UI.

Step 2 Once all the new dashboards are ok, save it on grafana.

Step 3 On the management node, execute the list to see the current status of custom dashboards:

```
# ciscovim cvimmon-dashboard list
```

Step 4 To sync all custom dashboards to the management repository and make it persist across reboots, execute the following command:

```
# ciscovim cvimmon-dashboard save
```

Note

- To delete custom dashboard from the management node repository (if deleted from Grafana), execute the steps associated to add followed by using save command that is augmented with “-f or –force” option.
- You can save all the custom dashboards on the Grafana server, to a specified directory only if that directory is empty.

Step 5 To export the custom dashboard to a directory, use the below command:

```
# ciscovim cvimmon-dashboard save --dir-path <target_empty_dir_on_mgmt_node>
```

Step 6 To import back the saved dashboard from a specified directory with custom dashboard snapshots, execute the following command:

```
# ciscovim cvimmon-dashboard upload --force --dir-path <dir_on_mgmt_node_where customization_exist>
```

The 'upload' command supports two options:

- -f or --force option: To delete all existing dashboards in the management node repository, and replace them with the new custom dashboard.
- -p or --preserve: To preserve all dashboards and add new dashboard to the management node repository.

All the logs for cvimmon-dashboards are populated under `/var/log/mercury_restapi/restapi.log` file.

Cisco VIM MON Inventory Discovery API usage

API Client

By default, Inventory_Discovery API is running on TCP port 8747 on the Cisco VIM management node.

The pod administrator can use the below tools offered on the management node:

1. API client: Available at / /var/lib/calipso/calipso_client.py
2. Data replication client: Available at /var/lib/calipso/calipso_replication_client.py

The API client provides options to interact with the Inventory API on any Cisco VIM pod.

On the Cisco VIM management node, aliases are available for both clients that run with calipso_client and calipso_replication_client. You can use them on desktop and any Cisco VIM node, if the following pre-requisites are met:

- python 2.7 or 3.5
- python requests

You can use any common REST query tool against the Inventory_Discovery API like curl, postman, httpie, and so on.

As the client source code is available, you can use it to understand the API and build similar client using other languages. The main library used is ‘requests’ which can be obtained for more capabilities from *https://pypi.org/project/requests/*

Running calipso_client --help provides details of the options available with API client.

Listed below are the key parameters of the tool:

- api_server API_SERVER - FQDN or IP address of the API Serve (default=localhost)
- api_port API_PORT - TCP Port exposed on the API Server (default=8747)
- api_password API_PASSWORD - API password (secret) used by the API Server (default=calipso_default)
- environment ENVIRONMENT - specify environment (pod) name configured on the API server (default=None)
- scan SCAN - actively discover the specific cloud environme -options: NOW/HOURLY/DAILY/WEEKLY/MONTHLY/YEARLY (default=None)
- method METHOD - method to use on the API server - options: get/post/delete/put (default=None)
- endpoint ENDPOINT - endpoint url extension to use on the API server - options: see API documentation for endpoints (default=None)
- payload PAYLOAD - 'dict' string with parameters to send to the API - options: see API documentation per endpoint (default=None)
- page PAGE - a page number for retrieval (default=0)
- page_size PAGE_SIZE - a number of total objects listed per page (default=1000)

- version-get a reply back with calipso_client version.

The default parameters for api_server and api_port are used for cases where the client is used on the same management node and the API server is running. For other cases, specific details are needed.

Note **Environment name** is used to describe the cloud facility endpoints managed by a specific entity. This naming convention is used to support multiple cloud types.

api_password is obtained through Cisco VIM secrets, either through cat /root/openstack-configs/secrets.yaml | grep CALIPSO_API_SERVICE_PWD cat /root/openstack-configs/secrets.yaml or when VAULT is used in setup_data, then retrieve using vault api:

1. Get vault data from source /var/lib/calipso/calipso_config as vault token is rendered in calipso_config in place of passwords if vault is defined.
2. Fetch Mongo password from `curl http://$MGMT_IP:8200/v1/secret/data/cvim-secrets/CALIPSO_MONGO_SERVICE_PWD -H "X-Vault-Token: $VAULT_TOKEN`

Environments

The first parameter that must be configured on the API server is an 'environment_config' that holds all the parameters forattributes of an 'environment'.

Environment_config is mandatory step before any scan discovery request can be made. The Environment is a generic cloud facility (of many types) to be discovered by the scanning server. In CVIM the Environment definition holds all the configurations needed to interact with the cloud and discover it's content, for example the API endpoints, the admin passwords, the DB passwords, the SSH passwords/keys, the Message-BUS access url and credentials etc.

To obtain the list of environments available on a specific API server use the examples below (using curl or calipso_client).:

The x-token is grabbed per session, allowing one-time password for secure communication with the server, any 'FQDN' or IP for API server can be used:

Token request using curl:

request:

```
curl -i -H "Content-Type: application/json" -H "Accept: application/json"
-X POST -d '{"auth": {"methods": ["credentials"],
"credentials": {"username": "calipso","password": "<CALIPSO_API_SERVICE_PWD> "}}}'
 http://localhost:8747/auth/tokens
```

response:

```
{"issued_at": "2019-06-17T09:13:17.388124", "method": "credentials", "expires_at":
"2019-06-18T09:13:17.388124",
"token": "a1fcff2023894061898a80fea6d5dd52", "_id": "5d0759ad6d07b1001214934b"}
```

As the underlying data is always json, it is recommended that each request has those two headers: Content-Type application/json and Accept application/json.

Post request requires data in json format (-d in curl), Get requests need to include attributes in the url.

For the duration of the session ('expires_at' is returned) the value of the 'token' mustbe used for all requests to the API server in a X-Auth-Token header, for example:

Environment request using curl:

request:

```
curl -i -H "Content-Type: application/json" -H "Accept: application/json" -H
"X-Auth-Token: a7d13511ad44406281362d18366d99fc" -X
GET http://localhost:8747/environment_configs
```

response:

```
{"environment_configs": [{"name": "cvim-cloud", "distribution": "Mercury"}]}
```

In the above example, GET is used ands url includes the values in case of the endpoint of /environment_configs.

The calipso_client handles all security needs automatically per request, and defaults to 'localhost' with default port and default username. You can give the API secret in a single call to get the same response

Environment request using calipso_client:

request:

```
calipso_client --api_server <br_api_mgmt_node> --api_password <CALIPSO_API_SERVICE_PWD>
--method get --endpoint environment_configs
```

response:

{"environment_configs": [{"name": "cvim-cloud", "distribution": "Mercury"}"}]}

Once the name of the environment is known, you can make a SCAN request to discover cloud content.

Scans

Discovering the details (inventory and dependencies) of a specific environment is handled through scan requests, scan requests can be made once (automated as needed)

or can be scheduled in-advance through scheduled scan request.

A prerequisite for any scan request is the existent of an environment_config (see validations above).

It is advised to kick off a Scan request once some configurations (instances, flavors, networks etc) has been made on the OpenStack environment.

Scan request and a successfully completed scan with full discovery is a mandatory step before any other query can be made against the underlying data .

Here is an example of a one-time scan request, note that specifying an environment parameter is mandatory for scan request:

```
Scan environment with calipso_client
```

Scan can take a while, depending on the size of the customer deployed resources on the OpenStack environment, if scan_status returns errors this needs to be debugged in the calipso_scan container (hint: look at the logs).

When scan_status is 'completed' and all Inventory, Links and Cliques has been discovered, the API can now be further used to grab data for analysis.

Scan can also be scheduled in advance, here is an example of a scheduled scan request:

Scheduled-scan environment with calipso client

request:

```
calipso_client --api_password <CALIPSO_API_SERVICE_PWD> --environment cvim-cloud --scan
WEEKLY
```

response:

```
Scheduled scan at: 2019-06-24T12:49:35.332000
Submitted at: 2019-06-17T05:49:34.426000
Scan frequency: WEEKLY
```

For scheduled-scan the reply above provides details about the submitted time and the time of the next scheduled scan, the scan will be repeated at the frequency defined in the request.

To watch the details of any previously submitted scan request, use the /scans or /scheduled_scans as endpoint for the request, also environment name is mandatory to get scans per that environment:

Get historical scan and scheduled scans with calipso_client

request:

```
calipso_client --api_password <CALIPSO_API_SERVICE_PWD>
--method get --endpoint scans --environment cvim-cloud
```

response

```
{
    "scans": [
        {
            "environment": "cvim-cloud",
            "id": "5cdd9d7c6d07b10013ade7f2",
            "status": "completed"
        },
        {
            "environment": "cvim-cloud",
            "id": "5cddb2726d07b10013ade7ff",
            "status": "completed"
        },
        {
            "environment": "cvim-cloud",
            "id": "5cdff1476d07b10013ade80f",
            "status": "running"
        },
    ]
}
```

request:

```
calipso_client --api_password <CALIPSO_API_SERVICE_PWD>  --method get --endpoint
scheduled_scans --environment cvim-cloud

response:
{
    "scheduled_scans": [
        {
            "environment": "cvim-cloud",
            "freq": "WEEKLY",
            "id": "5ce2f78e6d07b10013ade824",
            "scheduled_timestamp": "2019-06-17T18:53:04.519000"
        },
        {
            "environment": "cvim-cloud",
            "freq": "WEEKLY",
            "id": "5d078c5e6d07b10012149382",
            "scheduled_timestamp": "2019-06-24T12:49:35.332000"
        },
        {
            "environment": "cvim-cloud",
            "freq": "WEEKLY",
            "id": "5d078f3a6d07b10012149385",
            "scheduled_timestamp": "2019-06-24T13:01:46.794000"
        }
    ]
}
```

Note The developer needs to make sure schedules are well known and there are not too many overlapping or too frequent scans running against the same pod, during scan the data is cleared by default and scan can take some time.

Paging

Each Inventory Discovery API server may hold many objects, depending on the customer deployment this can get quite large.

A mechanism of paging is available for all API queries to the server, supporting page number and page size, and engineer can use this mechanism to request a certain page from a big list of items on the server and request total number of items to be listed per page (page_size).

Here is an example of request using paging, this example runs against the scans endpoint:

request:

```
calipso_client --
api_password <CALIPSO_API_SERVICE_PWD>--method get --
endpoint scans --environment cvim-cloud --page 0 --page_size 1
```

response:

```
{
    "scans": [
        {
            "environment": "cvim-cloud",
            "id": "5cdd9d7c6d07b10013ade7f2",
            "status": "completed"
        }
    ]
}
```

request:

```
request:
calipso_client --api_password <CALIPSO_API_SERVICE_PWD>--method get --
endpoint scans --environment cvim-cloud --page 0 --page_size 2
```

response:

```
{
    "scans": [
        {
            "environment": "cvim-cloud",
            "id": "5cdd9d7c6d07b10013ade7f2",
            "status": "completed"
        },
        {
            "environment": "cvim-cloud",
            "id": "5cddb2726d07b10013ade7ff",
            "status": "completed"
        }
    ]
}
```

Inventory

Each Inventory Discovery API server runs on a specific pod/environment and holds the latest scan results for all objects and resources on that specific environment in the mongoDB 'calipso' in a special collection called 'inventory'.

Query for inventory collection requires specifying an environment name and the common 'get' method.

The first logical query would be getting a list of all objects in that environment of a specific 'type'.

The list of supported object types can be grabbed from constants, here is the latest output for 3.4 release, with embedded explanations for the different types:

request:

```
calipso_client --api_password <CALIPSO_API_SERVICE_PWD>--method
get --endpoint constants --payload "{'name': 'object_types'}"
```

response:

```
request:
calipso_client --api_password <CALIPSO_API_SERVICE_PWD>--method get --endpoint constants
--payload "{'name': 'object_types'}"

response:
{
    "_id": "5cdd5f92bac311001dfbdbca",
    "data": [
        {
            "label": "vnic",       --> virtual NIC attached to a VM or a Namespace (ex: tap
 interface, virtualEthernet interface)
            "value": "vnic"
        },
        {
            "label": "vconnector",   --> Local Bridge connecting VMs running inside the
same node )ex: linux_bridge , bridge_domain)
            "value": "vconnector"
        },
        {
            "label": "vedge",   --> The device connecting VMs running inside a node to the
 physical network (ex: VPP, OVS, SR-IOV)
            "value": "vedge"
        },
        {
            "label": "instance",   --> VM
            "value": "instance"
        },
        {
            "label": "container",   --> Container
            "value": "container"
        },
        {
            "label": "pod",  --> K8s Pod
            "value": "pod"
        },
        {
            "label": "vservice",   --> a Namespace, a process/device providing networking
services
(ex: DHCP, Router, Proxy)
            "value": "vservice"
        },
        {
            "label": "host_pnic",   --> physical NIC on a node/host
            "value": "host_pnic"
        },
        {
            "label": "switch_pnic",   --> physical NIC on a switch
            "value": "switch_pnic"
        },
        {
            "label": "network",   --> the logical representation of an end-to-end
communication ,
like an OpenStack network
            "value": "network"
        },
        {
            "label": "switch",   --> physical switching device
            "value": "switch"
        },
        {
            "label": "port",   --> endpoint on a network
            "value": "port"
        },
        {
            "label": "otep",   --> overlay tunneling endpoint, of many types (gre, vxlan,
geneve etc ...)
            "value": "otep"
        },
        {
           "label": "agent",   --> a process running on a host for control (ex: ovs agent,
 dhcp agent etc)
            "value": "agent"
        },
        {
            "label": "host",  --> the node, physical server (or VM in nested environments)
            "value": "host"
        },
        {
            "label": "project",   --> openstack's tenant
            "value": "project"
        }
    ],
    "id": "5cdd5f92bac311001dfbdbca",
    "name": "object_types"
}
```

Querying for object details

To query the MongoDB for objects you need the following information:

- type of the specific object
- specific id of the object

The list of available objects of certain type with their names, ids and some generic attributes can be listed by query to inventory endpoint for a paged list of certain object type, for example here we look for instances, 5 per page:

request:

```
calipso_client --api_password <CALIPSO_API_SERVICE_PWD>--environment cvim-cloud
--method get --endpoint inventory --page_size 5 --payload "{'type': 'instance'}"
```

response:

```
{
    "objects": [
        {
            "environment": "cvim-cloud",
            "id": "3959f44c-5e76-4648-a8b7-86039f6f9372",
            "name": "gold-vm-1",
            "name_path": "/cvim-cloud/Regions/RegionOne/Availability
Zones/aio-zone/cloud-aio-2/
Instances/gold-vm-1",
            "type": "instance"
        },
        {
            "environment": "cvim-cloud",
            "id": "5a3cb117-714a-4086-a414-c162dab583cc",
            "name": "gold-vm-4",
            "name_path": "/cvim-cloud/Regions/RegionOne/Availability
Zones/aio-zone/cloud-aio-2/
Instances/gold-vm-4",
            "type": "instance"
        }
    ]
```

All objects in the API have a unique id, this id is listed in the query for any object type list, this should then be used to grab the more detailed data available for specific object, for example:

request:

```
calipso_client --api_password <CALIPSO_API_SERVICE_PWD>--environment cvim-cloud --method
get --endpoint
inventory --payload "{'id': 'fb7cb28a-08aa-497e-9d70-5dae755c18a2'}"
```

response:

```
{
    "_id": "5d078b2184c6929f454701d8",
    "accessIPv4": "",
    "accessIPv6": "",
    "addresses": {
        "flat-network": [
            {
                "OS-EXT-IPS-MAC:mac_addr": "fa:16:3e:db:29:4a",
                "OS-EXT-IPS:type": "fixed",
                "addr": "192.168.90.4",
                "version": 4
            }
        ]
    },
    Etc….etc….
                    "revision_number": 0,
                    "security_group_id": "ce305d1f-4d02-4759-89b7-a5f92446bb8d",
                    "tags": [],
                    "tenant_id": "c7488606a2ac40ccbd79172ba1ae8b93",
                    "updated_at": "2019-05-16T14:29:13Z"
                }
            ],
            "tags": [],
            "tenant_id": "c7488606a2ac40ccbd79172ba1ae8b93",
            "updated_at": "2019-05-16T14:29:13Z"
        }
    },
    "show_in_tree": true,
    "task_state": null,
    "tenant_id": "c7488606a2ac40ccbd79172ba1ae8b93",
    "terminated_at": null,
    "type": "instance",
    "user_id": "5d0068c060d146789c3bbaf085e573ed",
    "uuid": "fb7cb28a-08aa-497e-9d70-5dae755c18a2",
    "vm_state": "active",
    "volumes_attached": []
}
```

Inventory is offering dat discovered from OpenStack APIs , Databases and also from host-level CLI commands.

Links

Links represent relationships, a certain connection between specific object and another object, for example an instance connected to it's vnic or a host_pnic connected to a network.

Each Inventory Discovery API server runs on a specific pod/environment and holds the latest scan results for all links on that specific environment in the mongoDB 'calipso' in a special collection called 'links'.

Query for links collection requires specifying an environment name and the common 'get' method.

The first logical query would be getting a list of all links in that environment of a specific 'link_type'.

The list of supported link_types can be grabbed from constants, here is the latest output for 3.4 release, with embedded explanations for the different types:

request:

```
calipso_client --api_password <CALIPSO_API_SERVICE_PWD>--method get --
endpoint constants --payload "{'name': 'link_types'}"
```

response:

```
{
    "data": [
        {
            "label": "instance-vnic",
            "value": "instance-vnic"
        },
        {
            "label": "vnic-instance",
            "value": "vnic-instance"
        },
        {
            "label": "vnic-vconnector",
            "value": "vnic-vconnector"
        },
        }, etc ..etc ..
        {
            "label": "host_pnic-switch_pnic",
            "value": "host_pnic-switch_pnic"
Etc…etc..
    "id": "5cdd5f92bac311001dfbdbc7",
    "name": "link_types"
}
```

Querying for link details

To query the MongoDB for links you need the following information:

- link_type of the specific link
- specific id of the link

The list of available links of a certain type with their names, ids and some generic attributes can be listed by query to links endpoint for a paged list of certain link type, for example here we look for instance-vnic links, 5 per page:

request:

```
calipso_client --api_password <CALIPSO_API_SERVICE_PWD>--environment cvim-cloud --method
get --
endpoint links --
page_size 5 --payload "{'link_type': 'instance-vnic'}"
```

response:

```
{
    "links": [
        {
            "environment": "cvim-cloud",
            "host": "cloud-aio-2",
            "id": "5d078b4184c6929f454705a3",
            "link_name": "flat-network",
            "link_type": "instance-vnic"
        },
        {
            "environment": "cvim-cloud",
            "host": "cloud-aio-2",
            "id": "5d078b4184c6929f454705a8",
            "link_name": "flat-network",
            "link_type": "instance-vnic"
        },
Etc…etc…
}
```

Connectivity Analysis

All links in the API have a unique id, this id is listed in the query for any link type list, this should then be used to grab the more detailed data available for specific link, for example:

request:

```
request:
calipso_client --api_password <CALIPSO_API_SERVICE_PWD>--environment cvim-cloud --
method get --endpoint links --payload "{'id': '5d078b4184c6929f454705b2'}"

response:
{
    "attributes": {
        "network": "12772133-b894-4a06-8cfb-1f01154721f1"
    },
    "environment": "cvim-cloud",
    "host": "cloud-aio-1",
    "id": "5d078b4184c6929f454705b2",
    "implicit": false,
    "link_name": "flat-network",
    "link_type": "instance-vnic",
    "link_weight": 0,
    "source": "5d078b2184c6929f454701d8",
    "source_id": "fb7cb28a-08aa-497e-9d70-5dae755c18a2",
    "source_label": "",
    "state": "up",
    "target": "5d078b3a84c6929f45470404",
    "target_id": "cloud-aio-1-gold-vm-2-vhostuser-fa:16:3e:db:29:4a",
    "target_label": ""
}}
```

Response is always a JSON and can be filtered by any means, including grep on command line.

One important detail on any link is whether or not it is 'implicit' (implicit means it is analyzed after discovery for end-to-end dependency, explicit means it is discovered from real-time data on the objects).

Each link have a 'target_id' and a 'source_id' which represents the 'ids' of certain objects on the inventory collection and can each be grabbed from inventory as explained above on the 'inventory' section.

Cliques

Cliques represent a more complex concept for analysis purposes : dependencies for a certain object.

The object is a 'focal_point' (object of interest) and it refers to an array of links all representing the dependency tree (or topology tree) for that specific object, for example an instance connected to it's vnic, then to a bridge, then to ovs, then to vxaln, then to host_pnic etc.

Each Inventory Discovery API server runs on a specific pod/environment and holds the latest scan results for all cliques and their resources on that specific environment in the mongoDB 'calipso' in a special collection called 'cliques'.

Query for cliques collection requires specifying an environment name and the common 'get' method.

The first logical query would be getting a list of all clique_types in that environment for each specific 'focal_point_type'.

Clique_types are specific for cloud type, meaning it depends on attributes like the distribution type, the type_driver and mechanism_driver in use etc.

When analyzing the data for cliques, a match is made between the attributes of the below clique_types (for example - the distribution value) and the value on the specific environment_config (see environment section above).

The list of supported clique types can be grabbed from a specific endpoint called clique_types, here is the latest output for 3.4 release, with embedded explanations for the different types:

request:

```
calipso_client --api_password <CALIPSO_API_SERVICE_PWD>--method
get --endpoint clique_types
```

response:

```
request:
calipso_client --api_password <CALIPSO_API_SERVICE_PWD>--method get --endpoint clique_types

response:
{
    "clique_types": [
        {
            "environment": "ANY",               --> this list of links for this
focal_point_type will be used if a more specific one is not matched
```

```
            "focal_point_type": "instance",    --> this object type (instance) will depend
 on the below list of link_types
            "id": "5cdd5f92bac311001dfbdbaa",
            "link_types": [
                "instance-vnic",
                "vnic-vconnector",
                "vconnector-vedge",
                "vedge-otep",
                "otep-vconnector",
                "vconnector-host_pnic",
                "host_pnic-network"
            ],
            "name": "instance"
        },
        {
            "environment": "ANY",               --> this list of links for this
focal_point_type will be used if a more specific one is not matched
            "focal_point_type": "vservice",    -> this object type (vservice) will depend
on the below list of link_types
            "id": "5cdd5f92bac311001dfbdbab",
            "link_types": [
                "vservice-vnic",
                "vnic-vedge",
                "vedge-otep",
                "otep-vconnector",
                "vconnector-host_pnic",
                "host_pnic-network"
            ],
            "name": "vservice"
        }
        {
            "distribution": "Mercury",      --> for a more specific distribution of this
type (Mercury) the below links will be used for this focal_point_type
            "environment": "",
            "focal_point_type": "instance",
            "id": "5cdd5f92bac311001dfbdbb2",
            "link_types": [
                "instance-vnic",
                "vnic-vconnector",
                "vconnector-vedge",
                "vedge-host_pnic",
                "host_pnic-network"
            ],
            "name": "instance_vconnector_clique"
        },
        {
            "distribution": "Mercury",
            "environment": "",
            "focal_point_type": "vservice",
            "id": "5cdd5f92bac311001dfbdbb3",
            "link_types": [
                "vservice-vnic",
                "vnic-vconnector",
                "vconnector-vedge",
                "vedge-host_pnic",
                "host_pnic-network"
            ],
            "name": "vservice_vedge_clique"
        },
        {
            "distribution": "Mercury",
            "environment": "",
            "focal_point_type": "network",
            "id": "5cdd5f92bac311001dfbdbb4",
            "link_types": [
                "network-host_pnic",
                "host_pnic-vedge",
                "vedge-vconnector",
                "vedge-vnic",
                "vconnector-vnic",
                "vnic-instance",
                "vnic-vservice"
            ],
            "name": "network"
        }, etc…etc…
        }
    ]
}
```

Querying for clique details

To query the MongoDB for cliques you need the following information:

- focal_point_type for the specific clique
- specific focal_point_object_id of the clique
- id of the specific clique

The actual logical flow of getting full clique details is listed further below in this section:

The list of available cliques with the specific focal_point ids and some generic attributes can be listed by query to cliques endpoint for a paged list of certain clique type, for example here we look for instance as focal_point, and list 5 per page:

request:

```
calipso_client --api_password <CALIPSO_API_SERVICE_PWD>--method get --
endpoint cliques --environment cvim-cloud --payload
"{'focal_point_type': 'instance'}" --page_size 5
```

All objects in the API have a unique id, this id is listed in the query for any clique type list, this should then be used to grab the more detailed data available for specific clique, for example:

response:

```
request:
calipso_client --api_password <CALIPSO_API_SERVICE_PWD>--environment cvim-cloud --method
get --endpoint cliques --payload "{'id': '5d07d78084c6929f454a99fa'}"

response:
{
    "clique_type": "5cdd5f92bac311001dfbdbb2",
    "constraints": {
        "network": [
            "e4ab9d18-21a3-4241-b220-5070753251ec"
        ]
    },
    "environment": "cvim-cloud",
    "focal_point": "5d07d76784c6929f454a881a",
    "focal_point_object_id": "ae3fa0a0-e21b-47c1-b531-9a86f7cdd602",
    "focal_point_type": "instance",
    "id": "5d07d78084c6929f454a99fa",
    "links": [
        "5d07d77e84c6929f454a8ba1",
        "5d07d77e84c6929f454a8c50",
        "5d07d77e84c6929f454a8d4c",
        "5d07d77e84c6929f454a8d52",
        "5d07d77e84c6929f454a8d5f",
        "5d07d77e84c6929f454a8d64",
        "5d07d77e84c6929f454a8d6e",
        "5d07d77e84c6929f454a8ecb",
        "5d07d77e84c6929f454a8ed0",
        "5d07d77e84c6929f454a8ec6",
        "5d07d77e84c6929f454a8ed5"
    ],
    "links_detailed": [
        {
            "_id": "5d07d77e84c6929f454a8ba1",
            "attributes": {
                "network": "e4ab9d18-21a3-4241-b220-5070753251ec"
            },
            "environment": "cvim-cloud",
            "host": "cloud-compute-1",
            "implicit": false,
            "link_name": "my-network",
            "link_type": "instance-vnic",
            "link_weight": 0,
            "source": "5d07d76784c6929f454a881a",
            "source_id": "ae3fa0a0-e21b-47c1-b531-9a86f7cdd602",
            "source_label": "",
            "state": "up",
            "target": "5d07d77a84c6929f454a8a44",
            "target_id": "cloud-compute-1-test-vm-2-vhostuser-fa:16:3e:0b:6e:b2",
            "target_label": ""
        }, etc…etc..
    ],
    "nodes": [
        "5d07d76b84c6929f454a884c",
        "5d07d77a84c6929f454a8a44",
        "5d07d77b84c6929f454a8aaf",
        "5d07d77b84c6929f454a8ab6",
        "5d07d77b84c6929f454a8aa8",
        "5d07d77b84c6929f454a8abd",
        "5d07d74384c6929f454a8398",
        "5d07d76b84c6929f454a885a",
        "5d07d76784c6929f454a881a"
    ]
}
```

Collections Scheme

While not restricted to any specific scheme, each object, based on its type, can hold lots of attributes, specific to its technology domain, but several attributes are mandatory on the server, for accuracy, analysis and UI/Front-End common requirements.

The following main collections are always deployed with the DB for Inventory Discovery:

- api_tokens - not exposed externally, used to hold session tokens for interaction with the DB
- attributes_for_hover_on_data - not exposed externally, used for UI to control the display of specific attributes from a specific object
- clique_constraints - not exposed externally, defined the depth of the topology discovery (see 'constraints' in clique attributes)
- clique_types - exposed externally, defines the type of topology / dependency tree available on each specific cloud / environment type

- cliques - exposed externally, holds the details of each dependency tree for each object in the inventory
- connection_tests - not exposed externally, holds the requests for testing a connection to API endpoints, DBs and CLI on hosts
- constants - exposed externally, holds the list of all supported objects and thier attributes for the different clouds
- environment_options - not exposed externally, holds lists of all supported environment configurations usedby UI
- environments_config - exposed externally, the real time details of how to interact and communicate with a specific cloud / environment
- inventory - exposed externally, holds the list of all object discovered in real time from the cloud environment
- link_types - exposed externally, holds the list of all supported link types
- links - exposed externally, holds the list of all links discovered in real time from the cloud environment
- messages - exposed externally, holds the list of all messages and events discovered in real time from the cloud environment
- monitoring_config - not exposed externally, holds the list of actual monitoring configurations for the different clouds
- monitoring_config_templates - not exposed externally, holds the list of supported monitoring configurations templates for the different clouds
- network_agent_types - not exposed externally, holds the list of all supported network agents (per cloud release)
- roles - not exposed externally, used for role definitions for RBAC to access the system with LDAP or Internal
- scans - exposed externally, holds the list of requested scans to discover, per cloud environment
- scheduled_scans - exposed externally, holds the list of requested scheduled scans to discover, per cloud environment
- statistics - not exposed externally, holds the list of metrics and statistics over time for sensu with TSDB cases
- supported_environments - not exposed externally, holds the list of all supported variances for the different clouds (distributions, type_drivers etc)
- user_settings - not exposed externally, used for user authorization definitions for RBAC to access the system with LDAP or Internal
- users - not exposed externally, used for user definitions for RBAC to access the system with LDAP or Internal

Mandatory attributes for inventory object

The following attributes are mandatory per colection, while each object, linkd and clique based on it's type have many more additional attributes:

- Mandatory attributes for inventory objects
- environment - name of cloud environment where this object was discovered
- id - unique identification across all the inventory
- type - specific type of the object (ex: instance, switch, host etc)
- name and object_name - none-unique identification as name and per-environment unique name as object_name
- show_in_tree - boolean , if object needs to be presented in a tree
- name_path - clear placement in the herarchical tree, per environment/cloud type, based on names
- id_path - clear placement in the herarchical tree, per environment/cloud type, based on ids
- parent - name of the parent object (like instances under a certain host, ports under a certain network, containers under a certain pod etc)
- parent_id - id of the parent object
- parent_type - object type of the parent object
- launched_at - when this object was discovered last
- created_at - when this object was created
- state - for monitoring purposes, several values apply per type
- host/switch - (one of which mandatory) - physical device that runs this object (more attributes apply for nested environments)
-
-

Mandatory attributes for links

- environment - name of cloud environment where this link was discovered
- id - unique identification across all the links
- link_type - specific link type of the link (ex: instance-vnic, switch_pnic-host_pnic etc) per supported link_types in constants
- link_name - per-environment unique name for the link
- state - for monitoring purposes, several values apply per type
- source_id - id of the source object of this link
- link_weight - level of importance per clique, defaults to 0
- implicit - boolean value, represent if link is real-time discovered per data presented in inventory or analyzed through other links
- host/switch - (one of which mandatory) - physical device that runs this link (more attributes apply for nested environments

Mandatory attributes for cliques

- environment - name of cloud environment where this link was discovered
- id - unique identification across all the links
- focal_point - mongoDB id of the specific 'object of intrest' that is the source of the listed links (ex: instance is a start of a list of links: instance-vnic, vnic-vconnector etc) per supported clique_types
- focal_point_object_id - inventory id of the specific focal_point on the inventory
- nodes - all the objects that are part of the clqiue (for UI graphing purposes)
- links - all the links that are part of the clqiue (for UI graphing purposes)
- clique_type - the type of the clique, per the supported clique_types
- links_detailed - all details per link
- constraints - which object type is the final 'depth' (lowest, last) object in the specific topology tree

CHAPTER 4

Managing Cisco NFVI Security

The following topics describe Cisco NFVI network and application security and best practices.

Verifying Management Node Network Permissions

The Cisco NFVI management node stores sensitive information related to Cisco NFVI operations. Access to the management node can be restricted to requests coming from IP addresses known to be used by administrators. The administrator source networks is configured in the setup file, under **[NETWORKING]** using the **admin_source_networks** parameter.

To verify this host based firewall setting, log into the management node as an admin user and list the rules currently enforces by iptables. Verify that the source networks match the values configured. If no source networks have been configured, then all source traffic is allowed. However, note that only traffic destined to ports with known admin services is allowed to pass. The **admin_source_networks** value can be set at install time or changed through a reconfigure.

```
[root@control-server-1 ~]# iptables –list
Chain INPUT (policy ACCEPT)
target     prot opt source               destination
ACCEPT     icmp --  anywhere             anywhere
ACCEPT     tcp  --  10.0.0.0/8           anywhere             tcp dpt:ssh
ACCEPT     tcp  --  172.16.0.0/12        anywhere             tcp dpt:ssh
ACCEPT     tcp  --  10.0.0.0/8           anywhere             tcp dpt:https
ACCEPT     tcp  --  172.16.0.0/12        anywhere             tcp dpt:https
ACCEPT     tcp  --  10.0.0.0/8           anywhere             tcp dpt:4979
ACCEPT     tcp  --  172.16.0.0/12        anywhere             tcp dpt:4979
ACCEPT     tcp  --  10.0.0.0/8           anywhere             tcp dpt:esmagent
ACCEPT     tcp  --  172.16.0.0/12        anywhere             tcp dpt:esmagent
ACCEPT     tcp  --  10.0.0.0/8           anywhere             tcp dpt:8008
ACCEPT     tcp  --  172.16.0.0/12        anywhere             tcp dpt:8008
ACCEPT     tcp  --  10.0.0.0/8           anywhere             tcp dpt:copy
ACCEPT     tcp  --  172.16.0.0/12        anywhere             tcp dpt:copy
ACCEPT     tcp  --  10.0.0.0/8           anywhere             tcp dpt:22250
ACCEPT     tcp  --  172.16.0.0/12        anywhere             tcp dpt:22250
ACCEPT     all  --  anywhere             anywhere             state RELATED,ESTABLISHED
DROP       all  --  anywhere             anywhere
```

Verifying Management Node File Permissions

The Cisco NFVI management node stores sensitive information related to Cisco NFVI operations. These files are secured by strict file permissions. Sensitive files include secrets.yaml, openrc, *.key, and *.pem. To verify the file permissions, log into the management node as an admin user and list all of the files in the ***~/openstack-configs/*** directory. Verify that only the owner has read and write access to these files. For example:

```
[root@control-server-1 ~]# ls -l ~/openstack-configs
total 172
-rw-------. 1 root root  3272 Jun 21 17:57 haproxy.key
-rw-------. 1 root root  5167 Jun 21 17:57 haproxy.pem
-rw-------. 1 root root   223 Aug  8 18:09 openrc
-rw-------. 1 root root   942 Jul  6 19:44 secrets.yaml

[…]
```

Viewing Administrator Access Attempts

As the UCS servers are part of the critical Cisco NFVI infrastructure, Cisco recommends monitoring administrator login access periodically.

To view the access attempts, use the **journalctl** command to view the log created by ssh. For example:

```
[root@control-server-1 ~]# journalctl –u sshd
-- Logs begin at Tue 2016-06-21 17:39:35 UTC, end at Mon 2016-08-08 17:25:06 UTC. --
Jun 21 17:40:03 hh23-12 systemd[1]: Started OpenSSH server daemon.
Jun 21 17:40:03 hh23-12 systemd[1]: Starting OpenSSH server daemon...
Jun 21 17:40:03 hh23-12 sshd[2393]: Server listening on 0.0.0.0 port 22.
Jun 21 17:40:03 hh23-12 sshd[2393]: Server listening on :: port 22.
Jun 21 17:40:43 hh23-12 sshd[12657]: Connection closed by 171.70.163.201 [preauth]
Jun 21 17:41:13 hh23-12 sshd[12659]: Accepted password for root from 171.70.163.201 port
40499
Jun 21 17:46:41 hh23-12 systemd[1]: Stopping OpenSSH server daemon...
Jun 21 17:46:41 hh23-12 sshd[2393]: Received signal 15; terminating.
Jun 21 17:46:41 hh23-12 systemd[1]: Started OpenSSH server daemon.
Jun 21 17:46:41 hh23-12 systemd[1]: Starting OpenSSH server daemon...
Jun 21 17:46:41 hh23-12 sshd[13930]: Server listening on 0.0.0.0 port 22.
Jun 21 17:46:41 hh23-12 sshd[13930]: Server listening on :: port 22.
Jun 21 17:50:45 hh23-12 sshd[33964]: Accepted password for root from 171.70.163.201 port
40545
Jun 21 17:56:36 hh23-12 sshd[34028]: Connection closed by 192.168.212.20 [preauth]
Jun 21 17:57:08 hh23-12 sshd[34030]: Accepted publickey for root from 10.117.212.20 port
62819
Jun 22 16:42:40 hh23-12 sshd[8485]: Invalid user user1 from 10.117.212.20
Jun 22 16:42:40 hh23-12 sshd[8485]: input_userauth_request: invalid user user1 [preauth]
s
```

Verifying SELinux

To minimize the impact of a security breach on a Cisco NFVI server, the Cisco VM enables SELinux (Security Enhanced Linux) to protect the server resources. To validate that SELinux is configured and running in enforcing mode, use the **sestatus** command to view the status of SELinux and verify that its status is enabled and in enforcing mode. For example:

```
[root@mgmt1 ~]# /usr/sbin/sestatus -v
SELinux status:                 enabled
SELinuxfs mount:                /sys/fs/selinux
SELinux root directory:         /etc/selinux
Loaded policy name:             targeted
Current mode:                   enforcing
Mode from config file:          permissive
Policy MLS status:              enabled
Policy deny_unknown status:     allowed
Max kernel policy version:      28
```

Validating Port Listening Services

To prevent access by unauthorized users and processes, Cisco NFVI has no extra services listening on network ports. To verify this, use the netstat -plnt command to get a list of all services listening on the node and verify that no unauthorized services are listening. For example:

```
[root@-control-server-1 ~]# netstat -plnt
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address     State       PID/Program
name
tcp        0      0 23.23.4.101:8776        0.0.0.0:*           LISTEN      24468/python2
tcp        0      0 23.23.4.101:5000        0.0.0.0:*           LISTEN      19874/httpd
tcp        0      0 23.23.4.101:5672        0.0.0.0:*           LISTEN      18878/beam.smp

tcp        0      0 23.23.4.101:3306        0.0.0.0:*           LISTEN      18337/mysqld
tcp       0      0 127.0.0.1:11211        0.0.0.0:*           LISTEN      16563/memcached
tcp       0      0 23.23.4.101:11211      0.0.0.0:*           LISTEN      16563/memcached
tcp        0      0 23.23.4.101:9292        0.0.0.0:*           LISTEN      21175/python2
tcp        0      0 23.23.4.101:9999        0.0.0.0:*           LISTEN      28555/python
tcp        0      0 23.23.4.101:80          0.0.0.0:*           LISTEN      28943/httpd
tcp        0      0 0.0.0.0:4369            0.0.0.0:*           LISTEN      18897/epmd

tcp        0      0 127.0.0.1:4243          0.0.0.0:*           LISTEN      14673/docker
tcp        0      0 0.0.0.0:22              0.0.0.0:*               LISTEN      2909/sshd
tcp        0      0 23.23.4.101:4567        0.0.0.0:*               LISTEN      18337/mysqld
tcp        0      0 23.23.4.101:15672       0.0.0.0:*               LISTEN      18878/beam.smp
tcp        0      0 0.0.0.0:35672           0.0.0.0:*               LISTEN      18878/beam.smp
tcp        0      0 127.0.0.1:25            0.0.0.0:*               LISTEN      4531/master
tcp        0      0 23.23.4.101:35357       0.0.0.0:*               LISTEN      19874/httpd
tcp        0      0 23.23.4.101:8000        0.0.0.0:*               LISTEN      30505/python
tcp        0      0 23.23.4.101:6080        0.0.0.0:*               LISTEN      27996/python2
tcp        0      0 23.23.4.101:9696        0.0.0.0:*               LISTEN      22396/python2
tcp        0      0 23.23.4.101:8004        0.0.0.0:*               LISTEN      30134/python
tcp        0      0 23.23.4.101:8773        0.0.0.0:*               LISTEN      27194/python2
tcp        0      0 23.23.4.101:8774        0.0.0.0:*               LISTEN      27194/python2
tcp        0      0 23.23.4.101:8775        0.0.0.0:*               LISTEN      27194/python2
tcp        0      0 23.23.4.101:9191        0.0.0.0:*               LISTEN      20752/python2
tcp6       0      0 :::9200                 :::*                    LISTEN      18439/xinetd
tcp6       0      0 :::4369                 :::*                    LISTEN      18897/epmd
tcp6       0      0 :::22                   :::*                    LISTEN      2909/sshd
tcp6       0      0 ::1:25                  :::*                    LISTEN      4531/master
```

Validating Non-Root Users for OpenStack Services

To prevent unauthorized access, Cisco NFVI runs OpenStack processes as a non-root user. To verify OpenStack processes are not running as root, use the **ps** command to get a list of all node processes. In the following example the user is 162:

```
[root@control-server-1 ~]# ps -aux | grep nova-api
162      27194  0.6  0.0 360924 132996 ?       S    Aug08  76:58 /usr/bin/python2
/usr/bin/nova-api
162      27231  0.0  0.0 332192 98988 ?        S    Aug08   0:01 /usr/bin/python2
/usr/bin/nova-api
162      27232  0.0  0.0 332192 98988 ?        S    Aug08   0:01 /usr/bin/python2
/usr/bin/nova-api
162      27233  0.0  0.0 332192 98988 ?        S    Aug08   0:01 /usr/bin/python2
/usr/bin/nova-api
```

Verifying Password Strength

Cisco NFVI passwords can be generated in two ways during installation:

- The Cisco NFVI installer generates unique passwords automatically for each protected service.

- You can provide an input file containing the passwords you prefer.

Cisco-generated passwords are unique, long, and contain a mixture of uppercase, lowercase, and numbers. If you provide the passwords, password strength is your responsibility.

You can view the passwords by displaying the secrets.yaml file. For example:

```
[root@mgmt1 ~]# cat ~/openstack-configs/secrets.yaml

ADMIN_USER_PASSWORD: QOZGSjVQzgu7ejv1
CINDER_DB_PASSWORD: TP2h7OAfa0VHZBb2
CINDER_KEYSTONE_PASSWORD: 0jko2Vc76h005eP9
CLOUDPULSE_KEYSTONE_PASSWORD: Vuov6wdPe5jc5kGp
COBBLER_PASSWORD: 8bhVOeciqw5jUyY5
CPULSE_DB_PASSWORD: 2DwLE0IsavQWEfMn
CVIM_MON_PASSWORD: t4qf4ORVRTtce4E0
CVIM_MON_READ_ONLY_PASSWORD: UTicXzdxn0krFplS
CVIM_MON_SERVER_PASSWORD: 1qcASpt2bRuDWbi7
DB_ROOT_PASSWORD: 5a4pQjTpCZDO1sE5
ETCD_ROOT_PASSWORD: 43yluJNsNBhv8kTp
GLANCE_DB_PASSWORD: U1HdRc7lkZslW2nD
GLANCE_KEYSTONE_PASSWORD: FpQfFnqg0AtcJbVa
HAPROXY_PASSWORD: dQzIKoi9WbCxwHGz
```

When Vault is used, it provides fetch information about the following user facing password only: "CVIM_MON_PASSWORD", "CVIM_MON_READ_ONLY_PASSWORD", "CVIM_MON_SERVER_PASSWORD", "ADMIN_USER_PASSWORD", "KIBANA_PASSWORD", “CVIM_MON_PROXY_PASSWORD”.

```
# ciscovim list-secrets --getpassword <PASSWORD_KEY>
For example,
ciscovim list-secrets --getpassword ADMIN_USER_PASSWORD


+---------------------+-----------------------------+
|Secret Key           | Secret Value                                |
+---------------------+-----------------------------+
| ADMIN_USER_PASSWORD| D1g8O6Ws2Woav7Ye                    |
|+--------------------+------------------------------+
```

Reconfiguring Passwords and OpenStack Configurations

Note This section is not applicable, if you have installed the optional Cisco Virtual Topology System. For information about use of passwords when VTS is installed, see *Installing Cisco VTS* section of *Cisco Virtualized Infrastructure Manager Installation Guide*.

You can reset some configurations after installation including the OpenStack service password and debugs, TLS certificates, and ELK configurations. Two files, secrets.yaml and openstack_config.yaml which are located in : /root/installer-{tag id}/openstack-configs/, contain the passwords, debugs, TLS file location, and ELK configurations. Also, Elasticsearch uses disk space for the data that is sent to it. These files can grow in size, and Cisco VIM has configuration variables that establishes the frequency and file size under which they are rotated.

Cisco VIM installer generates the OpenStack service and database passwords with 16 alphanumeric characters and stores those in /root/openstack-configs/secrets.yaml. You can change the OpenStack service and database passwords using the password reconfigure command on the deployed cloud. The command identifies the containers affected by the password change and restarts them so the new password can take effect.

Note Always schedule the password reconfiguration in a maintenance window as the container restart might disrupt the control plane.

Run the following command to view the list of passwords and configurations:

```
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 installer-xxxx]# ciscovim help reconfigure
usage: ciscovim reconfigure [--regenerate_secrets] [--setpassword <secretkey>]
                            [--setopenstackconfig <option>]

Reconfigure the openstack cloud
Optional arguments:
  --regenerate_secrets           Regenerate All Secrets
  --setpassword <secretkey>      Set of secret keys to be changed.
  --setopenstackconfig <option>  Set of Openstack config to be changed.
[root@mgmt1 ~]# ciscovim list-openstack-configs

+------------------+-----------------------------------------------------------------------+
| Name                        | Option
                                                     |
+------------------+-----------------------------------------------------------------------+
| IRONIC_DEBUG_LOGGING        | True
                                                     |
| OPFLEX_DEBUG_LOGGING        | True
                                                     |
| GNOCCHI_VERBOSE_LOGGING     | True
                                                     |
| AIM_DEBUG_LOGGING           | True
                                                     |
| CINDER_DEBUG_LOGGING        | False
                                                     |
| KEYSTONE_DEBUG_LOGGING      | False
                                                     |
| log_rotation_size           | 100M
                                                     |
| CLOUDPULSE_VERBOSE_LOGGING | True
                                                     |
| MAGNUM_VERBOSE_LOGGING      | True
                                                     |
| NOVA_DEBUG_LOGGING          | True
                                                     |
| NEUTRON_VERBOSE_LOGGING     | True
                                                     |
| external_lb_vip_cert        | /root/openstack-configs/haproxy.pem
                                                     |
| GLANCE_VERBOSE_LOGGING      | True
                                                     |
| elk_rotation_frequency      | weekly
                                                     |
| CEILOMETER_VERBOSE_LOGGING | True
                                                     |
| NOVA_CPU_ALLOCATION_RATIO   | 16.0
                                                     |
| CLOUDPULSE_DEBUG_LOGGING    | False
                                                     |
| log_rotation_frequency     | weekly
                                                     |
| HEAT_DEBUG_LOGGING         | False
                                                     |
| KEYSTONE_VERBOSE_LOGGING   | True
                                                     |
| external_lb_vip_cacert     | /root/openstack-configs/haproxy-ca.crt
                                                     |
| GNOCCHI_DEBUG_LOGGING      | False
                                                     |
| MAGNUM_DEBUG_LOGGING       | True
                                                     |
| log_rotation_del_older     | 8
                                                     |
| CINDER_VERBOSE_LOGGING     | True
                                                     |
| elk_rotation_size          | 2
                                                     |
| IRONIC_VERBOSE_LOGGING     | True
                                                     |
| elk_rotation_del_older     | 8
                                                     |
| NEUTRON_DEBUG_LOGGING      | True
                                                     |
| HEAT_VERBOSE_LOGGING       | True
                                                     |
| CEILOMETER_DEBUG_LOGGING   | False
                                                     |
| ES_SNAPSHOT_AUTODELETE     | {u'threshold_warning': 60, u'enabled': True, u'period':
u'hourly', u'threshold_high': 80, u'threshold_low': 50} |
| GLANCE_DEBUG_LOGGING       | False
                                                     |
| NOVA_VERBOSE_LOGGING       | True
                                                     |
| NOVA_RAM_ALLOCATION_RATIO  | 1.5
                                                     |
+------------------+----------------------------------------------------------------------+

In the absence of Vault, the following commands lists the password keys
[root@mgmt1 installer-xxxx]# ciscovim list-password-keys

The corresponding command in a pod with Vault enabled is:
[root@mgmt1 installer-xxxx]# ciscovim list-secrets

+----------------------------------+
| Password Keys                    |
+----------------------------------+
| ADMIN_USER_PASSWORD              |
| CINDER_DB_PASSWORD               |
| CINDER_KEYSTONE_PASSWORD         |
| CLOUDPULSE_KEYSTONE_PASSWORD     |
| COBBLER_PASSWORD                 |
| CPULSE_DB_PASSWORD               |
| CVIM_MON_PASSWORD                |
| CVIM_MON_READ_ONLY_PASSWORD      |
| CVIM_MON_SERVER_PASSWORD         |
| DB_ROOT_PASSWORD                 |
| ETCD_ROOT_PASSWORD               |
| GLANCE_DB_PASSWORD               |
| GLANCE_KEYSTONE_PASSWORD         |
| HAPROXY_PASSWORD                 |
| HEAT_DB_PASSWORD                 |
| HEAT_KEYSTONE_PASSWORD           |
| HEAT_STACK_DOMAIN_ADMIN_PASSWORD |
| HORIZON_SECRET_KEY                 |
| KEYSTONE_DB_PASSWORD               |
| KIBANA_PASSWORD                    |
| METADATA_PROXY_SHARED_SECRET       |
| NEUTRON_DB_PASSWORD                |
| NEUTRON_KEYSTONE_PASSWORD          |
| NOVA_DB_PASSWORD                   |
| NOVA_KEYSTONE_PASSWORD             |
| RABBITMQ_ERLANG_COOKIE             |
| RABBITMQ_PASSWORD                  |
| VOLUME_ENCRYPTION_KEY              |
| WSREP_PASSWORD                     |
+------------------------------------+
[root@mgmt1 installer-xxxx]#
```

When using Vault, you can fetch information about the following user facing password only: "CVIM_MON_PASSWORD", "CVIM_MON_READ_ONLY_PASSWORD", "CVIM_MON_SERVER_PASSWORD", "ADMIN_USER_PASSWORD", "KIBANA_PASSWORD", “CVIM_MON_PROXY_PASSWORD”.

You can change specific password and configuration identified from the available list.

Run the reconfiguration command as follows:

```
# ciscovim help reconfigure
usage: ciscovim reconfigure [--regenerate_secrets]
                            [--setupfile <setupdata_file>]
                            [--alertmanager_config <alertmanager_config_file>]
                            [--alerting_rules_config <alerting_rules_config_file>]
                            [--setpassword <secretkey>]
                            [--setopenstackconfig <option>]
                            [--setopenstackconfig_file <config_file>]
                            [--cimc_password] [--rma_tors <tor1,tor3,...>]
                            [--regenerate_ceph_keyring] [-y]

Reconfigure the Openstack cloud

Optional arguments:
  --regenerate_secrets            Regenerate All Secrets
  --setupfile <setupdata_file>    User setup_data.yaml
  --alertmanager_config <alertmanager_config_file>
                                  User alertmanager_config.yaml
  --alerting_rules_config <alerting_rules_config_file>
                                  User alerting_rules_config.yaml
  --setpassword <secretkey>       Set of secret keys to be changed.
  --setopenstackconfig <option>   Set of Openstack config to be changed.
  --setopenstackconfig_file <config_file>
                                  Set of Openstack configs to be changed from
                                  file.
  --cimc_password                 Reconfigure CIMC password
  --rma_tors <tor1,tor3,...>      Comma separated list of ToRs
  --regenerate_ceph_keyring       Regenerate Ceph Keyring
  -y, --yes                       Yes option to perform the action

[root@mgmt1 ~]# ciscovim reconfigure --setpassword ADMIN_USER_PASSWORD,NOVA_DB_PASSWORD
--setopenstackconfig HEAT_DEBUG_LOGGING,HEAT_VERBOSE_LOGGING Password for ADMIN_USER_PASSWORD:
Password for NOVA_DB_PASSWORD:
Enter T/F for option HEAT_DEBUG_LOGGING:T Enter T/F for option HEAT_VERBOSE_LOGGING:T
```

The password must be alphanumeric and can be maximum 32 characters in length.

Following are the configuration parameters for OpenStack:

Configuration Parameter	Allowed Values
CEILOMETER_DEBUG_LOGGING	T/F (True or False)
CEILOMETER_VERBOSE_LOGGING	T/F (True or False)
CINDER_DEBUG_LOGGING	T/F (True or False)
CINDER_VERBOSE_LOGGING	T/F (True or False)
CLOUDPULSE_DEBUG_LOGGING	T/F (True or False)
CLOUDPULSE_VERBOSE_LOGGING	T/F (True or False)
GLANCE_DEBUG_LOGGING	T/F (True or False)
GLANCE_VERBOSE_LOGGING	T/F (True or False)
HEAT_DEBUG_LOGGING	T/F (True or False)
HEAT_VERBOSE_LOGGING	T/F (True or False)
KEYSTONE_DEBUG_LOGGING	T/F (True or False)
KEYSTONE_VERBOSE_LOGGING	T/F (True or False)
MAGNUM_DEBUG_LOGGING	T/F (True or False)
MAGNUM_VERBOSE_LOGGING	T/F (True or False)
NEUTRON_DEBUG_LOGGING	T/F (True or False)
NEUTRON_VERBOSE_LOGGING	T/F (True or False)
NOVA_DEBUG_LOGGING	T/F (True or False)
NOVA_VERBOSE_LOGGING	T/F (True or False)
elk_rotation_del_older	Days after which older logs are purged
elk_rotation_frequency	Available options: "daily", "weekly", "fortnightly", "monthly"
elk_rotation_size	Gigabytes (entry of type float/int is allowed)
external_lb_vip_cacert	Location of HAProxy CA certificate
external_lb_vip_cert	Location of HAProxy certificate
NOVA_RAM_ALLOCATION_RATIO	Mem oversubscription ratio (from 1.0 to 4.0)
NOVA_CPU_ALLOCATION_RATIO	CPU allocation ratio (from 1.0 to 16.0)

ES_SNAPSHOT_AUTODELETE	Elastic search auto-delete configuration, can manage the following: period: ["hourly", "daily", "weekly", "monthly"] # Frequency of cronjob to check for disk space threshold_warning: <1-99> # % of disk space occupied to display warning message threshold_low: <1-99> # % of disk space occupied after cleaning up snapshots threshold_high: <1-99> # % of disk space when starting to delete snapshots

Alternatively, you can regenerate all passwords using regenerate_secrets command option as follows:

```
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --regenerate_secrets
```

In addition to the services passwords, you can change the debug and verbose options for Heat, Glance, Cinder, Nova, Neutron, Keystone and Cloudpulse in /root/openstack-configs/openstack_config.yaml. You can modify the other configurations including the ELK configuration parameters, API and Horizon TLS certificates, Root CA, NOVA RAM ALLOCATION RATIO, NOVA CPU ALLOCATION RATIO and ES_SNAPSHOT_AUTODELETE. When reconfiguring these options (For Example API and TLS), some control plane downtime will occur, so plan the changes during maintenance windows.

The command to reconfigure these elements are:

```
ciscovim reconfigure
```

The command includes a built-in validation to ensure that you do not enter typos in the secrets.yaml or openstack_config.yaml files.

When reconfiguration of password or enabling of openstack-services fails, all subsequent pod management operations are blocked. In such case, you can contact Cisco TAC to resolve the situation.

From Cisco VIM 3.4.1, you can enable NOVA_RAM_ALLOCATION_RATIO and NOVA_CPU_ALLOCATION_RATIO on a per server basis during day-0 installation or day-2 as part of pod management. For more information, see the *Cisco Virtualized Infrastructure Manager Installation Guide*.

Note

- For pod operations, OpenStack uses the service accounts such as admin, cinder, glance, heat, heat_domain_admin, neutron, nova, placement, and cloudpulse. These accounts use passwords to authenticate each other for standard operations. You must not change the password used by these accounts, other than using the ciscovim reconfigure operation. To enforce this behavior, starting Cisco VIM 2.4.5, the "change password" panel is disabled on the Horizon dashboard for these accounts.
- You should create personal OpenStack user accounts for those who need OpenStack admin or member access. You can change the passwords for these accounts through the Horizon dashboard, OpenStack CLI, or OpenStack client interface.

Reconfiguring Glance Client Key for Central Ceph Cluster

From release Cisco VIM 3.0.0, the installation of a central ceph cluster is automated to serve the images to edge pods through Glance service. No local ceph cluster for edge pods as they have constraints on power and space. The edge pods do not need any persistent storage and provide services via a central ceph cluster for glance. For the edge pods to communicate with central ceph cluster using a cluster id, a GLANCE_CLIENT_KEY is required.

Follow the below steps to reset the GLANCE_CLIENT_KEY:

Step 1 Regenerate the client keyring for glance.

a) On the central ceph cluster, ssh to the management node and execute the following:

```
# ciscovim reconfigure --regenerate_ceph_keyring --setupfile /root/Save<setup_data.yaml> -y
```

Alternatively, you can regenerate the key via the corresponding RestAPI call:

```
# curl -u <user>:<password> -X POST https://<ip|host>:8445/v1/misc --header "Content-Type:
application/json" -d '{"action": {"reconfigure": "true", "regenerate_ceph_keyring": true}}'
```

Step 2 Retrieve the generated client keyring for glance. From the management node, execute the following command to get the cluster UUID:

```
# cat /root/openstack-configs/ceph/fetch/ceph_cluster_uuid.conf
<cluster_uuid>
# cat /root/openstack-configs/ceph/fetch/<cluster_uuid>/etc/ceph/ceph.client.glance.keyring
[client.glance]
key = <GLANCE_CLIENT_KEY>
caps mon = "allow r"
caps osd = "allow class-read object_prefix rbd_children, allow rwx pool=images"
```

Step 3 Reconfigure the edge pod to use the new keyring generated on central ceph. SSH to the management node of each edge pod and execute the following:

```
[root@mgmt1 ~]# cd /root/ [root@mgmt1 ~]# mkdir MyDir [root@mgmt1 ~]# cd MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml <my_setup_data.yaml> [root@mgmt1 ~]# cp
<my_setup_data.yaml> <my_setup_data_original.yaml>
[root@mgmt1 ~]# vi my_setup_data.yaml (update the GLANCE_CLIENT_KEY with the new info)
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile ~/MyDir/<my_setup_data.yaml>
```

Step 4 Optional, but recommended to do it on a handful of pods. Once reconfiguration is done, test if the keyring works by creating and deleting glance images.

Enabling Cloud Settings

You can enable specific cloud settings as a day-0 or day-n option via reconfiguration. Listed below are the settings that are allowed in Cisco VIM.

```
cloud_settings:
   keystone_lockout_failure_attempts: <int>   # Number of incorrect password attempts before
```

```
 user is locked out. Default 0 for no lockout. Range: 0 to 10
#   keystone_lockout_duration: <int>       # Number of seconds a user is locked out. Default
 is 1800 for 30 minutes. Range: minimum: 300 (5 minutes), maximum 86400 (24 hours)
#   keystone_unique_last_password_count: <int> # Forces to change your password to a value
 not used before. Default 0 for no history check. Range: minimum 0, maximum 10
#   keystone_minimum_password_age: <int>       # Restrict users to change their password
for preset number of days. Default is 0 for no limit. Range: minimum 0, maximum 2
#   keystone_disable_inactive_account: <int>   # Disable user accounts if inactive for this
 many days. Default is 0 for no limit. Range: minimum 0, maximum 365 (1 year).
#   horizon_session_timeout: <int>         # Number of seconds of inactivity before Horizon
 dashboard is logged out.  Default is 1800 for 30 minutes. Range: minimum 300 (5 minutes),
 maximum 86400 (24 hours)
```

OpenSource documentation of cloud settings is available at:https://docs.openstack.org/keystone/latest/admin/configuration.html#security-compliance-and-pci-dss

To initiate the integration of cloud_settings on an existing pod, copy the setupdata into a local directory and update it manually with information listed above, and then run the reconfiguration command as follows:

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cd MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml <my_setup_data.yaml>
[root@mgmt1 ~]# vi my_setup_data.yaml (update the setup_data to include cloud_settings
related info)
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile ~/MyDir/<my_setup_data.yaml>
```

Enabling NFVIMON Post Pod Installation

You can optionally install Cisco VIM with a third-party software known as NFVIMON which is used to monitor the health and performance of the NFV infrastructure. The NFVIMON feature enables extensive monitoring and performance data for various components of the cloud infrastructure including Cisco UCS blade and rack servers, service profiles, Nexus top of rack switches, fabric connections and also the OpenStack instances. The monitoring system is designed such that it can monitor single or multiple pods from a single management system. NFVIMON can be enabled by extending the setup_data.yaml with relevant information on an existing pod, through the reconfigure option.

NFVIMON consists of four components: ceilometer for data collection, collector, Resource Manager (RM), and control-center with Cisco Zenpacks (CC). As NVIFMON is a third party software, care has been taken to make sure its integration into VIM is loosely coupled and the VIM automation only deals with installing the ceilometer service software piece needed to monitor the pod. The installing of the other NFVIMON components (collector, Resource Manager (RM) and control-center with Cisco Zenpacks (CC)), are Cisco Advance Services led activity and those steps are outside the scope of the install guide.

Before you Begin

Ensure that you have engaged with Cisco Advance Services on the planning and installation of the NFVIMON accessories along with its network requirements. Also, the image information of collector, Resource Manager (RM) and control-center with Cisco Zenpacks (CC)) is available only through Cisco Advance Services. At a high level, you can have a node designated to host a pair of collector VM for each pod, and a common node to host CC and RM VMs, which can aggregate and display monitoring information from multiple pods.

The collector VMs must have two interfaces: an interface to br_mgmt of the VIM, and another interface that is routabl and reachable to the VIM Installer REST API and the RM VMs. As the collector VM is available in an independent node, four IPs from the management network of the pod must be pre-planned and reserved.

The installation steps of the collector, Resource Manager (RM) and control-center with Cisco Zenpacks (CC)) are part of Cisco Advance Services led activity.

Installation of NFVIMON

The ceilometer service is the only component in NFVIMON offering that is managed by VIM orchestrator. While the ceilometric service collects the metrics to pass openstack information of the pod to the collectors, the Cisco NFVI Zenpack available in the CC/RM node gathers the node level information. To enable NFVIMON as part of the VIM Install, update the setup_data with the following information:

```
#Define the PODNAME
PODNAME: <PODNAME with no space>; ensure that this is unique across all the pods
NFVIMON:
  MASTER:                  # Master Section
    admin_ip: <IP address of Control Centre VM>
  COLLECTOR:               # Collector Section
    management_vip: <VIP for ceilometer/dispatcher to use> #Should be unique across the VIM
 Pod; Should be part of br_mgmt network
    Collector_VM_Info:
      -
        hostname: <hostname of Collector VM 1>
        password: <password_for_collector_vm1>  # max length of 32
       ccuser_password: <password from master for 'ccuser' (to be used for self monitoring)>
  # max length of 32
        admin_ip: <ssh_ip_collector_vm1> # Should be part of br_api network
        management_ip: <mgmt_ip_collector_vm1> # Should be part of br_mgmt network
      -
        hostname: <hostname of Collector VM 2>
        password: <password_for_collector_vm2>  # max length of 32
       ccuser_password: <password from master for 'ccuser' (to be used for self monitoring)>
  # max length of 32
        admin_ip: <ssh_ip_collector_vm2> # Should be part of br_api network
        management_ip: <mgmt_ip_collector_vm2> # Should be part of br_mgmt network
    COLLECTOR_TORCONNECTIONS: # Optional. Indicates the port where the collector is hanging
 off. Recommended when Cisco NCS 5500 is used as ToR
      - tor_info: {po: <int>, switch_a_hostname: ethx/y, switch_b_hostname: ethx/y}
# Section of MASTER_2 and COLLECTOR_2 are optional and only needed to support NFVIMON in
HA
  MASTER_2: # Master Section
    admin_ip: <IP address of Control Centre VM>
  COLLECTOR_2: # Collector Section
    management_vip: <VIP for ceilometer/dispatcher to use> #Should be unique across the VIM
 Pod; Should be part of br_mgmt network
    Collector_VM_Info:
    -
        hostname: <hostname of Collector VM 1>
        password: <password_for_collector_vm1> # max length of 32
       ccuser_password: <password from master for 'ccuser' (to be used for self monitoring)>
 # max length of 32
        admin_ip: <ssh_ip_collector_vm1> # Should be reachable from br_api network
        management_ip: <mgmt_ip_collector_vm1> # Should be part of br_mgmt network
    -
        hostname: <hostname of Collector VM 2>
        password: <password_for_collector_vm2> # max length of 32
       ccuser_password: <password from master for 'ccuser' (to be used for self monitoring)>
 # max length of 32
        admin_ip: <ssh_ip_collector_vm2> # Should be reachable from br_api network
        management_ip: <mgmt_ip_collector_vm2> # Should be part of br_mgmt network
    COLLECTOR_TORCONNECTIONS: # Optional. Indicates the port where the collector is hanging
 off. Recommended when Cisco NCS 5500 is used as ToR
      - tor_info: {po: <int>, switch_a_hostname: ethx/y, switch_b_hostname: ethx/y}
  DISPATCHER:
    rabbitmq_username: admin  # Pod specific user for dispatcher module.
  NFVIMON_ADMIN: admin_name  # Optional, once enabled, need to have only 1 admin
reconfigurable to add/update user id
```

Note If NFVIMON HA is enabled, ensure that all the admin IPs are on the same subnet for NFVIMON VMs and deployed servers.

To monitor ToR, ensure that the following TORSWITCHINFO sections are defined in the setup_data.yaml.

```
TORSWITHCINFO:
  SWITCHDETAILS:
 -
      hostname: <switch_a_hostname>:     # Mandatory for NFVIMON if switch monitoring is
needed
      username: <TOR switch username>    # Mandatory for NFVIMON if switch monitoring is
needed
      password: <TOR switch password>    # Mandatory for NFVBENCH; Mandatory for NFVIMON
if switch monitoring is needed
      ssh_ip: <TOR switch ssh ip>        # Mandatory for NFVIMON if switch monitoring is
needed
      ....
  -
      hostname: <switch_b_hostname>:     # Mandatory for NFVIMON if switch monitoring is
needed
      username: <TOR switch username>    # Mandatory for NFVIMON if switch monitoring is
needed
      password: <TOR switch password>    # Mandatory for NFVIMON if switch monitoring is
needed
      ssh_ip: <TOR switch ssh ip>        # Mandatory for NFVIMON if switch monitoring is
needed
      ....
```

To initiate the integration of NFVIMON on an existing pod, copy the setupdata into a local directory and update it manually with information listed above, and then run the reconfiguration command as follows:

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cd MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml <my_setup_data.yaml>
[root@mgmt1 ~]# vi my_setup_data.yaml (update the setup_data to include NFVIMON related
info)
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile ~/MyDir/<my_setup_data.yaml>
```

To initiate the uninstallation of NFVIMON on an existing pod, copy the setupdata into a local directory and remove the entire NFVIMON section listed above, and then run the reconfiguration command as follows:

```
[root@mgmt1 ~]# cd /root/ [root@mgmt1 ~]# mkdir MyDir [root@mgmt1 ~]# cd MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml <my_setup_data.yaml>
[root@mgmt1 ~]# vi my_setup_data.yaml (update the setup_data to exclude NFVIMON related
info)
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim --setupfile ~/MyDir/<my_setup_data.yaml> reconfigure
```

Note

- NFVIMON is supported only on a pod running with Keystone v3 (Default for release Cisco VIM 3.2.0).
- NFVIMON can run with either root or non-root admin keys for monitoring.

Enabling CVIMMON Post Pod Installation

CVIMMON, an extensive monitoring solution, is designed to monitor a single pod from a single management system. Cisco VIM can be optionally installed with CVIMMON, to monitor the health and performance of the NFV infrastructure. CVIMMON is enabled by extending the setup_data.yaml with relevant information on an existing pod, using the reconfigure option.

You can enable CVIMMON and CVIM-TRAP (SNMP, SERVER_MON) using the reconfigure option, post installation of Cisco VIM.

Note

CVIM-TRAP can be enabled, only if CVIMMON exists. Once the CVIMMON or CVIM-TRAP is enabled, it cannot be disabled again.

To enable the CVIMMON and SNMP-Trap features or to change the individual parameters in CVIMMON, SNMP, or SERVER_MON:

1. Take a backup of setup_data file and update it manually with the configuration details by entering the following command:

```
# cd /root/
# mkdir MyDir
# cp /root/openstack-configs/setup_data.yaml /root/MyDir
# cd /root/MyDir
```

2. Edit the setup data.

3. Save the file and execute the below command. For sample configuration, see *Enabling CVIMMON on Cisco VIM* section of *Cisco Virtualized Infrastructure Manager Installation Guide*

```
#ciscovim --setupfile /root/MyDir/setup_data.yaml reconfigure
```

Note

Migration from SNMPv2 to SNMPv3 is only supported, but not vice-versa.

Reconfiguring CIMC/BMC Password on Existing Installation

Cisco VIM allows you to reconfigure the CIMC/BMC password on an existing installation along with OpenStack services.

Note You must have a Cisco C-series or Quanta-based pod up and running with Cisco to reconfigure the CIMC password.

Step 1 Update the cimc_password in the CIMC-COMMON section, and/or the individual cimc_password for each server and then run the reconfigure option provided by Ciscovimclient.

```
CIMC-COMMON:
  cimc_username: "admin"
  cimc_password: <"new password">
:
:
SERVERS:
:
control-server-2:
  cimc_info: {'cimc_ip': '<ip_addr>',
             'cimc_username': 'admin',
            'cimc_password': <'update with new passowrd'>} # only needed if each server has specific
 password
```

Step 2 To change the CIMC password for the pod, copy the setupdata into a local location and update it manually with the CIMC password as shown in the snippet above. The new password must satisfy atleast three of the following conditions:

Note Do not change CIMC password directly into the exiting /root/openstack-configs/setup_data.yaml file.

- Must contain at least one lower case letter.
- Must contain at least one upper case letter.
- Must contain at least one digit between 0 to 9.
- One of these special characters !$#@%^-_+=*&
- Your password has to be 8 to 14 characters long.

Step 3 Run the vim reconfiguration command, to post update the setup_data as follows:

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cd MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml <my_setup_data.yaml>
[root@mgmt1 ~]# cp <my_setup_data.yaml> <my_setup_data_original.yaml>
[root@mgmt1 ~]# vi my_setup_data.yaml (update the relevant CIMC  setup_data to include LDAP info)
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~1]# ciscovim reconfigure --cimc_password --setupfile /root/MyDir/<my_setup_data.yaml>
```

Note After successful completion of the CIMC Password, reconfigure operation triggers an auto-back when the management node auto-back recovery feature is enabled. If the CIMC Password reconfigure fails, contact Cisco TAC to recover from the failure.

Increasing/Decreasing Provider and Tenant VLAN Ranges

Cisco VIM, provides the flexibility of increasing or decreasing the provider and tenant VLAN ranges after the post pod installation. Increasing provider and tenant VLAN ranges applies to C-series and B-series pod that is enabled with Cisco UCS Manager plugin. B-series pod running without Cisco UCS Manager plugin, cannot use this feature because of the inherent day-0 networking configuration to be done in FI.

Note You should have the tenant and provider networks enabled on the pod from day-0.

To increase provider and tenant VLAN ranges, enter the TENANT_VLAN_RANGES and/or PROVIDER_VLAN_RANGES in the setup_data.yaml file and run the reconfigure command through Ciscovimclient as follows:

```
TENANT_VLAN_RANGES: old_vlan_info, new_vlan_info
or/and
PROVIDER_VLAN_RANGES: old_vlan_info, new_vlan_info
```

To decrease provider and tenant VLAN ranges, update the TENANT_VLAN_RANGES and/or PROVIDER_VLAN_RANGES to be a subset of the original one in the setup_data.yaml file and run the reconfigure command through Ciscovimclient as follows:

```
TENANT_VLAN_RANGES: subset_old_vlan_info
PROVIDER_VLAN_RANGES: subset_old_vlan_info
```

Note You cannot remove and add new VLANs at the same time. Also if you remove VLAN, they cannot be reduced to less than 2 and 1 VLANs for tenant and provider network, respectively.

To change the pod, copy the setupdata into a local dir and update it manually by running the following command:

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cd MyDir
```

Update the setup_data, by running the following command:

```
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml <my_setup_data.yaml> [root@mgmt1
 ~]# vi my_setup_data.yaml (update the setup_data with the right info)
```

Run the re-configuration command as follows:

```
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ./ciscovimclient/ciscovim reconfigure --setupfile ~/MyDir/<my_setup_data.yaml>
```

Note While using auto-ToR via ACI APIs without the APIC plugin, ensure that you update the `vim_apic_networks` section with the right VLAN information as part of the reconfiguration option.

Fernet Key Operations

Keystone fernet token format is based on the cryptographic authentication method - Fernet. Fernet is an implementation of Symmetric Key Encryption. Symmetric key encryption is a cryptographic mechanism that uses the same cryptographic key to encrypt plaintext and the same cryptographic key to decrypt ciphertext. Fernet authentication method also supports multiple keys where it takes a list of symmetric keys, performs all encryption using the first key in a list and attempts to decrypt using all the keys from that list.

The Cisco NFVI pods uses Fernet keys by default. The following operations can be carried out in Cisco NFVI pods.

To check if the fernet keys are successfully synchronized across the keystone nodes.

```
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim help check-fernet-keys
usage: ciscovim check-fernet-keys

Check whether the fernet keys are successfully synchronized across keystone nodes.
```

To forcefully rotate the fernet keys:

```
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim help rotate-fernet-keys
usage: ciscovim rotate-fernet-keys
Trigger rotation of the fernet keys on keystone
```

To resync the fernet keys across the keystone nodes:

```
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim help resync-fernet-keys
usage: ciscovim resync-fernet-keys
Resynchronize the fernet keys across all the keystone nodes
```

Managing Certificates

When TLS protection is configured for the OpenStack APIs, the two certificate files, haproxy.pem and haproxy-ca.crt, are stored in the /root/openstack-configs/ directory. Clients running on servers outside of the deployed cloud to verify cloud authenticity need a copy of the root certificate (haproxy-ca.crt). If a well-known certificate authority has signed the installed certificate, no additional configuration is needed on client servers. However, if a self-signed or local CA is used, copy haproxy-ca.crt to each client. Following instructions specific to the client operating system or browser to install the certificate as a trusted certificate.

Alternatively, you can explicitly reference the certificate when using the OpenStack CLI by using the environment variable OS_CACERT or command line parameter –cacert.

While Cisco NFVI is operational, a daily check is made to monitor the expiration dates of the installed certificates. If certificates are not nearing expiration, an informational message is logged. As the certificate approaches expiration, an appropriate warning or critical message is logged.

```
2017-04-24T13:56:01 INFO Certificate for OpenStack Endpoints at 192.168.0.2:5000 expires
in 500 days
```

It is important to replace the certificates before they expire. After Cisco NFVI is installed, you can update the certificates by replacing the haproxy.pem and haproxy-ca.crt files and running the reconfigure command:

```
 cd ~/installer-xxxx; ciscovim reconfigure
```

Reconfiguring TLS Certificates

Cisco VIM provides a way to configure TLS certificates on-demand for any reason. For example: certificate expiration policies governing certificate management.

Reconfiguration of certificates in general is supported in the following components:

- Cisco VIM Rest API endpoints
- OpenStack API endpoints
- Logstash service and Fluentd (client-side certificates)

Cisco VIM Rest API endpoints:

To reconfigure certificate files, follow the below steps:

Note Cisco VIM Rest API endpoint supports IP based CN (common name) TLS certificate.

1. Copy the new key, CA root and certificate files into the ~/openstack-configs folder under the following filenames

```
 cp <new-ca-root-cert> ~/openstack-configs/mercury-ca.crt
 cp <new-key-file> ~/openstack-configs/mercury.key
 cp <new-cert-file> ~/openstack-configs/mercury.crt
```

2. Once copied, run the reconfigure steps as under:

```
 cd ~/installer-xxxx/tools
 ./restapi.py -a reconfigure-tls
```

OpenStack API endpoints

To reconfigure certificate files, follow the below steps:

1. Copy the new key, CA root and certificate files into the ~/openstack-configs folder under the following filenames

```
cp <new-ca-root-cert> ~/openstack-configs/haproxy-ca.crt
cp <new-cert-file> ~/openstack-configs/haproxy.pem
```

   `haproxy-ca.crt` must contain entire trust chain which includes RootCA and any intermediate CA. If LDAP certificate for keystone authentication is issued by a different authority than that of haproxy certificate, the entire trust chain (RootCA and any intermediate CA) for LDAP certificate must be appended to the file.

   `haproxy.pem` must contain the entire chain of the TLS certificate (Root CA, intermediate CA, and TLS certificate) and the private key. The private key must not have any passphrase (non-encrypted key).

2. Once copied, run the reconfiguration command:

```
cd ~/installer-xxxx; ciscovim reconfigure
```

Logstash service and Fluentd (client-side certificates)

- For the Logstash service on the management node, both the key and certificate file are reconfigured as part of the reconfigure operation.

- For the Fluentd service on the controllers, compute and storage nodes, the certificate file are reconfigured as part of the reconfigure operation.
- Copy of the key and certificate files to the ~/openstack-configs folder on the management node and run reconfigure operation.

```
cp <new-key-file> ~/openstack-configs/logstash-forwarder.key
 cp <new-cert-file> ~/openstack-configs/logstash-forwarder.crt
cd ~/installer-xxxx; ciscovim reconfigure
```

Verifying TLS Certificates

Cisco VIM provides a tool to check the expiration date of the installed certificates. If a certificate is expired, you may not be able to access the HTTPS endpoints. Checks are run daily and a syslog message is created if a certificate is nearing expiration.

In addition, a tool is provided to check certificate expiration on demand.

The tool's command line support can be shown as follows:

```
# cd ~/installer-xxxx/tools
# python certificate-check.py –help
```

To check all certificates, run the following commands:

```
#cd ~/installer-xxxx/tools
# python certificate-check.py
```

To check a single certificate, run the following commands:

```
cd ~/installer-xxxx/tools
# python certificate-check.py –s openstack
```

LDAP/AD support with Keystone v3

With the introduction of KeystoneV3, the openstack service authentication can be delegated to an external LDAP/AD server. In Cisco VIM, this feature has been introduced optionally if the authorization is done by Keystone v3. Just like Keystonev3, this feature can be enabled on an existing pod running Cisco VIM. To avail this feature post pod deployment, the setup_data needs to be augmented with the following information during the pod installation.

An important pre-requisite for enabling AD/LDAP integration is that the AD/LDAP endpoint MUST be reachable from all the Controller nodes that run OpenStack Keystone Identity Service.

```
LDAP:
  domain: <Domain specific name>
  user_objectclass: <objectClass for Users> # e.g organizationalPerson
  group_objectclass: <objectClass for Groups> # e.g. groupOfNames
  user_tree_dn: '<DN tree for Users>' # e.g. 'ou=Users,dc=cisco,dc=com'
  group_tree_dn: '<DN tree for Groups>' # e.g. 'ou=Groups,dc=cisco,dc=com'
  suffix: '<suffix for DN>' # e.g. 'dc=cisco,dc=com'
  url: '<ldap:// host:port>' # e.g. 'ldap://172.26.233.104:389'
or
url: '<ldaps|ldap>://[<ip6-address>]:[port]'
e.g.ldap://[2001:420:293:2487:d1ca:67dc:94b1:7e6c]:389 ---> note the mandatory "[.. ]"
```

```
around the ipv6 address
  user: '<DN of bind user>' # e.g. 'dc=admin,dc=cisco,dc=com', Optional but need to added
along with password.
  password: <password> # e.g. password of bind user,  Optional but need to be added along
with DN of bind user.

user_filter = (memberOf=CN=os-users,OU=OS-Groups,DC=mercury,DC=local)
user_id_attribute = sAMAccountName
user_name_attribute = sAMAccountName
user_mail_attribute = mail             # Optional
group_tree_dn = ou=OS-Groups,dc=mercury,dc=local
group_name_attribute = sAMAccountName
group_filter: '(&(objectClass=group)(|(cn=server-ops)(cn=admins)))'  # Optional
group_member_attribute: memberUid # Optional
group_id_attribute: gidNumber    # Optional
group_members_are_ids: True      # Optional
chase_referrals: <True or False> # Optional
```

Condition for LDAP user and password parameters are as follows:

- 1 – Can be optional
- 2 – Should be mutually inclusive
- 3 – If defined, it cannot be empty

To initiate the integration of LDAP with Keystone v3 on an existing pod, copy the setupdata into a local directory, update it manually with the relevant LDAP configuration, and then run the following reconfiguration commands:

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cd MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml <my_setup_data.yaml>
[root@mgmt1 ~]# vi my_setup_data.yaml (update the setup_data to include LDAP info)
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile ~/MyDir/<my_setup_data.yaml>
```

The reconfigure feature supports a full or partial reconfiguration of the LDAP integration service.

Note All the parameters within the LDAP stanza are configurable with the exception of the domain parameter.

Integrating identity with LDAP over TLS: The automation supports keystone integration with LDAP over TLS. In order to enable TLS, the CA root certificate must be presented as part of the /root/openstack-configs/haproxy-ca.crt file. The url parameter within the LDAP stanza must be set to ldaps.

Additionally, the url parameter supportsthe following format: url: '<ldaps | ldap>://<FQDN | IP-Address>:[port]'

The protocol can be one of the following: ldap for non-ssland ldaps when TLS has to be enabled.

The ldap host can be a fully-qualified domainname (FQDN) or an IPv4 or v6 Address depending on how the SSL certificates are generated. .

The port number is optional and if not provided assumes that the ldap services are running on the default ports. For Example:. 389 for non-ssl and 636 for ssl. However, if these are not the defaults, then the non-standard port numbers must be provided. Except for the domain, all other item values can be changed via the 'reconfigure' option.

Moving Netapp transport from http to https

For deployements, with NETAPP running over http protocol you can migrate it to https, post-deployment.

Step 1 To initiate the change, copy the setupdata into a local dir and update it manually the name/value pair in the netapp section:

```
NETAPP:
   …
   ….
  server_port: 443
  transport_type: https
  ….
  netapp_cert_file: <root ca path for netapp cluster only if protocol is https>
```

Step 2 Excute the following commands to update the netapp section:

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# mkdir MyDir [root@mgmt1 ~]# cd MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml <my_setup_data.yaml>
[root@mgmt1 ~]# vi my_setup_data.yaml (update the setup_data to netapp section as listed above)
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile ~/MyDir/<my_setup_data.yaml>
```

Enabling Cinder Volume Encryption in Cisco VIM

Cisco VIM supports the configuration and creation of encrypted volumes managed by Cinder. The encryption is done natively using Linux Unified Key Setup (LUKS). Administrators can use the standard OpenStack APIs to create and mount the volumes. From release Cisco VIM 3.0.0, the Cinder volume encryption is supported by default. No configuration parameters are available in the setup data.

The following are the steps to create an encrypted volume:

Step 1 From the management node, load the OpenStack authentication variables:

```
[root@management-server-cisco ~]# source ~/openstack-configs/openrc
```

Step 2 Create a volume type that defines the desired encryption parameters using the below command:

```
[root@management-server-cisco images]# openstack volume type create \
       --encryption-provider nova.volume.encryptors.luks.LuksEncryptor \
       --encryption-cipher aes-xts-plain64 \
       --encryption-key-size 256 \
       --encryption-control-location front-end LUKS
```

Step 3 Create an encrypted volume using the following command:

```
[root@management-server-cisco images]# openstack volume create --size 1 --type LUKS encrypted_volume
```

Replacing ACI Controller in Cisco VIM

The Opflex ML2 plugin (in Unified mode) integrated with Cisco VIM manages the tenant VLANs dynamically, as VMs come and go in the cloud. In addition, we support an administrator driven automated workflow to provision the provider networks. This feature is supported on a C-series based Fullon or Micropod running with Cisco VIC 1227 and Intel NIC x710 with redundancy at NIC level. While the integration of ACI into Cisco VIM is a day-0 activity, Cisco VIM supports the replacement of the ACI controller in the ACI cluster and the expansion of the leaf switches to increase the fabric.

Step 1 To update the setup_data, follow the below steps:

```
APICINFO:
apic_hosts: '<ip1|host1>:[port], <ip2|host2>:[port], <ip3|host3>:[port]'
# max of 3, min of 1, not 2; reconfigurable

Since the APIC manages the Leaf switches, its mandatory to define the new Leaf switches (in pairs)
in the following format:

TORSWITCHINFO:  (mandatory)

  SWITCHDETAILS:
 :
 :
   -
   hostname: <leaf-hostname-1>
   vpc_peer_keepalive: <leaf-hostname-2>
   vpc_domain: 1  # Must be unique across pairs
   br_mgmt_port_info: 'eth1/27'  # br_mgmt_* attributes must exist on at least one pair
   br_mgmt_vlan_info: '3401'
   node_id: <int> # unique across switches

   -
   hostname: <leaf-hostname-2>
   vpc_peer_keepalive: <leaf-hostname-1>
   vpc_domain: 1
   br_mgmt_port_info: 'eth1/27'  # br_mgmt_* attributes must exist on at least one pair
   br_mgmt_vlan_info: '3401'
   node_id: <int> # unique across switches
```

Step 2 T o initiate the change in ACI config on an existing pod, copy the setupdata into a local dir and update it manually with the relevantapic_hosts and/or new TORSWITCH information, then run reconfiguration commands follows:

```
[root@mgmt1 ~]# cd /root/ [root@mgmt1 ~]# mkdir MyDir [root@mgmt1 ~]# cd MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml <my_setup_data.yaml> [root@mgmt1 ~]# vi
my_setup_data.yaml (update the setup_data to include ACI info)
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile ~/MyDir/<my_setup_data.yaml>
```

Hardening Cisco VIM Deployment

If you want to harden the Cisco VIM deployment, set up the firewalls ahead of the external interfaces.

The following tables provide information about the expected traffic from the management interfaces of Cisco VIM.

Table 12: Management Nodes

Interface	Direction	Protocol	UDP/TCP	Port	Application	Note
br_api	incoming	HTTPS	TCP	8445	RestAPI	
br_api	incoming	HTTPS	TCP	8008	RestAPI logs	
br_api	incoming	HTTPS	TCP	9000	Unified Management UI	
br_api	incoming	HTTPS	TCP	5601	Kibana	
br_api	incoming	SSH	TCP	22	SSH	
br_api	incoming	HTTPS	TCP	3000	Grafana	
br_api	outgoing	NTP	UDP	123	NTP	
br_api	outgoing	DNS	UDP	53	DNS	
br_api	outgoing	Syslog	UDP	514	Syslog	User configurable. Default value is 514.
br_mgmt	incoming	HTTP	TCP	7081	Fluentd-aggr	From all nodes to mgmt node
br_api	outgoing	HTTP	TCP	9090	Prometheus	
br_api	outgoing	HTTP	TCP	9093	Alertmanager	
localhost	incoming / outgoing	HTTP	TCP	1162	SNMP / CVIM_MON	Internal communication between processes
br_api	outgoing	SNMP	UDP	162	SNMP	Userdefined. Default value is 162
br_api	incoming	HTTP	TCP	22	SERVER_MON	From CIMC of the UCS servers.

Interface	Direction	Protocol	UDP/TCP	Port	Application	Note
br_api	incoming	Syslog	UDP	5140	SERVER_MON + Syslog	From CIMC of the UCS servers to the management node
br_api	outgoing	LDAP	TCP	389	LDAP	Default: 389 or defined in setup_data
br_api	outgoing	LDAPS	TCP	636	LDAPS	Default: 636 or defined in setup_data

Table 13: Controller Nodes

Interface	Direction	Protocol	UDP/TCP	Port	Application	Note
external_lb_vip	incoming	HTTP	TCP	80	Redirects to 443	
external_lb_vip	incoming	HTTPS	TCP	443	Horizon	
external_lb_vip	incoming	HTTPS	TCP	8774	Nova	
external_lb_vip	incoming	HTTPS	TCP	6080	Nova NoVNC Proxy	
external_lb_vip	incoming	HTTPS	TCP	9696	Neutron	
external_lb_vip	incoming	HTTPS	TCP	8776	Cinder	
external_lb_vip	incoming	HTTPS	TCP	9292	Galance	
external_lb_vip	incoming	HTTPS	TCP	8000	Heat	
external_lb_vip	incoming	HTTPS	TCP	8004	Heat	
external_lb_vip	incoming	HTTPS	TCP	9999	Cloudpulse	
external_lb_vip	incoming	HTTPS	TCP	8777	Ceilometer	
external_lb_vip	incoming	HTTPS	TCP	8041	Gnocchi	
external_lb_vip	incoming	HTTPS	TCP	8778	Placement	
external_lb_vip	incoming	HTTPS	TCP	5000	Keystone	
br_mgmt	outgoing	HTTP	TCP	156272	RabbitMQ monitoring	From management node only

Interface	Direction	Protocol	UDP/TCP	Port	Application	Note
br_mgmt	outgoing	LDAP	TCP	389	LDAP	Default: 389 or defined in setup_data
br_mgmt	incoming	LDAPS	TCP	636	LDAPS	Default: 636 or defined in setup_data
br_mgmt	incoming	HTTP	TCP	7081	Fluentd	To management node

Table 14: Cisco VIM Software Hub Server Node

Interface	Direction	Protocol	UDP/TCP	Port	Application	Note
br_public	outgoing	NTP	UDP	123	NTP	
br_public	incoming	HTTPS	TCP	443	HTTPD	Browsing artifacts on a web browser
br_private	incoming	HTTPS	TCP	8441	HTTPD	Reverse proxy for docker registry
br_public	incoming	SSH	TCP	22	SSH	

Table 15: Unified Management Node

Interface	Direction	Protocol	UDP/TCP	Port	Application	Note
br_api	outgoing	HTTPS	TCP	8445	Unified Management	Connect to Cisco VIM management node RestAPI
br_api	incoming	HTTPS	TCP	9000	HTTPD	UI
br_api	incoming	SSH	TCP	22	SSH	

Cisco VIM Monitor Alerting Rules Customization

Cisco VIM monitor is deployed with a set of built-in alerting rules that cover the most important error conditions that can occur in the pod. You can view the alerts from the Grafana user interface or Alerting dashboard or send them optionally to a number of supported receivers.

After deployment, the pod administrators can customize the alerting rules based on their requirements.

Alerting Rules Customization

The alerting rules define how alerts should be triggered based on conditional expressions on any available metric. For example, you can trigger an alert when any performance metric such as CPU usage, network throughput or disk usage reaches certain threshold.

You can add new alerting rules and modify or delete the pre-built existing alerting rules by following the below steps:

1. Create a proper custom alerting rules configuration file:
    a. Create a custom alerting rule configuration file named `alerting_custom_rules.yml` under the management node `openstack-configs` directory.
    b. Add the new rules, modified rules and deleted rules in that file using your favorite editor (see the file format below)
    c. Verify that the custom alerting rule file is valid using a provided tool.
2. Once validated, if needed, you can rename it and issue a standard reconfiguration using the ciscovim cli..

```
[root@mgmt1 ~]# ciscovim reconfigure --alerting_rules_config <alerting_rules_config_file>
```

Alerting Rules Customization Workflow

Once the custom alerting rules file is validated, you need to merge two files such as default pre-existing alerting rules and custom alerting rules. Every time a reconfigure operation with --alerting_rules_config option is performed, a merge tool starts with the default alerting rules as a base for all customizations. Any previous modifications are overwritten based on the current content of alerting_custom_rules.yml file. The merge tool output file consists of:

1. All rules from alerting_custom_rules.yml that do not belong to group change-rules or delete-rules.
2. Rules from default_alerting_rules.yml:
    - that do not duplicate from custom file rules.
    - that are not supposed to be deleted.
    - that can be modified based on change-rules input.

Custom Alerting Rule File Format

The `alerting_custom_rules.yml` file must follow the format defined in this section. This format is identical to the one used by the Prometheus configuration file, with a few additional semantic extensions to support deletion and modification of pre-built existing rules.

General Format

The group entry contains a list of groups identified by (group_name), where each group can include one or more rules. Use the labels to determine the severity and other snmp trap attributes.

Following are the limitations to set labels:

- `severity`, `snmp_fault_code`, and `snmp_fault_severity` must be set to one of the values specified in the example below.
- `snmp_fault_source` should indicate the metric used in the alert expression

- snmp_node must not be changed.
- snmp_podid must be same as the pod name specified insetup_data.yaml

```
groups:
- name: {group_name}
  rules:
  - alert: {alert_name}
    annotations:
      description: {alert_description}
      summary: {alert_summary}
    expr: {alert_expression}
    for: {pending_time}
    labels:
      severity: {informational/warning/critical}
      snmp_fault_code:
{other/resourceUsage/resourceThreshold/serviceFailure/hardwareFailure/networkConnectivity}
      snmp_fault_severity: {emergency/critical/major/alert/informational}
      snmp_fault_source: {fault_source}
      snmp_node: '{{ $labels.instance }}'
      snmp_podid: {pod_id}
```

Addition of Alerting Rules

Any alert rule specified under a group other than **change-rules** group or **delete-rules** group is populated to the merged output file. You can prioritize the custom rules over the pre-existing rules if there are two alerts with the same name in both the files, such that only the one from custom file is kept as a result of the merge.

Modification of Alerting Rules

You can modify any pre-existing rule using the following syntax:

```
groups:
- name: change-rules
  rules:
  - alert: {alert_name}
    expr: {new_alert_expression}
    annotations:
      summary: {new_alert_summary}
```

The above merge script finds only the group named **change-rules** and modifies the expression and/or summary of the corresponding alert.

If the alert to be changed does not exist, it will not be created and no changes are performed.

Deletion of Alerting Rule

You can delete any built-in rule using the following construct:

```
groups:
- name: delete-rules
  rules:
  - alert: {alert_name/regular_expression}
```

The above merge script finds only the group named **delete-rules** and deletes the pre-existing rules that match the alert name or regular expressions.

If the alert to be deleted does not exist, no changes are performed.

Example

The following custom configuration file includes examples of new alerting rule, modified alerting rule and deleted alerting rules:

```
groups:
- name: cpu
  rules:
  - alert: cpu_idle
    annotations:
      description: CPU idle usage is too high - resources under-utilized
      summary: CPU idle too high
    expr: cpu_usage_idle > 80
    for: 5m
    labels:
      severity: informational
      snmp_fault_code: resourceUsage
      snmp_fault_severity: informational
      snmp_fault_source: cpu_usage_idle
      snmp_node: '{{ $labels.instance }}'
      snmp_podid: pod7
  - alert: cpu_iowait
    annotations:
      description: CPU iowait usage is too high
      summary: CPU iowait too high
    expr: cpu_usage_iowait > 10
    for: 3m
    labels:
      severity: warning
      snmp_fault_code: resourceUsage
      snmp_fault_severity: alert
      snmp_fault_source: cpu_usage_iowait
      snmp_node: '{{ $labels.instance }}'
      snmp_podid: pod7
- name: change-rules
  rules:
  - alert: disk_used_percent
    expr: disk_used_percent > 99
    annotations:
      summary: Disk used > 99%
  - alert: reboot
    annotations:
      summary: Server rebooted
  - alert: system_n_users
    expr: system_n_users > 10
- name: delete-rules
  rules:
  - alert: disk_filling_up_in_4h
  - alert: mem.*
```

Validation Script

Validate any custom configuration file prior to reconfiguration, by executing the following CLI command from any location on the management node:

```
check_alerting_rules (no additional parameters are required)
```

The validation script uses the prometheus "promtool", but skips some of its checks to allow the modification and deletion of rules. It also checks if the provided SNMP severities and fault codes are supported. When no custom file is present, the expected location is mentioned in the output.

Ouput of validation script in case of success

```
# check_alerting_rules
check_promtool.py: checking /prometheus/alerting_custom_rules.yml
check_promtool.py: success:
check_promtool.py:  regular expressions for rules to be deleted: 2
check_promtool.py:  rules to be changed: 3
check_promtool.py:  rules to be added: 2
```

Output of validation script in case of failure

```
# check_alerting_rules
check_promtool.py: checking custom-rules.yml
check_promtool.py: failure:
check_promtool.py:    group "new_group", rule 0, "new_alert": could not parse expression:
parse error at char 8:
                       could not parse remaining input "@$"...
check_promtool.py:   group "new_group2", rule 0, "new_alert_3": could not parse expression:
 parse error at char 7:
                       bad number or duration syntax: "1"
# check_alerting_rules
check_promtool.py: checking /prometheus/alerting_custom_rules.yml
check_promtool.py: failure:
check_promtool.py:    line 36: field custom_field not found in type rulefmt.Rule
```

Alert Manager and Receiver Customization

The Alert Manager component in Cisco VIM monitor is in charge of routing, grouping, and inhibiting alerts that are sent by the Prometheus alert rules engine to the appropriate receivers.

The default configuration in Cisco VIM monitor allows every alert to be forwarded as SNMP traps to the SNMP managers through SNMP agent if enabled in the Cisco VIM configuration file.

After deployment, you can add custom alert routes, alert grouping, alert inhibitions and receivers by following the below steps:

1. Create a proper custom alerting rules configuration file:
   a. Create a custom alert manager rule configuration file named `alertmanager_custom_config.yml`.
   b. Edit the content using your favorite editor (see format below).
   c. Copy that file to the management node `openstack-configs` directory
   d. Verify that the custom alerting rule file is valid using a provided tool.
2. Once the file is validated, if needed, you can either leave it in `openstack-configs` directory or move it to your preferred location. Then use a **ciscovim reconfigure** command with an additional parameter:

   ```
   [root@mgmt1 ~]# ciscovim reconfigure --alertmanager_config <alertmanager_config_file>
   ```

Supported Receivers

The Alert Manager supports the following list of receivers:

- webhook
- pagerduty
- e-mail
- pushover
- wechat
- opsgenie
- victorops

Alert Manager Custom Configuration File Format

General Format

The following listing shows the general format of the alert manager configuration file. Most custom configuration files should only include a small subset of the available options.

```
global:
# ResolveTimeout is the time after which an alert is declared resolved # if it has not been
 updated.
[ resolve_timeout: <duration> | default = 5m ]

# The default SMTP From header field. [ smtp_from: <tmpl_string> ]
# The default SMTP smarthost used for sending emails, including port number.
# Port number usually is 25, or 587 for SMTP over TLS (sometimes referred to as STARTTLS).

# Example: smtp.example.org:587 [ smtp_smarthost: <string> ]
# The default hostname to identify to the SMTP server. [ smtp_hello: <string> | default =
"localhost" ]
[ smtp_auth_username: <string> ]
# SMTP Auth using LOGIN and PLAIN. [ smtp_auth_password: <secret> ]
# SMTP Auth using PLAIN.
[ smtp_auth_identity: <string> ] # SMTP Auth using CRAM-MD5.
[ smtp_auth_secret: <secret> ]
# The default SMTP TLS requirement.
[ smtp_require_tls: <bool> | default = true ]

# The API URL to use for Slack notifications. [ slack_api_url: <secret> ]
[ victorops_api_key: <secret> ]
[ victorops_api_url: <string> | default =
"https://alert.victorops.com/integrations/generic/20131114/alert/" ]
[ pagerduty_url: <string> | default = "https://events.pagerduty.com/v2/enqueue" ] [
opsgenie_api_key: <secret> ]
[ opsgenie_api_url: <string> | default = "https://api.opsgenie.com/" ] [ hipchat_api_url:
<string> | default = "https://api.hipchat.com/" ]  [ hipchat_auth_token: <secret> ]
[ wechat_api_url: <string> | default = "https://qyapi.weixin.qq.com/cgi-bin/" ] [
wechat_api_secret: <secret> ]
[ wechat_api_corp_id: <string> ]

# The default HTTP client configuration [ http_config: <http_config> ]

  # Files from which custom notification template definitions are read.
# The last component may use a wildcard matcher, e.g. 'templates/*.tmpl'. templates:
[ - <filepath> ... ]

# The root node of the routing tree. route: <route>

# A list of notification receivers. receivers:
- <receiver> ...

# A list of inhibition rules. inhibit_rules:
[ - <inhibit_rule> ... ]
```

The custom configuration must be a full working config file with the following template. It should contain three main keys (global, route, receiver).

The global configuration must have at least one attribute, for example, resolve_timeout = 5m. Ensure that all new receivers must be part of the route so the alerts can be routed to the proper receivers. The receiver name cannot be snmp.

You can find the configuration details for creating route/receiver in the Prometheus Alert Manager documentation (publicly available online).

```
global: resolve_timeout: 5m

route: <route>

receivers:
- <receiver> ...

The following is a custom config to add a webhook receiver.

global:
  resolve_timeout: 5m

route:
  group_by: ['alertname', 'cluster', 'service']
  group_wait: 30s
  group_interval: 5m
  repeat_interval: 8737h
  receiver: receiver-webhook

receivers:
- name: ‘receiver-webhook’
  webhook_configs:
  - send_resolved: true
    url: 'http://webhook-example:####/xxxx/xxx'
```

Default Built-in Configuration File

Two different default configuration files are available to define the following in order:

1. Generic route for all alerts to the SNMP agent running on the management node.
2. Route to a generic receiver that can be customized to add a channel of notification (webhook, slack and others).

Default configuration file with SNMP enabled

```
:
global:
  resolve_timeout: 5m
```

```
route:
  group_by: ['alertname', 'cluster', 'service']
  group_wait: 30s
  group_interval: 5m
  repeat_interval: 8737h

  # A default receiver
  receiver: snmp

receivers:
- name: 'snmp'
  webhook_configs:
  - send_resolved: true
    url: 'http://localhost:1161/alarms'
```

Default configuration file with SNMP disabled

```
route:
  receiver: recv
  group_by:
  - alertname
  - cluster
  - service
  group_wait: 30s
  group_interval: 5m
  repeat_interval: 8737h
receivers:
- name: recv
```

SNMP Trap Receivers

You can send the SNMP traps to SNMP managers enabled in the Cisco VIM configuration file `setup_data.yaml`.

Example: inhibit (mute) alerts matching a set of labels

Inhibit alerts is a tool that prevents certain alerts to be trigged if other alert/alerts is/are trigged. If one alert having the target attribute matches with the another alert having source attribute, this tool inhibits the alert with target attribute.

This is the general format for inhibit alerts. You can set a regex to match both the source and target alerts and to filter the alerts per label name.

```
# Matchers that have to be fulfilled in the alerts to be muted.
target_match:
  [ <labelname>: <labelvalue>, ... ]
target_match_re:
  [ <labelname>: <regex>, ... ]

# Matchers for which one or more alerts have to exist for the
# inhibition to take effect.
source_match:
  [ <labelname>: <labelvalue>, ... ]
source_match_re:
  [ <labelname>: <regex>, ... ]

# Labels that must have an equal value in the source and target
# alert for the inhibition to take effect.
[ equal: '[' <labelname>, ... ']' ]
```

Example: Inhibit alerts if other alerts are active

The following is an example of inhibit rule that inhibits all the warning alerts that are already critical.

```
inhibit_rules:
- source_match:
    severity: 'critical'
  target_match:
    severity: 'warning'
  # Apply inhibition if the alertname is the same.
  equal: ['alertname', 'cluster', 'service']
```

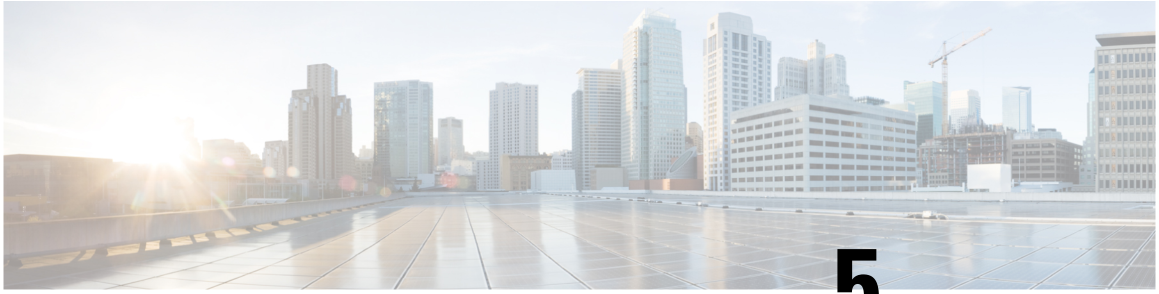
This is an example of inhibit all alerts docker_container in containers that are down (which has the alert docker_container_down on).

```
inhibit_rules:
  - target_match_re:
       alertname: 'docker_container.+'
    source_match:
       alertname: 'docker_container_down'
    equal: ['job', 'instance']
```

Validation Script

When a new configuration is set, execute the `check_alertmanager_config` from anywhere in the management node and ensure that you get a **SUCCESS** in the output from the configuration POV.

```
> check_alertmanager_config
Checking '/var/lib/cvim_mon/alertmanager_custom_config.yml'  SUCCESS
Found:
 - global config
 - route
 - 0 inhibit rules
 - 1 receivers
 - 0 templates
```



CHAPTER 5

Managing Cisco NFVI Storage

This chapter describes basic architectural concepts that will help you understand the Cisco NFVI data storage architecture and data flow. It also provides techniques you can use to monitor the storage cluster health and the health of all systems that depend on it

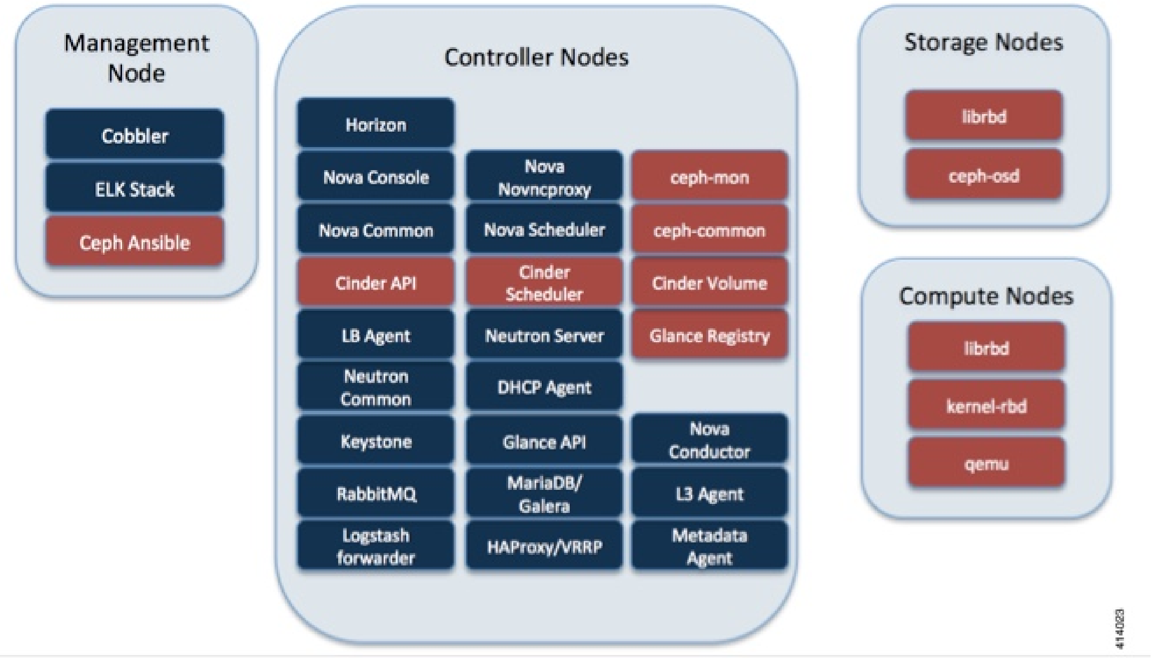
Cisco NFVI Storage Architecture

OpenStack has multiple storage back ends. Cisco NFVI uses the Ceph back end. Ceph supports both block and object storage and is therefore used to store VM images and volumes that can be attached to VMs. Multiple OpenStack services that depend on the storage backend include:

- Glance (OpenStack image service)—Uses Ceph to store images.
- Cinder (OpenStack storage service)—Uses Ceph to create volumes that can be attached to VMs.
- Nova (OpenStack compute service)—Uses Ceph to connect to the volumes created by Cinder.

The following figure shows the Cisco NFVI storage architecture component model.

Figure 15: Cisco NFVI Storage Architecture



Verifying and Displaying Ceph Storage Pools

Ceph is configured with four independent pools: images, volumes, vms, and backups. (A default rbd pool is used internally.) Each Ceph pool is mapped to an OpenStack service. The Glance service stores data in the images pool, and the Cinder service stores data in the volumes pool. The Nova service can use the vms pool to boot ephemeral disks directly from the Ceph cluster depending on how the NOVA_BOOT_FROM option in the ~/openstack-configs/setup_data.yaml was configured prior to Cisco NFVI installation. If NOVA_BOOT_FROM is set to ceph before you run the Cisco NFVI installation, the Nova service boot up from the Ceph vms pool. By default, NOVA_BOOT_FROM is set to local, which means that all VM ephemeral disks are stored as files in the compute nodes. Changing this option after installation does not affect the use of the vms pool for ephemeral disks.

The Glance, Cinder, and Nova OpenStack services depend on the Ceph cluster for backend storage. Therefore, they need IP connectivity to the controller nodes. The default port used to connect Glance, Cinder, and Nova to the Ceph cluster is 6789. Authentication through cephx is required, which means authentication tokens, called keyrings, must be deployed to the OpenStack components for authentication.

To verify and display the Cisco NFVI Ceph storage pools:

Step 1 Launch a SSH session to a controller node, for example:

```
[root@management-server-cisco ~]# ssh root@controller_server-1
```

Step 2 Navigate to the Ceph Monitor container:

```
[root@controller_server-1 ~]# cephmon
```

Step 3 List the Ceph pools:

```
cephmon_4612 [root@controller_server-1 ~]# ceph osd lspools
0 rbd,1 images,2 volumes,3 vms,4 backups,
```

Step 4 List the images pool content:

```
cephmon_4612 [ceph@controller_server-1 /]$ rbd list images
a4963d51-d3b7-4b17-bf1e-2ebac07e1593
```

Checking the Storage Cluster Health

Cisco recommends that you perform a few verifications to determine whether the Ceph cluster is healthy and is connected to the Glance, Cinder, and Nova OpenStack services, which have Ceph cluster dependencies. The first task to check the health of the cluster itself by completing the following steps:

Step 1 From the Cisco NFVI management node, launch a SSH session to a controller node, for example:

```
[root@management-server-cisco ~]# ssh root@controller_server-1
```

Step 2 Navigate to the Ceph Monitor container:

```
[root@controller_server-1 ~]# cephmon
```

Step 3 Check the Ceph cluster status:

```
cephmon_4612 [ceph@controller_server-1 ceph]$ ceph status
```

Sample response:

```
cluster dbc29438-d3e0-4e0c-852b-170aaf4bd935
     health HEALTH_OK
     monmap e1: 3 mons at {ceph-controller_server-1=20.0.0.7:6789/0,
    ceph-controller_server-2=20.0.0.6:6789/0,ceph-controller_server-3=20.0.0.5:6789/0}
            election epoch 8, quorum 0,1,2 ceph-controller_server-3,
    ceph-controller_server-2,ceph-controller_server-1
     osdmap e252: 25 osds: 25 up, 25 in
      pgmap v593: 1024 pgs, 5 pools, 406 MB data, 57 objects
            2341 MB used, 61525 GB / 61527 GB avail
                1024 active+clean
```

This example displays three monitors, all in good health, and 25 object storage devices (OSDs). All OSDs show as up and in the cluster.

Step 4 To see a full listing of all OSDs sorted by storage node, enter:

```
cephmon_4612 [ceph@controller_server-1 ceph]$ ceph osd tree
```

Sample response:

```
ID WEIGHT   TYPE NAME               UP/DOWN REWEIGHT PRIMARY-AFFINITY
-1 60.18979 root default
-2 18.96994     host controller_server-2
 1  2.70999         osd.1               up  1.00000          1.00000
 5  2.70999         osd.5               up  1.00000          1.00000
 6  2.70999         osd.6               up  1.00000          1.00000
```

```
11  2.70999         osd.11              up  1.00000          1.00000
12  2.70999         osd.12              up  1.00000          1.00000
17  2.70999         osd.17              up  1.00000          1.00000
20  2.70999         osd.20              up  1.00000          1.00000
-3 18.96994     host controller_server-1
 0  2.70999         osd.0               up  1.00000          1.00000
 4  2.70999         osd.4               up  1.00000          1.00000
 8  2.70999         osd.8               up  1.00000          1.00000
10  2.70999         osd.10              up  1.00000          1.00000
13  2.70999         osd.13              up  1.00000          1.00000
16  2.70999         osd.16              up  1.00000          1.00000
18  2.70999         osd.18              up  1.00000          1.00000
-4 18.96994     host controller_server-3
 2  2.70999         osd.2               up  1.00000          1.00000
 3  2.70999         osd.3               up  1.00000          1.00000
 7  2.70999         osd.7               up  1.00000          1.00000
 9  2.70999         osd.9               up  1.00000          1.00000
14  2.70999         osd.14              up  1.00000          1.00000
15  2.70999         osd.15              up  1.00000          1.00000
19  2.70999         osd.19              up  1.00000          1.00000
-5  3.27997     host controller_server-4
21  0.81999         osd.21              up  1.00000          1.00000
22  0.81999         osd.22              up  1.00000          1.00000
23  0.81999         osd.23              up  1.00000          1.00000
24  0.81999         osd.24              up  1.00000          1.00000
```

What to do next

After you verify the Ceph cluster is in good health, check that the individual OpenStack components have connectivity and their authentication tokens—keyrings—match the Ceph Monitor keyrings. The following procedures show how to check the connectivity and authentication between Ceph and Glance, Ceph and Cinder, and Ceph and Nova.

Checking Glance Connectivity

The Glance API container must be connected to the Cisco NFVI controller nodes. Complete the following steps to verify the Glance to controller node connectivity:

Step 1 From the management node, examine the IP addresses of controller node:

```
[root@management-server-cisco ~]# cat /root/openstack-configs/mercury_servers_info
```

Step 2 From the management node, launch a SSH session to a controller node, for example:

```
[root@management-server-cisco ~]# ssh root@controller_server-1
```

Step 3 Navigate to the Glance API container:

```
[root@controller_server-1 ~]# glanceapi
```

Step 4 Check the Glance API container connectivity to the storage IP address of the controller node different from the one entered in Step 2:

```
glanceapi_4612 [glance@controller_server-1 /]$ curl <storage_ip_of_another_controller>:6789
```

If the connection is successful, no message is displayed, but you need to do Ctrl+C to terminate the connection:

```
glanceapi_4612 [glance@controller_server-1 /]$ curl 7.0.0.16:6789
```

If the connection is not successful, you see a message like the following:

```
glanceapi_4612 [glance@controller_server-1 /]$ curl 7.0.0.16:6789 curl: (7)
Failed connect to controller_server-2:6789; Connection refused
```

The above message indicates that the Ceph monitor running on the target controller node controller_server-2 is not listening on the specified port or there is no route to it from the Glance API container.

Checking one controller node should be enough to ensure one connection path available for the Glance API. As Cisco NFVI controller nodes run as part of an HA cluster, you should run Step 3 above targeting all the controller nodes in the Cisco NFVI pod.

What to do next

After you verify the Glance API connectivity to all Cisco NFVI controller nodes, check the Glance keyring to ensure that it matches with the Ceph monitor keyring.

Verifying Glance and Ceph Monitor Keyrings

Complete the following steps to verify the Glance API keyring matches the Ceph Monitor keyring.

Step 1 Launch a SSH session to a controller node, for example:

```
[root@management-server-cisco ~]# ssh root@controller_server-1
```

Step 2 Navigate to the Glance API container:

```
[root@controller_server-1 ~]# glanceapi
```

Step 3 Check the Glance keyring content, for example:

```
glanceapi_4612 [glance@controller_server-1 /]$ cat /etc/ceph/client.glance.keyring [client.glance]
key = AQA/pY1XBAnHMBAAeS+0Wmh9PLZe1XqkIW/p0A==
```

Step 4 On the management node, check the CEPH cluster UUID:

```
[root@management-server-cisco ~]# cat /root/openstack-configs/ceph/fetch/ceph_cluster_uuid.conf
0e96e7f2-8175-44b3-ac1a-4f62de12ab9e
```

Step 5 Display the Ceph Glance keyring content:

```
[root@management-server-cisco ~]# cat
/root/openstack-configs/ceph/fetch/0e96e7f2-8175-44b3-ac1a-4f62de12ab9e/etc/ceph/ceph.client.glance.keyring

[mon.]

key = AQA/pY1XBAnHMBAAeS+0Wmh9PLZe1XqkIW/p0A==
```

Verify whether the keyring matches the Glance API keyring displayed in Step 3.

What to do next

A final check to ensure that Ceph and Glance are connected is to actually import a Glance image using Horizon or the Glance CLI. After you import an image, compare the IDs seen by Glance and by Ceph. They should match, indicating Ceph is handling the backend for Glance.

Verifying Glance Image ID on Ceph

The following steps verify Ceph is properly handling new Glance images by checking that the image ID for a new Glance image is the same as the image ID displayed in Ceph.

Step 1 From the management node, load the OpenStack authentication variables:

```
[root@management-server-cisco ~]# source ~/openstack-configs/openrc
```

Step 2 Import any Glance image. In the example below, a RHEL 7.1 qcow2 image is used.

```
[root@management-server-cisco images]# openstack image create
 "rhel" --disk-format qcow2 --container-format bare --file rhel-guest-image-7.1-20150224.0.x86_64.qcow2
```

Step 3 List the Glance images:

```
[root@management-server-cisco images]# openstack image list | grep rhel
| a4963d51-d3b7-4b17-bf1e-2ebac07e1593 | rhel
```

Step 4 Navigate to the Ceph Monitor container:

```
[root@controller_server-1 ~]# cephmon
```

Step 5 Display the contents of the Ceph images pool:

```
cephmon_4612 [ceph@controller_server-1 ceph]$ rbd list images | grep
a4963d51-d3b7-4b17-bf1e-2ebac07e1593
a4963d51-d3b7-4b17-bf1e-2ebac07e1593
```

Step 6 Verify that the Glance image ID displayed in Step 3 matches with the image ID displayed by Ceph.

Checking Cinder Connectivity

The Cinder volume container must have connectivity to the Cisco NFVI controller nodes. Complete the following steps to verify Cinder volume has connectivity to the controller nodes:

Step 1 From the management node, examine the IP addresses of controller node:

```
[root@management-server-cisco ~]# cat /root/openstack-configs/mercury_servers_info
```

Step 2 From the management node, launch a SSH session to a controller node, for example:

```
[root@management-server-cisco ~]# ssh root@controller_server-1
```

Step 3 Navigate to the Cinder volume container:

```
[root@controller_server-1 ~]# cindervolume
```

Step 4 Check the Cinder volume container connectivity to the storage IP address of controller node different from the one entered in Step 1:

```
cindervolume_4612 [cinder@controller_server-1 /]$ curl 7.0.0.16:6789
```

If the connection is successful, no message is displayed, but you need to do a Ctrl-C to terminate the connection:

```
cindervolume_4612 [cinder@controller_server-1 /]$ curl 7.0.0.16:6789
```

If the connection is not successful, you see a message like the following:

```
cindervolume_4612 [cinder@controller_server-1 /]$ curl controller_server-2:6789
curl: (7) Failed connect to controller_server-2:6789; Connection refused
```

A message like the one above means the Ceph monitor running on the target controller node controller_server-2 is not listening on the specified port or there is no route to it from the Cinder volume container.

Checking one controller node should be enough to ensure one connection path is available for the Cinder volume. However, because Cisco NFVI controller nodes run as part of an HA cluster, repeat Step 3 targeting all the controller nodes in the Cisco NFVI pod.

What to do next

After you verify the Cinder volume connectivity to all Cisco NFVI controller nodes, check the Cinder keyring to ensure it matches the Ceph monitor keyring.

Verifying Cinder and Ceph Monitor Keyrings

Complete the following steps to verify the Cinder volume keyring matches the Ceph Monitor keyring.

Step 1 From the management node, launch a SSH session to a controller node, for example:

```
[root@management-server-cisco ~]# ssh root@controller_server-1
```

Step 2 Navigate to the Cinder volume container:

```
[root@controller_server-1 ~]# cindervolume
```

Step 3 Check the Cinder keyring content, for example:

```
cindervolume_4612 [cinder@controller_server-1 /]$ cat /etc/ceph/client.cinder.keyring
[client.cinder]
key = AQA/pY1XBAnHMBAAeS+0Wmh9PLZe1XqkIW/p0A==
```

Step 4 On management node, check the CEPH cluster UUID:

```
[root@management-server-cisco ~]# cat /root/openstack-configs/ceph/fetch/ceph_cluster_uuid.conf
0e96e7f2-8175-44b3-ac1a-4f62de12ab9e
```

Step 5 Display the Ceph Cinder keyring content:

```
[root@management-server-cisco ~]# cat
```

```
/root/openstack-configs/ceph/fetch/0e96e7f2-8175-44b3-ac1a-4f62de12ab9e/etc/ceph/ceph.client.cinder.keyring
[client.cinder]
key = AQA/pY1XBAnHMBAAeS+0Wmh9PLZe1XqkIW/p0A==
```

Verify whether the keyring matches with the Cinder volume keyring displayed in Step 3.

What to do next

As a final Ceph and Cinder connectivity verification, import a Cinder image using Horizon or the Cinder CLI. After you import the image, compare the IDs seen by Cinder and by Ceph. If the IDs match, it indicates that Ceph is handling the backend for Cinder.

Verifying Cinder Volume ID on Ceph

The following steps verify Ceph is properly handling new Cinder volumes by checking that the volume ID for a new Cinder volume is the same as the volume ID displayed in Ceph.

Step 1 From the management node, load the OpenStack authentication variables:

```
[root@management-server-cisco ~]# source ~/openstack-configs/openrc
```

Step 2 Create an empty volume:

```
[root@management-server-cisco ~]# openstack volume create --size 5 ciscovol1
```

The preceding command creates a new 5 GB Cinder volume named ciscovol1.

Step 3 List the Cinder volumes:

```
[[root@management-server-cisco ~]# openstack volume list
+--------------------------------------+-----------+-----------+------+-------------+
| ID                                   | Name      | Status    | Size | Attached to |
+--------------------------------------+-----------+-----------+------+-------------+
| 3017473b-6db3-4937-9cb2-bd0ba1bf079d | ciscovol1 | available |    5 |             |
+--------------------------------------+-----------+-----------+------+-------------+
```

Step 4 Navigate to the Ceph Monitor container:

```
[root@controller_server-1 ~]# cephmon
```

Step 5 Display the contents of the Ceph volumes pool:

```
cephmon_4612 [ceph@controller_server-1 ceph]$ rbd list volumes
volume-3017473b-6db3-4937-9cb2-bd0ba1bf079d
```

Step 6 Verify that the Cinder volume ID displayed in Step 3 matches with the volume ID displayed by Ceph, excluding the "volume-" prefix.

Checking Nova Connectivity

The Nova libvirt container must have connectivity to the Cisco NFVI controller nodes. Complete the following steps to verify Nova has connectivity to the controller nodes:

Step 1 From the management node, examine the IP addresses of controller node:

```
[root@management-server-cisco ~]# cat /root/openstack-configs/mercury_servers_info
```

Step 2 From the management node, launch a SSH session to a controller node, for example:

```
[root@management-server-cisco ~]# ssh root@Computenode_server-1
```

Step 3 Navigate to the Nova libvirt container:

```
[root@compute_server-1 ~]# libvirt
```

Step 4 Check the Nova libvirt container connectivity to the storage address of the controller node different from the one entered in Step 1:

```
novalibvirt_4612 [root@compute_server-1 /]$ curl 7.0.0.16:6789
```

If the connection is successful, no message is displayed, but you need to do a Ctrl-C to terminate the connection:

If the connection is not successful, a message is displayed as follows:

```
novalibvirt_4612 [root@compute_server-1 /]$ curl 7.0.0.16:6789
curl: (7) Failed connect to controller_server-1:6789; Connection refused
```

The above message indicates that the Ceph monitor running on the target controller node controller_server-1 is not listening on the specified port or there is no route to it from the Nova libvirt container.

Checking one controller node is sufficient to ensure that one connection path is available for the Nova libvirt. As Cisco NFVI controller nodes run as part of an HA cluster, you should run Step 3 above targeting all the controller nodes in the Cisco NFVI pod.

What to do next

After you verify the Nova libvirt connectivity to all Cisco NFVI controller nodes, check the Nova keyring to ensure it matches the Ceph monitor keyring.

Verifying the Nova and Ceph Monitor Keyrings

Complete the following steps to verify the Nova libvirt keyring matches the Ceph Monitor keyring.

Step 1 From the management node, launch a SSH session to a controller node, for example:

```
[root@management-server-cisco ~]# ssh root@compute_server-1
```

Step 2 Navigate to the Nova libvert container:

```
[root@compute_server-1 ~]# libvirt
```

Step 3 Extract the libvirt secret that contains the Nova libvirt keyring:

```
novalibvirt_4612 [root@compute_server-1 /]# virsh secret-list
UUID                           Usage …
-----------------------------------------------------------------
b5769938-e09f-47cb-bdb6-25b15b557e84 ceph client.cinder
```

Step 4 Get the keyring from the libvert secret:

```
novalibvirt_4612 [root@controller_server-1 /]# virsh secret-get-value
b5769938-e09f-47cb-bdb6-25b15b557e84 AQBApY1XQCBBEBAAroXvmiwmlSMEyEoXKl/sQA==
```

Step 5 On management node, check the CEPH cluster UUID::

```
[root@management-server-cisco ~]# cat /root/openstack-configs/ceph/fetch/ceph_cluster_uuid.conf
0e96e7f2-8175-44b3-ac1a-4f62de12ab9e
```

Step 6 Display the Ceph Cinder keyring content:

```
[root@management-server-cisco ~]# cat
/root/openstack-configs/ceph/fetch/0e96e7f2-8175-44b3-ac1a-4f62de12ab9e/etc/ceph/ceph.client.cinder.keyring
[client.cinder]

key = AQBApY1XQCBBEBAAroXvmiwmlSMEyEoXKl/sQA==
```

Step 7 Verify whether the keyring matches with the Nova libvirt keyring displayed in Step 3.

Note In the above example, the Cinder keyring is checked even though this procedure is for the Nova libvirt keyring. This occurs because the Nova services need access to the Cinder volumes and so authentication to Ceph uses the Cinder keyring.

What to do next

Complete a final check to ensure that Ceph and Nova are connected by attaching a Nova volume using Horizon or the Nova CLI. After you attach the Nova volume, check the libvirt domain.

Working with Multi-Backend Ceph

The OpenStack component that provides an API to create block storage for cloud is called OpenStack Block Storage service or Cinder. Cinder requires you to configure single backend (by default) or multiple backend.

Cisco VIM supports the following Cinder backends either configured in isolation or parallel.

- Storage nodes full of SSDs disks
- Storage nodes full of HDDs disks

Choosing multi-backend ceph is currently a day-0 option, that is, the cloud administrator must choose single backend or multi-backend storage option at the beginning. It is recommended to have four nodes with a minimum being three nodes for each storage type (HDD or SSD).

To enable support for Cinder multi-backends, update the `setup_data.yaml` to include the `osd_disk_type` as HDD/SSD under 'hardware_info' of the storage server as given below:

```
storage-hdd-server-1:  ---□ Need mininmum of 3; recommend to have 4
        cimc_info: {cimc_ip: <cimc_ip}
```

```
   hardware_info: {osd_disk_type: HDD}
   rack_info: {rack_id: RackA}
storage-ssd-server-1:  --□ ---□ Need mininmum of 3; recommend to have 4
  cimc_info: {cimc_ip: <cimc_ip>}
  hardware_info: {osd_disk_type: SSD}
  rack_info: {rack_id: RackB}
```

After successful deployment of Cisco VIM, follow the below steps to create Cinder multi-backends:

Step 1 Log into Horizon of the cloud and navigate to <**Admin/Volume/Volume Types** tab

a) Specify the Name and Description (Optional). The Name can be **`volume-ssd`** or **`volume-hdd`** for SSD or HDD, respectively
b) Click the dropdown and select **view extra specs**
c) Click on **Create** and update the **Key** with **`volume_backend_name`**.
d) Enter the **Value** as given below:

For SSD, the Value is **`ceph-ssd`**

For HDD, the Value is **`ceph`**

Step 2 Create Volume from Horizon for each backend type

a) Choose **Project/Volumes/Volumes**
b) Click **Create Volume**

Volume name : SSD volume (example)

Description: Optional

Volume Source : use the default

Type : Choose the volume type from the dropdown. It can be volume-ssd/volume-hdd

Step 3 Attach the volume to Instance.

a) Navigate to **Project/compute/instance**.
b) Select the instance to be attached the volume.
c) Click on the drop down **Attach volume** and select the Volume ID from the dropdown.

Verifying Nova Instance ID

From the management node, complete the following steps to verify the Nova instance ID of a guest VM having a cinder volume attached::

Step 1 Load the OpenStack authentication variables:

```
[root@management-server-cisco installer]# source ~/openstack-configs/openrc
```

Step 2 List the Nova instances:

```
[root@management-server-cisco images]# nova list
+--------------------------------------+------------+--------+--------
| ID                                   | Name       | Status | Task
```

```
+--------------------------------------+------------+--------+--------
| 77ea3918-793b-4fa7-9961-10fbdc15c6e5 | cisco-vm   | ACTIVE | -
+----------------------------------+----------+-------+-
```

Step 3 Show the Nova instance ID for one of the instances:

```
[root@management-server-cisco images]# nova show
77ea3918-793b-4fa7-9961-10fbdc15c6e5 | grep instance_name
| OS-EXT-SRV-ATTR:instance_name        | instance-00000003
```

The Nova instance ID in this example is instance-00000003. This ID will be used later with the virsh command. Nova instance IDs are actually the libvirt IDs of the libvirt domain associated with the Nova instance.

Step 4 Identify the compute node where the VM was deployed:

```
[root@management-server-cisco images]# nova show 77ea3918-793b-4fa7-9961-10fbdc15c6e5 | grep
hypervisor
| OS-EXT-SRV-ATTR:hypervisor_hostname  | compute_server-1
```

The compute node in this case is compute_server-1. You will connect to this compute node to call the virsh commands. Next, you get the volume ID from the libvirt domain in the Nova libvirt container.

Step 5 Launch a SSH session to the identified compute node, compute_server-1:

```
[root@management-server-cisco ~]# ssh root@compute_server-1
```

Step 6 Navigate to the Nova libvirt container:

```
[root@compute_server-1 ~]# libvirt
```

Step 7 Get the instance libvirt domain volume ID:

```
novalibvirt_4612 [root@compute_server-1 /]# virsh dumpxml instance-00000003 | grep rbd
 <source protocol='rbd' name='volumes/volume-dd188a5d-f822-4769-8a57-c16694841a23'>
```

Step 8 Launch a SSH session to a controller node:

```
[root@management-server-cisco ~]# ssh root@controller_server-1
```

Step 9 Navigate to the Ceph Monitor container:

```
[root@compute_server-1 ~]# cephmon
```

Step 10 Verify volume ID matches the ID in Step 7:

```
cephmon_4612 [ceph@controller_server-1 ceph]
$ rbd list volumes | grep volume-dd188a5d-f822-4769-8a57-c16694841a23
volume-dd188a5d-f822-4769-8a57-c16694841a23
```

Displaying Docker Disk Space Usage

Docker supports multiple storage back ends such as Device Mapper, thin pool, overlay, and AUFS. Cisco VIM uses the devicemapper storage driver because it provides strong performance and thin provisioning. Device Mapper is a kernel-based framework that supports advanced volume management capability. Complete the following steps to display the disk space used by Docker containers.

Step 1 Launch a SSH session to a controller or compute node, for example:

```
[root@management-server-cisco ~]# ssh root@controller_server-1
```

Step 2 Enter the docker info command to display the disk space used by Docker containers:

```
[root@controller_server_1 ~]# docker info
Containers: 24
Images: 186
Storage Driver: devicemapper
 Pool Name: vg_var-docker--pool
 Pool Blocksize: 524.3 kB
 Backing Filesystem: xfs
 Data file:
 Metadata file:
 Data Space Used: 17.51 GB
 Data Space Total: 274.9 GB
 Data Space Available: 257.4 GB…
```

Reconfiguring Administrator Source Networks

To access the administrator services, Cisco VIM provides source IP based filtering of network requests on the management node. These services include SSH and Kibana dashboard access. When the services are configured all admin network requests made to the management node are dropped, except the white listed addresses in the configuration.

Reconfiguring administrator source network supports the following options:

- Set administrator source network list: Network addresses can be added or deleted from the configuration; the list is replaced in whole during a reconfigure operation.
- Remove administrator source network list: If the **admin_source_networks** option is removed, the source address does not filter the incoming admin service requests.

The following section needs to be configured in the Setup_data.yaml file:

```
admin_source_networks: # optional, host based firewall to white list admin's source IP
  - 10.0.0.0/8
  - 172.16.0.0/12
```

Note You must be careful while updating the source networks. If the list is misconfigured, you are locked and not allowed to access the management node through SSH. If it is locked, you must log into the management node through the console port to repair the configuration.

To initiate the integration, copy the `setupdata` into a local directory by running the following command:

```
[root@mgmt1 ~]# cd /root/
[root@mgmt1 ~]# mkdir MyDir
[root@mgmt1 ~]# cd MyDir
[root@mgmt1 ~]# cp /root/openstack-configs/setup_data.yaml <my_setup_data.yaml>
```

Update the `setupdata` by running the following command:

```
[root@mgmt1 ~]# vi my_setup_data.yaml (update the setup_data to include Admin source network
 information)
```

Run the reconfiguration command as follows:

```
[root@mgmt1 ~]# cd ~/installer-xxxx
[root@mgmt1 ~]# ciscovim reconfigure --setupfile ~/MyDir/<my_setup_data.yaml>
```

Password Reset for Cisco VIM Management Node

Run the following command to reset the Root Password of Cisco VIM management node **RHEL-7 / systemd** .

1. Boot your system and wait until the **GRUB2** menu appears.
2. In the **boot loader** menu, highlight any entry and press **e**.
3. Find the line beginning with linux. At the end of this line, append the following:

   ```
    init=/bin/sh
   ```

   Or if you face any alarm, instead of **ro** change **rw** to **sysroot** as shown in the following example:

   ```
   rw init=/sysroot/bin/sh
   ```

4. Press **Ctrl+X** to boot the system using the options you edited.

   Once the system boots, you can see the shell prompt without having to enter any user name or password:

   ```
   sh-4.2#
   ```

5. Load the installed SELinux policy by running the following command:

   ```
   sh-4.2# /usr/sbin/load_policy -i
   ```

6. Execute the following command to remount your root partition:

   ```
   sh4.2#
       mount -o remount,rw /
   ```

7. Reset the root password by running the following command:

   ```
   sh4.2# passwd root
   ```

   When prompted, enter your new root password and click **Enter** key to confirm. Enter the password for the second time to make sure you typed it correctly and confirm with **Enter** again. If both the passwords match, a confirmation message appears.

8. Execute the following command to remount the root partition again, this time as read-only:

   ```
   sh4.2#
       mount -o remount,ro /
   ```

9. Reboot the system. Now you can log in as the root user using the new password set up during this procedure.

   To reboot the system, enter `exit` and `exit` again to leave the environment and reboot the system.

References: https://access.redhat.com/solutions/918283.

Ceph Storage Expansion

From release Cisco VIM 3.0.0, a command `expand-storage` is available to add disks so as to expand an already deployed Ceph storage cluster. You can deploy the storage nodes in the Openstack PoD in one of two ways:

- Combination of HDD and SSD drives with Ceph deployed with dedicated journals.
- All SSD drives with Ceph deployed with collocated journals.

Note The expand-storage command is supported only on storage nodes with a combination of HDD and SSD drives.

You must install disk drives based on how the node was originally deployed. If you have a storage node with a 1 SSD/4 HDDs ratio, insert disks with that same SSD/HDD ratio for expanding the storage. The expand-storage command looks for blocks of disks with that ratio during the expansion process, and installs one block at a time.

Workflow

- Use ciscovim list-nodes to find a node with a role of “block-storage”
- Insert a block of disks based on your storage deployment into the target node
- Log into the CIMC of the target node and navigate to the storage panel.
- Verify that no disks are reporting errors.
- If any disk reports foreign configuration, clear the configuration.
- Enable JBOD if RAID controller is used.
- Run cloud-sanity and ensure that no failure occurs.
- Run osdmgmt check-osds to check the state and number of the OSDs currently installed.
- Run expand-storage with the name of the target storage node.
- Run osdmgmt check-osds to check the state and number of the OSDs .
- Compare the outputs of the two osdmgmt check-osd commands and verify whether the new disks were added as additional OSDs.

The expand storage command runs in the same manner as other ciscovim commands but with various steps executed at a time.The command execution is stopped in case of any failure. You can view the logs once the command execution is complete. The steps for the expand-storage command are:

- Hardware validations
- Baremetal
- CEPH for expansion
- VMTP

Command Help

```
$ ciscovim help expand-storage
usage: ciscovim expand-storage --setupfile SETUPFILE [-y] <node>

Expand storage node capacity

Positional arguments:
  <node>                 Expand Storage capacity of a storage node

Optional arguments:
  --setupfile SETUPFILE  <setupdata_file>. Mandatory for any POD management
                         operation.
  -y, --yes              Yes option to perform the action
```

Workflow command examples:

To expand the storage of node i13-27-test, get the current number/state of the OSDs in the cluster.

```
$ ciscovim list-nodes
+-------------+--------+---------------+---------------+
|  Node Name  | Status |      Type     | Management IP |
+-------------+--------+---------------+---------------+
|    i13-20   | Active |    control    |    15.0.0.7   |
|    i13-21   | Active |    control    |    15.0.0.8   |
|    i13-22   | Active |    control    |    15.0.0.5   |
|    i13-23   | Active |    compute    |    15.0.0.6   |
|    i13-24   | Active |    compute    |   15.0.0.10   |
|    i13-25   | Active | block_storage |   15.0.0.11   |
|    i13-26   | Active | block_storage |    15.0.0.9   |
| i13-27-test | Active | block_storage |    15.0.0.4   |
+-------------+--------+---------------+---------------+

ciscovim osdmgmt show check-osds --id <id>
+--------------------+-------------+---------------+-----------+---------+
| Message            | Host        | Role          | Server    | State   |
+--------------------+-------------+---------------+-----------+---------+
| Overall OSD Status | i13-25      | block_storage | 15.0.0.11 | Optimal |
|                    | i13-26      | block_storage | 15.0.0.9  | Optimal |
|                    | i13-27-test | block_storage | 15.0.0.4  | Optimal |
|                    |             |               |           |         |
| Number of OSDs     | i13-25      | block_storage | 15.0.0.11 | 10      |
|                    | i13-26      | block_storage | 15.0.0.9  | 10      |
|                    | i13-27-test | block_storage | 15.0.0.4  | 12       |
+--------------------+-------------+---------------+-----------+---------+
+-------------+--------+--------+----+------------+-----------+-----------
| Host        | OSDs   | Status | ID | HDD Slot   | Path      | Mount
+-------------+--------+--------+----+------------+-----------+-----------
.
omitted for doc
.
| i13-27-test | osd.2  | up     | 2  |  4 (JBOD)  | /dev/sda1 |
|             | osd.5  | up     | 5  |  3 (JBOD)  | /dev/sdb1 |
|             | osd.8  | up     | 8  |  6 (JBOD)  | /dev/sdc1 |
|             | osd.11 | up     | 11 |  2 (JBOD)  | /dev/sdd1 |
|             | osd.14 | up     | 14 |  5 (JBOD)  | /dev/sde1 |
|             | osd.19 | up     | 19 |  9 (JBOD)  | /dev/sdi1 |
|             | osd.24 | up     | 24 |  10 (JBOD) | /dev/sdj1 |
|             | osd.27 | up     | 27 |  8 (JBOD)  | /dev/sdl1 |
|             | osd.28 | up     | 28 |  12 (JBOD) | /dev/sdm1 |
|             | osd.29 | up     | 29 |  11 (JBOD) | /dev/sdn1 |
|             | osd.30 | up     | 30 |  13 (JBOD) | /dev/sdo1 |
|             | osd.31 | up     | 31 |  17 (JBOD) | /dev/sdp1 |
+-------------+--------+--------+----+------------+-----------+
```

Run the expand-storage command

```
# ciscovim expand-storage i13-27-test --setupfile setup_data.yaml

Perform the action. Continue (Y/N)Y

Monitoring StorageMgmt Operation

. . . . Cisco VIM Runner logs
The logs for this run are available in
<ip>:/var/log/mercury/05f068de-86fd-479c-afda-c54b14ffdd3e


############################################
Cisco Virtualized Infrastructure Manager
############################################


[1/3][VALIDATION: INIT]                                                       [   /   ]
 0min 0sec
Management Node Validations!
.
.
Omitted for doc
.
.
[1/3][VALIDATION: Starting HW Validation, takes time!!!]         [ DONE! ]

Ended Installation [VALIDATION] [Success]

[2/3][CEPH: Checking for Storage Nodes]                          [ DONE! ]
[2/3][CEPH: Creating Ansible Inventory]                          [ DONE! ]
.
.
Omitted for doc
.
.
[2/3][CEPH: Waiting for server to come back first try]           [ DONE! ]

Ended Installation [CEPH] [Success]
VMTP Starts

/home/vmtp/.ssh/id_rsa already exists.
.
.
Omitted for doc
.
.

[3/3][VMTP: INIT]                                               [ DONE! ]

Ended Installation [VMTP] [Success]

The logs for this run are available in
<ip>:/var/log/mercury/05f068de-86fd-479c-afda-c54b14ffdd3e
===========

Check the OSDs
ciscovim osdmgmt create check-osds
+------------+--------------------------------------+
| Field      | Value                                |
+------------+--------------------------------------+
| action     | check-osds                           |
| command    | create                               |
| created_at | 2019-01-07T19:00:23.575530+00:00     |
| id         | adb56a08-fdc5-4810-ac50-4ea6c6b38e3f |
| locator    | False                                |
| osd        | None                                 |
| result     |                                      |
| servers    | None                                 |
| status     | not_run                              |
| updated_at | None                                 |
+------------+--------------------------------------+
ciscovim osdmgmt list check-osds
+--------------------------------------+------------+----------+----------
| ID                                   | Action     | Status   | Created
 |
+--------------------------------------+------------+----------+----------
| cd108b85-2678-4aac-b01e-ee05dcd6fd02 | check-osds | Complete | 2019-01-
| adb56a08-fdc5-4810-ac50-4ea6c6b38e3f | check-osds | Complete | 2019-01-|
+--------------------------------------+------------+----------+----------

ciscovim osdmgmt show check-osds --id <id>
+--------------------+-------------+---------------+-----------+---------+
| Message            | Host        | Role          | Server    | State   |
+--------------------+-------------+---------------+-----------+---------+
| Overall OSD Status | i13-25      | block_storage | 15.0.0.11 | Optimal |
|                    | i13-26      | block_storage | 15.0.0.9  | Optimal |
|                    | i13-27-test | block_storage | 15.0.0.4  | Optimal |
|                    |             |               |           |         |
| Number of OSDs     | i13-25      | block_storage | 15.0.0.11 | 10      |
|                    | i13-26      | block_storage | 15.0.0.9  | 10      |
|                    | i13-27-test | block_storage | 15.0.0.4  | 16      |
+--------------------+-------------+---------------+-----------+---------+
+-------------+--------+--------+----+------------+-----------+-----------
| Host        | OSDs   | Status | ID | HDD Slot   | Path      | Mount
+-------------+--------+--------+----+------------+-----------+-----------
.
omitted for doc
.
| i13-27-test | osd.2  | up     | 2  |  4 (JBOD)  | /dev/sda1 |
|             | osd.5  | up     | 5  |  3 (JBOD)  | /dev/sdb1 |
|             | osd.8  | up     | 8  |  6 (JBOD)  | /dev/sdc1 |
|             | osd.11 | up     | 11 |  2 (JBOD)  | /dev/sdd1 |
|             | osd.14 | up     | 14 |  5 (JBOD)  | /dev/sde1 |
|             | osd.19 | up     | 19 |  9 (JBOD)  | /dev/sdi1 |
|             | osd.24 | up     | 24 |  10 (JBOD) | /dev/sdj1 |
|             | osd.27 | up     | 27 |  8 (JBOD)  | /dev/sdl1 |
|             | osd.28 | up     | 28 |  12 (JBOD) | /dev/sdm1 |
|             | osd.29 | up     | 29 |  11 (JBOD) | /dev/sdn1 |
|             | osd.30 | up     | 30 |  13 (JBOD) | /dev/sdo1 |
|             | osd.31 | up     | 31 |  17 (JBOD) | /dev/sdp1 |
|             | osd.32 | up     | 32 |  15 (JBOD) | /dev/sdq1 |
|             | osd.33 | up     | 33 |  14 (JBOD) | /dev/sdr1 |
|             | osd.34 | up     | 34 |  16 (JBOD) | /dev/sds1 |
|             | osd.35 | up     | 35 |  7 (JBOD)  | /dev/sdt1 |
+-------------+--------+--------+----+------------+-----------+
```

CHAPTER 6

Overview to Cisco VIM Unified Management

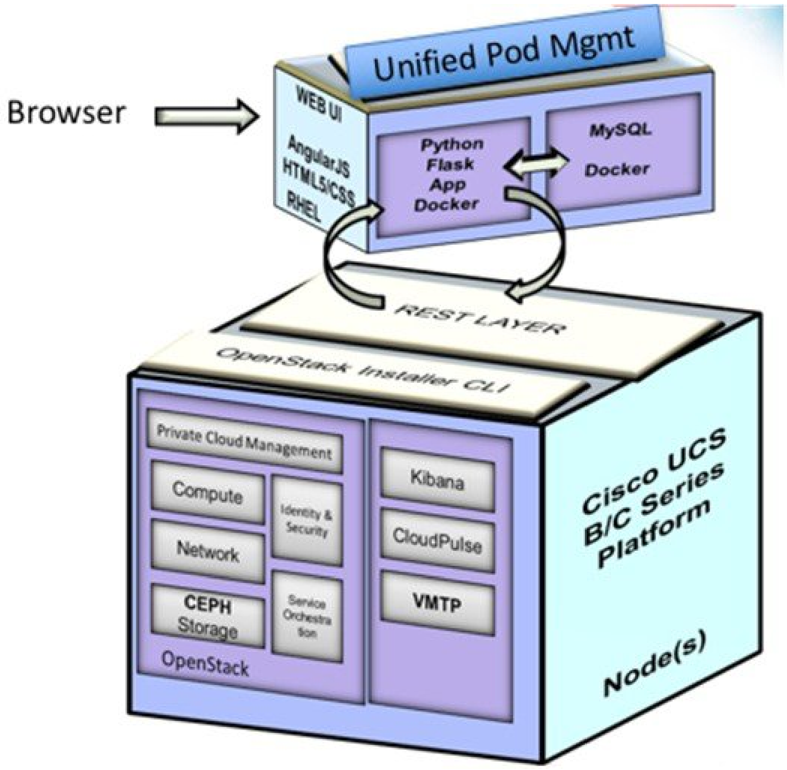
Cisco VIM Unified Management is an optional application, which acts as a single point of management for the Cisco VIM. Inclusive of your Cisco NFVI package, you can use Cisco VIM Unified Management to manage Cisco NFVI for day-0 and day-n and for multi-site and multi-pod management features.

Cisco VIM Unified Management Overview

Cisco VIM provides an Intuitive and easy way to deploy and manage the NFVI platform, reducing user-error and providing visualization deployment to manage multiple Cisco VIM Pods from a single portal. In Cisco VIM 2.2 and higher releases, a light-weight UI which is a dockerized application, supports multi-tenancy with local RBAC support and CiscoVIM Rest layer are integrated. The container-based UI platform manages multiple CiscoVIM pods from day-0, or above in the lifecycle of the cloud.

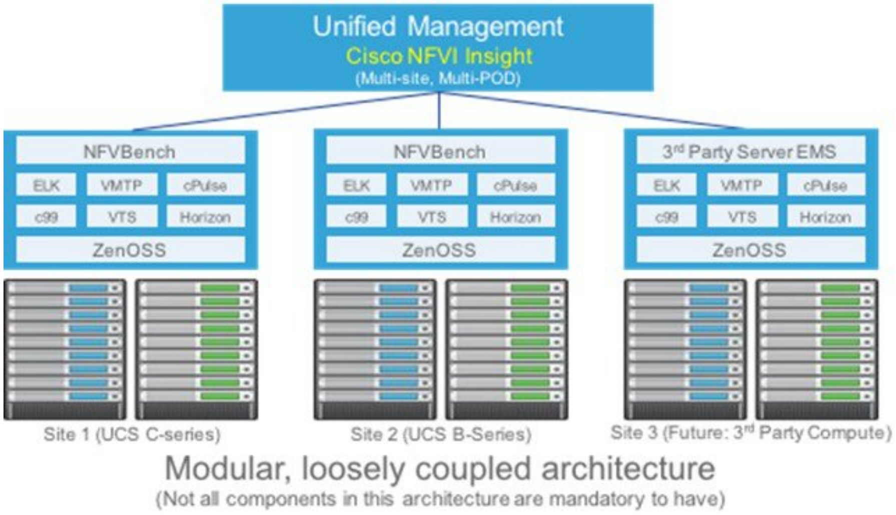
The following figure shows the architecture of the CiscoVIM UM's interaction with a Pod:

Figure 16: Cisco VIM UM's Interaction with a Pod



The architecture of the CiscoVIM UM is light-weight, hierarchical, and scalable. Each local site is autonomous with localized toolsets. Global Unified Management UI, provides ease of management with multisite and multi-pod capability for distributed NFV deployment at scale. This facility can be used through browsers such as IE, Firefox, Safari, and Chrome. Cisco VIM UM by itself, is designed to operate in HA. The platform is a modular, loosely coupled architecture, that provides the capability to manage multiple pods, with RBAC support as depicted in the following figure:

Figure 17: Cisco VIM UM Architecture



Cisco VIM UM can be installed in Standalone or non-HA mode: You can Install in a Standalone or non-HA mode (on the management node of the pod) or a standalone (BOM same as the management node) server. Migrating from one install mode to another can be done effectively as the UI interacts with each Pod through REST API and little RBAC information of the Admin and user is kept in the DB.

The UI has two types of views:

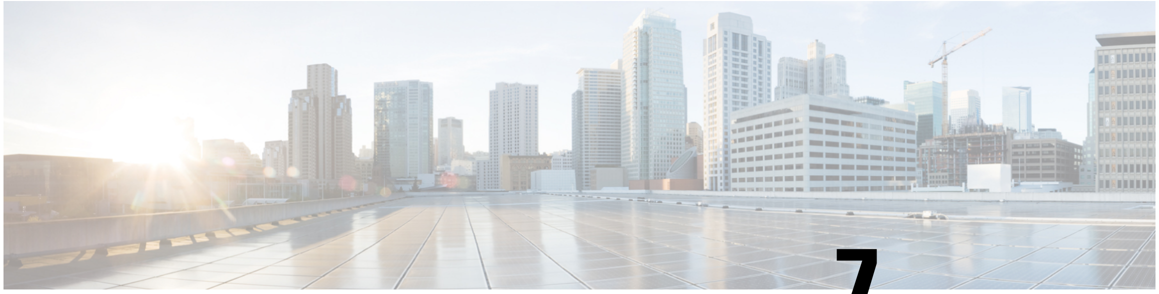
- UI Admin: UI Admin can add users as UI Admin or Pod Admin.
- Pod Admin: Pod Admin has the privilege only at the Pod level, unless Pod Admin is also a UI Admin.

Cisco VIM Unified Management Admin UI Overview

Admin UI is responsible for managing the UI and Pod admin, which includes adding and revoking user privileges. Also, the UI Admin can delete an existing Pod from the management pane.

Cisco VIM Unified Management Pod UI Overview

The Pod UI, is responsible for managing each Pod. VIM UM gives easy access to switch between multiple Pods. Through the Pod UI, a Pod Admin can manage users and their respective roles and responsibilities. Also, the Pod UI provides the user to execute day-0 (install) and day-n (Pod management, software update, and so on.) activities seamlessly. ELK, Horizon Web UI, and so on, are also cross-launched and visible for each Pod through the Pod UI.



CHAPTER 7

Managing Cisco VIM through Unified Management

This funcationality brings in clear separation of roles. It does not store any pod related details obtained directly through Rest API from the pods locally, except for RBAC information.

UI Administrators Privileges and Responsibilities

The Unified Management UI Admin has the following privileges and responsibilities:

1. Unified Management UI Admin(s) can only add Pod Admin. The Pod Admin can be added in two ways:
   - Local database
   - LDAP with registration type as mail, uid, cn or group.
2. Unified Management UI Admin can manage all the users in Unified Management from **Manage Pod Users**.
   - UI Admin can revoke permission of Users: If UI Admin wants to revoke a user from a Pod, click **Revoke permission** icon under Action column.
   - UI Admin can delete a User: If UI Admin wants to delete a user from the UM, Click **Delete** icon under Action column. If there is only one user associated with a Pod then UI Admin needs to delete the pod and then delete or revoke the user permission.
3. Unified Management UI Admin can manage Pod Admin(s) from **Manage Pod Admin**.
   - UI Admin can add a new Pod Admin in Unified Management.
   - UI Admin can revoke permission of a user or LDAP group from being a Pod Admin.

4. Unified Management UI Admin can manage Pods from Manage Pods.
   - UI Admin can delete a Pod from Unified Management.
   - UI Admin can also update password for the REST incase there was a system update on the pod and REST password was changed in that process.
5. Unified Management UI Admin can manage other UI Admin(s) from **Manage UI Admin Users**.
   - Unified Management UI Admin can add another UI Admin.
   - Unified Management UI Admin can revoke permission of the user from being an UI Admin.

Note If there is only one UI Admin for Unified Management, the revoke permission icon is disabled for the user.

Pod UI Privileges and Responsibilities

As Cisco VIM is Rest API based, you can manage a pod through CLI, Rest API or UI. You can always bring in a partial or fully functional Pod and register with VIM UM. UM queries the pod status through Rest API and reflect the same.

Note We recommend the admin to choose only one path to manage the pod.

Adding Cisco VIM Pod

Before you begin

Complete the following pre-requisites to add a Cisco VIM pod:

- Bootstrap of VIM Unified Management must be complete and successful.
- UI and Pod Admin must be available.

Step 1 Navigate to https://br_api:9000

Step 2 Click **Register Management Node** link. Options for selecting IPv4, IPv6, and FQDN are displayed. Checking one of these options displays the corresponding input fields for IPv4, IPv6 and FQDN respectively.

- Enter the endpoint IP (IPv4/IPv6) which is the **br_api** of your pod, or add FQDN address.

  Note Perform the runtime validation to check if the endpoint IP is already registered to Unified Management. No validation is available for IPv6 and FQDN.

- Give a name or tag for the pod you are registering.
- Enter the REST API password for the Pod.

  - You can locate the REST API password on the pod you are registering.
  - The path to locate REST API password is : /opt/cisco/ui_config.json.

- A brief description about management node. Description field is optional and can be left blank.
- Enter the email ID of the Pod Admin.
  - Run time validation to check if the email ID is Pod admin or not.
  - If False, the Unified Management gives an error that the User is not registered as Pod Admin.
  - If True, the User Name is auto-populated and the **Register** button is enabled.

Step 3 Click **Browse** to upload restapi server CA Certificate. This is enabled once the Pod Admin validation is successful.

- Navigate to `/var/www/mercury/mercury-ca.crt` of the management node.
- Download the Certificate to the local machine and upload the certificate using Unified Management.

Validation check for file size and extension is done as a part of upload and in case of failure the Certificate is deleted and you need to upload the valid certificate again.

If the Certificate is uploaded successfully then **Register** button is enabled. To do a management node health check click **Register**.

- If the REST API service is down on the management node then a failure message will be displayed as : Installer REST API service not available. The certificate will not be deleted.
- If the Certificate is invalid and there is a SSL connection problem with the management node then certificate is deleted and message is displayed to upload the certificate again.
- If the Certificate is valid user is redirected to the login page with a message- management node registered successfully.

Step 4 Click **Register** to redirect the user to the landing or login page. Pod Admin receives the notification mail that the management node is registered successfully.

Note If UM_ADMIN_AS_POD_ADMIN is set to True, all UM-Admins are added as pod-users with **Full-Pod-Access** during pod registration.

Editing Pod from Cisco VIM Unified Management

You can edit the pod by following the below steps:

Step 1 Log in as the UM UI Admin

Step 2 In the navigation pane, click **PODS**

Step 3 Choose the pod that you want to EDIT in the **Action** column.

Step 4 In the **Edit Pod** popup window, you can edit the **Node name** and **Description**.

Step 5 Click **Save** to update the Pod.

Deleting Pod from Cisco VIM Unified Management

When you delete a Pod from Cisco VIM UM, you are not deleting the Pod from your OpenStack deployment.

Before you begin

Following the steps to delete a Cisco VIM Pod:

- Bootstrap of VIM Unified Management is complete and successful as per the install guide.
- At least one UI and Pod Admin exists as per the install guide.
- The UM manages the targeted Pod.

Step 1 Log in as the **UM UI Admin**.

Step 2 In the navigation pane, click **Manage Pods**.

Step 3 Choose the pod that you want to delete in the Action column and click **Delete**.

Step 4 Click **Proceed**, to confirm the deletion.

Context Switching Within Unified Management

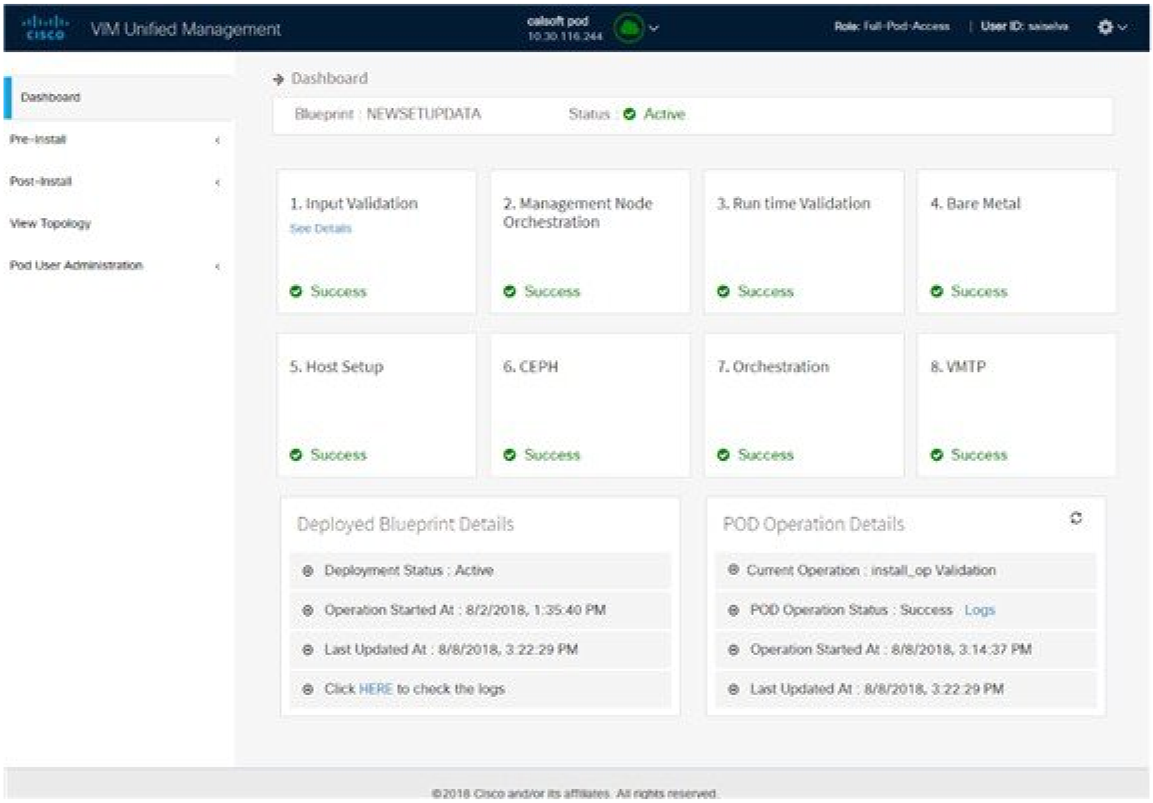
Cisco VIM UM has permissions to switch between two or more pods for a particular node. The user can be a admin for one or more pods, and a normal user for some other pod, simultaneously. Ability to access multiple pods, provides the user to maintain context and yet scale from a pod management point of view.

There are two ways a user can switch to another pod.

- **Context Switching Icon**: Context Switching Icon is situated on the top right corner and is the third icon from the right tool tip of the UI. Click **Context Switching** Icon to view all the pods that you can access. Pod with a red dot indicates that the REST Password that is entered during registration of the Management node does not match with the current REST Password for that of particular node. In such a situation the Pod admin or User has to reach out to UI admin to update the password for that Node. UI admin updates the password from Manage Pods in Unified Management UI admin Portal.
- **Switch Between Management Nodes**: Switch Between Management Nodes is available in the Dashboard. The user can see all the pods in the table and can navigate to any Pod using a single click. If mouse pointer changes from hand or cursor to a red dot sign it indicates that the REST Password entered during registration of Management node does not match with the current REST Password for that particular node.

Dashboard

After selecting a Pod from landing page, you will be redirected to the **Dashboard** of that particular Pod.



Blueprint : NEWSETUPDATA Status : Active

1. Input Validation: Success
2. Management Node Orchestration: Success
3. Run time Validation: Success
4. Bare Metal: Success
5. Host Setup: Success
6. CEPH: Success
7. Orchestration: Success
8. VMTP: Success

- Deployment Status : Active
- Operation Started At : 8/2/2018, 1:35:40 PM
- Last Updated At : 8/8/2018, 3:22:29 PM
- Click HERE to check the logs

- Current Operation : install_op Validation
- POD Operation Status : Success Logs
- Operation Started At : 8/8/2018, 3:14:37 PM
- Last Updated At : 8/8/2018, 3:22:29 PM

Blueprint Name

Blueprint section provides the name of the Blueprint, the health status of the blueprint and the various installation stages with the status. The different status is Success, Failed or Not Run.

Click **Next and Previous**, you can navigate between various installation stages.

Deployed Cloud Status

This section highlights the cloud status on the Pod.

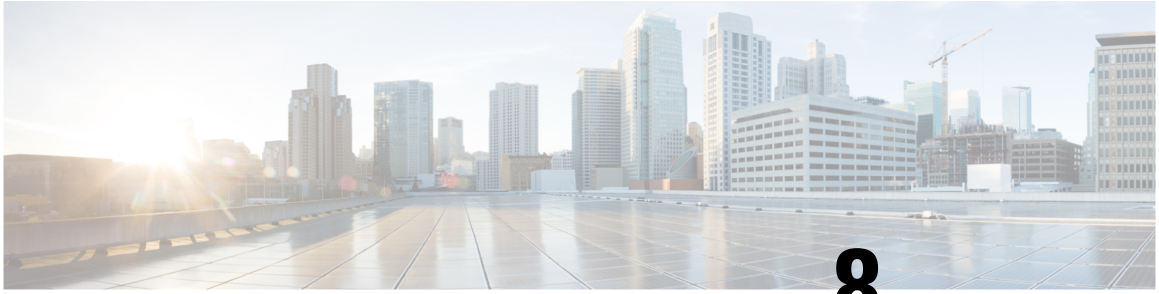
- Active (Green): If the cloud is deployed without any failures.
- Failed (Red): If the cloud deployment fails.
- Not Available (Gray): If the cloud is not deployed on the Pod.

Deployed Blueprint Details

In this section you get information about deployed blueprint which includes Deployment Status, Operation start time, Operation update time, and a link to the log of last operation. In case of the failure of cloud installation, the name with keyword regarding component failure is visible as Deployment Status.

Pod Operation Details

The Pod operation details table provides information regarding the current and last operation which includes Current operation details, Pod operation status and information about the operation start time and update time. Refresh icon facilitates the user to fetch latest operation status from the Pod.



CHAPTER 8

Managing Blueprints

The following topics tell you how to manage Cisco NFVI Blueprints.

Blueprints

Blueprints contain the configuration metadata required to deploy an OpenStack system through a Cisco VIM pod in Cisco VIM Uinfied Management. You can create a blueprint in Cisco UM or you can upload a yaml file that contains the metadata for a blueprint. You can also create a blueprint from an existing OpenStack system that you are configuring as a Cisco VIM pod.

The configuration in the blueprint is specific to the type of Cisco UCS server that is in the OpenStack system. A blueprint for a C-Series server-based OpenStack system cannot be used to configure a B-Series server-based OpenStack system. Cisco UM displays an error if the blueprint does not match the configuration of the OpenStack system.

The blueprint enables you to quickly change the configuration of an OpenStack system. While only one blueprint can be active, you can create or upload multiple blueprints for a Cisco VIM pod. If you change the active blueprint for a pod, you have to update the configuration of the OpenStack system to match the new blueprint.

Note You can modify and validate an existing blueprint, or delete a blueprint. However, you cannot modify any of the configuration metadata in the active blueprint for a Cisco VIM pod.

Blueprint Activation

A blueprint becomes active when you use it in a successful installation for a Cisco VIM pod. Other blueprints that you created or uploaded to that pod are in nonactive state.

Uploading or creating a blueprint does not activate that blueprint for the pod. Install a blueprint through the **Cisco VIM Suite** wizard. If the installation is successful, the selected blueprint becomes active.

Note If you want to activate a new blueprint in an existing pod, you have to delete certain accounts and the credential policies for that pod before you activate the blueprint. See Activating a Blueprint in an Existing Pod with OpenStack Installed, on page 247.

Viewing Blueprint Details

To view blueprint details:

Step 1 Log in to Cisco VIM Unified Management as pod user.

Step 2 Choose the Cisco VIM pod with the blueprint that you want to view.

Step 3 Click **Menu** at the top left corner to expand the navigation pane.

Step 4 Choose **Pre-Install** > **Blueprint Management.**

Step 5 Choose a blueprint from the list.

Step 6 Click **Preview and Download YAML.**

Creating a Blueprint Using Upload Functionality

Before you begin

- You must have a YAML file (B series or C Series) on your system.
- Only one blueprint can be uploaded at a time. To create a blueprint off-line, refer to the setup_data.yaml.B_Series_EXAMPLE or setup_data.yaml.C_Series_EXAMPLE.
- The respective keys in the sample YAML have to match or the corresponding pane does not get populated during the upload.

Step 1 Log in to **Cisco VIM UM**.

Step 2 In the navigation pane, expand the**Pre-Install** section and click **Blueprint** setup.

Step 3 Click the**Browse** in the **Blueprint Initial Setup**.

Step 4 Click**Select**.

Step 5 Click**Load** in the **Unified Management UI Application**.
All the fields present in the YAML file is uploaded to the respective fields in the UI.

Step 6 Provide a **Name for the Blueprint**.

While saving the blueprint name has to be unique.

Step 7 Click **Offline Validation**.

- If all the mandatory fields in the UI are populated, then Offline Validation of the Blueprint commences, or else a pop up message indicating the section of Blueprint creation that has missing information error shows up.

Step 8 On Offline Blueprint Validation being successful, **Save Blueprint** and **Cancel** is enabled.

Note If the Blueprint Validation Fails, only the **Cancel** button is enabled.

Activating a Blueprint in an Existing Pod with OpenStack Installed

Before you begin

You must have a POD which has an active Installation of OpenStack. If the OpenStack installation is in Failed State, then UM UI will not be able to fetch the Blueprint.

Step 1 Go to the **Landing page** of the UM Log in.

Step 2 Click **Register Management Node**.

Step 3 Enter the following details:

- Management Node IP Address.
- Management Node Name (Any friendly Name).
- REST API Password (/opt/cisco/ui_config.json).
- Description about the Management Node.
- POD Admin's Email ID.

A notification email is sent to the email id entered during registration.

Step 4 Log in using the same email id and password.

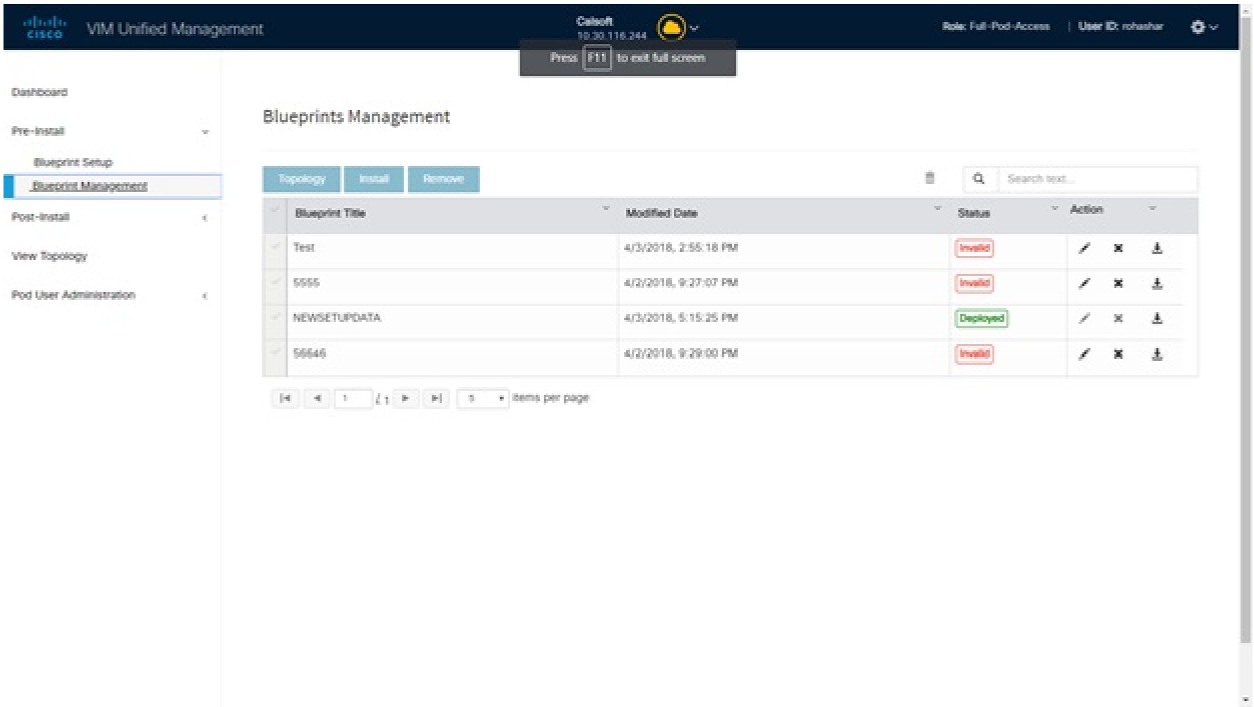
Step 5 In the navigation pane, click **Pre-Install** > **Blueprint Management**.

Choose the **NEWSETUPDATA** from the **Blueprint Management** pane.

This is the same setup data which was used by ciscovimclient, to run the installation on the Management Node.

Blueprint Management

Note You must have at least one blueprint (In any state Active or In-Active or In-progress), in the Blueprint Management Pane.



Blueprints Management

Blueprint Title	Modified Date	Status	Action
Test	4/3/2018, 2:55:18 PM	Invalid	✎ ✖ ⤓
5555	4/2/2018, 9:27:07 PM	Invalid	✎ ✖ ⤓
NEWSETUPDATA	4/3/2018, 5:15:25 PM	Deployed	✎ ✖ ⤓
56646	4/2/2018, 9:29:00 PM	Invalid	✎ ✖ ⤓

1 / 1 5 items per page

Blueprint Management grid contains the list of all the blueprints that are saved. You can save the blueprint even if it is failed in the Blueprint Setup. However, you will not be allowed to deploy those Blueprints.

Blueprint Management table provides the following information:

- Blueprint Name
- Modified Date
- Edit, Remove, and Download Blueprint
- Search Blueprint

Blueprint Name: It shows the name of the Blueprint. You cannot edit this field. It shows the name of the blueprint that is saved after Offline Validation.

Note No two blueprints can have the same Blueprint name.

Modified Date: This shows when blueprint was last modified.

Blueprint Status: There are 6 total status for the Blueprint.

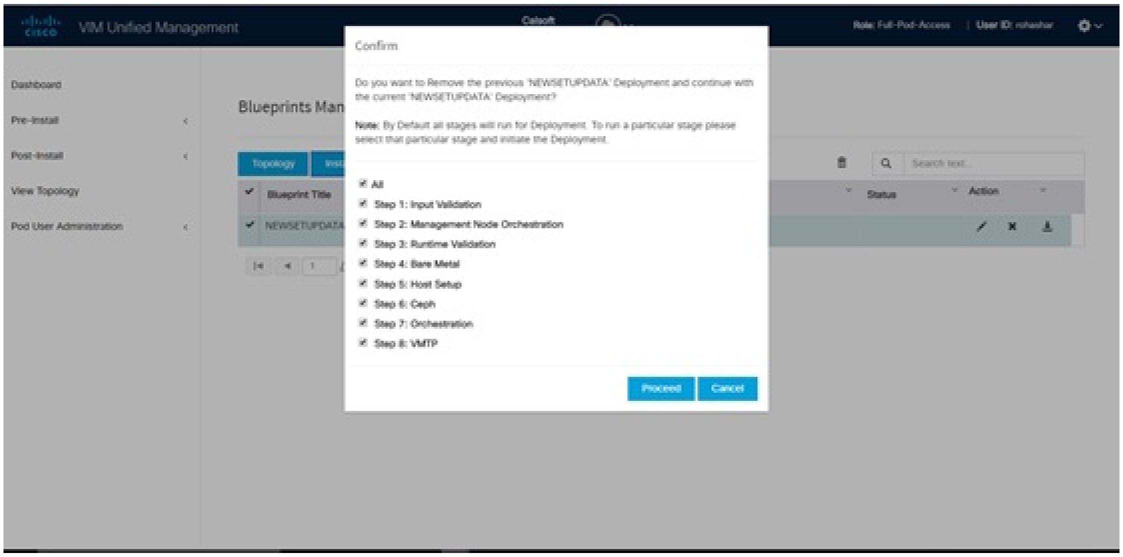
- Valid: Blueprint that is saved after offline validation success.
- Invalid: Blueprint that is saved after Offline Validation failure.
- Inprogress: Blueprint that is saved without running Offline Validation.
- Deployed: Blueprint that is used to bring up cloud without failures.
- Installing: Blueprint that is used to initiate the cloud deployment.

- Failed: Blueprint that is used to deploy the cloud which eventually failed.

With every blueprint record, there are some operations associated that you can perform by using the buttons – Topology, Install, and Remove.

Topology

Topology allows you to view graphical representation of the control, compute, and storage node that is associated with the various network segments.



Confirm

Do you want to Remove the previous 'NEWSETUPDATA' Deployment and continue with the current 'NEWSETUPDATA' Deployment?

Note: By Default all stages will run for Deployment. To run a particular stage please select that particular stage and initiate the Deployment.

☑ All
☑ Step 1: Input Validation
☑ Step 2: Management Node Orchestration
☑ Step 3: Runtime Validation
☑ Step 4: Bare Metal
☑ Step 5: Host Setup
☑ Step 6: Ceph
☑ Step 7: Orchestration
☑ Step 8: VMTP

Proceed Cancel

Install Button

Click **Install**, a confirmation message is generated requesting to initiate the deployment with the stages you wants to run. By default all stages are selected but you can also do an incremented install. In case of Incremented Install, you have to choose stages in the order. For Example: If you choose Validation Stage then the 2nd stage Management Node Orchestration is enabled. You cannot skip stages and run a deployment. Once you click **Proceed**, the Cloud Deployment is initiated and the progress can be viewed from the Dashboard.

Remove Button

Choose the blueprint and click **Remove** to remove the blueprint. A confirmation message appears. If you click**Proceed**, the blueprint removal operation is initiated.

Edit, Remove, and Download Blueprint

You can edit or delete a Blueprint which is not in Deployed State. If you want to take a backup of the Blueprint locally, click *Download* icon which generates the preview to download the Blueprint.

Following are the ways to deploy a Blueprint:

- If there is no Blueprint in Deployed state, then you can choose any Valid Blueprint from the list.
- If there is a Blueprint in a Failed state, you can choose another Valid Blueprint but Unified Management asks you to remove the previous deployment before proceeding.
- If there is a Blueprint in Deployed state, you can choose another Valid Blueprint but Unified Management asks you to remove the previous deployment before proceeding.

The deployment of Blueprint occurs stepwise and if any one step fails for some reason, a **Play** button is displayed on that particular step. You can click a**Play** button and begin the installation for that particular state.

Note There is always one blueprint in Deployed state. You cannot deploy multiple blueprints in the cloud.

Search Blueprint: Search box is displayed on top-right of the table which facilitates you to lookup for Blueprint by their name or status. Navigate to **Topology** and choose a Blueprint which redirects you to the default blueprint, the one which is selected in the Blueprint Management pane.

Note During the various operations across the application the cloud icon in the center of the header changes its color which is based on the following table.

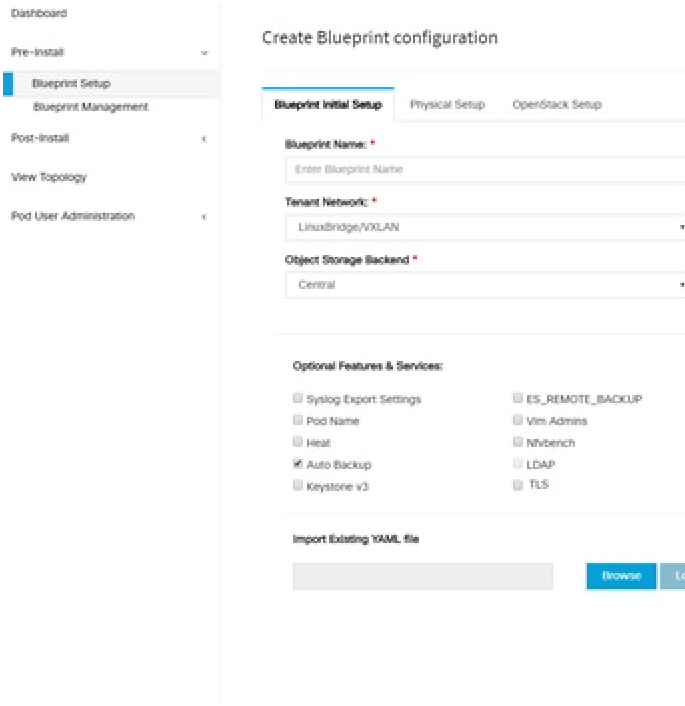
Table 16:

POD Operation	Status	Icon or Color
Management Node Registered, No Active Deployment	Pending	Gray
Cloud Up And Running, No Failure	Active	Green
Cloud Installation/ Any Operation In Progress	In-Progress	Blue
Cloudpulse Failed	Critical Warnings	Red
Pod Operation Failed	Warning	Amber
Software Update (Auto) Rollback Failed	Critical Warnings	Red
Uncommitted Software Update	Warning	Amber
Reconfigure Openstack Password	Critical Warning	Red
Reconfigure CIMC Password	Warning	Amber
Reconfigure Optional Features/ OS	Critical Warning	Red
Power Management Operation Fails	Warning	Amber
Management Not-Reachable	Not-Reachable	Red

Creating a Blueprint for B-Series Server Platform

Procedure

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td><b>Step 1</b></td><td>In the navigation pane, choose <b>Pre-Install</b> &gt; <b>Blueprint Setup</b>.</td><td></td></tr>
<tr><td><b>Step 2</b></td><td>To create a <b>B Series Blueprint</b>:</td><td>
<b>a.</b> On the <b>Blueprint Initial Setup</b> pane of the Cisco VIM Unified Management, complete the following fields:



Blueprint Name: *
Enter Blueprint Name

Tenant Network: *
LinuxBridge/VXLAN

Object Storage Backend *
Central

Optional Features & Services:

□ Syslog Export Settings
□ Pod Name
□ Heat
☑ Auto Backup
□ Keystone v3
□ ES_REMOTE_BACKUP
□ Vim Admins
□ Nfvbench
□ LDAP
□ TLS

Import Existing YAML file

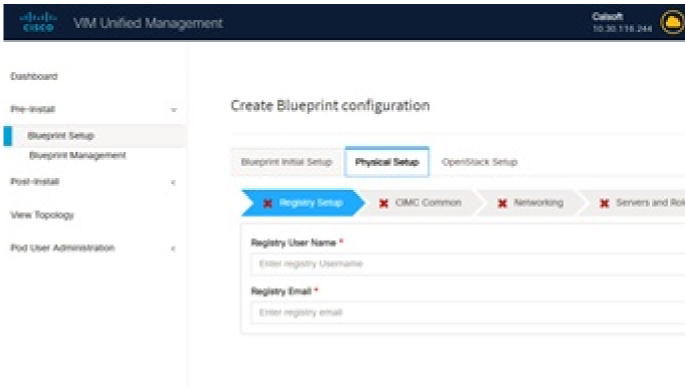
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>Blueprint Name</b> field</td><td>Enter blueprint configuration name.</td></tr>
<tr><td><b>Platform Type</b> drop-down list</td><td>Choose one of the following platform types:
• B-Series (By default) choose B series for this section.
• C-Series</td></tr>
</table>
</td></tr>
</table>

Command or Action	Purpose	
	Name	**Description**
	Tenant Network drop-down list	Choose one of the following tenant network types: • Linuxbridge/VXLAN • OVS/VLAN
	Pod Type drop-down list	Choose one of the following pod types: • Fullon(By Default)
	Ceph Mode drop-down list	Choose one of the following Ceph types: • Dedicated • Central (By Default) - Not supported in Production
	SSH Banner	An optional parameter `ssh_banner` is available in the setup_data, to accept a string or message that is to be displayed before the login prompt. This message indicates a warning consistent with a company's IT policies.
	Optional Features and Services Checkbox	LDAP, Syslog Export Settings, Install Mode, ToR Switch Information, TLS, NFVMON, Pod Name, VMTP, NFV Bench, Auto-backup, Heat, Keystone v3, Enable Esc Priv. If any one is selected, the corresponding section is visible in various Blueprint sections. By default all features are disabled except Auto -backup.

	Command or Action	Purpose

Name	Description
Import Existing YAML file	Click **Browse** button to import the existing yaml file. If you have an existing B Series YAML file you can use this feature to upload the file. Unified Management automatically fill in the fields and if any mandatory field is missed then it gets highlighted in the respective section.

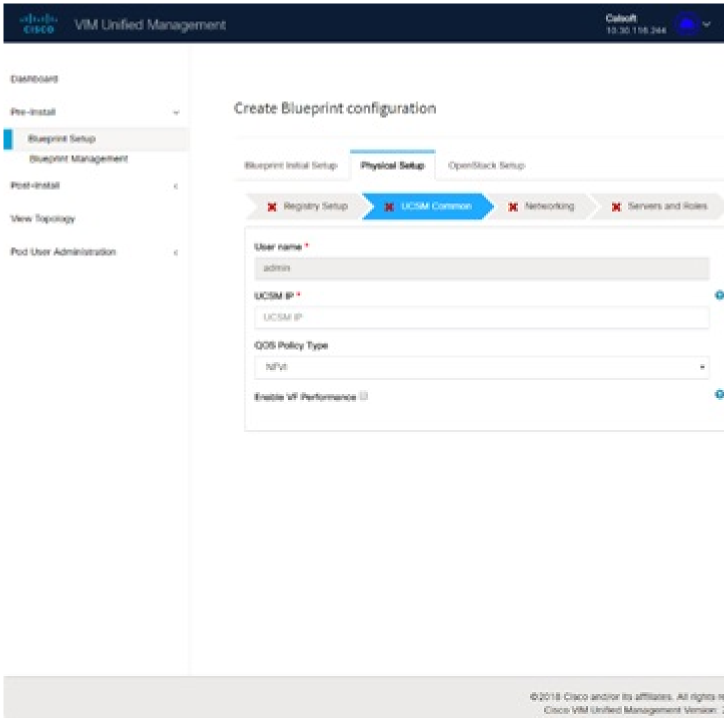
b. Click **Physical Setup** to navigate to the **Registry Setup configuration** page. Fill in the following details for Registry Setup:



Name	Description
Registry User Name text field	Enter the User-Name for Registry **(Mandatory)**.
Registry Password text field	Enter the Password for Registry **(Mandatory)**.
Registry Email text field	Enter the Email ID for Registry **(Mandatory)**.

Once all mandatory fields are filled the **Validation Check Registry Pane** shows a Green Tick.

c. Click **UCSM Common Tab** and complete the following fields:

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>


Create Blueprint configuration

User name *
admin

UCSM IP *
UCSM IP

QOS Policy Type
NFVI

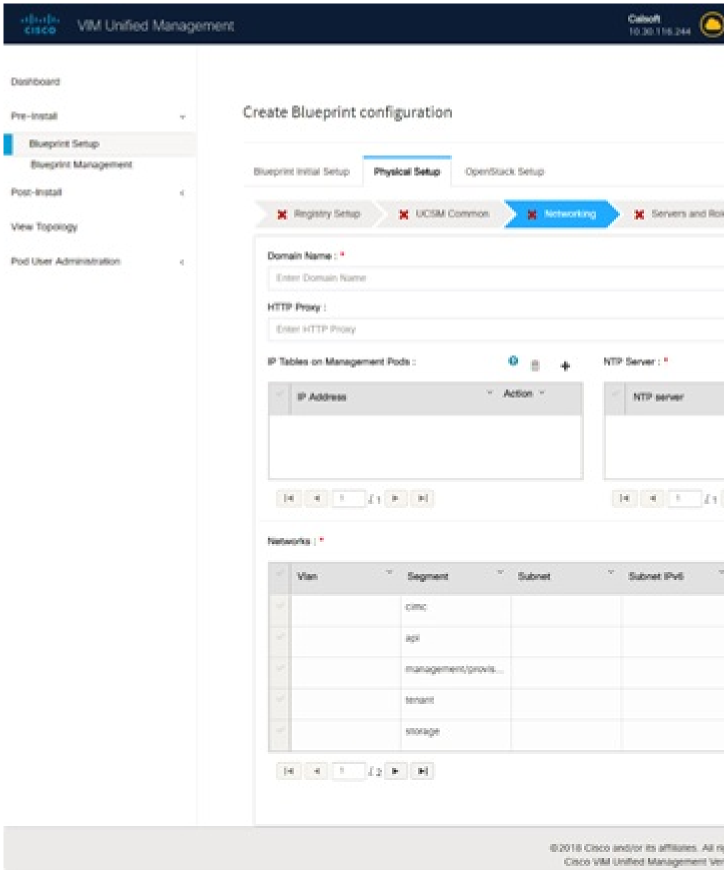
Enable VF Performance □

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>User name</b> disabled field</td><td>By default the value is Admin.</td></tr>
<tr><td><b>Password</b> text field</td><td>Enter Password for UCSM Common <b>(Mandatory)</b>.</td></tr>
<tr><td><b>UCSM IP</b> text field</td><td>Enter IP Address for UCSM Common (<b>Mandatory).</b></td></tr>
<tr><td><b>Resource Prefix</b> text field</td><td>Enter the resource prefix<b>(Mandatory)</b>.</td></tr>
<tr><td><b>QOS Policy Type</b> drop-down</td><td>Choose one of the following types:
• NFVI (Default)
• Media</td></tr>
</table>
</td></tr>
</table>

	Command or Action	Purpose

Name	Description
Max VF Count text field	Select the Max VF Count. <1-54> Maximum VF count 54, default is 20. If VF performance is enabled we recommend you to keep MAX_VF_COUNT to 20 else may fail on some VICs like 1240.
Enable VF Performance optional checkbox	Default is false. Set to true to apply adaptor policy at VF level.
Enable Prov FI PIN optional checkbox	Default is false.
MRAID-CARD optional checkbox	Enables JBOD mode to be set on disks. Applicable only if you have RAID controller configured on Storage C240 Rack servers.
Enable UCSM Plugin optional checkbox	Visible when Tenant Network type is OVS/VLAN.
Enable QoS Policy optional checkbox	Visible only when UCSM Plugin is enabled. If UCSM Plugin is disabled then this option is set to False.
Enable QOS for Port Profile optional checkbox	Visible only when UCSM Plugin is enabled.
SRIOV Multi VLAN Trunk optional grid	Visible when UCSM Plugin is enabled. Enter the values for network and vlans ranges. Grid can handle all CRUD operations such as Add, Delete, Edit and, Multiple Delete.

d. Click **Networking** to advance to the networking section of the Blueprint:

	Command or Action	Purpose
		

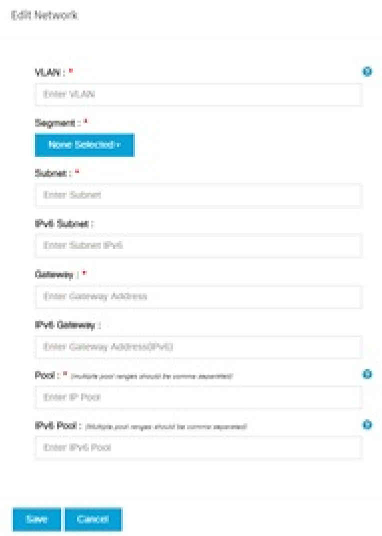
Name	Description
Domain Name field	Enter the domain name **(Mandatory)**.
HTTP Proxy Server field	If your configuration uses an HTTP proxy server, enter the IP address of the server.
HTTPS Proxy Server field	If your configuration uses an HTTPS proxy server, enter the IP address of the server.
IP Tables on Management Pods	Specifies the list of IP Address with Mask.
NTP Server	Enter a maximum of four and minimum of one IPv4 and /or IPv6 addresses in the table.

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td><table><tr><th>Name</th><th>Description</th></tr><tr><td><b>Domain Name Server</b></td><td>Enter a maximum of three and minimum of one IPv4 and/or IPv6 addresses.</td></tr></table></td></tr>
</table>

	Command or Action	Purpose
		<table><tr><th>Name</th><th>Description</th></tr><tr><td>**Network table**</td><td></td></tr></table>

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>
Network table is pre-populated with segments. To add Networks you can either clear all the table using <b>Delete All</b> or click <b>Edit</b> icon for each segment and fill in the details.

You can add, edit, or delete network information in the table:



- Click + to enter new entries (networks) to the table.
- Specify the following fields in the <b>Edit Entry to Networks</b> dialog box.

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>VLAN</b> field</td><td>Enter the VLAN ID.

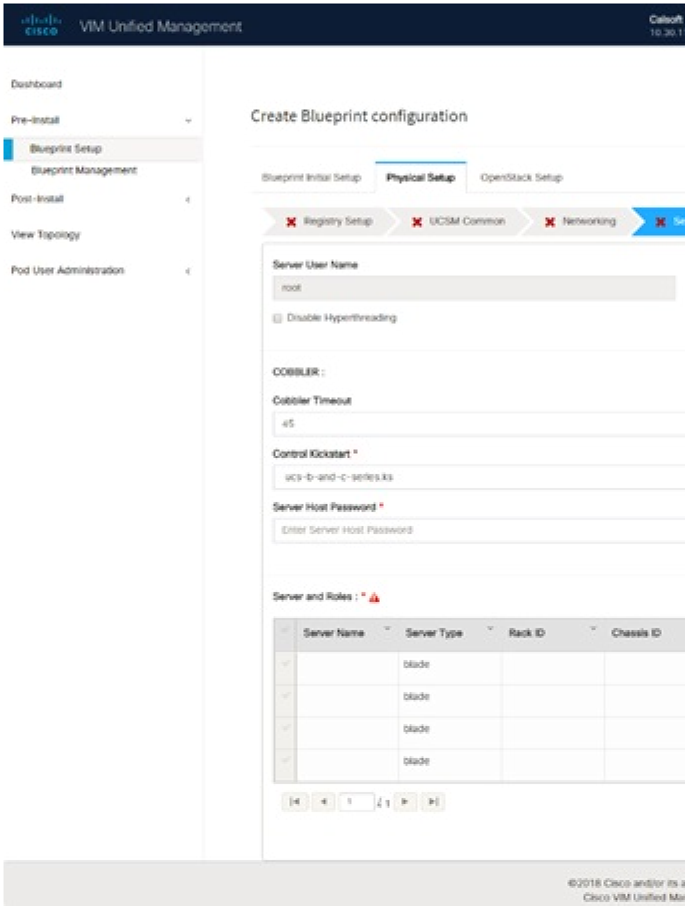
For Segment - Provider, the VLAN ID value is</td></tr>
</table>
</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>always <i>none</i>.</td></tr>
<tr><td><b>Segment</b> drop-down list</td><td>You can select any one segment from the drop-down list.
• API
• Management/Provision
• Tenant
• CIMC
• Storage
• External
• Provider (optional)
<b>Note</b> Some segments do not need some of the values listed in the preceding points.</td></tr>
<tr><td><b>Subnet</b> field</td><td>Enter the IPv4 address for the subnet.</td></tr>
<tr><td><b>IPv6 Subnet</b> field</td><td></td></tr>
</table>
</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>Enter IPv6 address. This field is available only for Management provision and API.</td></tr>
<tr><td><b>Gateway</b> field</td><td>Enter the IPv4 address for the Gateway.</td></tr>
<tr><td><b>IPv6 Gateway</b> field</td><td>Enter IPv6 gateway. This field is available only for Management provision and API network.</td></tr>
<tr><td><b>Pool</b> field</td><td>Enter the pool information in the following format. For example: 10.30.1.1 or 10.30.1.1 to 10.30.1.12</td></tr>
<tr><td><b>IPv6 Pool</b> field</td><td></td></tr>
</table>
</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>Enter the pool information in the following format. For example: 10.1.1.5-10.1.1.10,10.2.1.5-10.2.1.10
This field is only available for the Mgmt/Provision.</td></tr>
</table>
Click <b>Save</b>.</td></tr>
</table>
<b>e.</b> On the <b>Servers and Roles</b> page of the Cisco VIM Suite wizard, you see a pre-populated table filled with Roles: Control, Compute and Block Storage (Only if CEPH Dedicated is selected in Blueprint Initial Setup.</td></tr>
</table>

	Command or Action	Purpose



Create Blueprint configuration

Server User Name: root

□ Disable Hyperthreading

COBBLER :

Cobbler Timeout: 45

Control Kickstart *: ucs-b-and-c-series.ks

Server Host Password *: Enter Server Host Password

Server and Roles : *

Server Name	Server Type	Rack ID	Chassis ID
	blade		
	blade		
	blade		
	blade		

Name	Description
Server User Name field	Enter the username of the server.
Disable Hyperthreading	Default value is false. You can set it as true or false.
Vendor	Set vendor type at the global level
Roles	Set Vendor type at per role level in the roles table

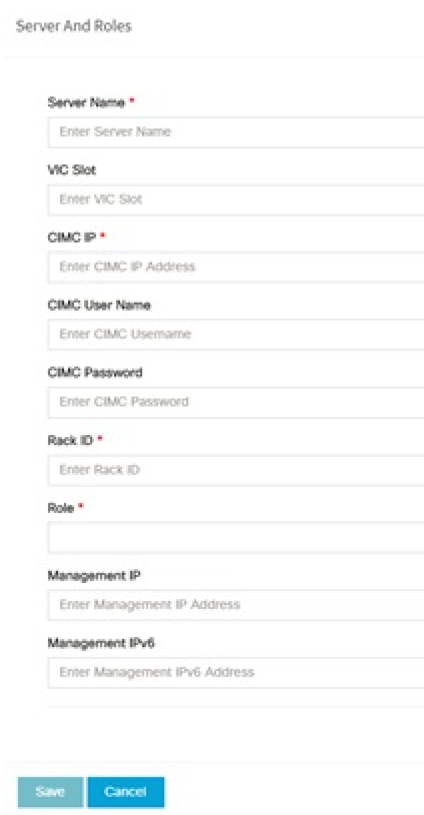
	Command or Action	Purpose
		<table><tr><th>Name</th><th>Description</th></tr><tr><td>Cobbler</td><td></td></tr></table>

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>Enter the Cobbler details in the following fields:
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>Cobbler Timeout</b> field</td><td>The default value is 45 min.
This is an optional parameter. Timeout is displayed in minutes, and its value ranges from 30 to 120.</td></tr>
<tr><td><b>Block Storage Kickstart</b> field</td><td>Kickstart file for Storage Node.</td></tr>
<tr><td><b>Admin Password Hash</b> field</td><td>Enter the Admin Password. Password must be Alphanumeric. Password should contain minimum 8 characters and maximum of 32 characters.</td></tr>
<tr><td><b>Cobbler Username</b> field</td><td>Enter the cobbler username to access the cobbler server.</td></tr>
<tr><td><b>Control Kickstart</b></td><td>Kickstart file for</td></tr>
</table>
</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td>field</td><td>Control Node.</td></tr>
<tr><td><b>Compute Kickstart</b> field</td><td>Kickstart file for Compute Node.</td></tr>
<tr><td><b>Cobbler Admin Username</b> field</td><td>Enter the admin username of the Cobbler.</td></tr>
</table>
</td></tr>
</table>
</td></tr>
</table>

	Command or Action	Purpose
		<table><tr><th>Name</th><th>Description</th></tr><tr><td>**Add Entry to Servers and Roles**</td><td></td></tr></table>

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>Click <b>Edit</b> or + to add a new server and role to the table.



Server And Roles

Server Name *
Enter Server Name

VIC Slot
Enter VIC Slot

CIMC IP *
Enter CIMC IP Address

CIMC User Name
Enter CIMC Username

CIMC Password
Enter CIMC Password

Rack ID *
Enter Rack ID

Role *

Management IP
Enter Management IP Address

Management IPv6
Enter Management IPv6 Address

<table>
<tr><td><b>Server Name</b></td><td>Enter a server name.</td></tr>
<tr><td><b>Server Type</b> drop-down list</td><td>Choose Blade or Rack from the drop-down list.</td></tr>
<tr><td><b>Rack ID</b></td><td>The Rack ID for the server.</td></tr>
<tr><td><b>Chassis ID</b></td><td>Enter a Chassis ID.</td></tr>
<tr><td>If Rack is</td><td>Enter a</td></tr>
</table>
</td></tr>
</table>
</td></tr>
</table>

Command or Action	Purpose		
	Name	Description	
		chosen, the **Rack Unit ID** field is displayed.	Rack Unit ID.
		If Blade is chosen, the **Blade ID** field is displayed.	Enter a Blade ID.
		Select the **Role** from the drop-down list.	If Server type is Blade then select **Control and Compute**. If server is Rack then select **Block Storage**.
		VIC Admin FEC mode	Applicable only for Cisco VIC that supports to change the admin FEC mode. Can be auto/off/cl74/cl91.
		VIC Port Channel Enable	Optional. By default, it is true. Can be either true or false.
		Secure Computing mode	Optional, it can be either 0 or 1. By default, it is 1 if not defined.

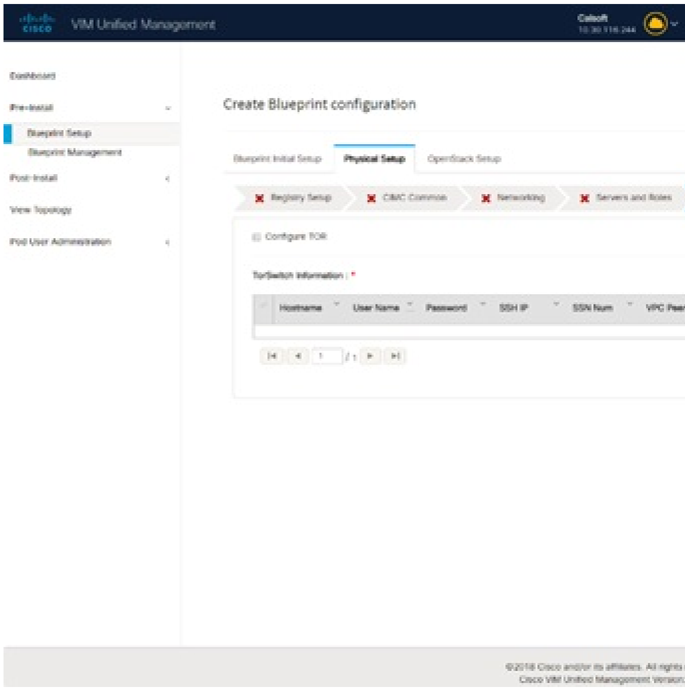
	Command or Action	Purpose

Name	Description	
	Nova CPU Allocation Ratio	Optional, override the NOVA_CPU_ALLOCATION_RATIO configuration defined in openstack_config.yaml Values are in the range of 0.958 to 16.0
	Nova RAM Allocation Ratio	Optional, overrides the NOVA_RAM_ALLOCATION_RATIO configuration defined in openstack_config.yaml Values are in the range of 1.0 to 4.0
	VM Hugepage Size	Optional, 2M or 1G Overrides the global VM_HUGEPAGE_SIZE value, when NFV_HOSTS is enabled.
	Management IP	It is an optional field but if provided for one server then it is mandatory to provide details for other servers.
	Storage IP	

	Command or Action	Purpose

Name	Description	
		It is an optional field, but if provided for one server then it is mandatory to provide details for other servers.
	Management IPv6	Enter the Management IPv6 Address.
	Click **Save**.	

f. Click **ToR Switch** checkbox in **Blueprint Initial Setup** to enable the **TOR SWITCH** configuration page. It is an **Optional** section in Blueprint Setup, but when all the fields are filled it is a part of the Blueprint.

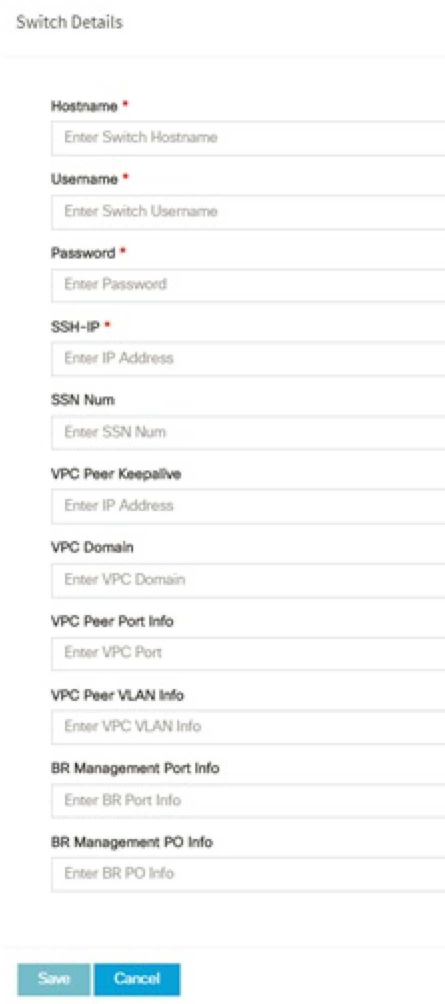


<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>Configure ToR</b> optional checkbox.</td><td>Enabling this checkbox, changes the configure ToR section from false to true.</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td><table><tr><th>Name</th><th>Description</th></tr><tr><td><b>ToR Switch Information</b> mandatory table.</td><td></td></tr></table></td></tr>
</table>

	Command or Action	Purpose

Name	Description
	Click **(+)** to add information for ToR Switch.



Switch Details

Hostname *
Enter Switch Hostname

Username *
Enter Switch Username

Password *
Enter Password

SSH-IP *
Enter IP Address

SSN Num
Enter SSN Num

VPC Peer Keepalive
Enter IP Address

VPC Domain
Enter VPC Domain

VPC Peer Port Info
Enter VPC Port

VPC Peer VLAN Info
Enter VPC VLAN Info

BR Management Port Info
Enter BR Port Info

BR Management PO Info
Enter BR PO Info

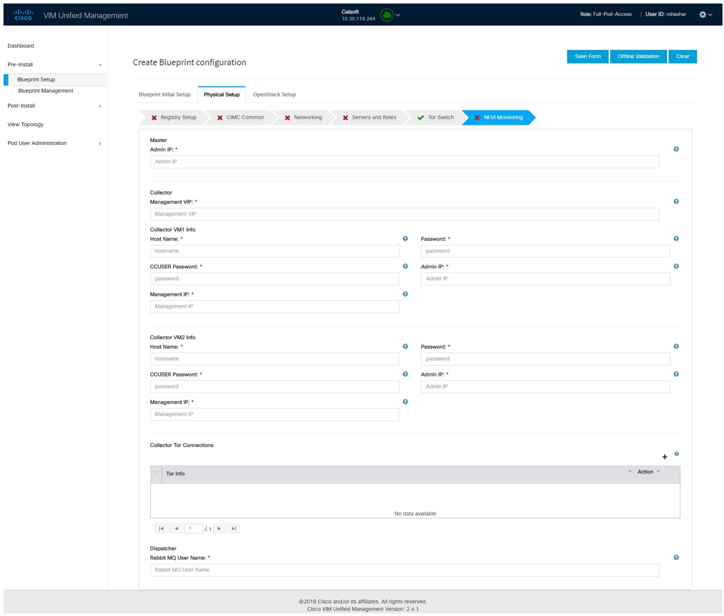
Name	Description
Hostname	ToR switch hostname.
Username	ToR switch username.
Password	ToR switch password.
SSH IP	ToR switch SSH IP

	Command or Action	Purpose

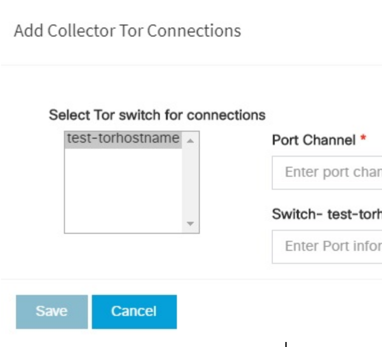
Name	Description	
		Address.
	SSN Num	ToR switch ssn num.
	VPC Peer Keepalive	Peer Management IP. You do not define if there is no peer.
	VPC Domain	Do not define if peer is absent.
	VPC Peer Port Info	Interface for vpc peer ports.
	BR Management Port Info	Management interface of the management node.
	BR Management PO Info	Port channel number for management interface of the management node.
	Click**Save**.	
On clicking save button, **Add ToR Info Connected to Fabric** field is visible.	**Port Channel** field.	Enter the Port Channel input.
	Switch Name field.	Enter the name of the Switch.

g. Click **NFVI Monitoring** checkbox in Blueprint Initial Setup to enable the NFVI Monitoring configuration tab.

	Command or Action	Purpose



Name	Description
Admin IP	IP Address of Control Center VM
Management VIP	VIP for ceilometer/dispatcher to use, must be unique across VIM Pod
Host Name	Hostname of Collector VM
Password	Password of Collector VM
CCUSER Password	Password of CCUSER
Admin IP	SSH IP of Collector VM
Management IP	Management IP of Collector VM
Master 2	Optional, but becomes mandatory if collector 2 is defined. Must contain valid Admin IP.

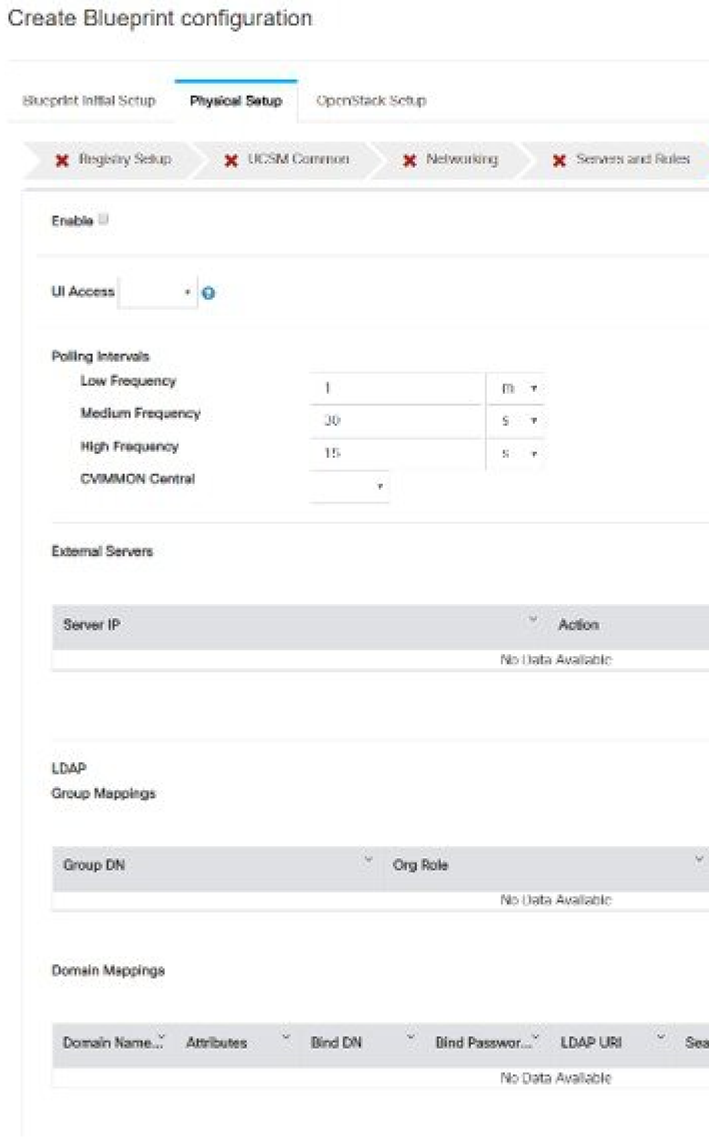
<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>Collector 2</b></td><td>Optional, but becomes mandatory if Master 2 is defined. Collector 2 is secondary set to collector and with all the properties of Collector.
Contains Management VIP and Collector VM information.</td></tr>
<tr><td><b>Collector ToR Connections</b></td><td>1. Click on (+) icon to Add Collector ToR Connections.
2. Select the ToR switches from list to add the information.
3. It is optional and available for ToR type NCS-5500
4. For now, it supports adding only one Collector ToR Connection


<table>
<tr><td><b>Port Channel</b></td><td>Enter port channel.</td></tr>
<tr><td><b>Switch - {tSwitchhotname}</b></td><td>Enter port number, E.g:eth1/15.</td></tr>
</table>
Click <b>Save</b></td></tr>
</table>
</td></tr>
</table>

	Command or Action	Purpose
		(continued below)

Name	Description
Rabbit MQ User Name	Enter Rabbit MQ username.

h. Click CVIMMON option in **Blueprint Initial Setup** to enable the **CVIM Monitoring** configuration tab.



Create Blueprint configuration

Enable □

UI Access

Polling Intervals

Low Frequency	1	m
Medium Frequency	30	s
High Frequency	15	s
CVIMMON Central		

External Servers

Server IP	Action
No Data Available	

LDAP
Group Mappings

Group DN	Org Role
No Data Available	

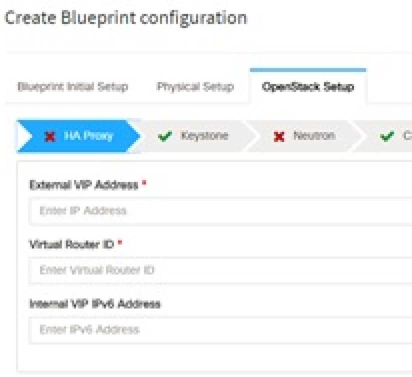
Domain Mappings

Domain Name...	Attributes	Bind DN	Bind Passwor...	LDAP URI	Sea
No Data Available					

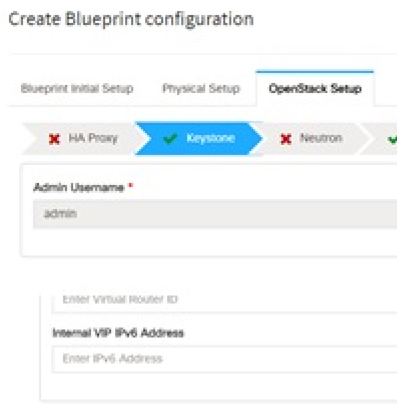
	Command or Action	Purpose

Name	Description
Enable	By default, it is false. It is case-sensitive and can be True or False
UI Access	Optional, and if not defined it is set to True by defaul. With this option disabled, CVIM_MON with SNMP is available but you cannot access Grafana, Alert-Manager, and Prometheus UIs
Polling Interval	Optional. Denotes 's' for seconds, m for minutes, and h for hours
High Frequency	Minimum of 10 seconds (10s) and maximum of 60 mins (1h). If not defined, defaults to 15s.
Medium Frequency	Minimum of 30 seconds (30s) and maximum of 60 mins (1h). If not defined, defaults to 30s. It must be more than high interval
Low Frequency	Minimum of 1 minute (1m) and maximum of 60 mins (1h). If not defined, defaults to 1 minute. It must be more than medium interval.
CVIMMON Central	Optional, if not defined, defaults to False.With this option enabled, you will get central CVIM-MON (only telegraf agents running on pod), without local Prometheus, AlertManager, or Grafana
External Servers	Optional, list of external server IPs (v4 or v6) to be monitoried by CVIM MON

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
i. Click <b>OpenStack Setup</b> tab to advance to the OpenStack Setup Configuration page. On the <b>OpenStack Setup</b> page of the Cisco VIM Unified Management wizard, complete the following fields:
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>HA Proxy</b></td><td>
Fill in the following details:

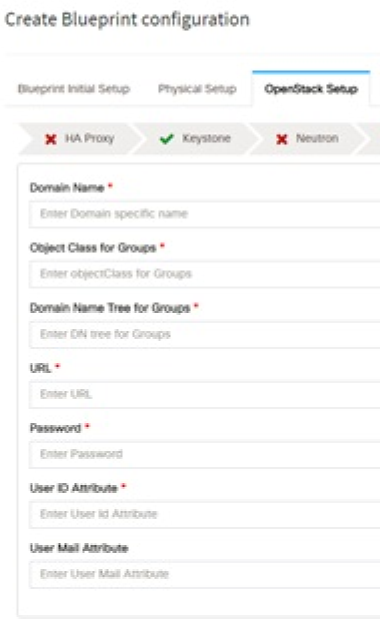


<table>
<tr><td><b>External VIP Address</b> field</td><td>Enter the IP address of the External VIP.</td></tr>
<tr><td><b>External VIP Address IPv6</b> field</td><td>Enter the IPv6 address of the External VIP.</td></tr>
<tr><td><b>Virtual Router ID</b> field</td><td>Enter the Router ID for the HA.</td></tr>
<tr><td><b>Internal VIP Address IPv6</b> field</td><td>Enter the IPv6 address of the Internal IP.</td></tr>
<tr><td><b>Internal VIP Address</b> field</td><td>Enter the IP address of the Internal VIP.</td></tr>
</table>
</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>Keystone</b></td><td>The following are the Pre-populated field values. This option is always set to be true.

Create Blueprint configuration

Admin Username * admin
Enter Virtual Router ID
Internal VIP IPv6 Address
Enter IPv6 Address
<table>
<tr><td><b>Admin Username</b> field</td><td>admin</td></tr>
<tr><td><b>Admin Tenant Name</b> field</td><td>admin</td></tr>
</table>
</td></tr>
</table>
</td></tr>
</table>

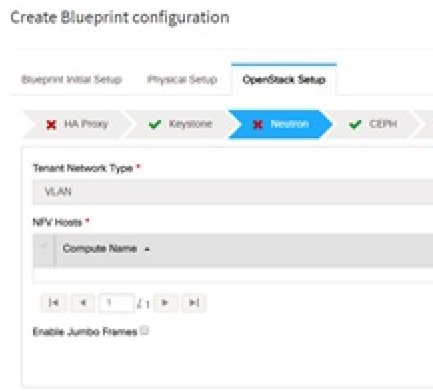
	Command or Action	Purpose	
		Name	**Description**
		LDAP (Only if Keystonev3 is enabled) **Note** This option is only available with Keystone v3	

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>This is available only when Keystone v3 and LDAP both are enabled under <i>Optional Features and Services</i> in Blueprint Initial Setup.


<table>
<tr><td><b>Domain Name</b> field</td><td>Enter the Domain name.</td></tr>
<tr><td><b>Object Class for Users</b> field</td><td>Enter a string as input.</td></tr>
<tr><td><b>Object Class for Groups</b>field</td><td>Enter a string.</td></tr>
<tr><td><b>Domain Name Tree for Users</b> field</td><td>Enter a string.</td></tr>
<tr><td><b>Domain Name Tree for Groups</b></td><td>Enter a string.</td></tr>
</table>
</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><td>field</td><td></td></tr>
<tr><td><b>Suffix for Domain Name</b> field</td><td>Enter a string.</td></tr>
<tr><td><b>URL</b> field</td><td>Enter a URL with ending port number.</td></tr>
<tr><td><b>Domain Name of bind user</b> field</td><td>Enter a string.</td></tr>
<tr><td><b>Password</b> field</td><td>Enter Password as string format.</td></tr>
<tr><td><b>User Filter</b> field</td><td>Enter filter name as string.</td></tr>
<tr><td><b>User ID Attribute</b> field</td><td>Enter a string.</td></tr>
<tr><td><b>User Name Attribute</b> field</td><td>Enter a string.</td></tr>
<tr><td><b>User Mail Attribute</b> field</td><td>Enter a string.</td></tr>
<tr><td><b>Group Name Attribute</b> field</td><td>Enter a string.</td></tr>
</table>
</td></tr>
</table>
</td></tr>
</table>

	Command or Action	Purpose
		<table><tr><th>Name</th><th>Description</th></tr><tr><td>**Neutron**</td><td></td></tr></table>

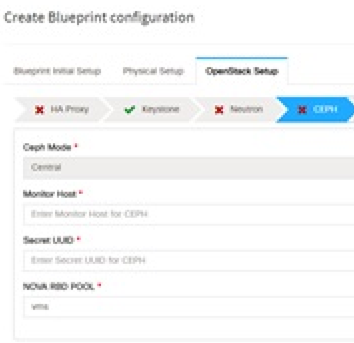
<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>Neutron fields change on the basis of <i>Tenant Network Type</i> selection from <b>Blueprint Initial Setup</b>. Following are the options available for Neutron for OVS/VLAN:


Tenant Network Type * VLAN
NFV Hosts *
Compute Name ▲
Enable Jumbo Frames □
<table>
<tr><td><b>Tenant Network Type</b> field</td><td>It is Auto-filled based on the <i>Tenant Network Type</i>selected in the Blueprint Initial Setup page.</td></tr>
<tr><td><b>Mechanism Drivers</b> field</td><td>It is Auto-filled based on the <i>Tenant Network Type</i> selected in Blueprint Initial Setup page.</td></tr>
<tr><td><b>NFV Hosts</b> field</td><td>It is Auto-filled with the Compute you added in</td></tr>
</table>
</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><td></td><td>Server and Roles.
If you select All in this section NFV_HOSTS: <b>ALL</b> is added to the Blueprint or you can select one particular compute. For Example:
NFV_HOSTS: compute-server-1, compute-server-2.</td></tr>
<tr><td><b>Tenant VLAN Ranges</b> field</td><td>List of ranges separated by comma form start:end.</td></tr>
<tr><td><b>Provider VLAN Ranges</b> field</td><td>List of ranges separated by comma form start:end.</td></tr>
<tr><td><b>VM Hugh Page Size (available for NFV_HOSTS option)</b> field</td><td>2M or 1G</td></tr>
<tr><td><b>Enable Jumbo Frames</b> field</td><td>Enable the checkbox.</td></tr>
</table>
For Tenant Network Type, Linux Bridge everything remains the same but <b>Tenant VLAN Ranges</b> is removed.
</td></tr>
</table>
</td></tr>
</table>

	Command or Action	Purpose	
		Name	**Description**
		CEPH	

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>
1. 1. When Object Storage Backend is selected as <i>Central</i> in the blueprint initial setup.


Create Blueprint configuration

Blueprint Initial Setup | Physical Setup | OpenStack Setup

✗ HA Proxy ✓ Keystone ✗ Neutron ✗ CEPH

Ceph Mode * Central

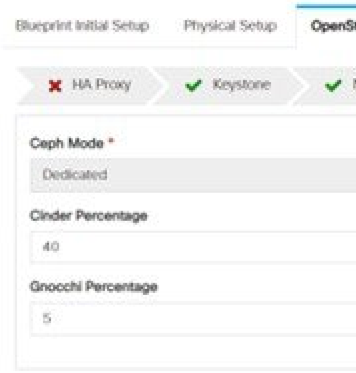
Monitor Host * Enter Monitor Host for CEPH

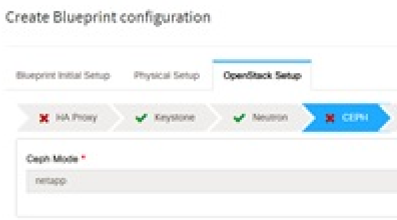
Secret UUID * Enter Secret UUID for CEPH

NOVA RBD POOL * vms

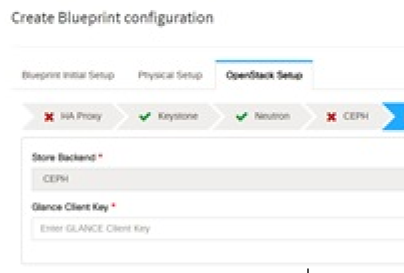
<table>
<tr><td>CEPH Mode</td><td>By default Ceph Mode is Central.</td></tr>
<tr><td>Cluster ID</td><td>Enter the Cluster ID.</td></tr>
<tr><td>Monitor Host</td><td>Enter the Monitor Host for CEPH</td></tr>
<tr><td>Monitor Members</td><td>Enter the Monitor Members for CEPH</td></tr>
<tr><td>Secret UUID</td><td>Enter the Secret UUID for CEPH</td></tr>
<tr><td>NOVA Boot from</td><td>You can choose CEPH or local from the drop-down list.</td></tr>
<tr><td>NOVA RBD POOL</td><td>Enter the NOVA RBD Pool (default's to vms)</td></tr>
<tr><td>CEPH</td><td>CEPH NAT</td></tr>
</table>
</td></tr>
</table>
</td></tr>
</table>

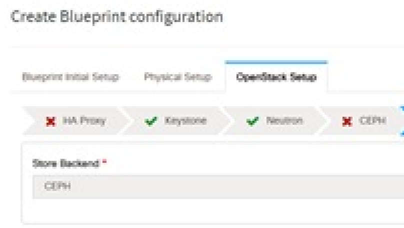
<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><td>NAT</td><td>is required for Central Ceph and when mgmt network is not routable.</td></tr>
</table>
</td></tr>
</table>
</td></tr>
</table>

	Command or Action	Purpose	
		Name	**Description**
			2. When Object Storage Backend is selected as *Dedicated* in the blueprint initial setup.  Blueprint Initial Setup Physical Setup OpenS HA Proxy Keystone Ceph Mode * Dedicated Cinder Percentage 40 Gnocchi Percentage 5 • CEPH Mode: By default, it is set to Dedicated. • Nova Boot From: You can choose CEPH or local. • Cinder Percentage: Must be 60 when Nova Boot From is local, and must be 40 when Nova Boot is Ceph • Nova Percentage: Only applicable when Nova Boot From is Ceph. Must be 30% otherwise. • Glance Percentage : Must be 40 when Nova Boot From is local, and must be 30 when NOVA Boot From is Ceph. If Ceilometer is enabled, it must be 35% for Nova Boot from local and 25% for NOVA Boot From is Ceph.

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>
- Gnocchi Percentage: Only applicable when ceilometer is enabled, and must be 5%.
3. When Object Storage Backend is selected as <i>NetApp</i> in the blueprint initial setup.


Ceph Mode * netapp
- Ceph mode : By Default netapp
- Cinder Percenatge : Must be 60%
- Glance Percenatge: Must be 40%
</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>GLANCE</b></td><td>1. When Object Storage Backend is selected as <i>Central</i> in the blueprint initial setup.

Create Blueprint configuration

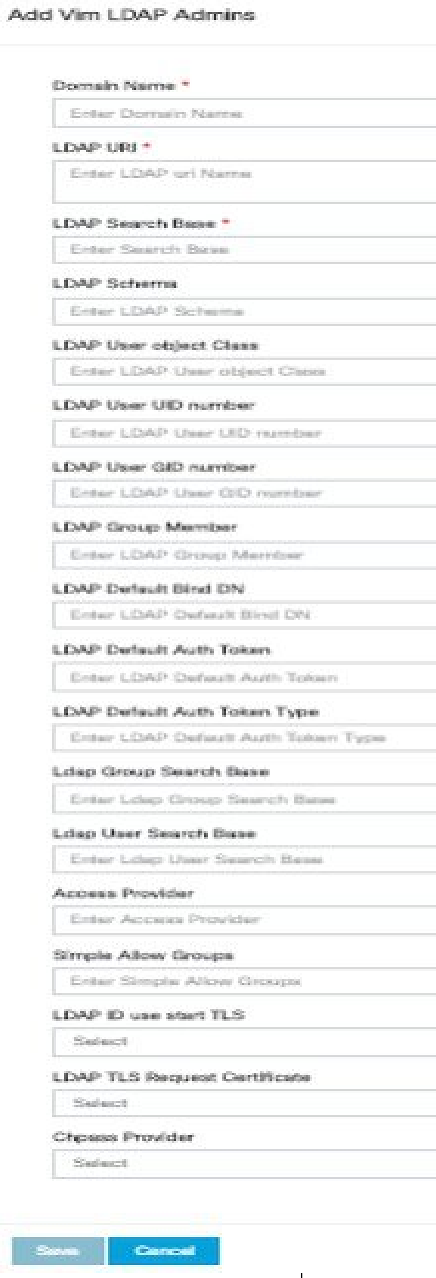
Store Backend *: CEPH
Glance Client Key *: Enter GLANCE Client Key
<table>
<tr><td><b>Store Backend</b></td><td>By default CEPH.</td></tr>
<tr><td><b>Glance RBD Pool</b> field</td><td>By default images.</td></tr>
<tr><td><b>Glance Client Key</b></td><td>Enter GLANCE Client Key</td></tr>
</table>
2. When Object Storage Backend is selected as <i>Dedicated</i> in the blueprint initial setup.

Create Blueprint configuration

Store Backend *: CEPH
By default Populated for CEPH Dedicated with Store Backend value as CEPH.</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td><table><tr><th>Name</th><th>Description</th></tr><tr><td><b>Vim LDAP Admins</b></td><td></td></tr></table></td></tr>
</table>

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td><table><tr><th>Name</th><th>Description</th></tr><tr><td></td><td>Optional entry to support LDAP for Admin access to management node. TLS must be enabled for the external api (i.e. external_lb_vip_tls: True).
Following are the values to be filled to add vim LDAP admins:</td></tr></table></td></tr>
</table>

	Command or Action	Purpose

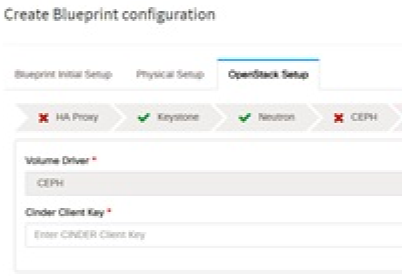
Name	Description
	 Add Vim LDAP Admins Domain Name * Enter Domain Name LDAP URI * Enter LDAP uri Name LDAP Search Base * Enter Search Base LDAP Schema Enter LDAP Schema LDAP User object Class Enter LDAP User object Class LDAP User UID number Enter LDAP User UID number LDAP User GID number Enter LDAP User GID number LDAP Group Member Enter LDAP Group Member LDAP Default Bind DN Enter LDAP Default Bind DN LDAP Default Auth Token Enter LDAP Default Auth Token LDAP Default Auth Token Type Enter LDAP Default Auth Token Type Ldap Group Search Base Enter Ldap Group Search Base Ldap User Search Base Enter Ldap User Search Base Access Provider Enter Access Provider Simple Allow Groups Enter Simple Allow Groups LDAP ID use start TLS Select LDAP TLS Request Certificate Select Chpass Provider Select Save Cancel

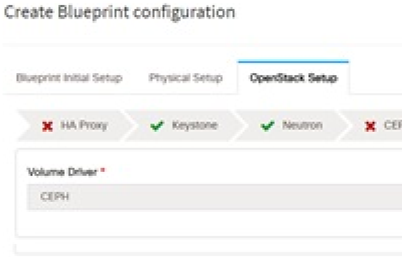
Command or Action	Purpose	
	Name	**Description**
		• **domain_name**: Mandatory to define vim LDAP admins. • **ldap_uri** : The ldap_uris must be secured over ldaps. It is mandatory field . • **ldap_search_base**: It is mandatory. Enter search base • **ldap_schema**: Optional. Enter the schema. • **ldap_user_object_class**: Optional. Indicates the posixAccount. • **ldap_user_uid_number**: Optional. Enter the user id number. • **ldap_user_gid_number**: Optional. Enter the group id number. • **ldap_group_member**: Optional. Enter the group member. • **ldap_default_bind_dn**: Optional . Enter default distinguished name • **ldap_default_authtok:** Optional. Default authentication token. • **ldap_default_authtok_type**: Optional. Default authentication token type. • **ldap_group_search_base**: Optional. Enter group search base • **ldap_user_search_base**:

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>

Name	Description
	Optional. Enter user Search Base • **access_provider**: Optional • **simple_allow_groups**: Optional • **ldap_id_use_start_tls**: Optional. Can be true or false. • **ldap_tls_reqcert**: Optional . Can be never/allow/try/demand. • **chpass_provider**: Optional. Can be ldap/krb5/ad/none.

</td></tr>
</table>

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>CINDER</b></td><td>By default Populated for <i>CEPH Dedicated</i> with Volume Driver value as <b>CEPH</b>.


Create Blueprint configuration
Volume Driver * CEPH
Cinder Client Key * Enter CINDER Client Key
<table>
<tr><td><b>Volume Driver</b></td><td>By default CEPH.</td></tr>
<tr><td><b>Cinder RBD Pool</b> field</td><td>By default volumes.</td></tr>
<tr><td><b>Cinder Client Key</b></td><td>Enter Cinder Client Key</td></tr>
</table>


Create Blueprint configuration
Volume Driver * CEPH
</td></tr>
</table>
</td></tr>
</table>

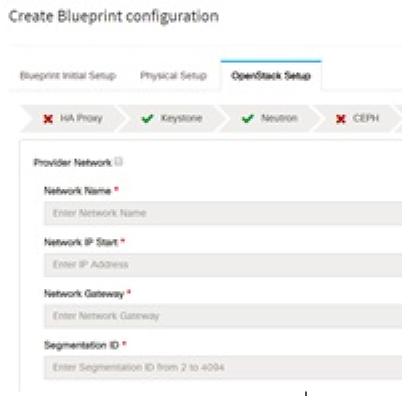
<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td><table><tr><th>Name</th><th>Description</th></tr><tr><td><b>VMTP</b>
VMTP optional section will only be visible once VMTP is selected from Blueprint Initial Setup.</td><td></td></tr></table></td></tr>
</table>

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>

Check one of the check boxes to specify a VMTP network:

- Provider Network
- External Network

For the **Provider Network** complete the following:



Provider Network □

Network Name *

Enter Network Name

Network IP Start *

Enter IP Address

Network Gateway *

Enter Network Gateway

Segmentation ID *

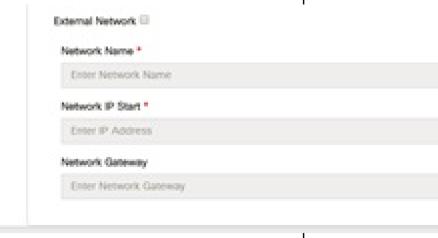
Enter Segmentation ID from 2 to 4094

<table>
<tr><td><b>Network Name</b> field</td><td>Enter the name for the external network.</td></tr>
<tr><td><b>Subnet</b> field</td><td>Enter the Subnet for Provider Network.</td></tr>
<tr><td><b>Network IP Start</b> field</td><td>Enter the start of the floating IPv4 address.</td></tr>
<tr><td><b>Network IP End</b> field</td><td>Enter the end of the floating IPv4 address.</td></tr>
<tr><td><b>Network Gateway</b>field</td><td>Enter the IPv4 address for the Gateway.</td></tr>
<tr><td></td><td></td></tr>
</table>

</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><td><b>DNS Server</b> field</td><td>Enter the DNS server IPv4 address.</td></tr>
<tr><td><b>Segmentation ID</b> field</td><td>Enter the segmentation ID.</td></tr>
</table>

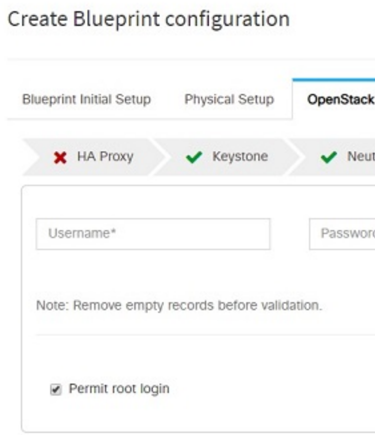
For <b>External Network</b> fill in the following details:

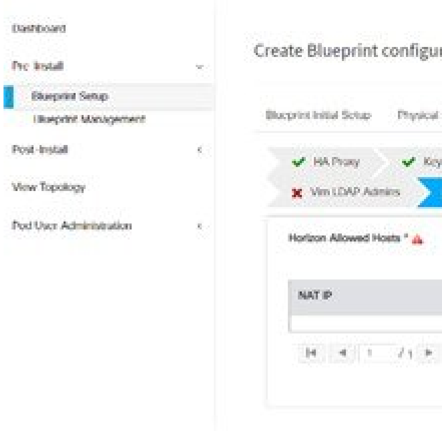


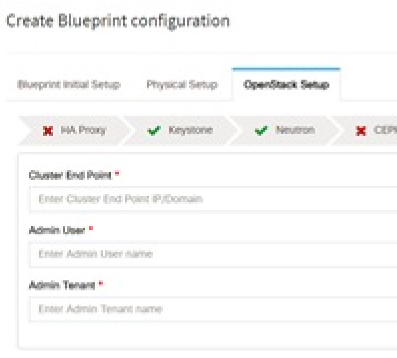
External Network □
Network Name *
Enter Network Name
Network IP Start *
Enter IP Address
Network Gateway
Enter Network Gateway

<table>
<tr><td><b>Network Name</b> field</td><td>Enter the name for the external network.</td></tr>
<tr><td><b>Subnet</b> field</td><td>Enter the Subnet for the external Network.</td></tr>
<tr><td><b>Network IP Start</b> field</td><td>Enter the start of the floating IPv4 address.</td></tr>
<tr><td><b>Network IP End</b> field</td><td>Enter the endof the floating IPv4 address.</td></tr>
<tr><td><b>Network Gateway</b> field</td><td>Enter the IPv4 address for the Gateway.</td></tr>
<tr><td><b>DNS Server</b> field</td><td>Enter the DNS server IPv4 address.</td></tr>
</table>
</td></tr>
</table>
</td></tr>
</table>

	Command or Action	Purpose

Name	Description
TLS This optional section will only be visible once TLS is selected from Blueprint Initial Setup Page.	**TLS** has two options: - **External LB VIP FQDN** - -Text field. - **External LB VIP TLS** True/False. By default this option is false.
Under the OpenStack setup tab, **Vim_admins** tab will be visible only when Vim_admins is selected from the **Optional Features & Services** under the Blueprint Initial setup tab	Following are the field descriptions for VIM Admins:  Create Blueprint configuration Blueprint Initial Setup Physical Setup OpenStack HA Proxy Keystone Neut Username* Passwor Note: Remove empty records before validation. Permit root login - **User Name** - Text field. - **Password** -Password field. Admin hash password should always start with $6.

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>Horizon Aliases</b></td><td>If the external_lb_vip is behind a NAT router or has a DNS alias, provide a list of those addresses. <b>Horizon Allowed Host</b>s uses comma separated list of IP addresses and/or DNS names for horizon hosting.

 </td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>SwiftStack</b> optional section will be visible once SwiftStack is selected from <b>Blueprint Initial Setup</b> Page. SwiftStack is only supported with KeyStonev2 . If you select Keystonev3, swiftstack will not be available for configuration.</td><td>Following are the options that needs to be filled for SwiftStack:


Cluster End Point *
Enter Cluster End Point IP/Domain
Admin User *
Enter Admin User name
Admin Tenant *
Enter Admin Tenant name
<table>
<tr><td><b>Cluster End Point</b> field</td><td>IP address of PAC (Proxy-Account-Container) endpoint.</td></tr>
<tr><td><b>Admin User</b> field</td><td>Admin user for swift to authenticate in keystone.</td></tr>
<tr><td><b>Admin Tenant</b> field</td><td>The service tenant corresponding to the Account-Container used by the Swiftstack.</td></tr>
<tr><td><b>Reseller Prefix</b> field</td><td>Reseller_prefix as configured for Keysone Auth,AuthToken support in Swiftstack. Example: KEY_</td></tr>
<tr><td><b>Admin Password</b> field</td><td>swiftstack_admin_password</td></tr>
<tr><td><b>Protocol</b></td><td>http or https</td></tr>
</table>
</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>

j. For SolidFire, enter the following:

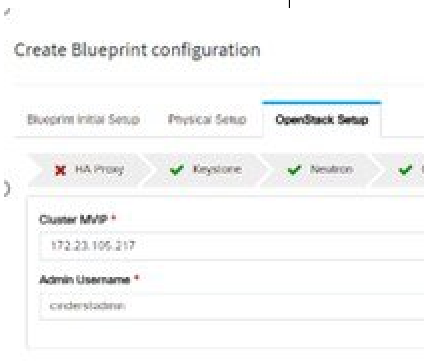
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td>

SolidFire is visible for configuration on day0

SolidFire is not allowed as a day-2 deployment option

SolidFire is always available with CEPH.

</td><td>



Create Blueprint configuration

Cluster MVIP * 172.23.105.217

Admin Username * cinderstadmin

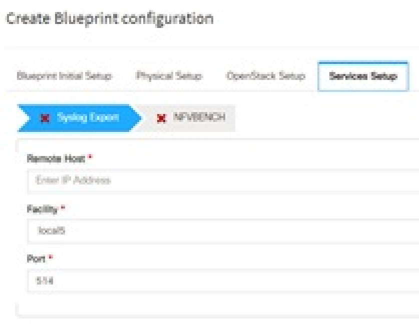
<table>
<tr><td><b>Cluster MVIP field</b></td><td>Management IP of SolidFire cluster.</td></tr>
<tr><td><b>Cluster SVIP field</b></td><td>Storage VIP of SolidFire cluster.</td></tr>
<tr><td><b>Admin Username</b></td><td>Admin user on SolidFire cluster</td></tr>
<tr><td><b>Admin Password</b></td><td>Admin password on SolidFire cluster.</td></tr>
</table>

</td></tr>
</table>

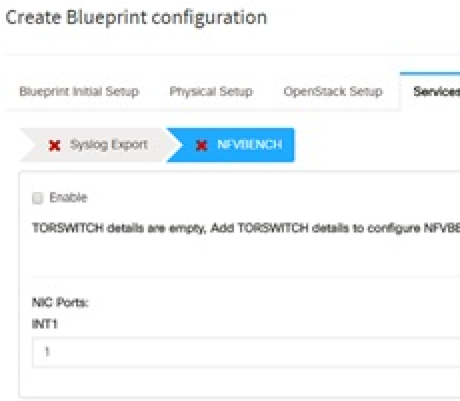
k. If **Syslog Export** or **NFVBENCH** is selected in **Blueprint Initial Setup**, the **Services Setup** pane is enabled for the user to view.

Following are the options under **Services Setup** Tab:

</td></tr>
</table>

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>Syslog Export</b></td><td>Following are the options for Syslog Settings:


Create Blueprint configuration
Remote Host * Enter IP Address
Facility * local5
Port * 514
<table>
<tr><td><b>Remote Host</b></td><td>Enter Syslog IP address.</td></tr>
<tr><td><b>Protocol</b></td><td>Only UDP is supported.</td></tr>
<tr><td><b>Facility</b></td><td>Defaults to local5.</td></tr>
<tr><td><b>Severity</b></td><td>Defaults to debug.</td></tr>
<tr><td><b>Clients</b></td><td>Defaults to ELK.</td></tr>
<tr><td><b>Port</b></td><td>Defaults to 514 but can be modified by the User.</td></tr>
</table>
</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th></th><th>Command or Action</th><th>Purpose</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>NFVBENCH</b></td><td><b>NFVBENCH enable checkbox</b> which by default is <i>False</i>.
Create Blueprint configuration
Blueprint Initial Setup | Physical Setup | OpenStack Setup | Services
✖ Syslog Export ✖ NFVBENCH
□ Enable
TORSWITCH details are empty, Add TORSWITCH details to configure NFVBE
NIC Ports:
INT1
1
Add ToR information connected to switch:
• Select a TOR Switch and enter the Switch name.
• Enter the port number. For example:eth1/5. VTEP VLANS (mandatory and needed only for VXLAN): Enter 2 different VLANs for VLAN1 and VLAN2
• NIC Ports: INT1 and INT2 optional input. Enter the 2 port numbers of the 4-port 10G Intel NIC at the management node used for the NFVBench.</td></tr>
<tr><td><b>ENABLE_ESC_PRIV</b></td><td>Enable the checkbox to set it as True. By default it is <i>False</i>.</td></tr>
</table>
</td></tr>
</table>

Creating Blueprint for C-Series Server Platform

Create a Cisco VIM Unified Management User Account and register the respective Pod.

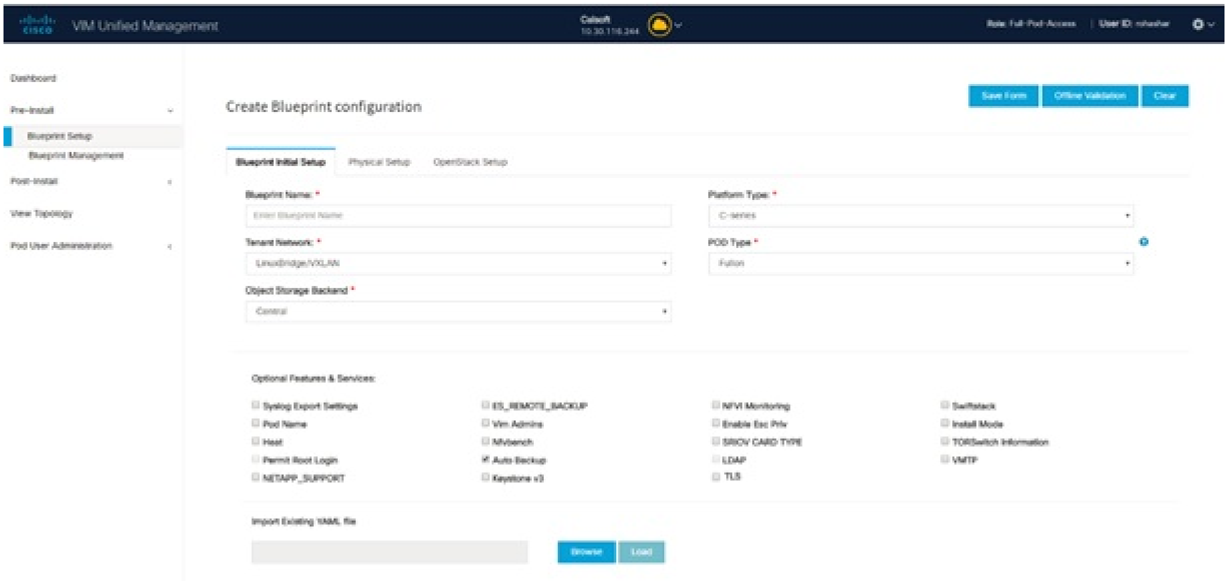
Step 1 Log into **CISCO VIM Unified Management**.

Step 2 In the **Navigation** pane, expand the **Pre-Install Section**.

Step 3 Click **Blueprint Setup**.

Step 4 To create a **C Series Blueprint**:

a. On the **Blueprint Initial Setup** page of the Cisco VIM Unified Management, complete the following fields:



Blueprint Name: * Enter Blueprint Name

Platform Type: * C-series

Tenant Network: * LinuxBridge/VXLAN

POD Type * Fullon

Object Storage Backend * Central

Optional Features & Services:

□ Syslog Export Settings
□ Pod Name
□ Heat
□ Permit Root Login
□ NETAPP_SUPPORT
□ ES_REMOTE_BACKUP
□ Vim Admins
□ NFVbench
☑ Auto Backup
□ Keystone v3
□ NFVI Monitoring
□ Enable Esc Priv
□ SRIOV CARD TYPE
□ LDAP
□ TLS
□ Swiftstack
□ Install Mode
□ TORSwitch Information
□ VMTP

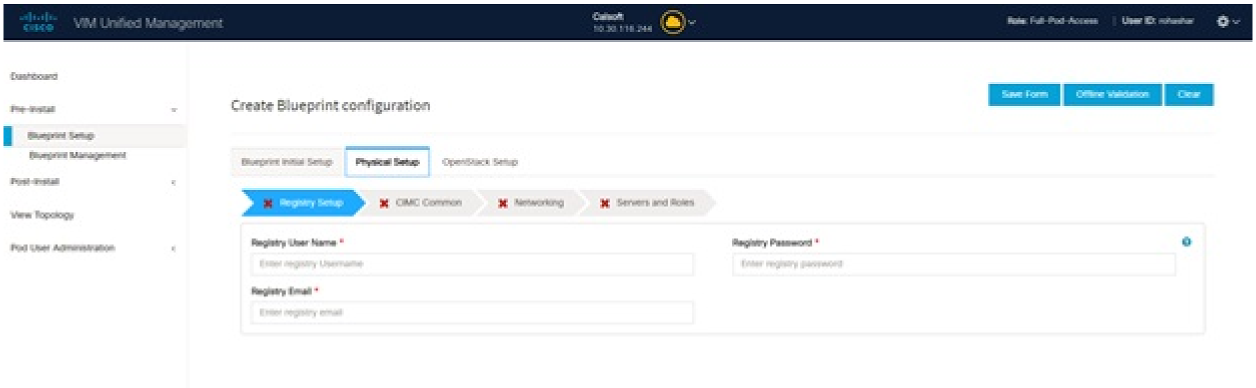
Import Existing YAML file

Name	Description
Blueprint Name field.	Enter the name for the blueprint configuration.
Platform Type drop-down list	Choose one of the following platform types: • B-Series (By default) • C-Series (Select C Series)

Name	Description
Tenant Network drop-down list	Choose one of the following tenant network types: • Linux Bridge/VXLAN • OVS/VLAN • VTS/VLAN • VPP/VLAN • ACI/VLAN **Note** when VTS/VLAN or ACI/VLAN is selected then respective tabs are available on Blueprint setup. When Mechanism driver OVS or ACI is selected, VM_HUGEPAGE_PERCENTAGE field is enabled for all standalone compute nodes, when NFV_HOSTS is enabled.
Pod Type drop-down list	Choose one of the following pod type : • Fullon(By Default) • Micro • UMHC • NGENAHC **Note** • UMHC pod type is only supported for OVS/VLAN tenant type. • NGENAHC is supported for VPP/VLAN tenant type with no SRIOV • Pod type micro is supported for OVS/VLAN, ACI/VLAN,VPP/VLAN.
Ceph Mode drop-down list	Choose one of the following Ceph types: • Dedicated: Enabled by default. • Central. It is not supported in production
SSH Banner	Optional parameter `ssh_banner` is available in the setup_data, to accept a string or message that is to be displayed before the login prompt. This message indicates a warning in consistent with company's IT policies.

Name	Description
Optional and Services Features checkbox	LDAP, Syslog Export Settings, Install Mode, TorSwitch Information, TLS, NFVMON, Pod Name, VMTP, NFVBench, Autbackup, Heat, Keystone v3, Enable Esc Priv. If any one is selected, the corresponding section is visible in various Blueprint sections. By default all features are disabled except Auto Backup.
Import Existing YAML file	If you have an existing C Series YAML file you can use this feature to upload the file. Unified Management will automatically fill in the fields and any missed mandatory field will be highlighted in the respective section.

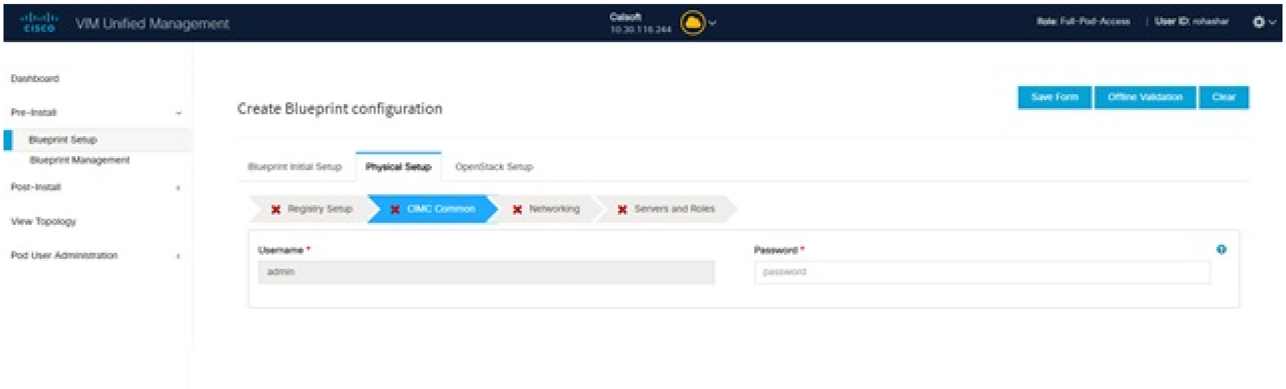
b. Click **Physical Setup** to advance to the **Registry Setup** configuration page. Fill in the following details for Registry Setup:



Name	Description
Registry User Name text field	User-Name for Registry **(Mandatory)**.
Registry Password text field	Password for Registry **(Mandatory)**.
Registry Email text field	Email ID for Registry **(Mandatory)**.

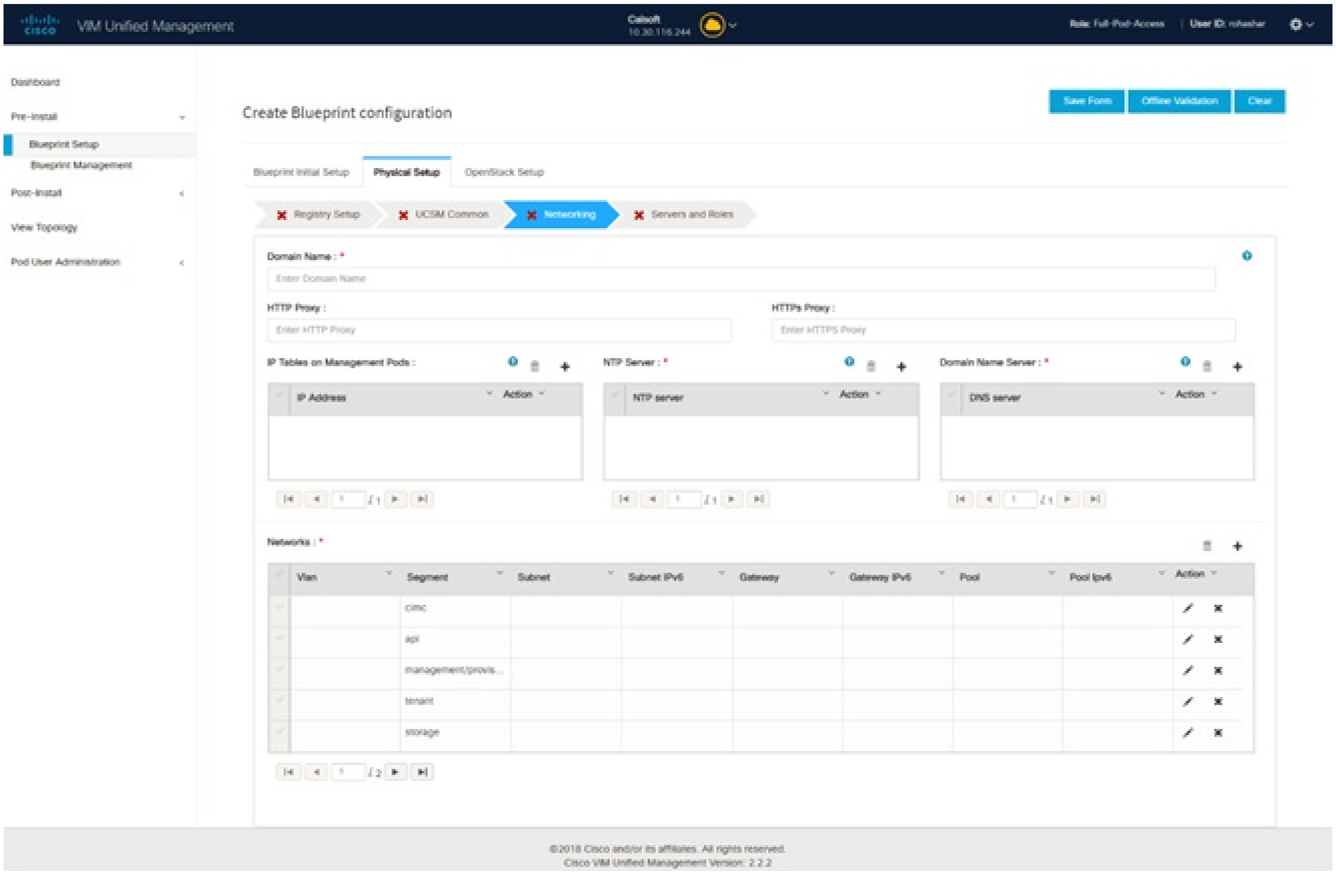
Once all the mandatory fields are filled the **Validation Check Registry Page** will be changed to a Green Tick.

c. Click **CIMC Common Tab** and complete the following fields:



Name	Description
User Name disabled field	By default value is Admin.
Password text field	Enter Password for UCSM Common **(Mandatory)**.

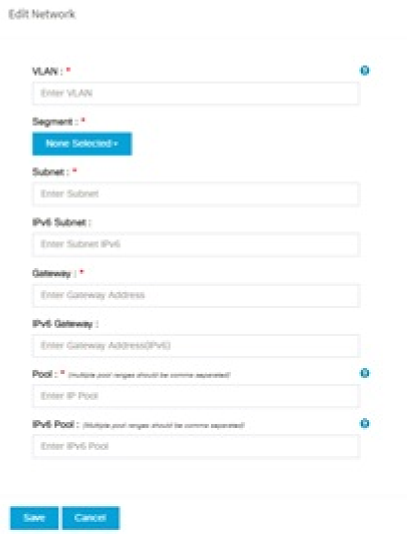
d. Click **Networking** to advance to the networking section of the Blueprint.



Name	Description
Domain Name field	Enter the domain name. **(Mandatory)**

Name	Description
HTTP Proxy Server field	If your configuration uses an HTTP proxy server, enter the IP address of the server.
HTTPS Proxy Server field	If your configuration uses an HTTPS proxy server, enter the IP address of the server.
IP Tables on Management Pods	Specifies the list of IP Address with Mask.
NTP Servers field	Enter a maximum of four and minimum of one IPv4 and/or IPv6 addresses in the table.
Domain Name Servers field	Enter a maximum of three and minimum of one IPv4 and/or IPV6 addresses.

Name	Description
Networks table	

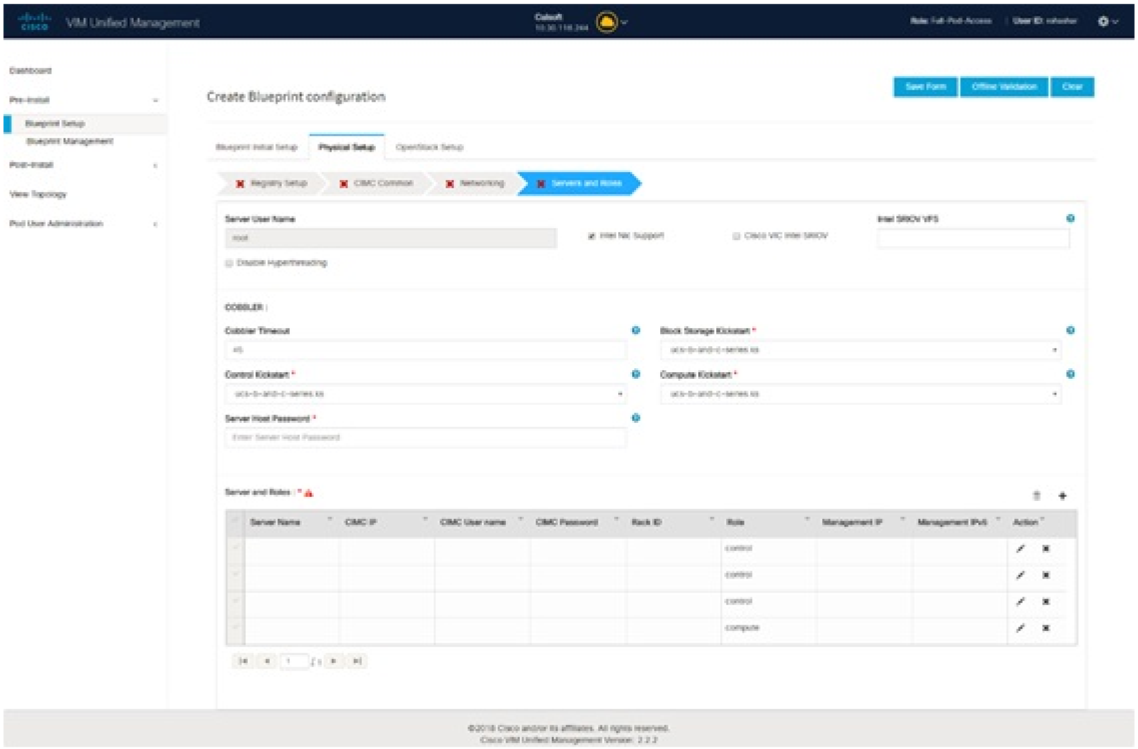
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>
Network table is pre-populated with Segments. To add Networks you can either clear all the table with <b>Delete all</b> or click <b>edit</b> icon for each segment and fill in the details.
You can add, edit, or delete network information in the table.


• Click <b>Add (+)</b> to add new entries (networks) to the table.
• Specify the following fields in the Edit Entry to Networks dialog:
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>VLAN</b> field</td><td>Enter the <b>VLAN ID</b>.
For Segment - Provider, the VLAN ID value is 'none'.</td></tr>
<tr><td><b>Segment</b> drop-down list</td><td>When you add/edit new segment then following segments types are available in the form of dropdown list and you can select only one.
• API
• Management/provision
• Tenant
• Storage</td></tr>
</table>
</td></tr>
</table>

Name	Description	
		• External • Provider • ACIINFRA **Note** **Aciinfra** segment is available only when ACI/VLAN tenant type is selected) Depending upon the segment some of the entries below are not needed. Please refer to the example file in openstack-configs dir for details.
	Subnet field	Enter the IPv4 address for the subnet.
	IPv6 Subnet field	Enter IPv6 Address. This field will be available only for Management provision and API
	Gateway field	Enter the IPv4 address for the Gateway.
	Gateway IPv6 field	Enter the IPv6 address for the gateway. This will support for API and management provision.
	Pool field	Enter the pool information in the required format, for example: 10.1.1.5-10.1.1.10,10.2.1.5-10.2.1.10 This field is available only for the Mgmt/Provision, Storage, and Tenant segments.
	IPv6 Pool field	Enter the pool information in the required format. For example: 10.1.1.5-10.1.1.10,10.2.1.5-10.2.1.10

Name	Description
	Allowed only when ToR is NCS-5500 Can only be defined for management/provision, storage, and tenant segments Click **Save**.

e. On the **Servers and Roles** page of the Cisco VIM Suite wizard, a pre-populated table filled with Roles : Control, Compute and Block Storage (Only if CEPH Dedicated is selected in Blueprint Initial Setup is available.



Create Blueprint configuration

Server User Name: root

☑ Intel Nic Support

□ Cisco VIC Intel SRIOV

Intel SRIOV VFS

□ Disable Hyperthreading

COBBLER :

Cobbler Timeout: 45

Block Storage Kickstart *: ucs-b-and-c-series.ks

Control Kickstart *: ucs-b-and-c-series.ks

Compute Kickstart *: ucs-b-and-c-series.ks

Server Host Password *: Enter Server Host Password

Server and Roles : *

Server Name	CIMC IP	CIMC User name	CIMC Password	Rack ID	Role	Management IP	Management IPv6	Action
					control			
					control			
					control			
					compute			

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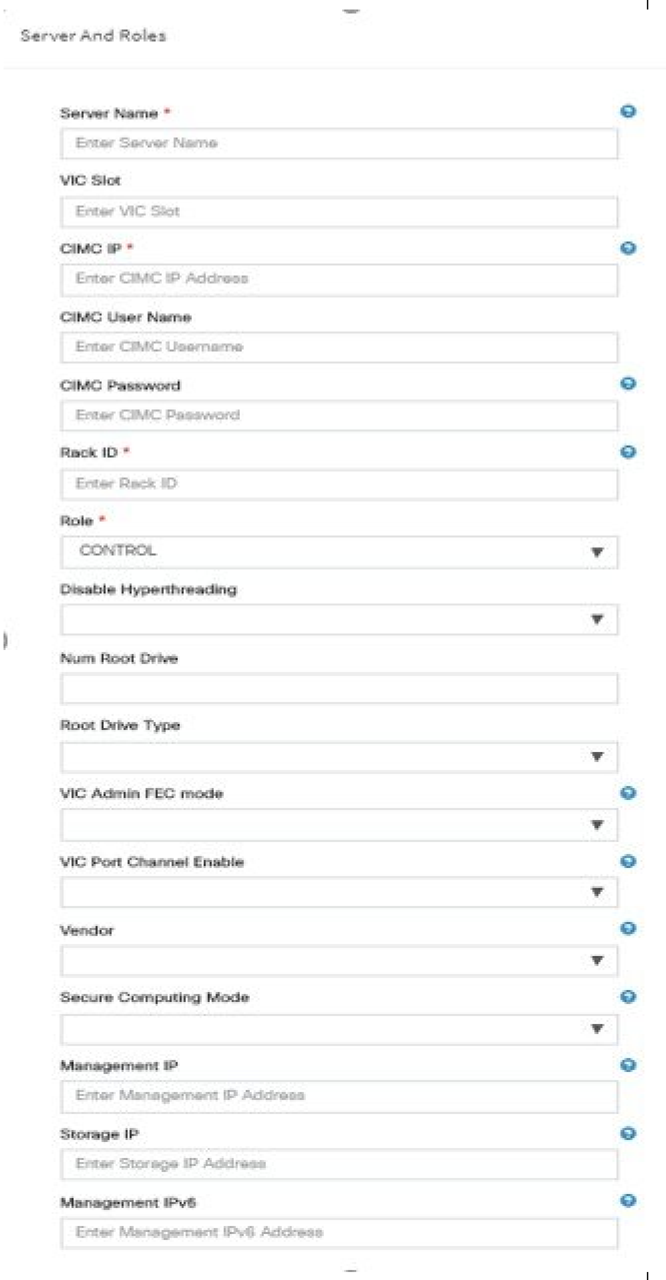
Cisco VIM Unified Management Version: 2.2.2

Note If you choose mechanism driver as OVS or ACI, VM_HUGEPAGE_PERCENTAGE field column is available for compute nodes, where you can fill values from 0 to 100%, when NFV_HOSTS: ALL is chosen.

Name	Description
Server User Name field	Enter the username of the Server.
Disable Hyperthreading	Default value is false. You can set it as true or false.

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>Cobbler</b></td><td>Enter the Cobbler details in the following fields:
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>Cobbler Timeout</b> field</td><td>The default value is 45 min.
This is an optional parameter. Timeout is displayed in minutes, and its value ranges from 30 to 120.</td></tr>
<tr><td><b>Block Storage Kickstart</b> field</td><td>Kickstart file for Storage Node.</td></tr>
<tr><td><b>Admin Password Hash</b> field</td><td>Enter the Admin Password. Password should be Alphanumeric. Password should contain minimum 8 characters and maximum of 32 characters.</td></tr>
<tr><td><b>Cobbler Username</b> field</td><td>Enter the cobbler username to access the cobbler server.</td></tr>
<tr><td><b>Control Kickstart</b> field</td><td>Kickstart file for Control Node.</td></tr>
<tr><td><b>Compute Kickstart</b> field</td><td>Kickstart file for Compute Node.</td></tr>
<tr><td><b>Cobbler Admin Username</b> field</td><td>Enter the admin username of the Cobbler.</td></tr>
</table>
</td></tr>
</table>

Name	Description
Add Entry to Servers and Roles **Note** when Pod type micro is selected then all the three servers will be associated with control, compute and block storage role. For Example: Roles • Block Storage • -Server 1 • -Server 2 • -Server 3 • Control • -Server 1 • -Server 2 • -Server 3 • Compute • -Server 1 • -Server 2 • -Server 3 **Note** When Pod type UMHC is selected then auto ToR configuration is not supported and the ToR info at server and roles level is not allowed to be entered.	

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>Click <b>Edit</b> or + to add a new server and role to the table.
If mechanism driver is either OVS or ACI, an additional optional field VM_HUGEPAGE_PERCENTAGE is shown when compute role is chosen; This option is only valid when NFV_HOSTS is set to ALL; If no value is entered then the global value of VM_HUGEPAGE_PERCENTAGE is used.
Server And Roles
Server Name * — Enter Server Name
VIC Slot — Enter VIC Slot
CIMC IP * — Enter CIMC IP Address
CIMC User Name — Enter CIMC Username
CIMC Password — Enter CIMC Password
Rack ID * — Enter Rack ID
Role * — CONTROL
Disable Hyperthreading
Num Root Drive
Root Drive Type
VIC Admin FEC mode
VIC Port Channel Enable
Vendor
Secure Computing Mode
Management IP — Enter Management IP Address
Storage IP — Enter Storage IP Address
Management IPv6 — Enter Management IPv6 Address
<table><tr><td><b>Server Name</b></td><td>Entry the name of the server.</td></tr></table></td></tr>
</table>

Name	Description	
	Rack ID field	The rack ID for the server.
	VIC Slot field	Enter a VIC slot.
	CIMC IP	Enter an IP address. Both IPv4 and IPv6 supported.
	CIMC Username field	Enter a Username.
	CIMC Password field	Enter a Password for CIMC.
	Select the **Role** from the drop down list	Choose Control or Compute or Block Storage from the drop-down list.
	VIC Admin FEC mode	Applicable only for Cisco VIC that supports to change the admin FEC mode. Can be auto/off/cl74/cl91.
	VIC Port Channel Enable	Optional. Default is true. Can be either true or false.
	Secure Computing mode	Optional, can be either 0 or 1. By default,it is 1 if not defined.
	Nova CPU Allocation Ratio	Optional, overrides the NOVA_CPU_ALLOCATION_RATIO defined in openstack_config.yaml. Values are in the range of 0.958 to 16.0
	Nova RAM Allocation Ratio	Optional, overrides the NOVA_RAM_ALLOCATION_RATIO defined in openstack_config.yaml. Values are in the range of 1.0 to 4.0
	VM Hugepage Size	Optional, 2M or 1G. Overrides the global VM_HUGEPAGE_SIZE value, if NFV_HOSTS is enabled.
	Disable Hyperthreading	True or False. Optional, overrides the global hyper-threading configuration.

Name	Description	
	Root Drive Type	Optional, HDD or SSD in front or rear drive bay. M.2_SATA internal SSD. It is a mandatory configuration if booting off M.2 SATA SSD, and not valid for M4 platform.
	Management IP	It is an optional field, but if provided for one server then it is mandatory to provide it for other servers.
	Storage IP	It is an optional field but if provided for one server then it is mandatory to provide details for other servers.
	Vendor	Allows static override value for platform vendor instead of dynamic discovery at runtime. Can be CISCO - Cisco Systems Inc/ QCT - Quanta Cloud Technology Inc/ HPE - Hewlett Packard Enterprise.
	Management IPv6	Routable and valid IPv6 address. It is an optional field but if provided for one server then it is mandatory for all other servers as well.
Click **Save or Add** .	On clicking **Save or Add** all information related to Servers and Roles gets saved.	
If **Configure ToR** checkbox is **True**with at-least one switch detail, these fields will be displayed for each server and this is similar to DP Tor: **Port Channel and Switch Name (Mandatory if Configure ToR is true)**	• **Port Channel** field • **Switch Name** field • **Switch Port Info** field	• Enter the port channel input. • Enter the switch name. • Enter the switch port information.
DP ToR (Only for Control and Compute) : Mandatory if Intel NIC and Configure TOR is True.	• **Port Channel** field • **Switch Name** field • **Switch Port Info** field	• Enter the port channel input. • Enter the switch name. • Enter the switch port information.

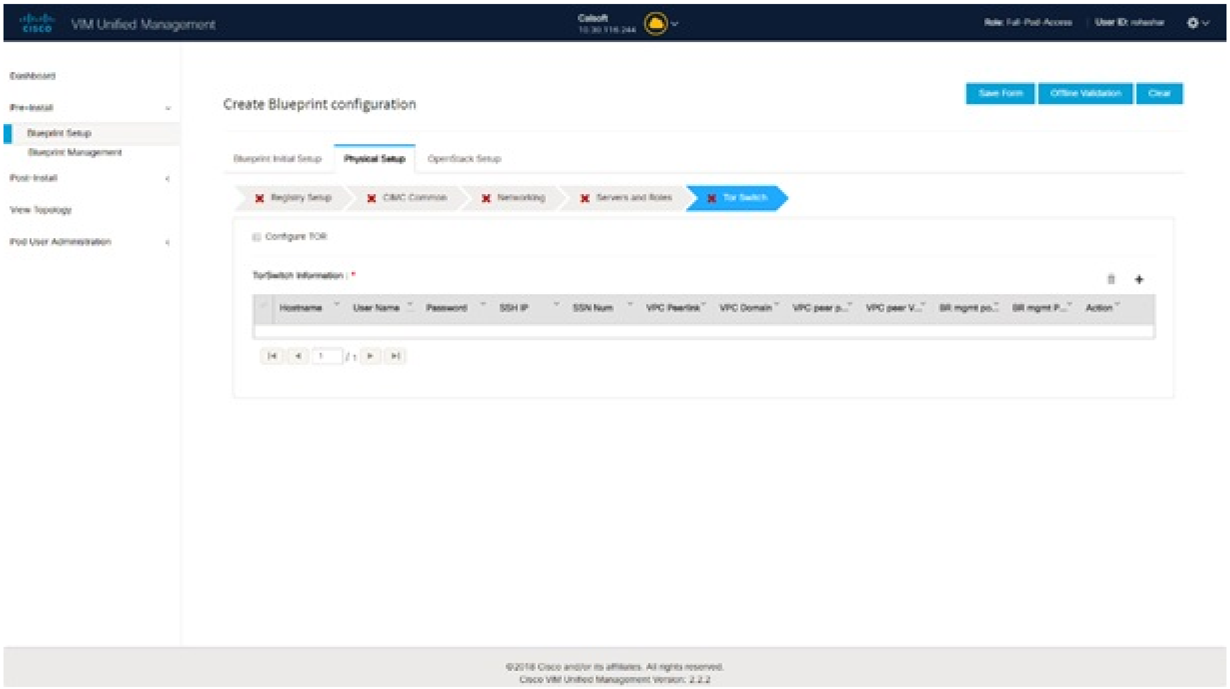
Name	Description	
SRIOV TOR INFO (Only for Compute Nodes). It is mandatory in server and roles if Intel NIC and Configure TOR is True. with TOR TYPE Nexus. For TOR TYPE NCS-5500 these fields are optional **Switch Name (Mandatory if Configure ToR is true).** This field appears only when Intel NIC support is true, as Auto TOR config is not supported in VIC_NIC combo	• **Switch Name** field • **Switch Port Info** field	• Enter the switch name. • Enter the switch port information.
Intel SRIOV VFS (valid for Intel NIC testbeds) and can be integer.	For SRIOV support for Intel NIC. By Default, SRIOV support is disabled. To enable, define a value in the range # * 1-32 when INTEL_NIC_SUPPORT is set True (X710 Max VFs = 32) # * 1-63 when CISCO_VIC_INTEL_SRIOV is set True (X520 Max VFs = 63)	
INTEL_SRIOV_PHYS_PORTS (valid for Intel NIC test beds) and can be of value 2 or 4 (default is 2)	In some cases the # of Physical SRIOV port needed is 4; to meet that requirement, define the following: # this is optional, if nothing is defined code will assume it to be 2; the only 2 integer values this parameter # takes is 2 or 4 and is true when INTEL_NIC_SUPPORT is True and INTEL_SRIOV_VFS is valid.. For Cisco NCS 5500 this value is set to 4 and is non-editable.	
Click **Save or Add** .	If all mandatory fields are filled click **Save or Add** to add information on Servers and Roles.	
Disable Hyperthreading	Default value is false. You can set it as true or false.	
Click **Save**		

Note Maximum two ToR info needs to be configured for each connection type on each node (control, compute and block_storage node).

Note If pod type UMHC is selected then CISCO_VIC_INTEL_SRIOV is enabled to be TRUE. CISCO_VIC_INTEL_SRIOV is also supported on Micro pod with expanded computes

Note For Tenant type **ACI/VLAN,** port channel for each ToR port will not be available in servers and roles, as APIC will automatically assign port-channel numbers. Also, for ACI in full on mode you can select Intel NIC Support in the “Servers and Roles” section.

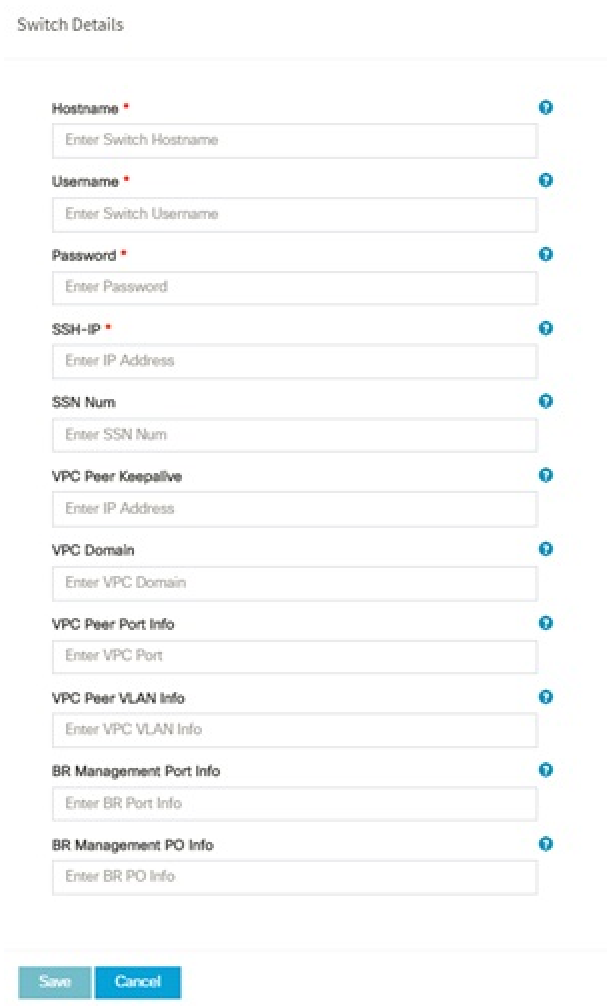
f. Click **ToR Switch** checkbox in **Blueprint Initial Setup** to enable the **TOR SWITCH** configuration page. It is an **Optional** section in Blueprint Setup but once all the fields are filled in then it will become a part of the Blueprint.



Name	Description
Configure ToR optional checkbox. **Note** If **UMHC** is selected as podtype, configure TOR is not allowed.	Enabling this checkbox, changes the configure ToR section from false to true. **Note** Configure tor is true then ToR switch info maps in servers

Name	Description
ToR Switch Information mandatory table if you want to enter ToR information.	

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>Click (+) to add information for ToR Switch.



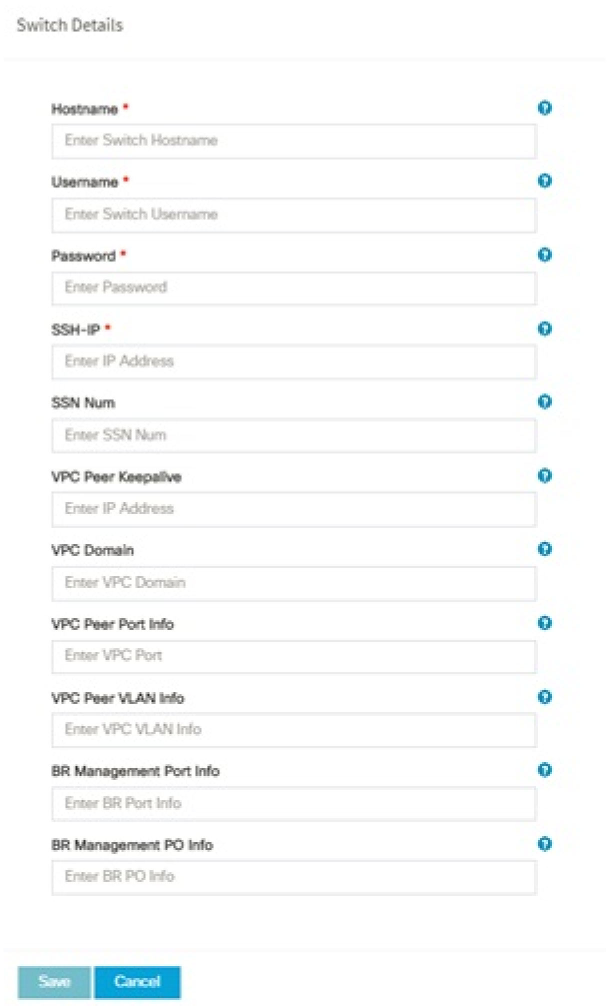
<table>
<tr><td>Name</td><td>Description</td></tr>
<tr><td><b>Name</b></td><td>ToR switch name.</td></tr>
<tr><td><b>Username</b></td><td>ToR switch username.</td></tr>
<tr><td><b>Password</b></td><td>ToR switch password.</td></tr>
<tr><td><b>SSH IP</b></td><td>ToR switch SSH IP.</td></tr>
<tr><td><b>SSN Num</b></td><td>ToR switch ssn num.</td></tr>
<tr><td><b>VPC Peer Keepalive</b></td><td>Peer Management IP. You cannot define if there is no peer.</td></tr>
<tr><td><b>VPC Domain</b></td><td>Cannot define if there is no</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><td></td><td>peer.</td></tr>
<tr><td><b>VPC Peer Port Info</b></td><td>Interface for vpc peer ports.</td></tr>
<tr><td><b>VPC Peer VLAN Info</b></td><td>VLAN ids for vpc peer ports (optional).</td></tr>
<tr><td><b>BR Management Port Info</b></td><td>Management interface of build node.</td></tr>
<tr><td><b>BR Management PO Info</b></td><td>Port channel number for management interface of build node.</td></tr>
<tr><td><b>BR Management VLAN info</b></td><td>VLAN id for management interface of build node (access).</td></tr>
</table>
</td></tr>
<tr><td colspan="2">Click <b>Save</b>.</td></tr>
</table>

Note When tenant type ACI/VLAN is selected, the TOR switch information table differs and is mandatory.

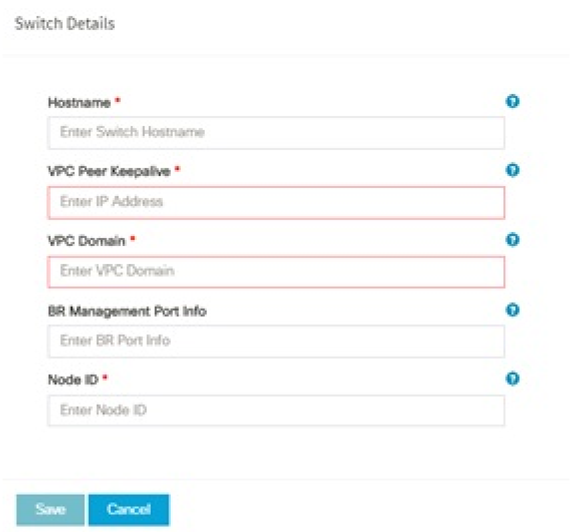
Name	Description
Configure ToR optional checkbox. **Note** If **UMHC** is selected as podtype, configure TOR is not allowed.	Enabling this checkbox, changes the configure ToR section from false to true. **Note** Configure tor is true then ToR switch info maps in servers

Name	Description
ToR Switch Information mandatory table if you want to enter ToR information.	

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>Click <b>(+)</b> to add information for ToR Switch.

Switch Details
Hostname * — Enter Switch Hostname
Username * — Enter Switch Username
Password * — Enter Password
SSH-IP * — Enter IP Address
SSN Num — Enter SSN Num
VPC Peer Keepalive — Enter IP Address
VPC Domain — Enter VPC Domain
VPC Peer Port Info — Enter VPC Port
VPC Peer VLAN Info — Enter VPC VLAN Info
BR Management Port Info — Enter BR Port Info
BR Management PO Info — Enter BR PO Info
Save Cancel
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>Name</b></td><td>ToR switch name.</td></tr>
<tr><td><b>Username</b></td><td>ToR switch username.</td></tr>
<tr><td><b>Password</b></td><td>ToR switch password.</td></tr>
<tr><td><b>SSH IP</b></td><td>ToR switch SSH IP.</td></tr>
<tr><td><b>SSN Num</b></td><td>ToR switch ssn num.</td></tr>
<tr><td><b>VPC Peer Keepalive</b></td><td>Peer Management IP. You cannot define if there is no peer.</td></tr>
<tr><td><b>VPC Domain</b></td><td>Cannot define if there is no</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><td></td><td>peer.</td></tr>
<tr><td><b>VPC Peer Port Info</b></td><td>Interface for vpc peer ports.</td></tr>
<tr><td><b>VPC Peer VLAN Info</b></td><td>VLAN ids for vpc peer ports (optional).</td></tr>
<tr><td><b>BR Management Port Info</b></td><td>Management interface of build node.</td></tr>
<tr><td><b>BR Management PO Info</b></td><td>Port channel number for management interface of build node.</td></tr>
<tr><td><b>BR Management VLAN info</b></td><td>VLAN id for management interface of build node (access).</td></tr>
</table>
</td></tr>
<tr><td colspan="2">Click <b>Save</b>.</td></tr>
</table>

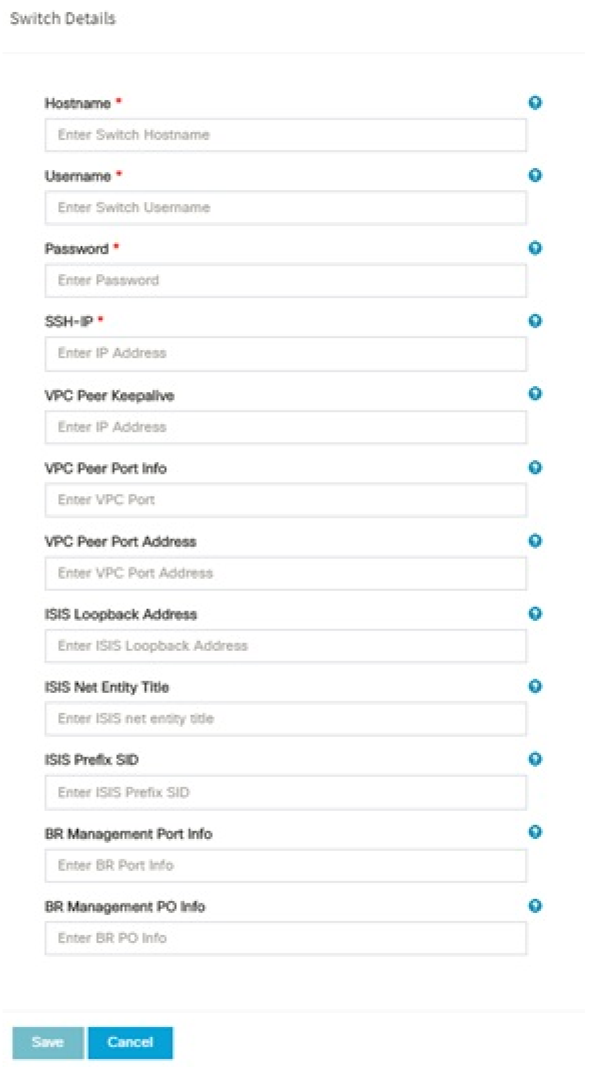
Note When the Tenant type ACI/VLAN is selected, the ToR switch information table differs and is mandatory.

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>Configure ToR</b></td><td>Is not checked, as by default ACI will configure the ToRs

Switch Details
Hostname *
Enter Switch Hostname
VPC Peer Keepalive *
Enter IP Address
VPC Domain *
Enter VPC Domain
BR Management Port Info
Enter BR Port Info
Node ID *
Enter Node ID
Save Cancel
<table>
<tr><td><b>Host Name</b></td><td>ToR switch name.</td></tr>
<tr><td><b>VPC Peer keep alive</b></td><td>Enter Peer must be exist pair.</td></tr>
<tr><td><b>VPC Domain</b></td><td>Enter an integer.</td></tr>
<tr><td><b>BR management port info</b></td><td>Enter BR management port info eg. Eth1/19 ,atleast one pair to be exist.</td></tr>
<tr><td><b>Enter Node ID</b></td><td>Entered integer must be unique.</td></tr>
</table>
</td></tr>
</table>

Note If TOR_TYPE is selected as NCS-5500, the TOR switch information table differs and is mandatory.

Name	Description
Configure ToR optional checkbox **Note** If **NSC-5500** is selected as TOR_TYPE, configure TOR is set as mandatory.	Enabling this checkbox, changes the configure ToR section from false to true. **Note** Configure TOR is true then ToR switchinfo maps in servers.

Name	Description
If you want to enter NCS details fill in the **NCS-5500 Information** table.	

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>Click <b>(+)</b> to add information for NCS-500 Switch.

Switch Details
Hostname *
Enter Switch Hostname
Username *
Enter Switch Username
Password *
Enter Password
SSH-IP *
Enter IP Address
VPC Peer Keepalive
Enter IP Address
VPC Peer Port Info
Enter VPC Port
VPC Peer Port Address
Enter VPC Port Address
ISIS Loopback Address
Enter ISIS Loopback Address
ISIS Net Entity Title
Enter ISIS net entity title
ISIS Prefix SID
Enter ISIS Prefix SID
BR Management Port Info
Enter BR Port Info
BR Management PO Info
Enter BR PO Info
Save Cancel
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>Name</b></td><td>Enter the NCS-5500 hostname.</td></tr>
<tr><td><b>User Name</b></td><td>Enter the NCS-5500 username.</td></tr>
<tr><td><b>Password</b></td><td>Enter the NCS-5500 password.</td></tr>
<tr><td><b>SSH IP</b></td><td>Enter the NCS-5500 ssh IP Address.</td></tr>
<tr><td><b>VPC Peer Link</b></td><td>Peer management IP.</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>BR Management PO Info</b></td><td>Port channel number for management interface of build node.</td></tr>
<tr><td><b>BR Management VLAN info</b></td><td>VLAN id for management interface of build node (access).</td></tr>
<tr><td><b>VPC Peer Port Info</b></td><td>Interface for vpc peer ports.</td></tr>
<tr><td><b>VPC Peer Port Address</b></td><td>Address for ISIS exchange.</td></tr>
<tr><td><b>ISIS Loopback Interface address</b></td><td>ISIS loopack IP Address.</td></tr>
<tr><td><b>ISIS net entity title</b></td><td>Enter a String.</td></tr>
<tr><td><b>ISIS prefix SID</b></td><td>Integer between 16000 to 1048575.
Optional, if TOR-TYPE is NCS-5500.
Entry not allowed when ESI_PREFIX is defined.</td></tr>
</table>
</td></tr>
</table>

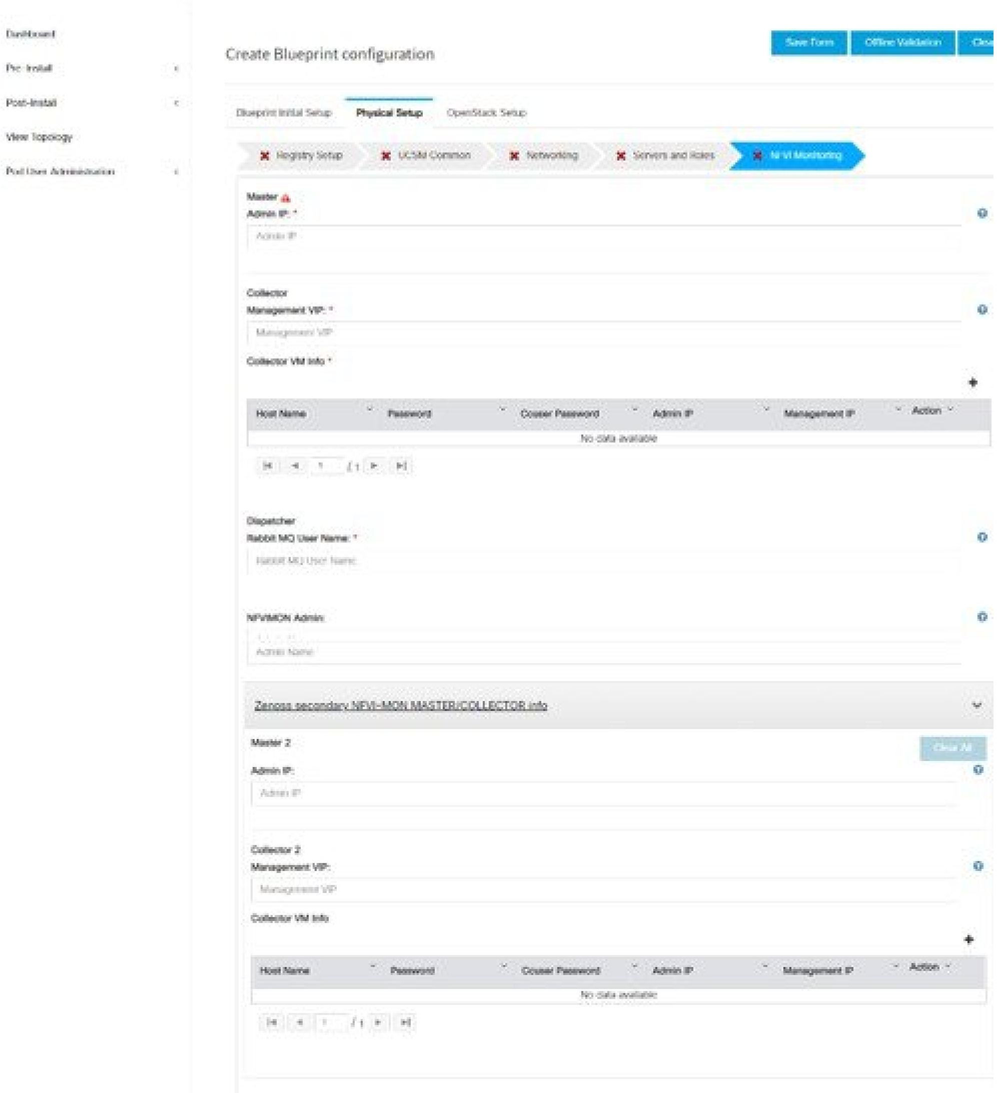
When TOR-TYPE selected as NCS-5500 and 2 NCS-5500 are configured, it is mandatory to configure MULTI_SEGMENT_ROUTING_INFO

Name	Description
BGP AS Number field	Integer between 1 to 65535.
ISIS Area Tag field	A valid string.
Loopback Interface name field	Loopback Interface name.
API bundle ID field	Integer between 1 to 65535.
API bridge domain field	String (Optional, only needed when br_api of mgmt node is also going through NCS-5500; this item and api_bundle_id are mutually exclusive).
EXT bridge domain field	A valid string (user pre-provisions physical, bundle interface, sub-interface and external BD for external uplink and provides external BD info setup_data).

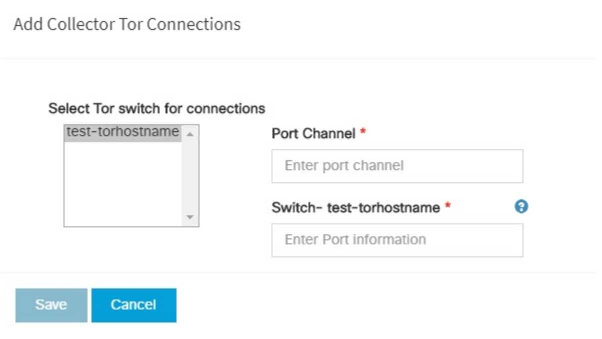
When TOR-TYPE is NCS-5500, you can optionally define ESI_PREFIX field.

Name	Description
ESI_PREFIX	Ethernet-segment identifier type Example: 91.<Pod_number>.<pod_region_number>.00.00.00.00.

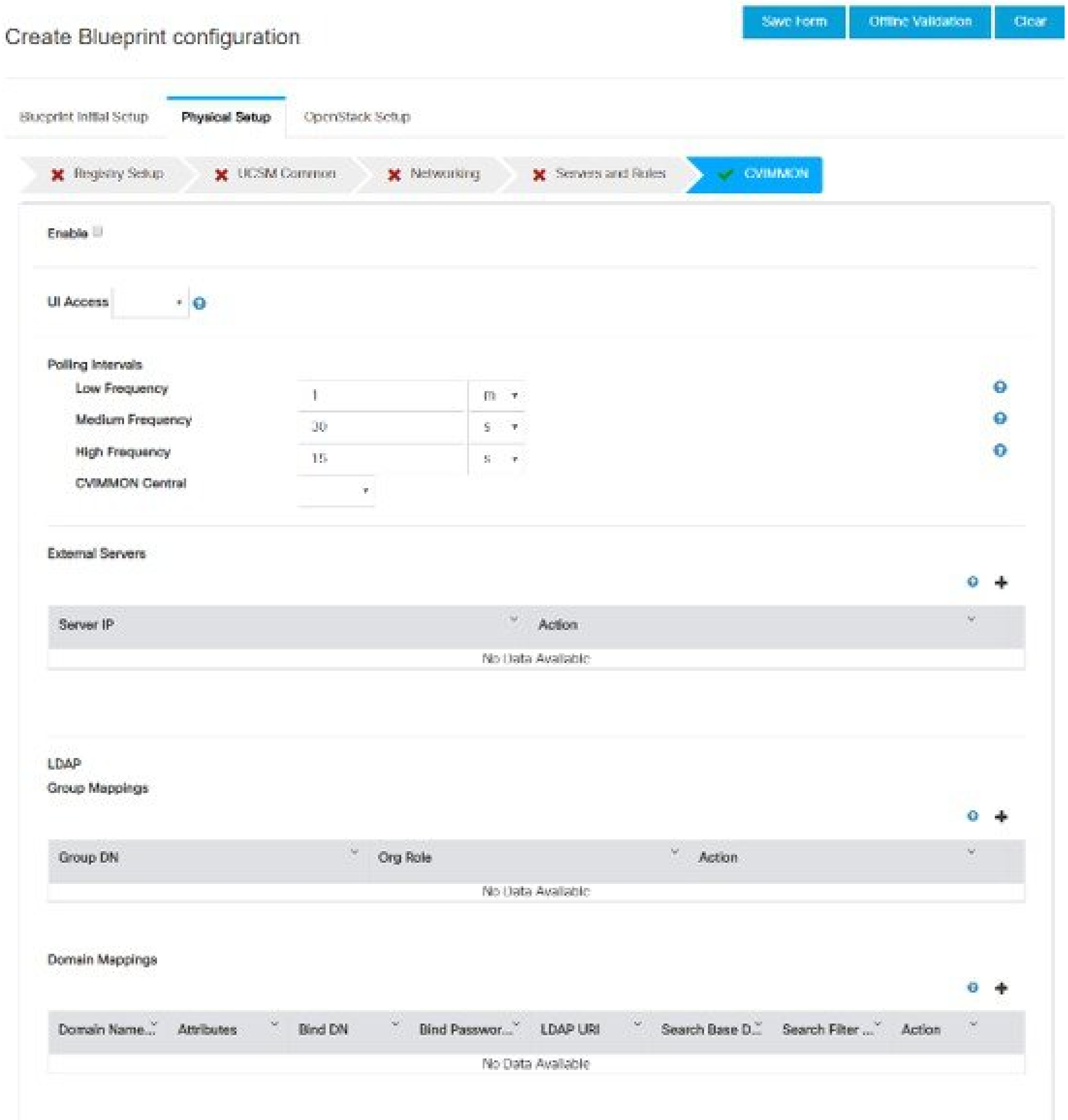
g. Click **NFVI Monitoring** checkbox in Blueprint Initial Setup, to enable the NFVI Monitoring configuration tab. NFVIMON can be un-configured once configured.



Name	Description
Master - Admin IP	IP Address of Control Center VM
Collector - Management VIP	VIP for ceilometer/dispatcher to use, must be unique across VIM Pod

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>Host Name</b></td><td>Hostname of Collector VM</td></tr>
<tr><td><b>Password</b></td><td>Password of Collector VM</td></tr>
<tr><td><b>CCUSER Password</b></td><td>Password of CCUSER</td></tr>
<tr><td><b>Admin IP</b></td><td>SSH IP of Collector VM</td></tr>
<tr><td><b>Management IP</b></td><td>Management IP of Collector VM</td></tr>
<tr><td><b>Master 2</b></td><td>Optional, but becomes mandatory if collector 2 is defined. Must contain valid Admin IP.</td></tr>
<tr><td><b>Collector 2</b></td><td>Optional, but becomes mandatory if Master 2 is defined. Collector 2 is secondary set to collector and with all the properties of Collector.
Contains Management VIP and Collector VM information.</td></tr>
<tr><td><b>NFVIMON ADMIN</b></td><td>Optional and reconfigurable to add/update user id. Once enabled, you must have only one admin.</td></tr>
<tr><td><b>Collector ToR Connections</b></td><td>
1. Click on (+) icon to Add Collector ToR Connections.
2. Select the ToR switches from list to add the information.
3. It is optional and available for ToR type NCS-5500
4. For now, it supports adding only one Collector ToR Connection

Add Collector Tor Connections
Select Tor switch for connections
test-torhostname
Port Channel *
Enter port channel
Switch- test-torhostname *
Enter Port information
Save
Cancel
<table>
<tr><td><b>Port Channel</b></td><td>Enter port channel.</td></tr>
<tr><td><b>Switch - {torSwitch-hostname}</b></td><td>Enter port number, E.g:eth1/15.</td></tr>
</table>
Click <b>Save</b>
</td></tr>
<tr><td><b>Rabbit MQ User Name</b></td><td>Enter Rabbit MQ username.</td></tr>
</table>

h. Click CVIMMON option in **Blueprint Initial Setup** to enable the **CVIM Monitoring** configuration tab.

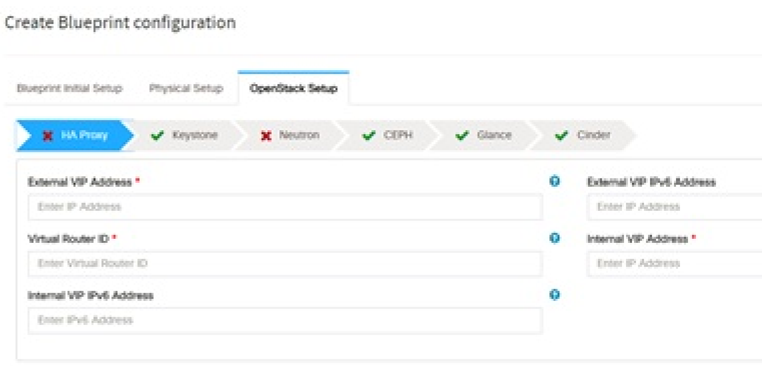


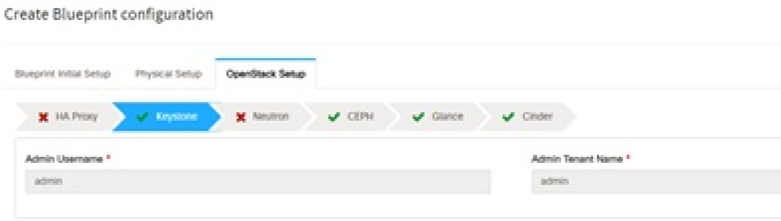
Low Frequency 1 m
Medium Frequency 30 s
High Frequency 15 s

Name	Description
Enable	By default, it is false. It is case-sensitive and can be True or False
UI Access	Optional, and if not defined it is set to True by defaul. With this option disabled, CVIM_MON with SNMP is available but you cannot access Grafana, Alert-Manager, and Prometheus UIs
Polling Interval	Optional. Denotes 's' for seconds, m for minutes, and h for hours

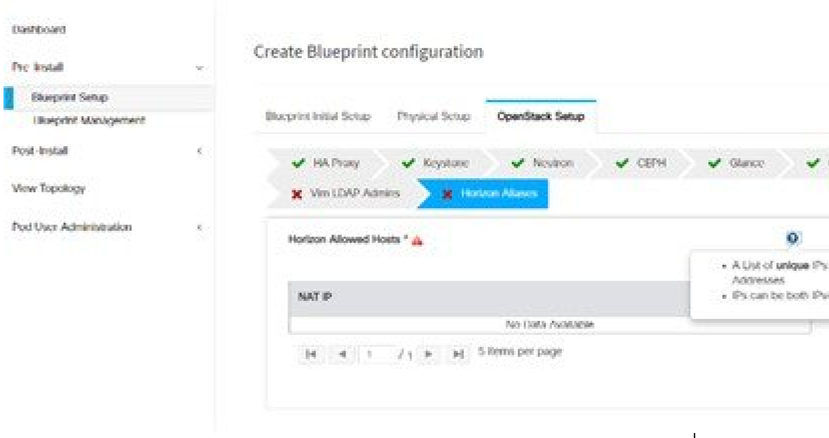
Name	Description
High Frequency	Minimum of 10 seconds (10s) and maximum of 60 mins (1h). If not defined, defaults to 15s.
Medium Frequency	Minimum of 30 seconds (30s) and maximum of 60 mins (1h). If not defined, defaults to 30s. It must be more than high interval
Low Frequency	Minimum of 1 minute (1m) and maximum of 60 mins (1h). If not defined, defaults to 1 minute. It must be more than medium interval.
CVIMMON Central	Optional, if not defined, defaults to False.With this option enabled, you will get central CVIM-MON (only telegraf agents running on pod), without local Prometheus, AlertManager, or Grafana
External Servers	Optional, list of external server IPs (v4 or v6) to be monitoried by CVIM MON
CVIMMON LDAP	If defined, the group mappings and domain mappings are mandatory.
group_mappings	Must contain at least one group with org_role **Admin** Optionally, you can add a second group with org_role **Viewer**
domain_mappings	Must contain one domain exactly.
domain_name	Any non-empty name is acceptable.
attributes	All subkeys are mandatory
bind_dn	Describes the user that can connect to the LDAP server to check credentials. It can be a read-only user or refer to a group that matches all possible users.
bind_password	This is the password of the bind_dn user. When the bind_dn is a group, this field must be omitted.
ldap_uri	The URI used to connect to the LDAP servers One or multiple URIs are configurable and separated by a comma.
search_base_dns	The base dns name used for all queries
search_filter	Filter used for the queries

i. Click **OpenStack Setup** Tab to advance to the **OpenStack Setup** Configuration page. On the **OpenStack Setup** Configuration page of the Cisco VIM Unified Management wizard, complete the following fields:

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>HA Proxy</b></td><td>Fill in the following details:


<table>
<tr><td><b>External VIP Address</b> field</td><td>Enter IP address of External VIP.</td></tr>
<tr><td><b>External VIP Address IPv6</b> field</td><td>Enter IPv6 address of External VIP.</td></tr>
<tr><td><b>Virtual Router ID</b> field</td><td>Enter the Router ID for HA.</td></tr>
<tr><td><b>Internal VIP Address IPv6</b> field</td><td>Enter IPv6 address of Internal IP.</td></tr>
<tr><td><b>Internal VIP Address</b> field</td><td>Enter IP address of Internal VIP.</td></tr>
</table></td></tr>
<tr><td><b>Keystone</b></td><td>Mandatory fields are pre-populated.


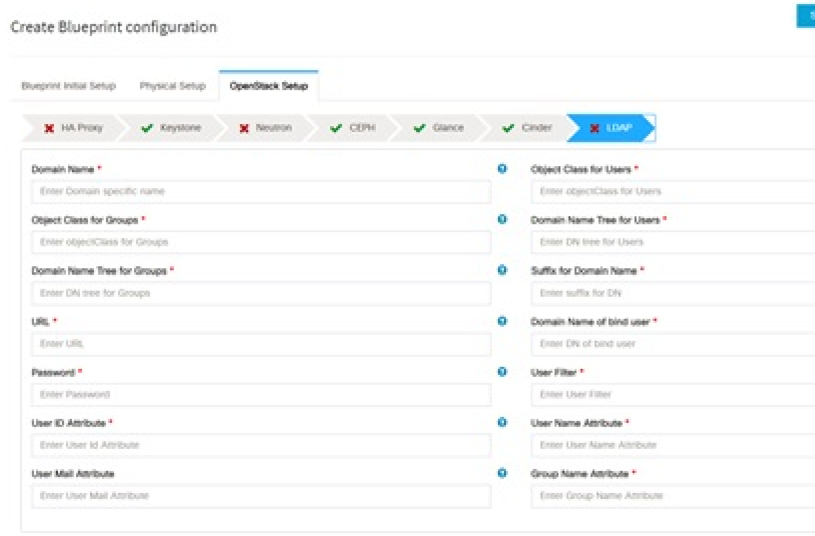
Admin Username * admin
Admin Tenant Name * admin
<table>
<tr><td><b>Admin User Name</b></td><td>admin.</td></tr>
<tr><td><b>Admin Tenant Name</b></td><td>admin.</td></tr>
</table></td></tr>
</table>

Name	Description
Horizon Aliases	If the external_lb_vip is behind a NAT router or with a DNS alias, provide a list of those addresses.  Dashboard Pre-Install Blueprint Setup Blueprint Management Post-Install View Topology Pod User Administration Create Blueprint configuration Blueprint Initial Setup Physical Setup OpenStack Setup HA Proxy Keystone Neutron CEPH Glance Vim LDAP Admins Horizon Aliases Horizon Allowed Hosts * A List of unique IPs Addresses IPs can be both IPv NAT IP No Data Available 1 / 1 5 items per page **Horizon Allowed hosts– NAT IP** : Uses comma separated list of IP addresses and/or DNS names

Name	Description
LDAP	

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>

LDAP enable checkbox which by default is **false**, if LDAP is enabled on keystone.

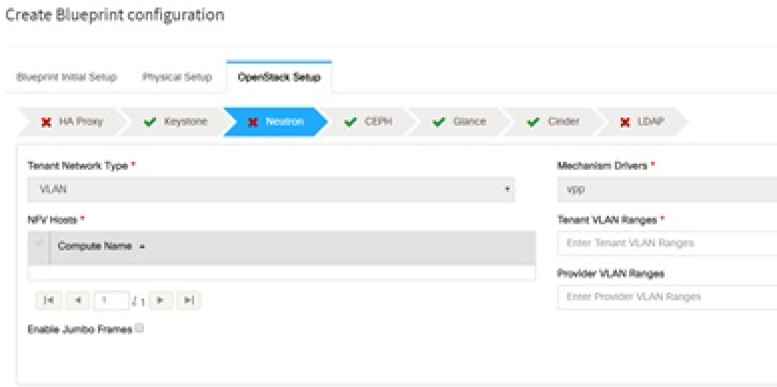


<table>
<tr><td><b>Domain Name</b> field</td><td>Enter name for Domain name.</td></tr>
<tr><td><b>Object Class for Users</b> field</td><td>Enter a string as input.</td></tr>
<tr><td><b>Object Class for Groups</b> field</td><td>Enter a string.</td></tr>
<tr><td><b>Domain Name Tree for Users</b> field</td><td>Enter a string.</td></tr>
<tr><td><b>Domain Name Tree for Groups</b> field</td><td>Enter a string.</td></tr>
<tr><td><b>Suffix for Domain Name</b> field</td><td>Enter a string.</td></tr>
<tr><td><b>URL</b> field</td><td>Enter a URL with ending port number.</td></tr>
<tr><td><b>Domain Name of Bind User</b> field</td><td>Enter a string.</td></tr>
<tr><td><b>Password</b> field</td><td>Enter Password as string format.</td></tr>
<tr><td><b>User Filter</b> field</td><td>Enter filter name as string.</td></tr>
<tr><td><b>User ID Attribute</b> field</td><td>Enter a string.</td></tr>
<tr><td><b>User Name Attribute</b> field</td><td>Enter a string.</td></tr>
<tr><td><b>User Mail Attribute</b> field</td><td>Enter a string.</td></tr>
</table>

</td></tr>
</table>

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td><table><tr><td><b>Group Name Attribute</b> field</td><td>Enter a string.</td></tr></table></td></tr>
</table>

Name	Description
Neutron	

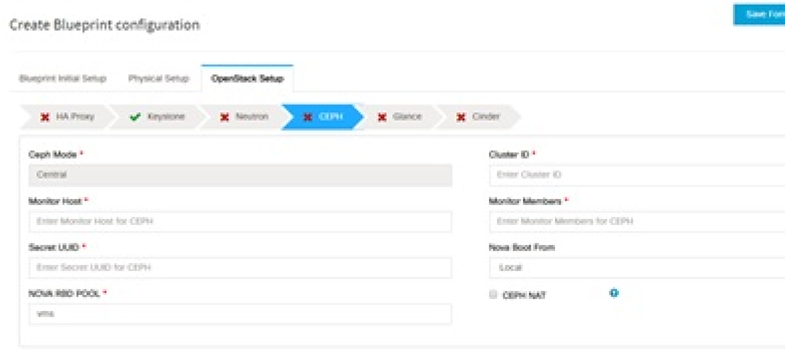
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>Neutron fields would change on the basis of <b>Tenant Network Type</b> Selection from <b>Blueprint Initial Setup</b>. Following are the options available for Neutron for OVS/VLAN:

Create Blueprint configuration
Blueprint Initial Setup | Physical Setup | OpenStack Setup
✗ HA Proxy | ✓ Keystone | ✗ Neutron | ✓ CEPH | ✓ Glance | ✓ Cinder | ✗ LDAP
Tenant Network Type *: VLAN
Mechanism Drivers *: vpp
NFV Hosts *: Compute Name
Tenant VLAN Ranges *: Enter Tenant VLAN Ranges
Provider VLAN Ranges: Enter Provider VLAN Ranges
Enable Jumbo Frames □
<table>
<tr><td><b>Tenant Network Type</b> field</td><td>Auto Filled based on the Tenant Network Type selected in the Blueprint Initial Setup page.</td></tr>
<tr><td><b>Mechanism Drivers</b> field</td><td>Auto Filled based on the Tenant Network Type selected in Blueprint Initial Setup page.</td></tr>
<tr><td><b>NFV Hosts</b> field</td><td>Auto filled with the Compute you added in Server and Roles.
If you select All in this section NFV_HOSTS: <b>ALL</b> will be added to the Blueprint or you can select one particular compute. For Eg:
NFV_HOSTS: compute-server-1, compute-server-2.</td></tr>
<tr><td><b>Tenant VLAN Ranges</b> field</td><td>List of ranges separated by comma form start:end.</td></tr>
<tr><td><b>Provider VLAN Ranges</b> field</td><td>List of ranges separated by comma form start:end.</td></tr>
<tr><td><b>VM Hugh Page Size (available for NFV_HOSTS option)</b> field</td><td>2M or 1G (optional, defaults to 2M)</td></tr>
<tr><td><b>VM_HUGHPAGE_PERCENTAGE</b></td><td>Optional, defaults to 100%; can range between 0 and 100</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><td><b>VSWITCH_WORKER_PROFILE</b></td><td>Allowed only for VPP
Optionally available options: numa_zero and even
• numa_zero: Reserved cores will always reside in NUMA node 0.
• Even : Reserved cores will be evenly distributed across all NUMA.</td></tr>
<tr><td><b>NR_RESERVED_VSWITCH_PCORES</b></td><td>Allowed only for VPP
Number of cores associated to VPP, defaults to 2.</td></tr>
<tr><td><b>Enable Jumbo Frames</b> field</td><td>Enable the checkbox</td></tr>
</table>
For Tenant Network Type Linux Bridge everything remains the same but <b>Tenant VLAN Ranges</b> will be removed.</td></tr>
</table>

Name	Description
CEPH	

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>

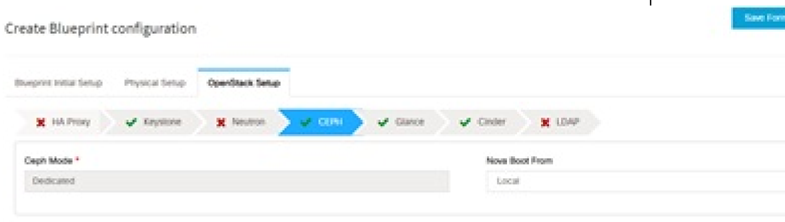
1. 1. When Object Storage Backend is selected Central in blueprint initial setup.



Create Blueprint configuration
Ceph Mode * Central
Cluster ID * Enter Cluster ID
Monitor Host * Enter Monitor Host for CEPH
Monitor Members * Enter Monitor Members for CEPH
Secret UUID * Enter Secret UUID for CEPH
Nova Boot From Local
NOVA RBD POOL * vms
□ CEPH NAT

<table>
<tr><td>CEPH Mode</td><td>By default Central.</td></tr>
<tr><td>Cluster ID</td><td>Enter Cluster ID.</td></tr>
<tr><td>Monitor Host</td><td>Enter Monitor Host for CEPH</td></tr>
<tr><td>Monitor Members</td><td>Enter Monitor Members for CEPH</td></tr>
<tr><td>Secret UUID</td><td>Enter Secret UUID for CEPH</td></tr>
<tr><td>NOVA Boot from</td><td>Drop down selection. You can choose CEPH or local.</td></tr>
<tr><td>NOVA RBD POOL</td><td>Enter NOVA RBD Pool (default's to vms)</td></tr>
<tr><td>CEPH NAT</td><td>Optional, needed for Central Ceph and when mgmt network is not routable</td></tr>
</table>

2. When Object Storage Backend is selected Dedicated in blueprint initial setup.



Create Blueprint configuration
Ceph Mode * Dedicated
Nova Boot From Local

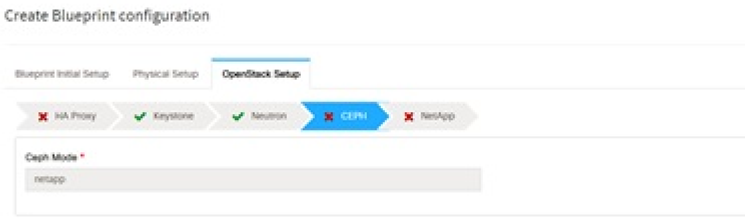
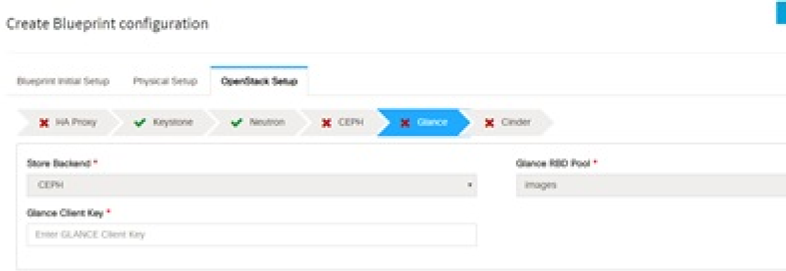
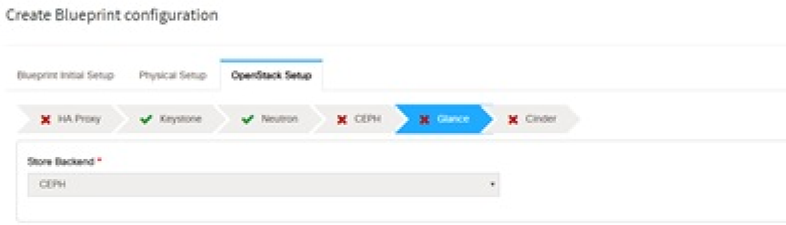
• CEPH Mode: By default Dedicated.

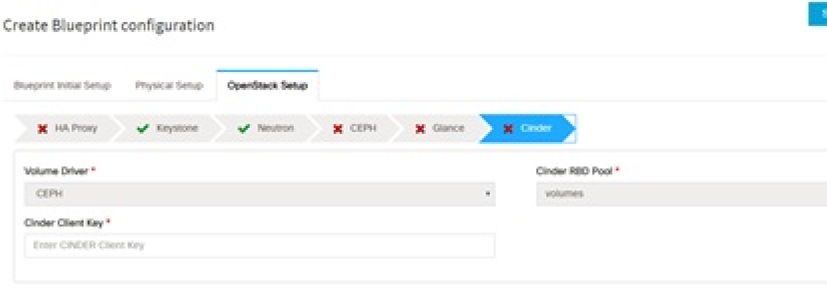
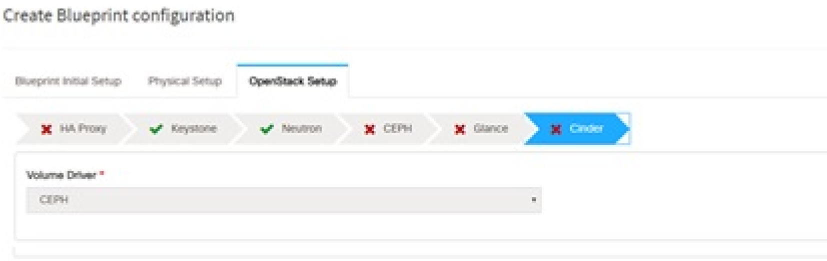
• NOVA Boot: From drop down selection you can choose CEPH or local.

• Cinder Percentage: Must be 60 when Nova Boot From is local, and must be 40 when Nova Boot is Ceph

• Nova Percentage: Only applicable when Nova Boot From

</td></tr>
</table>

Name	Description
	is Ceph. Must be 30% otherwise. • Glance Percentage : Must be 40 when Nova Boot From is local, and must be 30 when NOVA Boot From is Ceph. If Ceilometer is enabled, it must be 35% for Nova Boot from local and 25% for NOVA Boot From is Ceph. • Gnocchi Percentage: Only applicable when ceilometer is enabled, and must be 5%. **3.** When Object Storage Backend is selected NetApp in blueprint initial setup.  Create Blueprint configuration Blueprint Initial Setup Physical Setup OpenStack Setup HA Proxy Keystone Neutron CEPH NetApp Ceph Mode *: netapp • Ceph mode : By default, it is NetApp • Cinder Percenatge : Must be 60% • Glance Percenatge: Must be 40%
GLANCE	1. When Object Storage Backend is selected Central in blueprint initial setup.  Create Blueprint configuration Blueprint Initial Setup Physical Setup OpenStack Setup HA Proxy Keystone Neutron CEPH Glance Cinder Store Backend *: CEPH Glance RBD Pool *: images Glance Client Key *: Enter GLANCE Client Key When Object Storage Backend is selected Dedicated in blueprint initial setup.  Create Blueprint configuration Blueprint Initial Setup Physical Setup OpenStack Setup HA Proxy Keystone Neutron CEPH Glance Cinder Store Backend *: CEPH **Note** By default Populated for CEPH Dedicated with Store Backend value as CEPH.

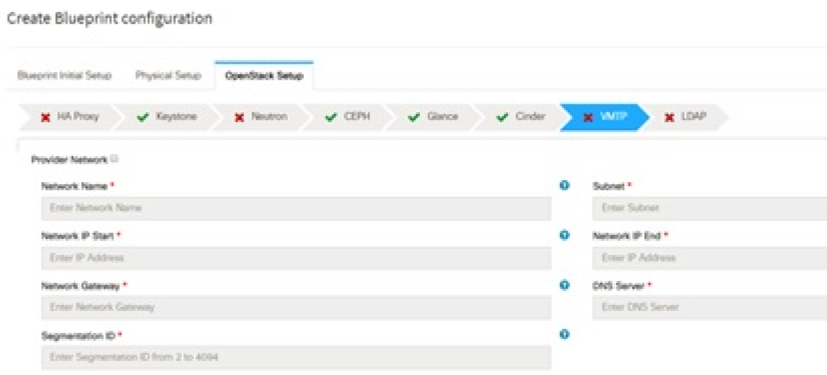
Name	Description
CINDER	By default Populated for **CEPH Dedicated** with Volume Driver value as **CEPH**.  Create Blueprint configuration Blueprint Initial Setup Physical Setup OpenStack Setup HA Proxy Keystone Neutron CEPH Glance Cinder Volume Driver * CEPH Cinder RBD Pool * volumes Cinder Client Key * Enter CINDER Client Key 2. When Object Storage Backend is selected Dedicated in blueprint initial setup.  Create Blueprint configuration Blueprint Initial Setup Physical Setup OpenStack Setup HA Proxy Keystone Neutron CEPH Glance Cinder Volume Driver * CEPH **Note** By default Populated for CEPH Dedicated with Volume Driver value as CEPH.

Name	Description
VMTP optional section, this will be visible only if VMTP is selected from Blueprint Initial Setup. For VTS tenant type Provider network is only supported.	

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>
Check one of the check boxes to specify a VMTP network:

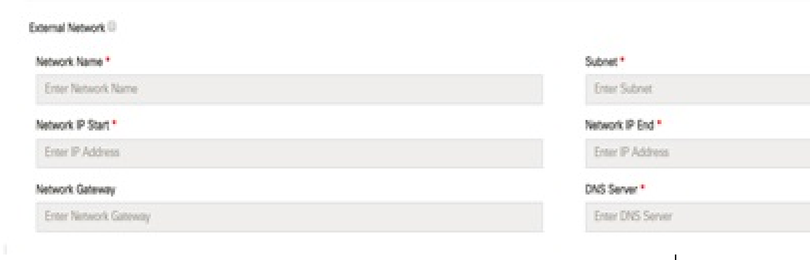
- Provider Network
- External Network

For the **Provider Network** complete the following:



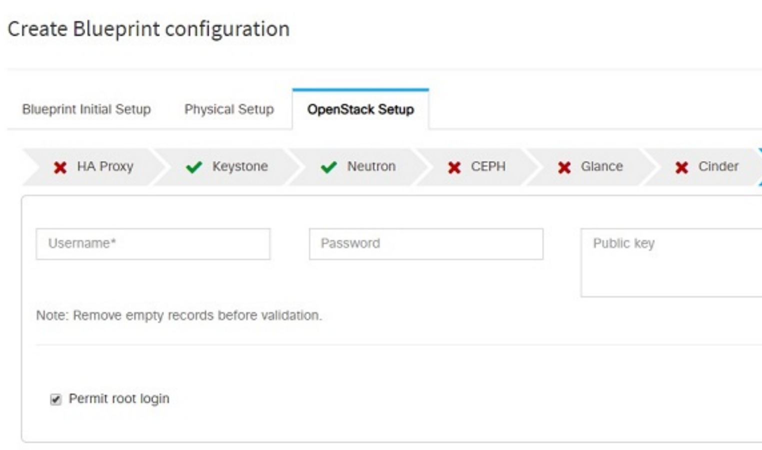
<table>
<tr><td><b>Network Name</b> field</td><td>Enter the name for the external network.</td></tr>
<tr><td><b>Subnet</b> field</td><td>Enter the Subnet for Provider Network.</td></tr>
<tr><td><b>Network IP Start</b> field</td><td>Enter the starting floating IPv4 address.</td></tr>
<tr><td><b>Network IP End</b> field</td><td>Enter the ending floating IPv4 address.</td></tr>
<tr><td><b>Network Gateway</b>field</td><td>Enter the IPv4 address for the Gateway.</td></tr>
<tr><td><b>DNS Server</b> field</td><td>Enter the DNS server IPv4 address.</td></tr>
<tr><td><b>Segmentation ID</b> field</td><td>Enter the segmentation ID.</td></tr>
</table>

For **External Network** fill in the following details:



</td></tr>
</table>

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><td><b>Network Name</b> field</td><td>Enter the name for the external network.</td></tr>
<tr><td><b>IP Start</b> field</td><td>Enter the starting floating IPv4 address.</td></tr>
<tr><td><b>IP End</b> field</td><td>Enter the ending floating IPv4 address.</td></tr>
<tr><td><b>Gateway</b> field</td><td>Enter the IPv4 address for the Gateway.</td></tr>
<tr><td><b>DNS Server</b> field</td><td>Enter the DNS server IPv4 address.</td></tr>
<tr><td><b>Subnet</b> field</td><td>Enter the Subnet for External Network.</td></tr>
</table>
</td></tr>
<tr><td><b>TLS</b> optional section, this will be visible only if TLS is selected from Blueprint Initial Setup Page.</td><td><b>TLS</b> has two options:
• <b>External LB VIP FQDN -</b> Text Field.
• <b>External LB VIP TLS -</b> True/False. By default this option is false.</td></tr>
<tr><td>Under the OpenStack setup tab, Vim_admins tab will be visible only when Vim_admins is selected from the Optional Features & Services under the Blueprint Initial setup tab</td><td>Following are the field descriptions for VIM Admins:

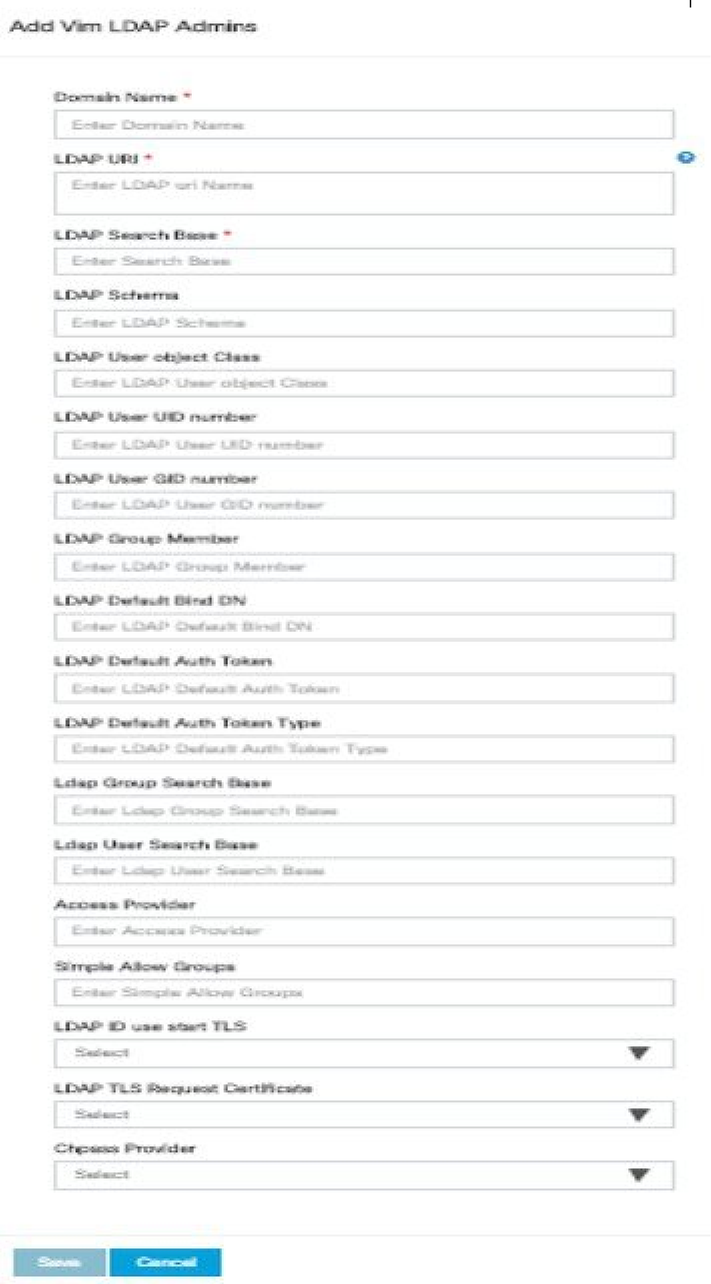


Note: Remove empty records before validation.

<table>
<tr><td><b>User Name</b></td><td>Enter username</td></tr>
<tr><td><b>Password</b></td><td>Password field. Admin hash password should always start with $6.</td></tr>
</table>
</td></tr>
</table>

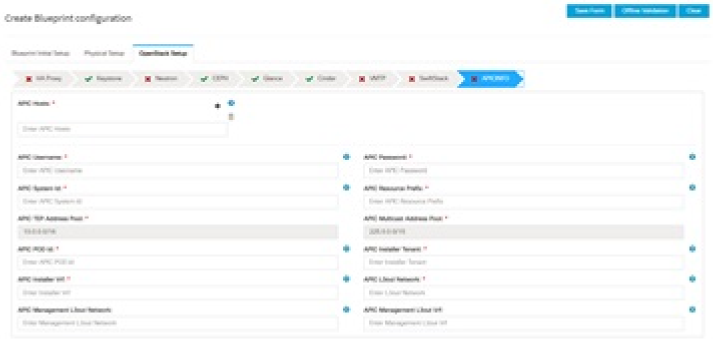
Name	Description
Vim LDAP Admins: Optional entry to support LDAP for admin access to management node. For this feature, TLS has to be enabled for the external api (i.e. external_lb_vip_tls: True).	

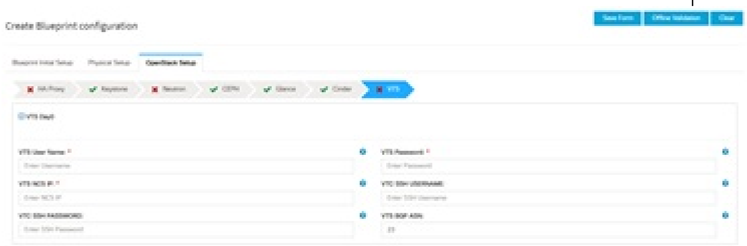
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td></td><td>
Following are the values to be filled to add vim LDAP admins:



<table>
<tr><td><b>domain_name</b></td><td>Mandatory field. Indicates the domain name to define vim LDAP admins.</td></tr>
<tr><td><b>ldap_uri</b></td><td>Mandatory. Ensure that ldap_uri is secured over ldaps.</td></tr>
<tr><td></td><td></td></tr>
</table>
</td></tr>
</table>

Name	Description	
	ldap_search_base	Mandatory. Enter search base.
	ldap_schema	Optional. Enter the schema.
	ldap_user_object_class	Optional. Indicates the posix account.
	ldap_user_uid_number	Optional. Indicates the user ID.
	ldap_user_gid_number	Optional. Indicates the group ID.
	ldap_group_member	Optional. It is the group member ID.
	ldap_default_bind_dn	Optional. Enter default distinguished name
	ldap_default_authtok	Optional. Default authentication token
	ldap_default_authtok_type	Optional. Default authentication token type.
	ldap_group_search_base	Optional. Enter group search base.
	ldap_user_search_base	Optional. Enter user Search Base
	access_provider	Optional.
	simple_allow_groups	Optional
	ldap_id_use_start_tls	Optional .Can be true or false
	ldap_tls_reqcert	Optional . Can be never/allow/try/demand.
	chpass_provider	Optional. Can be ldap/krb5/ad/none

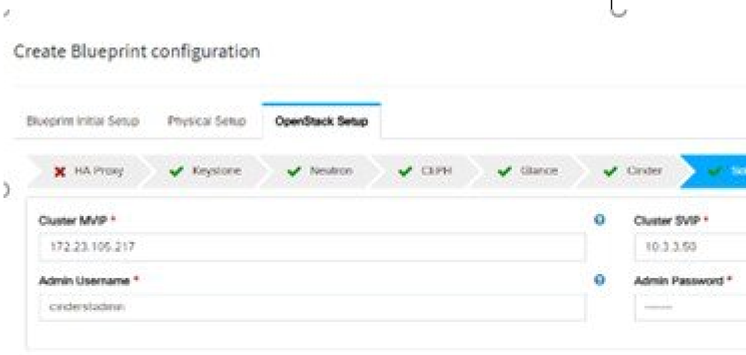
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td>APICINFO tab is available in Openstack setup, when the Tenant type ACI/VLAN is selected in blueprint initial setup.
<b>Note</b> When ACI/VLAN is selected then ToR switch from initial setup is mandatory.</td><td>
Create Blueprint configuration
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>APIC Hosts</b> field</td><td>Enter host input. Example: <ip1|host1>:[port] . max of 3, min of 1, not 2;</td></tr>
<tr><td><b>apic_username</b> field</td><td>Enter a string format.</td></tr>
<tr><td><b>apic_password</b> filed</td><td>Enter Password.</td></tr>
<tr><td><b>apic_system_id</b> field</td><td>Enter input as string. Max length 8.</td></tr>
<tr><td><b>apic_resource_prefix</b> field</td><td>Enter string max length 6.</td></tr>
<tr><td><b>apic_tep_address_ pool</b> field</td><td>Allowed only 10.0.0.0/16</td></tr>
<tr><td><b>multiclass_address_pool</b> field</td><td>Allowed only 225.0.0.0/15</td></tr>
<tr><td><b>apic_pod_id</b> field</td><td>Enter integer(1- 65535)</td></tr>
<tr><td><b>apic_installer_tenant</b> field</td><td>Enter String, max length 32</td></tr>
<tr><td><b>apic_installer_vrf</b> field</td><td>Enter String, max length 32</td></tr>
<tr><td><b>api_l3out_network</b> field</td><td>Enter String, max length 32</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td>VTS tab is available in Openstack setup, when Tenant Type is VTS/VLAN selected.
If vts day0 is enabled then SSH username and SSH password is mandatory.
If SSH_username is input present then SSH password is mandatory vice-versa</td><td>

Create Blueprint configuration
Save Form
Offline Validation
Clear
Blueprint Initial Setup
Physical Setup
OpenStack Setup
HA Proxy
Keystone
Neutron
CEPH
Glance
Cinder
VTS

VTS Day0
VTS User Name *: Enter Username
VTS Password *: Enter Password
VTS NCS IP *: Enter NCS IP
VTC SSH USERNAME: Enter SSH Username
VTC SSH PASSWORD: Enter SSH Password
VTS BGP ASN: 23
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>VTS Day0 (checkbox)</b></td><td>True or false default is false.</td></tr>
<tr><td><b>VTS User name</b></td><td>Enter as string does not contain special characters.</td></tr>
<tr><td><b>VTS Password</b></td><td>Enter password</td></tr>
<tr><td><b>VTS NCS IP</b></td><td>Enter IP Address format.</td></tr>
<tr><td><b>VTC SSH Username</b></td><td>Enter a string</td></tr>
<tr><td><b>VTC SHH Password</b></td><td>Enter password</td></tr>
</table></td></tr>
</table>

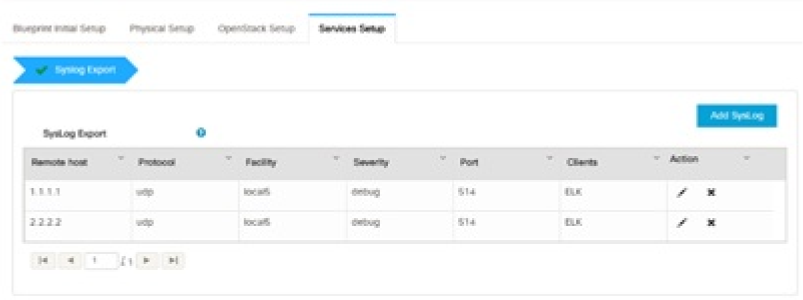
j. For SolidFire, enter the following:

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td>SolidFire is visible for configuration on day0
SolidFire is not allowed as a day-2 deployment option
SolidFire is always available with CEPH.</td><td>

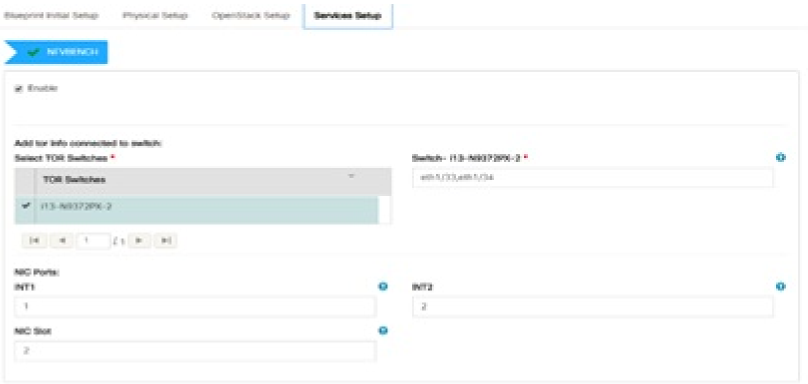
Create Blueprint configuration
Blueprint Initial Setup
Physical Setup
OpenStack Setup
HA Proxy
Keystone
Neutron
CEPH
Glance
Cinder

Cluster MVIP *: 172.23.105.217
Cluster SVIP *: 10.3.3.50
Admin Username *: cindersfadmin
Admin Password *: ------
<table>
<tr><td><b>Cluster MVIP field</b></td><td>Management IP of SolidFire cluster.</td></tr>
<tr><td><b>Cluster SVIP field</b></td><td>Storage VIP of SolidFire cluster.</td></tr>
<tr><td><b>Admin Username</b></td><td>Admin user on SolidFire cluster</td></tr>
<tr><td><b>Admin Password</b></td><td>Admin password on SolidFire cluster.</td></tr>
</table></td></tr>
</table>

k. If **Syslog Export** or **NFVBENCH** is selected in **Blueprint Initial Setup** Page, then **Services Setup** page will be enabled for user to view. Following are the options under **Services Setup** Tab:

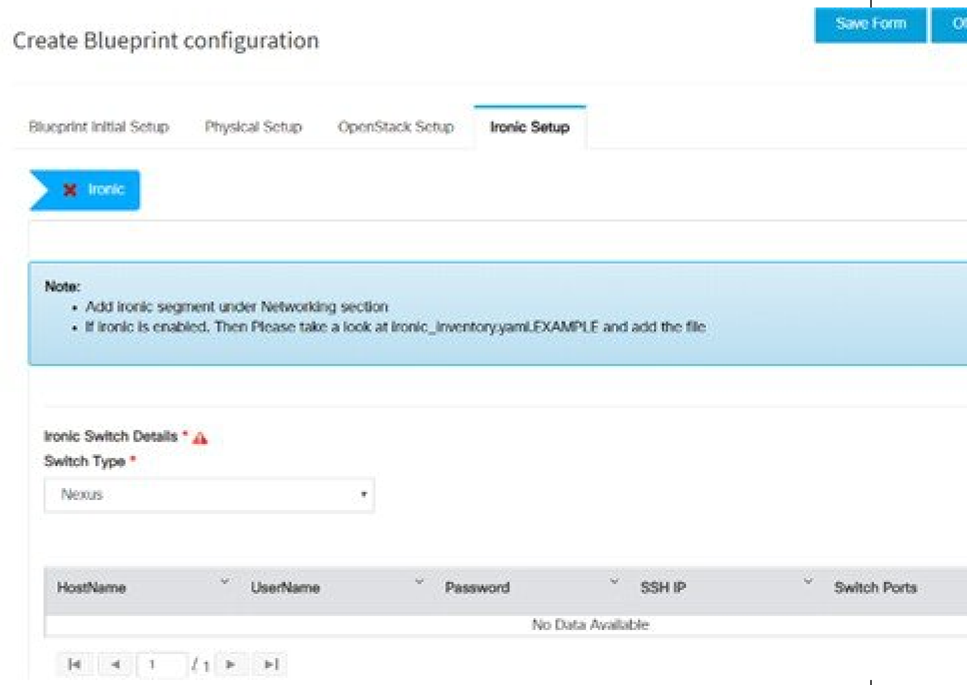
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><strong>Syslog Export</strong></td><td>Following are the options for Syslog Settings:
User can add maximum of three entries.
To add new SysLog information, click on Add SysLog button, fill all the required information listed below and hit Save button.


SysLog Export
<table>
<tr><th>Remote host</th><th>Protocol</th><th>Facility</th><th>Severity</th><th>Port</th><th>Clients</th><th>Action</th></tr>
<tr><td>1.1.1.1</td><td>udp</td><td>local5</td><td>debug</td><td>514</td><td>ELK</td><td>✎ ✖</td></tr>
<tr><td>2.2.2.2</td><td>udp</td><td>local5</td><td>debug</td><td>514</td><td>ELK</td><td>✎ ✖</td></tr>
</table>
<table>
<tr><td><strong>Remote Host</strong></td><td>Enter Syslog IP address.</td></tr>
<tr><td><strong>Protocol</strong></td><td>Only UDP is supported.</td></tr>
<tr><td><strong>Facility</strong></td><td>Defaults to local5.</td></tr>
<tr><td><strong>Severity</strong></td><td>Defaults to debug.</td></tr>
<tr><td><strong>Clients</strong></td><td>Defaults to ELK.</td></tr>
<tr><td><strong>Port</strong></td><td>Defaults to 514 but can be modified by the User.</td></tr>
</table></td></tr>
</table>

Name	Description
NFVBENCH	**NFVBENCH enable checkbox** by default is**false**. Add ToR information connect to Switch:  Blueprint Initial Setup Physical Setup OpenStack Setup Services Setup NFVBENCH ☑ Enable Add tor info connected to switch: Select TOR Switches * TOR Switches ✓ i13-N9372PX-2 1 / 1 Switch- i13-N9372PX-2 *: eth1/33,eth1/34 NIC Ports: INT1: 1 INT2: 2 NIC Slot: 2 • Select a TOR Switch and enter the Switch name. • Enter the port number. For example, eth1/5 . VTEP VLANS (mandatory and needed only for VTS/VXLAN). Enter two different VLANs for VLAN1 and VLAN2. • NIC Ports: INT1 and INT2 optional input. Enter the two port numbers of the 4-port 10G Intel NIC at the management node used for NFVBench. NIC Slot: Optional input, indicates which NIC to use in case there are multiple NICs. **Note** NIC port and slot need to be together.
ENABLE_ESC_PRIV	Enable the checkbox to set it as True. By default it is **False**.

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>Ironic</b></td><td>
Following are the options for Ironic :

- Ironic is applicable only for C-series and OVS/VLAN tenant network.
- Ironic is available in optional service list. If ironic is enabled, the **Ironic Segment** under **Networks Segment** and **Ironic Switch Details** under **Ironic** are mandatory.



Create Blueprint configuration

Note:
- Add ironic segment under Networking section
- If ironic is enabled. Then Please take a look at ironic_inventory.yaml.EXAMPLE and add the file

Ironic Switch Details *

Switch Type *

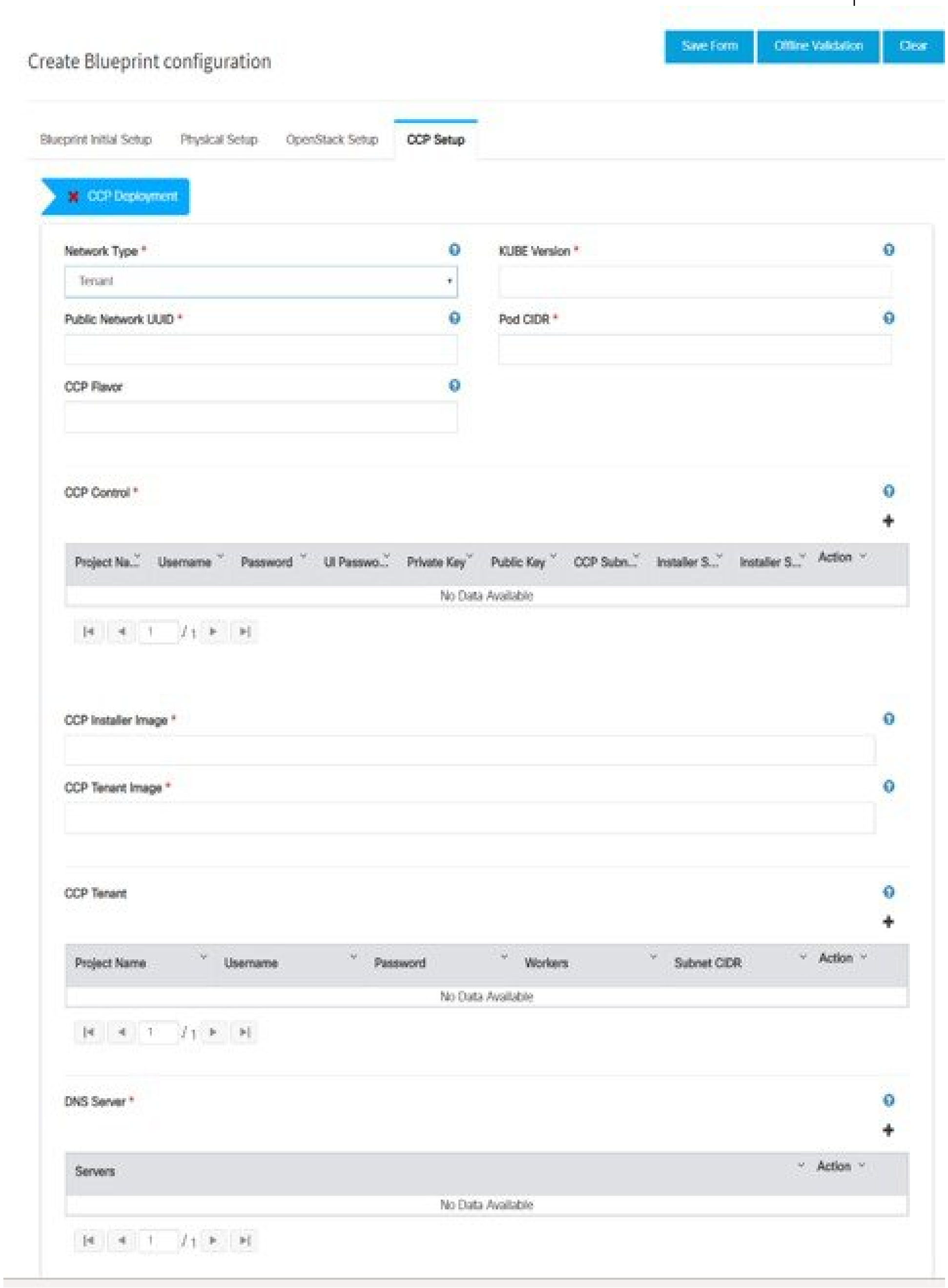
Nexus

HostName	UserName	Password	SSH IP	Switch Ports
No Data Available				

1 / 1

<table>
<tr><td><b>Switch Type</b></td><td>It can be Nexus, ACI, or BypassNeutron</td></tr>
<tr><td><b>Hostname</b></td><td>Enter ironic hostname. Required only if <b>Switch Type</b> is ACI or BypassNeutron.</td></tr>
<tr><td><b>Username</b></td><td>Enter ironic username. Required only if <b>Switch Type</b> is ACI or BypassNeutron.</td></tr>
<tr><td><b>Password</b></td><td>Enter the ironic password. Required only if <b>Switch Type</b> is ACI or BypassNeutron.</td></tr>
<tr><td><b>SSH IP</b></td><td>Enter ironic switch SSH IP. Required only if <b>Switch Type</b> is ACI or BypassNeutron.</td></tr>
<tr><td><b>Switch Ports</b></td><td>Optional. Indicates the ports that are in use to slap on inspector VLAN through Auto-ToR. Can be specified if <b>Switch Type</b> is ACI or BypassNeutron.</td></tr>
</table>
</td></tr>
</table>

Name	Description
CCP	

Name	Description
	Cisco Container Platform is applicable only for C-series and OVS/VLAN tenant network. Ironic is available in optional service list. LBAAS must be enabled to define Cisco Container Platform. 

Network type	It can be Tenant or Provider.

Name	Description	
	Kubernetes Version	Version of Kubernetes to be installed
	Public Network UUID	UUID of Openstack external network or provider network
	Pod CIDR	Pod CIDR to use for calico network optional if not to be changed
	CCP Flavor	Optional, but mandatory when NFV_HOSTS is enabled during Cisco Container Platform installation.
	CCP Control	Following fields are mandatory for network types tenant and provider. **Project Name** - Tenant name to create in Openstack to host tenant cluster **Username** - Username for openstack tenant **Password** - Password for the Openstack tenant UI **Password** - Password for Cisco Container Platform UI **Private Key** - Private key to be used to SSH to VM must be ed25519 **Public Key** - Public key for Cisco Container Platform VMs, for example, /root/ecdsa-key.pub Following fields are mandatory for network type tenant: **Cisco Container Platform Subnet** - Subnet to create to deploy Cisco Container Platform control plane **Installer Subnet** - Subnet used for creating bootstrap installer **Installer Subnet Gateway** - Gateway used for bootstrap installer
	CCP Installer Image	Pointer to the CCP Installer image (required)
	CCP Tenant Image	Pointer to CCP tenant cluster image (required)
	CCP Tenant	

Name	Description	
		Fields are mandatory **Project Name** - Tenant name to be created in Openstack to host tenant cluster **Username** - Username for openstack tenant. **Password** - Password for tenant. **Workers** - Number of kubernetes workers in tenant cluster (required). **Tenant Subnet CIDR** - Tenant subnet CIDR.
	DNS Server	DNS server must be reachable from cloud (required)

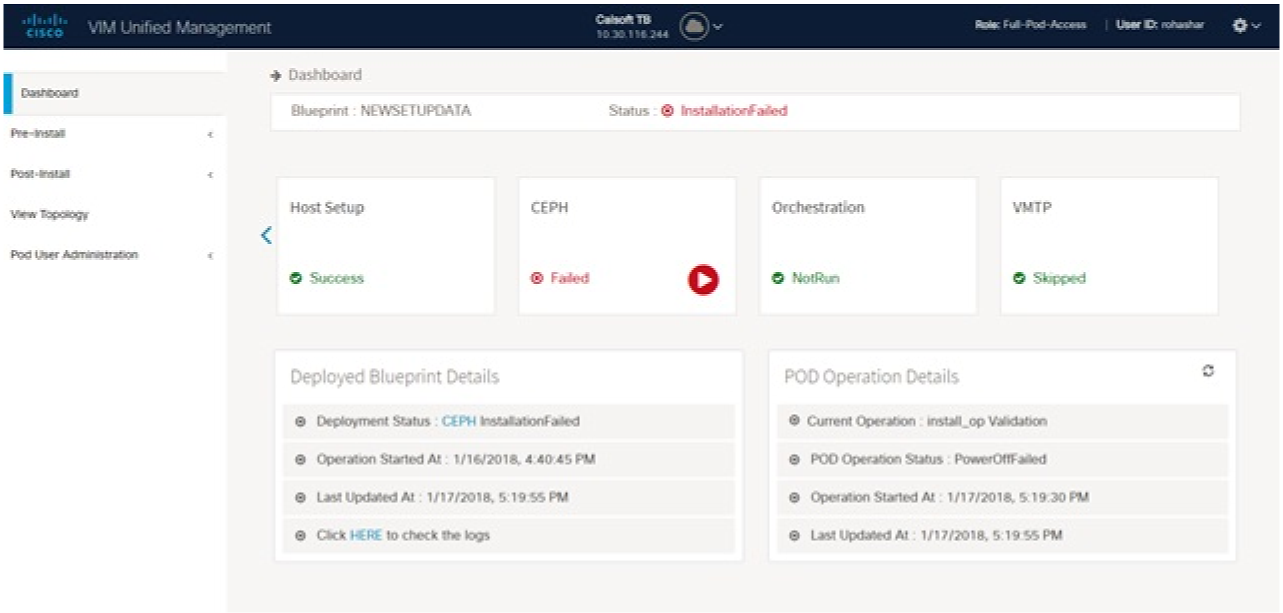
Step 5 Click **Offline validation** button to initiate an offline validation of the Blueprint.

Step 6 Once the **Offline validation** is successful, **Save** option will be enabled for you which when clicked would redirect you to the **Blueprint Management** page.

Redeploy Multiple Install Stages during Cisco VIM Installation using Unified Management

You can redeploy Cisco VIM in multiple stages during blueprint installation using the Cisco VIM Unified Management dashboard.

Step 1 When the blueprint installation status is in Active/failed/Installation failed and stage install status as Failed/NotRun/Skipped., the redeployed icon is displayed.



Dashboard

Blueprint : NEWSETUPDATA Status : InstallationFailed

Host Setup	CEPH	Orchestration	VMTP
Success	Failed	NotRun	Skipped

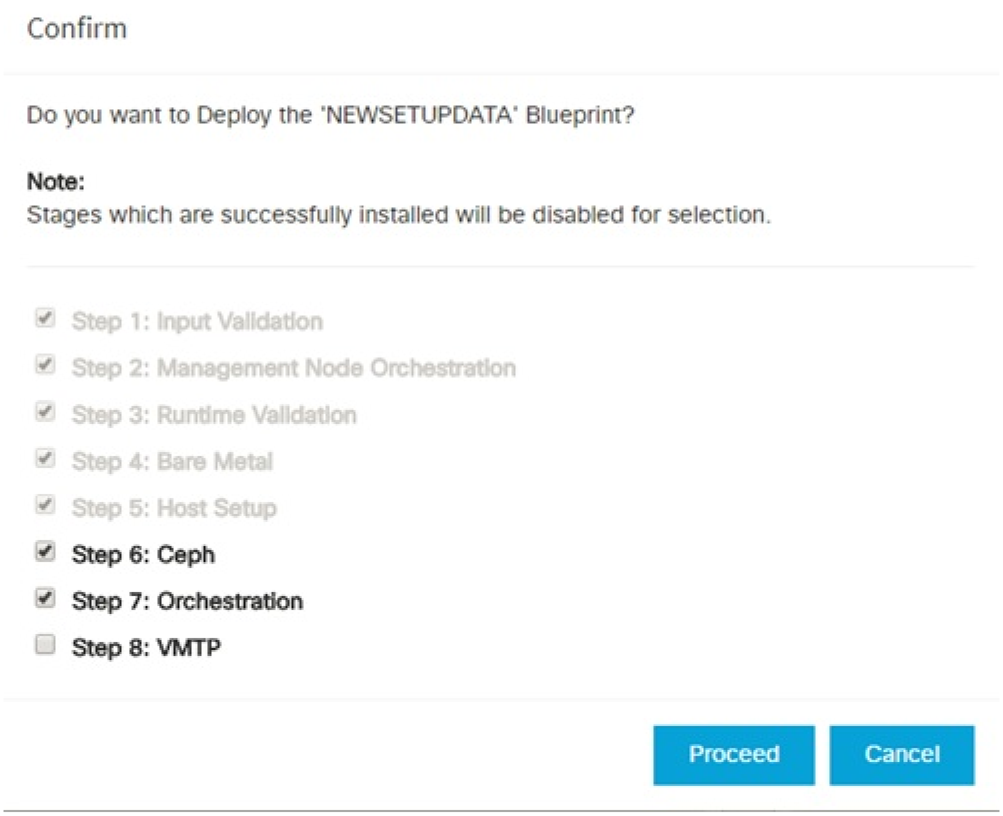
Deployed Blueprint Details

- Deployment Status : CEPH InstallationFailed
- Operation Started At : 1/16/2018, 4:40:45 PM
- Last Updated At : 1/17/2018, 5:19:55 PM
- Click HERE to check the logs

POD Operation Details

- Current Operation : install_op Validation
- POD Operation Status : PowerOffFailed
- Operation Started At : 1/17/2018, 5:19:30 PM
- Last Updated At : 1/17/2018, 5:19:55 PM

Step 2 Click **Reployed** icon to redeploy multiple stages during installation. A confirmation dialogue box appears.



Confirm

Do you want to Deploy the 'NEWSETUPDATA' Blueprint?

Note:
Stages which are successfully installed will be disabled for selection.

- ☑ Step 1: Input Validation
- ☑ Step 2: Management Node Orchestration
- ☑ Step 3: Runtime Validation
- ☑ Step 4: Bare Metal
- ☑ Step 5: Host Setup
- ☑ Step 6: Ceph
- ☑ Step 7: Orchestration
- ☐ Step 8: VMTP

Step 3 Select the stages to be installed.

Step 4 You can select the stages only in sequence. For example,you can select the VMTP stage (current) stage only if the Orchestration (previous) stage is selected for blueprint installation (assuming Orchestration was in Failed/NotRun state)

Step 5 Click **Proceed** to run the installation.

Downloading Blueprint

Before you begin

You must have atleast one blueprint (In any state Active/In-Active or In-progress), in the **Blueprint Management Page**.

Step 1 Log in to **CISCO VIM Unified Management**.

Step 2 In the navigation pane, expand the **Pre-Install Section**.

Step 3 Click **Blueprint Management**.

Step 4 Go-to **Download** for any Blueprint under Action title. (**Download Button** > **Downward Arrow** (with tooltip Preview & Download YAML).

Step 5 Click the **Download** icon.
A pop to view the Blueprint in the YAML format is displayed.

Step 6 Click the **Download** button at the bottom left of the pop-up window.
YAML is saved locally with the same name of the Blueprint.

Validating Blueprint

Step 1 Log in to **CISCO VIM Unified Management**.

Step 2 In the **Navigation** pane, expand the **Pre-Install Section**.

Step 3 Click **Blueprint Creation**.

Step 4 Upload an existing YAML, or create a **New Blueprint**.

Fill all the mandatory fields so that all Red Cross changes to **Green Tick**.

Step 5 Enter the name of the Blueprint.

Step 6 Click**Offline Validation.**
Only, if the Validation is successful, the Unified Management allows you to save the blueprint.

What to do next

If you see any errors, a hyperlink is created for those errors. Click the link to be navigated to the page where error has been encountered.

Managing Post Install Features

Cisco VIM provides an orchestration that helps in lifecycle management of a cloud. VIM is responsible for pod management activities which includes fixing both hardware and software issues with one-touch automation. VIM Unified Management provides the visualization of the stated goal. As a result, it integrates with POST install features that Cisco VIM offers through its Rest API. These features are enabled only if there is an active Blueprint deployment on the pod.

Monitoring the Pod

Cisco VIM uses EFK (Elasticsearch, Fluentd, and Kibana) to monitor the OpenStack services, by cross-launching the Kibana dashboard.

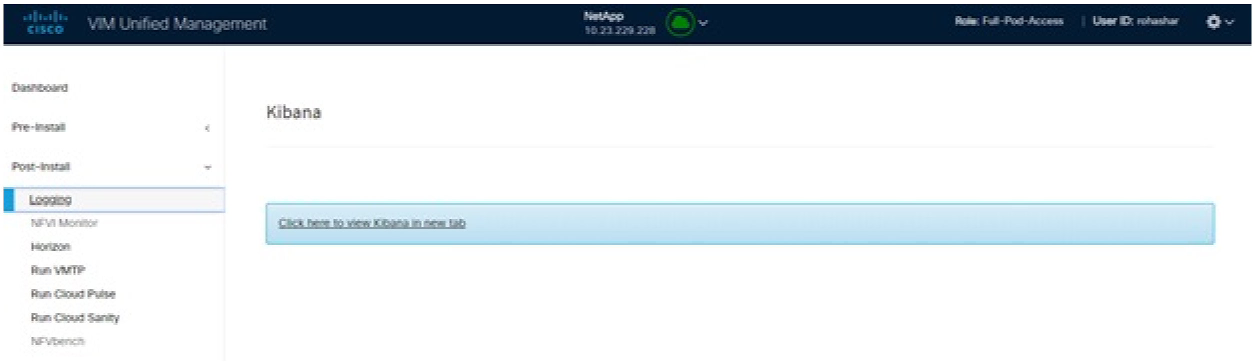
To cross launch Kibana, complete the following instructions:

Step 1 In the navigation pane, click **Post-Install** > **Logging**.

Step 2 Click **Click here to view Kibana in new tab.**

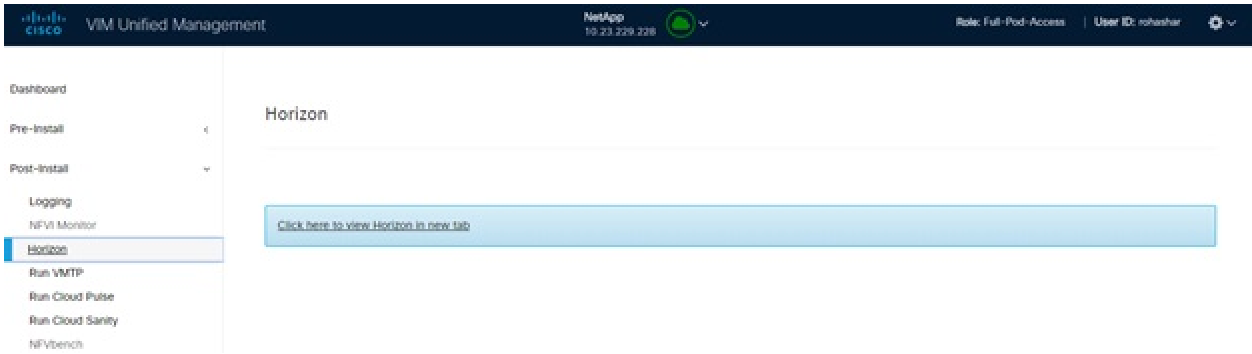
Step 3 Enter the **Username** as Admin.

Step 4 Enter the Kibana_PASSWORD password that is obtained from /root/installer-<tagid>/openstack-configs/secrets.yaml in the management node.



Cross Launching Horizon

Horizon is the canonical implementation of OpenStack's Dashboard, which provides a web-based user interface to OpenStack services including Nova, Swift and, Keystone.



Step 1 In the navigation pane, click **Post-Install** > **Horizon**.

Step 2 Click the link **Click here to view Horizon logs in new tab**. You will be redirected to Horizon landing page in a new tab.

Step 3 Enter the ADMIN_USER_PASSWORD obtained from /root/installer-<tagid>/openstack-configs/secrets.yaml in the management node.

NFVI Monitoring

NFVI monitoring is the Cross launch browser same as Horizon. NFVI monitoring link is available in the post install only if the setupdata has NFVI Monitoring configuration during the cloud deployment. NFVI Monitoring checks the status of **Collector VM1 Info** and **Collector VM2 Info** .

Step 1 In the navigation pane, click **Post-Install** > **NFVI Monitoring**.

Step 2 Click the link **Click here to view NFVI monitoring.**

You will be redirected to NFVI Monitoring page.

Run VMTP

Run VMTP is divided in two sections:

- **Results for Auto Run**: This shows the results of VMTP which was run during the cloud deployment (Blueprint Installation).
- **Results for Manual Run**: Run the VMTP on demand. To run VMTP on demand, click **Run VMTP**.

Note If VMTP stage was skipped or has not-run during Blueprint Installation, this section of POST Install would be disabled for the user.

Run CloudPulse

In VIM 2.0 and later, we provide an integrated tool, called Cloud Pulse, that periodically checks the cloud services endpoint. The results of these tests are reflected under the Cloud Pulse link. Also, you can run these API endpoint tests on demand, and fetch the result of these tests by refreshing the table.

OpenStack CloudPulse tool is used to verify Cisco NFVI health. CloudPulse servers are installed in containers on all Cisco NFVI control nodes and CloudPulse clients are installed on the management node.

CloudPulse has two test sets: endpoint scenario (runs as a cron or manually) and operator test (run manually).

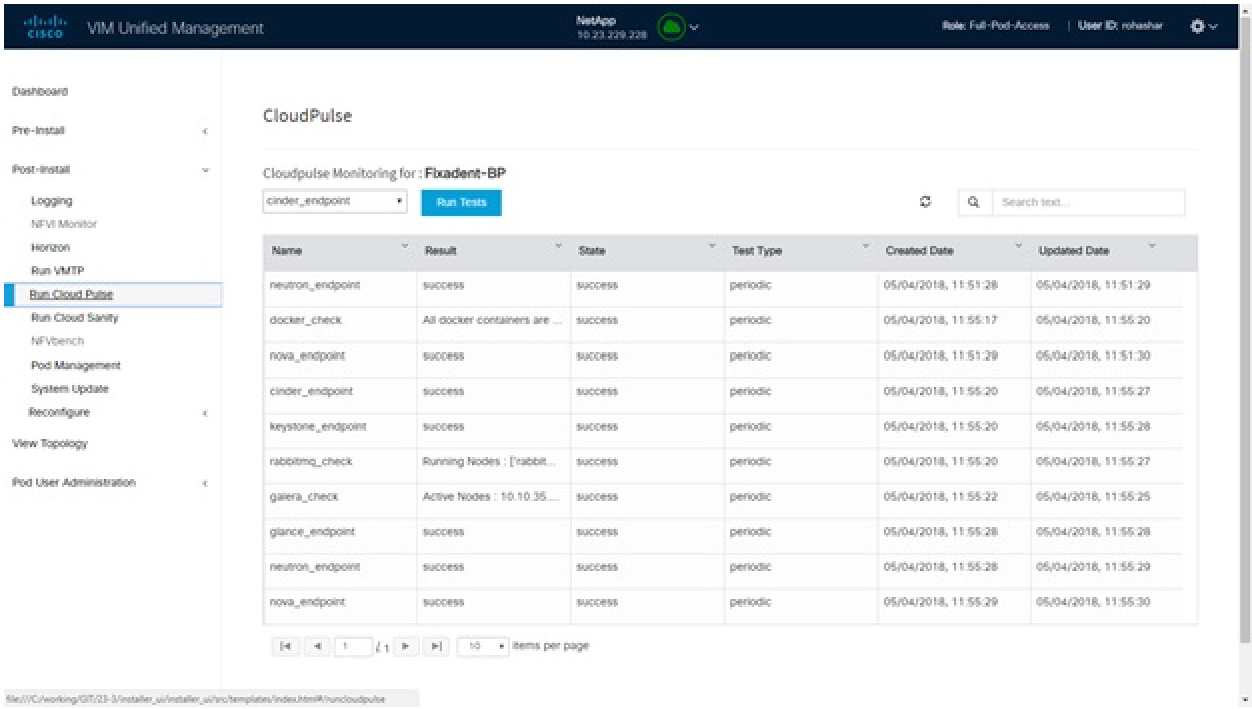
Following are the tests which are supported in CloudPulse:

Endpoint tests include

- cinder_endpoint
- glace_endpoint
- keystone_endpoint
- nova_endpoint
- neutron_endpoint

Operator tests include

- ceph_check
- docker_check
- galera_check
- node_check
- rabbitmq_check



Cloudpulse Monitoring for : Fixadent-BP

cinder_endpoint

Name	Result	State	Test Type	Created Date	Updated Date
neutron_endpoint	success	success	periodic	05/04/2018, 11:51:28	05/04/2018, 11:51:29
docker_check	All docker containers are ...	success	periodic	05/04/2018, 11:55:17	05/04/2018, 11:55:20
nova_endpoint	success	success	periodic	05/04/2018, 11:51:29	05/04/2018, 11:51:30
cinder_endpoint	success	success	periodic	05/04/2018, 11:55:20	05/04/2018, 11:55:27
keystone_endpoint	success	success	periodic	05/04/2018, 11:55:20	05/04/2018, 11:55:28
rabbitmq_check	Running Nodes : ['rabbit...	success	periodic	05/04/2018, 11:55:20	05/04/2018, 11:55:27
galera_check	Active Nodes : 10.10.35....	success	periodic	05/04/2018, 11:55:22	05/04/2018, 11:55:25
glance_endpoint	success	success	periodic	05/04/2018, 11:55:28	05/04/2018, 11:55:28
neutron_endpoint	success	success	periodic	05/04/2018, 11:55:28	05/04/2018, 11:55:29
nova_endpoint	success	success	periodic	05/04/2018, 11:55:29	05/04/2018, 11:55:30

1 / 1 10 items per page

file:///C:/working/GIT/23-3/installer_ui/installer_ui/src/templates/index.html#/runcloudpulse

To run a cloud pulse test, choose a particular test from the dropdown and click **Run Test**. Once the test is in progress, Click **(Spin/refresh)** icon to fetch the latest result. This grid does not fetch the latest result automatically.

Run Cloud Sanity Test

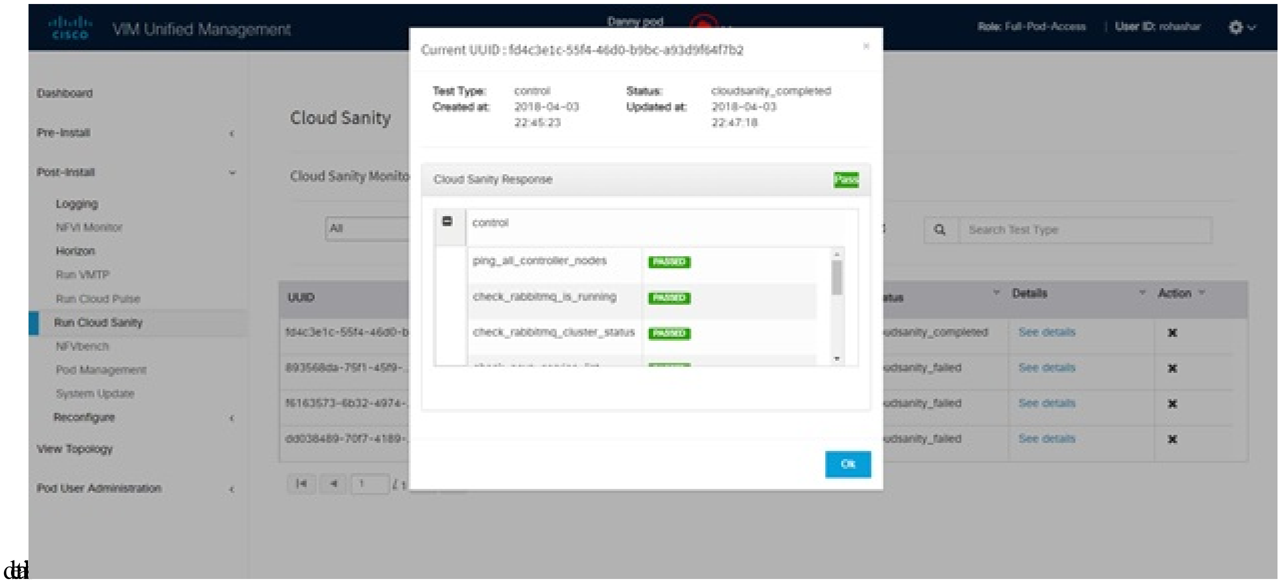
You can use the cloud sanity tool to test the Cisco NFVI pod and cloud infrastructure (host connectivity, basic mraiadb, rabbit, ceph cluster check, and RAID disks).

Following are the test available to run from Unified Management.

- Control
- Compute
- Cephmon
- Cephosd
- Management
- All

Step 1 To run a Cloud sanity test choose a particular test from the dropdown.

Step 2 Click **Run Test** to proceed with the operation. Once the test is completed, click**See Details** for more



Current UUID : fd4c3e1c-55f4-46d0-b9bc-a93d9f64f7b2

Test Type: control
Created at: 2018-04-03 22:45:23
Status: cloudsanity_completed
Updated at: 2018-04-03 22:47:18

Cloud Sanity Response Pass

control

ping_all_controller_nodes	PASSED
check_rabbitmq_is_running	PASSED
check_rabbitmq_cluster_status	PASSED

UUID	atus	Details	Action
fd4c3e1c-55f4-46d0-b	udsanity_completed	See details	✖
893568da-75f1-45f9-...	udsanity_failed	See details	✖
f6163573-6b32-4974-...	udsanity_failed	See details	✖
dd038489-70f7-4189-...	udsanity_failed	See details	✖

deta

Run NFV Bench

You can **Run NFV Bench** for **B** and **C** series Pod, through Cisco VIM Unified Management. On a pod running with CVIM, choose a *NFVbench* link on the NAV-Menu.

You can run either fixed rate test or NDR/PDR test. As the settings and results for the test types differ, the options to run these tests are presented in two tabs, with its own settings and results. To run a particular test, you can either select a particular hypervisor from the available list or allow the system to select any hypervisor.

NDR/PDR Test

Step 1 Log in to **CISCO VIM Unified Management**.

Step 2 In the Navigation pane, click **Post-Install** >Run NFV Bench.

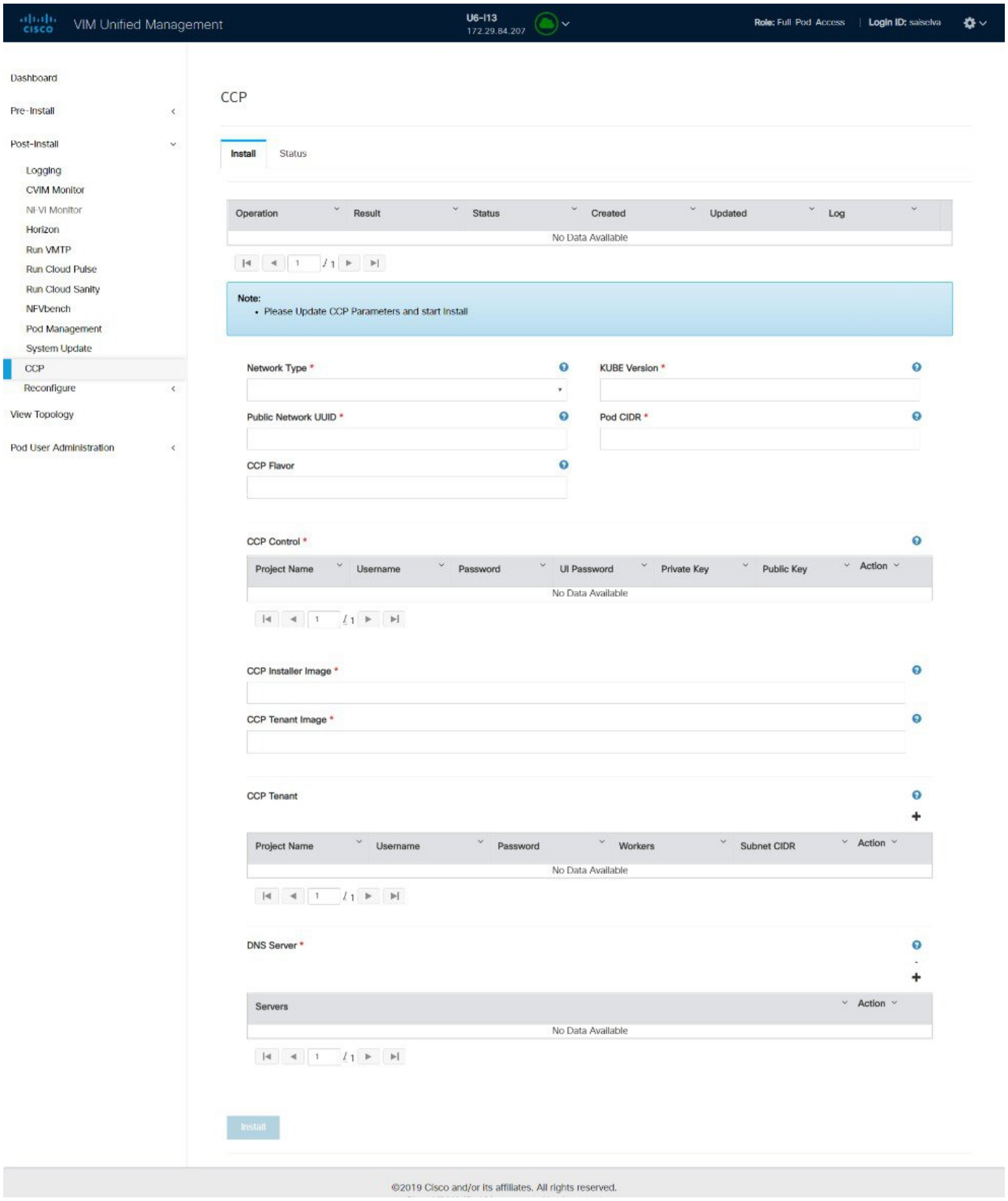
Step 3 Click NDR/PDR test and complete the following fields

Name	Description
Select a hypervisor (Optional)	Select any hypervisor to run the NDR/PDR. By default, the option **Use any hypervisor** is selected.
Iteration Duration	Choose duration from 10 to 60 sec. Default is 20 sec.
Frame Size	Choose the correct frame size to run.
VXLAN	Enable VXLAN encapsulation, only if VXLAN is enabled.
Run NDR/PDR test	Click **Run NDR/PDR test**. After, completion it displays each type of test with its own settings and results.

Cisco Container Platform

You can install, verify, and cleanup Cisco Container Platform for B and C series pod with OVS/VLAN tenant type, through Cisco VIM Unified Management. On a pod running with Cisco VIM, choose a Cisco Container Platform link on the NAV menu.

You can either install Cisco Container Platform during initial installation or add Cisco Container Platform during install operation.



CCP

Operation	Result	Status	Created	Updated	Log
No Data Available					

Note:

- Please Update CCP Parameters and start Install

Network Type *

KUBE Version *

Public Network UUID *

Pod CIDR *

CCP Flavor

CCP Control *

Project Name	Username	Password	UI Password	Private Key	Public Key	Action
No Data Available						

CCP Installer Image *

CCP Tenant Image *

CCP Tenant

Project Name	Username	Password	Workers	Subnet CIDR	Action
No Data Available					

DNS Server *

Servers	Action
No Data Available	

After successful installation, you can either do verify or cleanup operation.

Step 1 Log into **Cisco VIM Unified Management**.

Step 2 In the navigation pane, click **Post-Install** >**CCP**.

Step 3 Under **Install** tab, enter the following values if not defined during initial installation.

Name	Description
Network type	It can be tenant or provider.
Kube version	Version of Kubernetes to be installed
Public network UUID	UUID of Openstack external network or provider network.
Pod CIDR	Optionally, used for calico network.
Cisco Container Platform Flavor	Optional, but mandatory when NFV_HOSTS is enabled during Cisco Container Platform installation
Cisco Container Platform Control	**Project Name**:Tenant name to create in Openstack to host tenant cluster. It is mandatory for network type tenant and provider. **Username**: Username of openstack tenant. It is mandatory for network type tenant and provider. **Password**: Password for the Openstack tenant. It is mandatory for network type tenant and provider. **UI Password**: Password for Cisco Container Platform UI. It is mandatory for network type tenant and provider. **Private Key**: Private key used to SSH to VM must be ed25519. It is mandatory for network type tenant and provider. **Public Key**: Public key for Cisco Container Platform VMs, for example /root/ecdsa-key.pub. It is mandatory for network type tenant and provider. **Cisco Container Platform Subnet**: Subnet to deploy Cisco Container Platform **Control plane installer subnet** : Subnet to create for bootstrap installer. It is mandatory for network type tenant. **Installer Subnet Gateway**: Gateway used for bootstrap installer. It is mandatory for network type tenant.
Cisco Container Platform Installer Image	Pointer to the Cisco Container Platform installer image (required)
Cisco Container Platform Tenant Image	Pointer to Cisco Container Platform tenant cluster image (required)

Name	Description
Cisco Container Platform Tenant	**Project Name**: Tenant name to create in Openstack to host tenant cluster. It is mandatory. **Username**: Username for openstack tenant. It is mandatory. **Password**: Password for tenant. It is mandatory. **Workers**: Number of kubernetes workers in tenant cluster. It is mandatory **Tenant Subnet CIDR**: Tenant subnet CIDR. It is mandatory.
DNS Server	DNS server to be reachable from cloud (required)

Reconfiguring CIMC Password Through Unified Management

Update the cimc_password in the CIMC-COMMON section, or the individual cimc_password for each server and then run the update password option.

To update a password, you have to follow the password rules:

- Must contain at least one lower-case letter.
- Must contain at least one upper-case letter.
- Must contain at least one digit between 0 to 9.
- One of these special characters !$#@%^-_+=*&
- Your password has to be 8 to 14 characters long.

Before you begin

You must have a C-series pod up and running with Cisco VIM to reconfigure CIMC password.

Note Reconfigure CIMC password section is disabled if the pod is in failed state as indicated by ciscovim install-status.

Step 1 Log in to **CISCO VIM Unified Management**.

Step 2 In the navigation pane, choose **Post-Install**

Step 3 Click **Reconfigure CIMC Password**.

Step 4 On the Reconfigure CIMC Password page of the Cisco VIM UM, complete the following fields:

Name	Description
CIMC_COMMON old Password	**CIMC_COMMON** old password field cannot be edited.

Name	Description
CIMC-COMMON new Password	Enter the **CIMC-COMMON** password. Password has to be alphanumeric according to the password rule.
Click **Update**	Old **CIMC-COMMON** password can be updated with new **CIMC-COMMON** password.

CHAPTER 9

Managing Pod Through Cisco VIM Unified Management

The following are the naming conventions used in the Cisco VIM UM

1. Super Administrator (UM Admin): User having access to UM Admin profile
2. POD Administrator: User having access to register a Pod in the system(Only UM can add new Pod Admin in the system)
3. Pod users (Normal users): o All the users which are associated with the Pod. Full-pod-access: Role assigned to user which gives full access of a specific Pod(This has nothing to do with Pod Admins)

The following are the Key Points

- User who are UM admin or Pod admin but not associated with any Pod are not counted in UM admin dashboard user count section
- Only Pod Admins can register a new Pod
- Every Pod must a user with “Full-pod-Access” role.
- User cannot be revoked/delete if the users is the last user on the pod with “Full-Pod-Access” role.
- User cannot be delete if user is a Pod admin or UM admin.

The following topics tell you how to install and replace Cisco Virtual Infrastructure Manager (VIM) nodes using Cisco VIM Unified Management.

Monitoring Pod Status

The unified management application manages the pods and displays the pod management action status with a cloud icon.

The following table displays a summary of the pod operation, the corresponding cloud-icon color, and the pod status.

Table 17: Pod Operation Status

Pod Operation	UM Icon-Color	Pod Status
Active cloud with no failures	Green	Active
Cloud installation or pod management operation is in progress	Blue	In-progress
Software update (auto) rollback is failed	Red	Critical Warnings
Pending commit post software update	Amber	Warning
Reconfigure failed (for any operation)	Red	Critical Warning
Update, commit, or Rollback failed	Red	Critical Warning
Power management operation fails	Amber	Warning
Management not reachable	Red	Not Reachable

Managing Hardware

Management of your Cisco VIM pods includes adding, removing, or replacing the nodes.

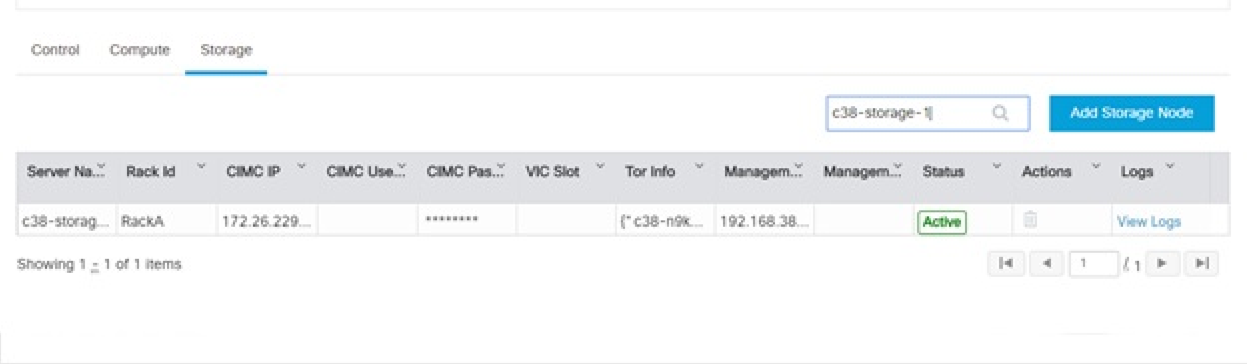
In a pod, multiple nodes cannot be changed at the same time. For example, if you want to replace two control nodes, you must successfully complete the replacement of the first node before you begin to replace the second node. Same restriction applies for addition and removal of storage nodes. Only, in case of Compute Nodes you can add or remove multiple nodes together.However, there must always be one active compute node in the pod at any given point. VNF manager stays active and monitors the compute nodes so that moving the VNFs accordingly as compute node management happens.

Note When you change a control, storage, or compute node in a Cisco VIM pod using Unified Management, it automatically updates the server and role in the active blueprint, as a result, your OpenStack deployment changes. When a node is removed from Cisco VIM, sensitive data may remain on the drives of the server. Administrator advice you to use Linux tools to wipe the storage server before using the same server for another purpose. The drives that are used by other application server must be wiped out before adding to Cisco VIM.

Searching Compute and Storage Nodes

This functionality allows you to search the Compute and Storage nodes by server names only. The search result is generated or shows an empty grid if there are no results.

Figure 18: Search Storage Nodes



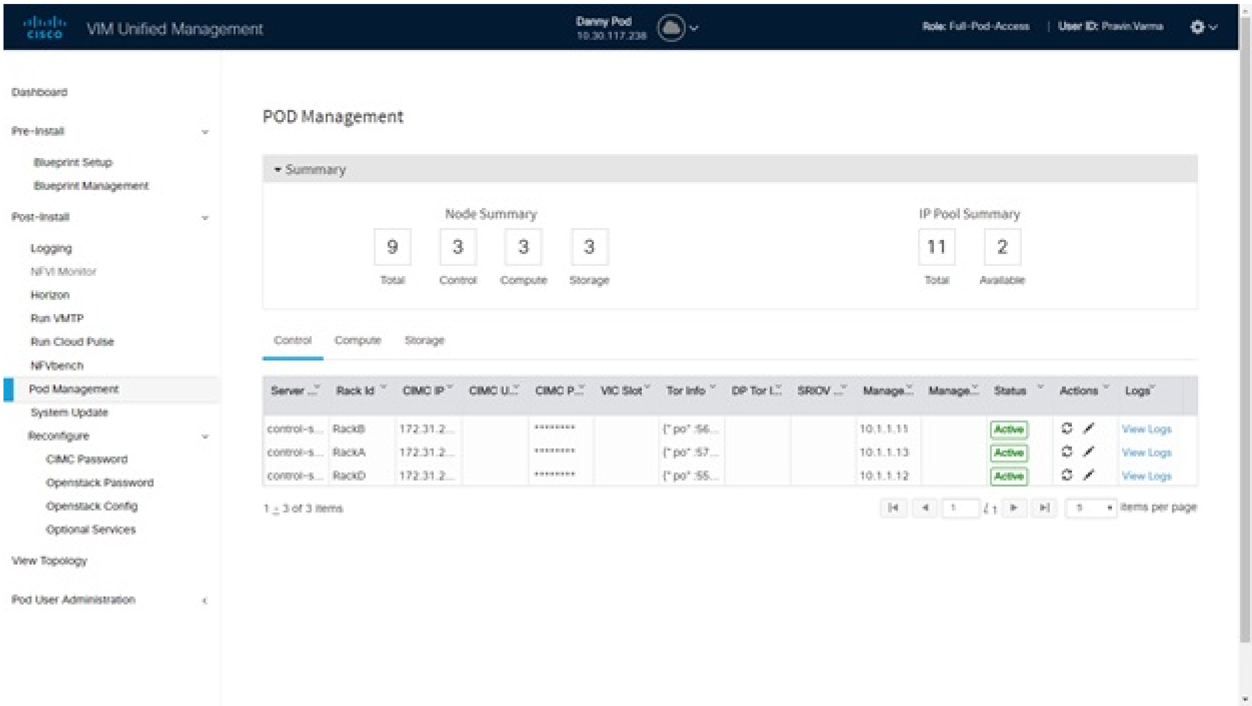
Server Na...	Rack Id	CIMC IP	CIMC Use...	CIMC Pas...	VIC Slot	Tor Info	Managem...	Managem...	Status	Actions	Logs
c38-storag...	RackA	172.26.229...		********		{"c38-n9k...	192.168.38...		Active		View Logs

Showing 1 - 1 of 1 items

POD Management

Cisco VIM allows the admin to perform pod life-cycle management from a hardware and software perspective. Cisco VIM provides the ability to power on/off compute node, add, remove or replace nodes based on the respective roles when the nodes of a given pod corrupts at times.

Figure 19: POD Management



Server ...	Rack Id	CIMC IP	CIMC U...	CIMC P...	VIC Slot	Tor Info	DP Tor I...	SRIOV ...	Manage...	Manage...	Status	Actions	Logs
control-s...	RackB	172.31.2...		********		{"po" :56...			10.1.1.11		Active		View Logs
control-s...	RackA	172.31.2...		********		{"po" :57...			10.1.1.13		Active		View Logs
control-s...	RackD	172.31.2...		********		{"po" :55...			10.1.1.12		Active		View Logs

1 - 3 of 3 items

Pod Management page has two sections–

1. **Node Summary:** This section shows how many nodes are available and the detailed count of Control, Compute and Storage type.

2. **IP Pool Summary:** This section shows the Total Pool Summary and the current available pool count.

The operations performed on the running pod are:

Replace Control Nodes: Double fault scenario is not supported. Only the replacement of one controller at a time is supported.

Note If the TOR type is Cisco NCS 5500, an additional popup is displayed to enable the user to update splitter configuration before replacing the control node.

Add Computes/Storage Nodes: N-computes nodes can be replaced simultaneously; however at any given point, at least one compute node has to be active.

Note If the TOR type is Cisco NCS 5500, an option is available to update the splitter cable configuration.

Power On/ Off compute Nodes: You can Power On or Power Off compute node. At least one compute node must be powered on.

Remove Compute/Storage Nodes: You can add one node at a time, when Ceph is run as a distributed storage offering.

Note If TOR type is Cisco NCS 5500, an additional popup is displayed to enable the user to update the splitter cable configuration, before the removal of compute or storage node.

Add Pool: You can increase pool size at any time.

Managing Storage Nodes

Before you add or remove a storage node, review the following guidelines for Managing Storage Nodes.

- **Required Number of Storage Nodes**: A Cisco VIM pod must have a minimum of three and a maximum of 20 storage nodes. If your pod has only two storage nodes, you cannot delete a storage node until you add another storage node. If you have fewer than three storage nodes, you can add one node at a time until you get to 20 storage nodes.
- **Validation of Nodes**: When you add a storage node to a pod, Cisco VIM Unified Management validates that all the nodes in the pod meet the minimum requirements and are in active state. If you have a control or compute node in a faulty state, you must either correct, delete or replace that node before you can add a storage node.
- **Update Blueprint**: When you add or delete a storage node, Unified Management updates the blueprint for the Cisco VIM pod.
- **Storage Node Logs**: You can access the logs for each storage node from the link in the Log column on the **Storage Nodes** tab.

Adding Storage Node

Complete the following instructions to add a storage node:

Note You cannot add more than one storage node at a time.

Before you begin

- Remove the non-functional storage node from the pod. You can have maximum 20 storage nodes in a Cisco VIM pod.
- Ensure that the server for the new storage node is in powered state in OpenStack for C Series.

Step 1 In the navigation pane, choose **Post-Install** > **Pod Management** > **Storage**.

Step 2 Click on Add Storage node button on the Storage tab. A popup will open where you can provide information about the new Storage node.

Step 3 For C Series, add the following details:

- **Server Name**: Name for the Storage Server to be added.
- **Rack ID**: Enter the Rack ID. (Accepts String format).
- **CIMC IP**: Enter the CIMC IP.
- **CIMC User Name**: User name for the CIMC.
- **CIMC Password**: Enter the password for the CIMC
- **VIC Slot**: Enter the VIC Slot (Optional).
- **ToR switch info**:Mandatory if ToR is configured as True
  - **Management IPv6**: Enter IPv6 Address.

Step 4 For B Series, add the following details:

- **Server Name**: Name for the Storage Server to be added.
- **Rack ID**: Enter the Rack ID. (Accepts String format).
- **Rack Unit ID**: Enter the Rack Unit ID.
- **Management IPv6**: Enter IPv6 Address.

Note Cancel will discard the changes and popup will be closed

If all mandatory fields are filled in correctly then **Add Storage** button will be enabled.

Step 5 Click **Initiate Add Storage**. Add node initialized message will be displayed.

Step 6 To view logs, click **View logs** under Logs column.
The status of the POD will change to Active.

Step 7 Two kinds of failure may occur:

- **Add Node Pre-Failed**: When addition of node failed before the bare-metal stage (step 4), the Active Blueprint is modified but the Node is not yet added in the Cloud. If you press **X** Icon, then Unified Management will delete the node information form the Blueprint and the state would be restored.
- **Add Node Post-Failed**: When addition of node failed after the bare-metal stage (step 4), the Active Blueprint is modified and the node is registered in the cloud. If you press **X** Icon, thn Unified Management will first delete the node from the Blueprint and then node removal from cloud would be initiated.

You can view the logs for this operation under **Logs** column.

Deleting Storage Node

You cannot delete more than one storage node at a time.

Step 1 In the Navigation pane, choose **Post-Install** > **POD Management** > **Storage**.

Step 2 Click **X** adjacent to the storage node you want to delete.

Yor can delete a storage node with Force option for hyper-converged POD. The Force option is useful when VM's are running on the node.

Step 3 **Node Removal Initiated successfully** message will be displayed.

To view logs, click **View logs** under logs column.

- If the Storage Node is deleted successfully, the storage node will be removed from the list under **Add/Remove storage Node**.
- In deletion failed, a new button **Clear Failed Nodes** will be displayed. Click **Clear Failed Nodes** to remove the node form cloud and Blueprint.

Managing Compute Nodes

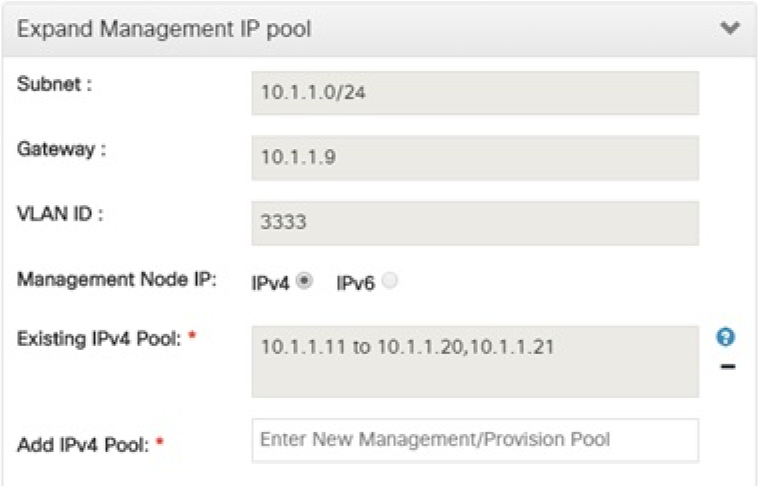
Before you add or remove a compute node, review the following guidelines:

- **Required number of compute nodes**: Cisco VIM pod must have a minimum of one compute node and a maximum of 128 nodes. Out of 128 nodes, three nodes are control nodes and remaining 125 nodes is between compute and ceph nodes with a maximum of 25 ceph nodes. If your pod has only one compute node, you cannot delete that node until you add another compute node.
- **Update blueprint**: When you add or remove a compute node, Unified Management updates the blueprint for the Cisco VIM pod.
- **Compute node logs**: You can access the Logs for each compute node from the link in the Log column on the Compute Nodes table.

Adding Compute Node

Add IP Pool

If all the existing pool size is already used, then you need to increase the pool size. On the Add compute or Add storage popup, Click **Expand Management IP pool** to add a new Pool.



Expand Management IP pool

Subnet : 10.1.1.0/24

Gateway : 10.1.1.9

VLAN ID : 3333

Management Node IP: IPv4 ● IPv6 ○

Existing IPv4 Pool: * 10.1.1.11 to 10.1.1.20,10.1.1.21

Add IPv4 Pool: * Enter New Management/Provision Pool

Complete the instructions, to add a compute node:

Before you begin

Ensure that the server for the new compute node is in powered state in OpenStack. You can add more than one compute node at a time.

Step 1 In the navigation pane, click **Post-Install** > **Pod Management** > **Compute**.

Step 2 Click **Add Compute Node** on the Compute tab a popup opens . Add the required information in the popup. To add another node clcik **Add Another Node** if you planned to add another compute node OR hit Initiate Add Compute if you so not plan to add any more compute node. If you hit **Add Another Node** button, the existing form will be emptied. You need to fill the information for the new compute node and then repeat step 1. You may use **Previous** and **Next** button to navigate among different added node information.

Step 3 For C-series, add the following details:

- **Server Name**: Name for the Compute Server.
- **Rack ID**: Enter the Rack ID. (Accepts String format).
- **CIMC IP**: Enter the CIMC IP.
- **CIMC User Name**: User name for the CIMC.
- **CIMC Password**: Enter the password for the CIMC.
- **VIC Slot**: Enter the VIC Slot (Optional).
- **ToR switch info**: Mandatory if configured ToR is true.
- **DP ToR switch info**: Enter input as string format.
- **SRIVO ToR info** : Enter input as string format.

- **Management IPv6** : Enter IPv6 address.
- **Trusted_vf**: Optional and not reconfigurable. Applicable only for SRIOV node with compute role for C-series pod.
- **Vtep IPs**: IP address from vxlan-tenant and vxlan-tenant.
- **INTEL_SRIOV_VFS** :Value range is 1 to 32.
- **INTEL_FPGA_VFS**: Value range is 1 to 8.
- **INTEL_VC_SRIOV_VFS**: Value range is 1 to 32.
- **Vendor**: Optional. It can be CISCO - Cisco Systems Inc or QCT - Quanta Cloud Technology Inc or HPE - Hewlett Packard Enterprise.

  :
- **VM Hugepage Size**: Optional. It can be 2M or 1G. Only applicable with NFV HOSTS.
- **RX TX Queue Size**: Optional. It can be 256, 512, or 1024.
- **SECCOMP_SANDBOX** : Optional. If not defined, set to 1.
- **NOVA_CPU_ALLOCATION_RATIO**: Optional, overrides the NOVA_CPU_ALLOCATION_RATIO defined in openstack_config.yaml. Values lie in the range of 0.958 to 16.0
- **NOVA_RAM_ALLOCATION_RATIO:** Optional, overrides the NOVA_RAM_ALLOCATION_RATIO defined in openstack_config.yaml. Values lie in the range of 1.0 to 4.0
- **NUM GPU CARDS**: Optional, for server with GPU. Value lies in the range from 0 to 6
- **root_drive_type: <HDD or SSD or M.2_SATA, NUM_GPU_CARDS**: 0 to 6
- **VIC Port Channel Enable**: Optional. It can be True or False. By default, it is set to True.
- **VIC Admin FEC mode**: Optional. It can be auto, off, cl74, or cl91.

Step 4 For B series, add the following details:

- **Server Name**: Name for the Storage Server to be added.
- **Rack ID**: Enter the Rack ID. (Accepts String format).
- **Rack Unit ID**: Enter the Rack Unit ID.
- **Chassis ID**: Enter the Chassis ID. Range for Chassis ID is 1-24.
- **Blade ID**: Enter the Blade ID. Range for Blade ID is 1-8.
- **CIMC Password**: Enter the CIMC Password.
- **VM Hugepage Size**: Optional. It can be 2M or 1G. Only applicable for NFV HOSTS.
- **RX TX Queue Size**: Optional. It can be 256, 512, or 1024.
- **SECCOMP_SANDBOX** : Optional. If not defined, set to 1.
- **NOVA_CPU_ALLOCATION_RATIO**: Optional, overrides the NOVA_CPU_ALLOCATION_RATIO defined in openstack_config.yaml. Values lie in the range of 0.958 to 16.0
- **NOVA_RAM_ALLOCATION_RATIO:** Optional, overrides the NOVA_RAM_ALLOCATION_RATIO defined in openstack_config.yaml. Values lie in the range of 1.0 to 4.0

- **Management IPv6**: Enter IPv6 address.

  If all mandatory fields are filled in correctly, click **Save**

Note
- Add compute process can initiate multiple addition of compute nodes. Fill in the mandatory fields to save new compute node or press cancel to exit.
- Fields of pod management will remain mandatory for user input based on setup-data.

Step 5 You may perform one among these steps mentioned below:

- Clicking **Cancel** displays the compute node information listed in the table and **Add Compute Node** button is enabled.
- If you feel you have filled in a wrong entry for the compute node information, click **Delete**. This will delete the entry from the table as this information is not added in the Blueprint.
- Click **Initiate Add Compute**, displays Add node initialized message.

Step 6 To view logs, click **View logs** under Logs column. The status of the POD will change to Active.

Step 7 Two kinds of failure may occur:

- **Add Node Pre-Failed**: When addition of node failed before the bare-metal stage (step 4) the Active Blueprint will be modified but the Node is not yet added in the Cloud. If you press **X** Icon, then Unified Management will delete the node information form the Blueprint and the state would be restored.
- **Add Node Post-Failed**: When addition of node failed after the bare-metal stage (step 4) the Active Blueprint will be modified and the node is registered in the cloud. If you press **X** Icon, then Unified Management will first delete the node from the Blueprint and then node removal from cloud would be initiated.

You can view the logs for this operation under **Logs** column.

Deleting Compute Node

Compute node is deleted due to a hardware failure. You can delete one compute node at a time.

Note If your pod has only one compute node, you cannot delete that node until you add another compute node.

Step 1 In the navigation pane, choose **Post-Install** > **POD Management** > **Compute**.

Step 2 Click **X** for the compute node to be deleted. To remove multiple compute nodes, choose the target compute nodes which is on the extreme left column, then click **Trash** to remove multiple computes.

You can delete a compute node with Force option which is useful when VM’s are running on the node.

"Node removal initiated successfully" message is displayed.

Step 3 To view the Logs, click **View logs** under Logs column.

- If compute nodes are deleted successfully, you cannot view the compute node in the list under **Add or Remove Compute Node**.

- If Compute Note is deleted, a new button **Clear Failed Nodes** is displayed.

Step 4 Click **Clear Failed Nodes** to remove the node form Cloud and Blueprint.

Managing Control Nodes

Before you replace a control node, review the following guidelines:

- **Required Number of Control Nodes**: A Cisco VIM pod must have three control nodes and you can only replace one node at a time.
- **Validation of Nodes**: When you replace a control node, Cisco VIM Unified Management validates if all the other nodes in the pod meet the minimum requirements and are in active state. If you have a storage or a compute node in a faulty state, you must correct the faulty state or delete or replace that node before you can replace the control node.
- **Update Blueprint**: When you replace a control node, Unified Management updates the Active blueprint for the Cisco VIM pod.
- **Control Node Logs**: You can access the logs for each control node from the link in the **Logs** column of Control Nodes table.

Replacing Control Node

You can replace only one control node at a time.

Step 1 In the navigation pane, click **Post-Install** > **Pod Management** > **Control**.

Step 2 Click (Spin) icon. A confirmation pop-up appears, Click **Proceed** to continue.

You can replace a control node with Force option for Micropod. The Force option is useful when VM's are running on the node.

Step 3 If you want to edit a specific control node before replace, click **Edit** to update the changes.

Step 4 On success, **Replace Node Initiated** successfully message is displayed.

Step 5 You can view the logs in the **Logs** column on the Control Nodes table.

What to do next

If the replacement of the control node fails, do the following:

- Click the link in the Logs column.
- Check the logs to determine the cause of the failure.
- Correct the issue and attempt to replace the control node again.

Note For replace controller, you can change only a subset of the server information. For C-series, you can change the server information such as CIMC IP, CIMC Username, CIMC password, rack_id, and tor_info. For B-series, you can change the rack_id, chassis_id, and blade_id, but not the server hostname and management IP during the operation of replace controller.

Power Management

Compute node can be powered on or powered off from the Compute Tab in Pod Management section. There is a power button associated with each compute with information provided as tooltip when you hover on that icon.

Following are the steps to power on/off multiple compute node:

1. Click **Power** button located to the left of delete button.
2. Choose the compute nodes by selecting the check box, the corresponding power button gets enabled.

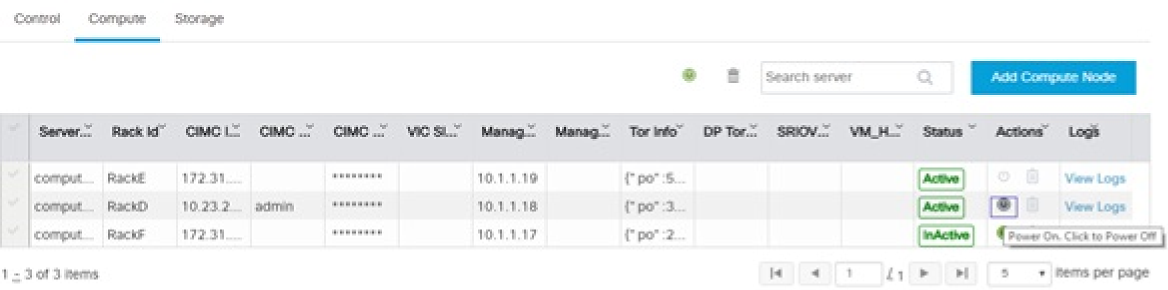
Powering On a Compute Node

Following are the steps to power on the compute node:

1. Click the **Compute** tab.
2. In the Pod Management area, check the check box corresponding to the Compute node that you want to power on.

Note The **Power** button of a Compute node is enabled only after you select the Compute node.

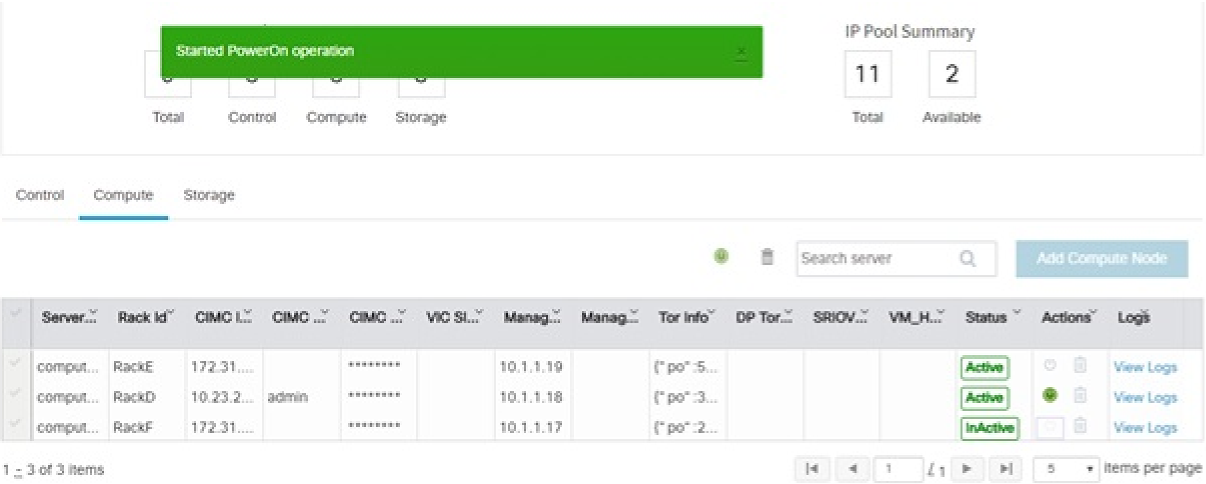
Figure 20: Powering On a Compute Node



Server...	Rack Id	CIMC I...	CIMC ...	CIMC ...	VIC Sl...	Manag...	Manag...	Tor Info	DP Tor...	SRIOV...	VM_H...	Status	Actions	Logs
comput...	RackE	172.31....		********		10.1.1.19		{" po" :5...				Active		View Logs
comput...	RackD	10.23.2...	admin	********		10.1.1.18		{" po" :3...				Active		View Logs
comput...	RackF	172.31....		********		10.1.1.17		{" po" :2...				InActive	Power On. Click to Power Off	

3. Under the Actions column, click the **Power** button of the Compute node. It may take a few minutes for the Compute node to power on. The tooltip of the power button displays the status of the Compute node. Once the compute node is powered on, the Power button stops blinking and its color changes to green.

Figure 21: Power On Operation



Started PowerOn operation

Server...	Rack Id	CIMC I...	CIMC ...	CIMC ...	VIC Sl...	Manag...	Manag...	Tor Info	DP Tor...	SRIOV...	VM_H...	Status	Actions	Logs
comput...	RackE	172.31....		********		10.1.1.19		{" po" :5...				Active		View Logs
comput...	RackD	10.23.2...	admin	********		10.1.1.18		{" po" :3...				Active		View Logs
comput...	RackF	172.31....		********		10.1.1.17		{" po" :2...				InActive		View Logs

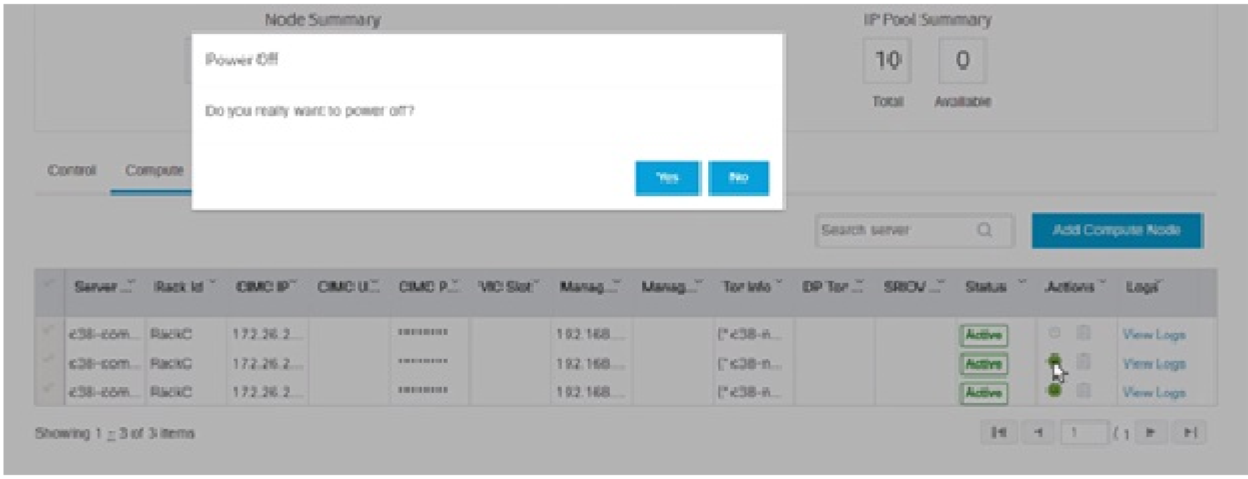
You can add a Compute node only once a power on task is complete.

Powering Off Compute Node

> **Note**
>
> You cannot power off all the Compute nodes. There must be at least one Compute node that is in the On state.

Follow these steps to power off a Compute node:

1. Click the **Compute** tab.
2. In the Pod Management area, under the Actions column, click the **Power** button of the Compute node that you want to power off.

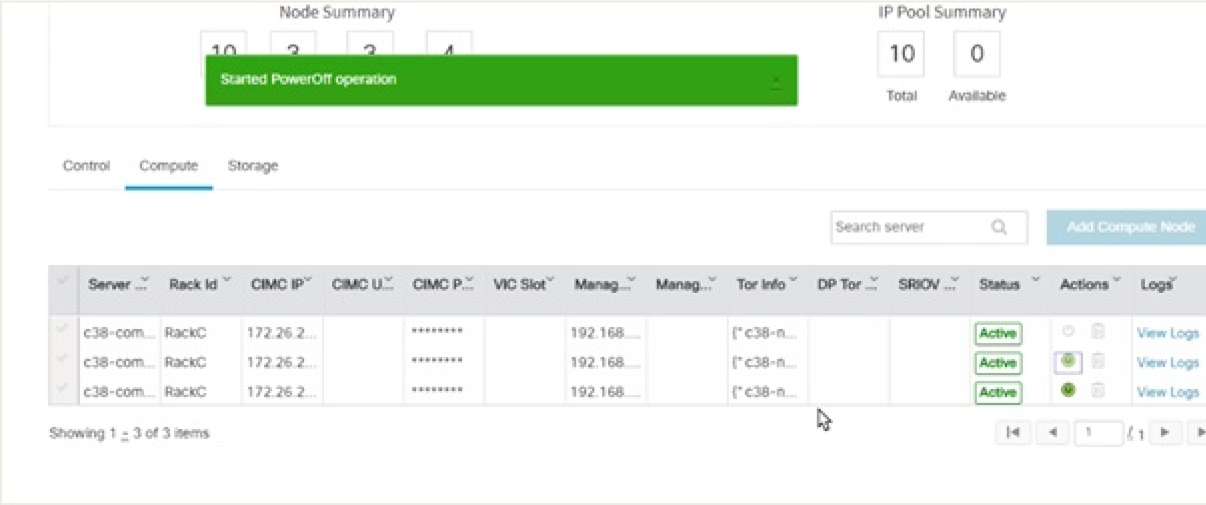


Power Off

Do you really want to power off?

Server ...	Rack Id	CIMC IP	CIMC U...	CIMC P...	VIC Slot	Manag...	Manag...	Tor Info	DP Tor...	SRIOV ...	Status	Actions	Logs
c38-com...	RackC	172.26.2...		********		192.168...		["c38-n...			Active		View Logs
c38-com...	RackC	172.26.2...		********		192.168...		["c38-n...			Active		View Logs
c38-com...	RackC	172.26.2...		********		192.168...		["c38-n...			Active		View Logs

3. Click **Yes** in the confirmation dialog box.



Started PowerOff operation

Server ...	Rack Id	CIMC IP	CIMC U...	CIMC P...	VIC Slot	Manag...	Manag...	Tor Info	DP Tor ...	SRIOV ...	Status	Actions	Logs
c38-com...	RackC	172.26.2...		********		192.168....		{"c38-n...			Active		View Logs
c38-com...	RackC	172.26.2...		********		192.168....		{"c38-n...			Active		View Logs
c38-com...	RackC	172.26.2...		********		192.168....		{"c38-n...			Active		View Logs

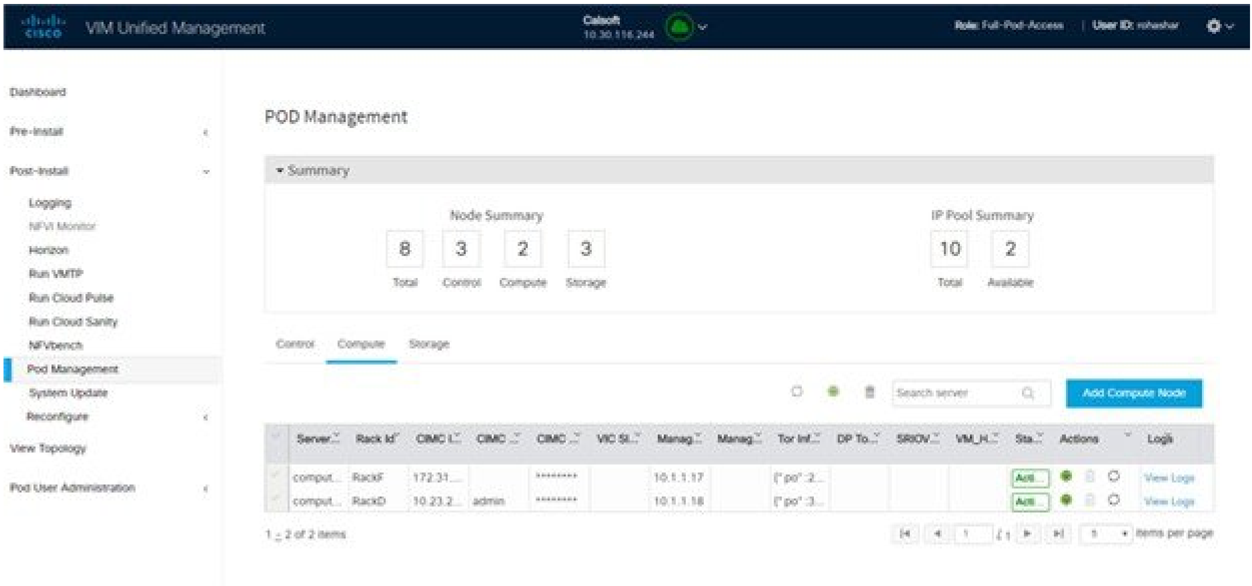
Showing 1 - 3 of 3 items

It may take a few minutes for the Compute node to power off. The tooltip of the power button displays the status of the Compute node. Once the compute node is powered off, the Power button stops blinking and its color changes to grey.

Note If there is only one compute node in the grid, and you try to power off it, a message *Last compute node can't be powered off* is displayed. Also, when you power off the last available compute node in the list of nodes, then the message *At least one compute node should be powered on* is displayed.

Multiple compute power/ delete/ reboot operation

You can perform power, delete, and reboot operation on multiple compute nodes using the global buttons located at the top of grid. To enable this operation, select at least one compute node.



Server...	Rack Id	CIMC I...	CIMC ...	CIMC ...	VIC Sl...	Manag...	Manag...	Tor Inf...	DP To...	SRIOV...	VM_H...	Sta...	Actions	Logs
comput...	RackF	172.31....		********		10.1.1.17		{"po":2...				Acti...		View Logs
comput...	RackD	10.23.2...	admin	********		10.1.1.18		{"po":3...				Acti...		View Logs

1 - 2 of 2 items

Rebooting Compute Node

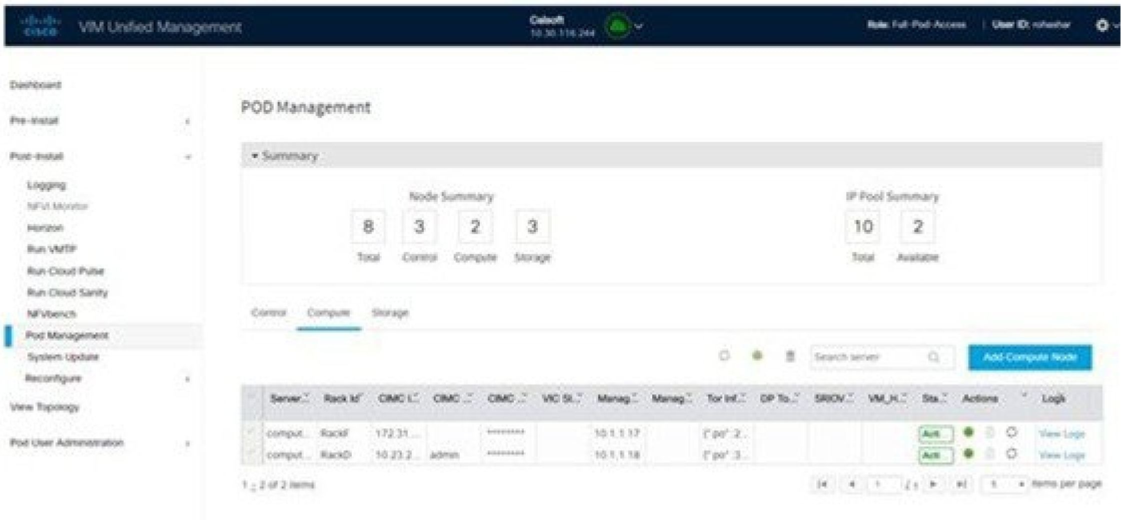
To reboot the compute node, follow the below steps:

1. Click on **Compute** tab.
2. In the **Pod Management** pane, under the **Actions** column, click **Reboot** of the compute node that you want to reboot.
3. Click **Yes** in the confirmation dialog box, to perform reboot. You can reboot a compute node with Force option which is useful when VM's are running on the node.

Multiple compute power/ delete/ reboot operation

You can perform power, delete, and reboot operation on multiple compute nodes using the global buttons located at the top of grid. To enable this operation, select at least one compute node.

Figure 22: Pod Management



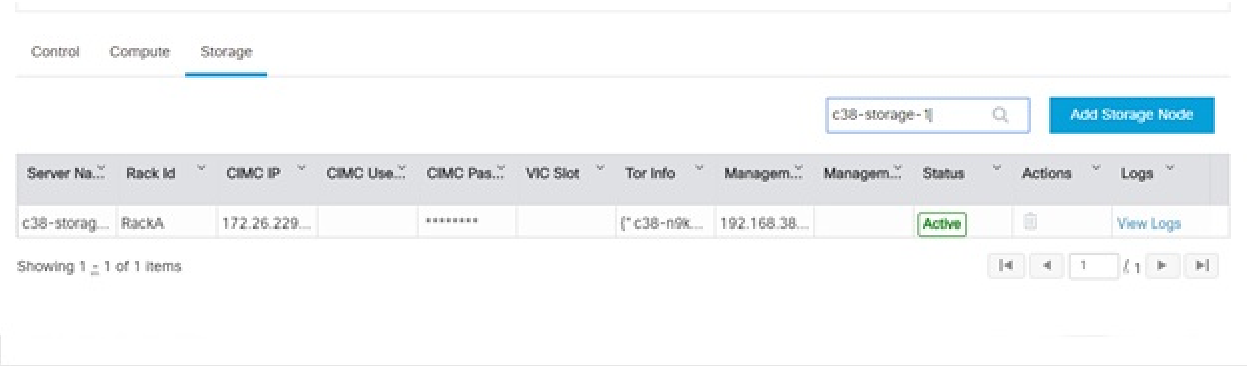
Server...	Rack Id	CIMC I...	CIMC ...	CIMC ...	VIC St...	Manag...	Manag...	Tor Inf...	DP To...	SRIOV...	VM_H...	Sta...	Actions	Logs
comput...	RackF	172.31...		********		10.1.1.17		{"po":2...				Act	● ▯ ○	View Logs
comput...	RackD	10.23.2...	admin	********		10.1.1.18		{"po":3...				Act	● ▯ ○	View Logs

1 - 2 of 2 items   1 / 1   5 items per page

Searching Compute and Storage Nodes

This functionality allows you to search the Compute and Storage nodes by server names only. The search result is generated or shows an empty grid if there are no results.

Figure 23: Search Storage Nodes



Server Na...	Rack Id	CIMC IP	CIMC Use...	CIMC Pas...	VIC Slot	Tor Info	Managem...	Managem...	Status	Actions	Logs
c38-storag...	RackA	172.26.229...		********		{"c38-n9k...	192.168.38...		Active		View Logs

Showing 1 - 1 of 1 items

Managing Software

Software management of your Cisco VIM pods includes software update, reconfigure of openstack services and password, etc.

VIM Software Update

As part of the lifecycle management of the cloud, VIM has the ability to bring in patches (bug fixes related to code, security, etc.), thereby providing cloud management facility from software point of view. Software update of the cloud is achieved by uploading a valid tar file, following initiation of a System Update form the Unified Management as follows:

Step 1 In the Navigation pane, click **Post-Install** > **System Update**.

Step 2 Click **Browse** and select the valid tar file.

Step 3 Click **Open**.

Step 4 Click **Upload and Update**.
Update started Successfully message will be displayed.

Step 5 Update status will be shown as **ToUpdate**.

Click the hyperlink to view the reconfigure logs for install logs.

Reconfigure status will be available on the page or the dashboard under **POD Operation** details.

What to do next

System Update has been initiated message will be displayed. Logs front-ended by hyperlink will be in the section below in-front of **Update Logs** which shows the progress of the update. During the software update, all other pod management activities will be disabled. Post-update, normal cloud management will commence. Once update has completed you will see the status of update in the box below.

If log update fails, **Auto-RollBack** will be initiated automatically.

If log update is successful, you will have two options to be performed:

1. **Commit**—To proceed with the update.
2. **RollBack**—To cancel the update.

If Auto-rollback fails during software update fails through Unified Management UI, it is advised that the administrator contact Cisco TAC for help. Do not re-try the update or delete the new or the old installer workspace.

If the update is successful and reboot is required for at least one compute node:

- Only commit or rollback is allowed.
- Following operations are not permitted:
  - Reconfigure
  - System update
  - Pod management

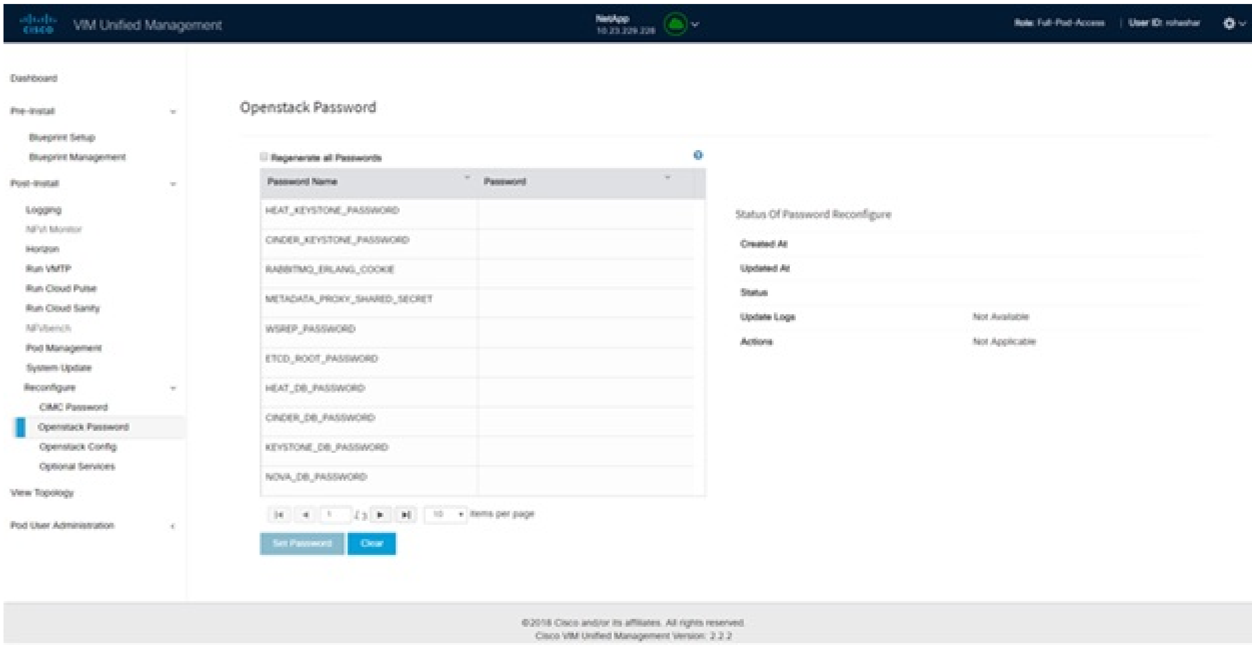
Note You can reboot the node, only after the commit or rollback operation.

.

Reconfigure Openstack Passwords

There are two options to regenerate the passwords:

- **Regenerate all passwords**: Click **Regenerate all passwords** checkbox and click **Set Password**. This will automatically regenerate all passwords in alphanumeric format.
- **Regenerate single or more password**: This will set a specific password by doing an inline edit for any service like Horizon's ADMIN_USER_PASSWORD. Double click on the filed under Password and enter the password to enable **Set Password** button.



Openstack Password

□ Regenerate all Passwords

Password Name	Password
HEAT_KEYSTONE_PASSWORD	
CINDER_KEYSTONE_PASSWORD	
RABBITMQ_ERLANG_COOKIE	
METADATA_PROXY_SHARED_SECRET	
WSREP_PASSWORD	
ETCD_ROOT_PASSWORD	
HEAT_DB_PASSWORD	
CINDER_DB_PASSWORD	
KEYSTONE_DB_PASSWORD	
NOVA_DB_PASSWORD	

Status Of Password Reconfigure

Created At	
Updated At	
Status	
Update Logs	Not Available
Actions	Not Applicable

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Cisco VIM Unified Management Version: 2.2.2

During the reconfiguration of password, all other pod management activities will be disabled. Post-update, normal cloud management will commence. If the reconfigure of the password fails, all subsequent pod management operations will be blocked. It is advised to contact Cisco TAC to resolve the situation through CLI.

Reconfigure OpenStack Services, TLS Certificates, and ELK Configurations

Cisco VIM supports the reconfiguration of OpenStack log level services, TLS certificates, and ELK configuration. Following are the steps to reconfigure the OpenStack and other services:

Step 1 In the navigation pane, click **Post-Install** > **Reconfigure Openstack Config**.

Step 2 Click the specific item that you want to change and update. For example: to update the TLS certificate click the path to the certificate location.

Step 3 Enter **Set Config** to commence the process.

What to do next

During the reconfiguration process, all other pod management activities are disabled. Post-update, normal cloud management commences. If reconfigure of OpenStack Services fails, all subsequent pod management operations are blocked. Contact, Cisco TAC to resolve the situation through CLI.

Reconfiguring CIMC Password through Unified Management

Cisco VIM allows you to update the cimc_password in the CIMC-COMMON section, and/or the individual cimc_password for each server and then run the update password option.

You need to match the following password rule to update the password:

- Must contain at least one lower case letter.
- Must contain at least one upper case letter.
- Must contain at least one digit between 0 to 9.
- One of these special characters !$#@%^-_+=*&
- Your password has to be 8 to 14 characters long.

Before you begin

You must have a C-series pod up and running with Cisco VIM to reconfigure CIMC password.

Note Reconfigure CIMC password section is disabled if the pod is in failed state as indicated by ciscovim install-status.

Step 1 Log-in to **CISCO VIM Unified Management**.

Step 2 In the navigation pane, select **Post-Install**.

Step 3 Click **Reconfigure CIMC Password**.

Step 4 You can reconfigure the CIMC Password at global level by adding new CIMC_COMMON Password. To reconfigure CIMC Password for individual servers, double-click the server password that you want to edit.

Step 5 Click **Reconfigure** to initiate reconfigure process.

Reconfiguring Optional Services

Cisco VIM offers optional services such as heat, migration to Keystone v3, NFVBench, NFVIMON, etc, that can be enabled post-pod deployment. These services can be enabled in one-shot or selectively.

Listed below are the steps to enable optional services:

Step 1 In the navigation pane, click **Post-Install** > **Reconfigure Optional Services**.

Step 2 Choose the right services and update the fields with the right values.

Step 3 Click **Offline validation**.

Step 4 Once offline validation is successful, click **Reconfigure** to commence the process.

During the reconfiguration process, all other pod management activities will be disabled. Post-update, normal cloud management will commence.

If reconfigured OpenStack Services fail, all subsequent pod management operations are blocked. Contact Cisco TAC to resolve the situation through CLI.

Note All reconfiguration features contain repeated re-deployment option set to true or false.

- Repeated re-deployment true - Feature can be re-deployed again.
- Repeated re-deployment false- Deployment of feature allowed only once.

Deployment Status :

Optional Features	Repeated re-deployment Option
APICINFO	True
DHCP reservation for VM MAC address	True
EXTERNAL_LB_VIP_FQDN	False
EXTERNAL_LB_VIP_TLS	False
INSTALL_MODE	True
HTTP_PROXY & HTTPS_PROXY	True
LDAP	True
NETWORKING	True
NFVBENCH	False
NFVIMON	True. Can be unconfigured.
PODNAME	False
PROVIDER_VLAN_RANGES	True
SYSLOG_EXPORT_SETTINGS	False
TENANT_VLAN_RANGES	True
TORSWITCHINFO	False
VIM _ ADMINS	True
VMTP	False
VTS_PARAMETERS	False
AUTOBACKUP	` True
Heat	False
Cobbler	True
ES Remote Backup	True
CVIM-MON	True
NETAPP_SUPPORT	True
Enable Read-only OpenStack Admins	True
Base MAC address	True

Optional Features	Repeated re-deployment Option
VAULT	False
Cloud Settings	True

Reconfiguring Optional Features Through Unified Management

Step 1 Log into Cisco VIM UM.

Step 2 In the **Navigation** pane, expand the **Post-Install Section**.

Step 3 Click **Reconfiguring Optional Feature through UM**.

Step 4 On the **Reconfiguring Optional Feature through UM** page of the Cisco VIM UM, enter the data for the following fields:

Name	Description
Heat check box	• Enable **Heat**. • Click **Offline Validation** . • When Offline Validation is successful, click **Reconfigure** to commence the process.
Enable Read-only OpenStack Admins checkbox	• Check/uncheck **Enable Read-only OpenStack Admins** • Click **Offline Validation** When Offline Validation is successful, click **Reconfigure** to commence the process.
Keystone v3 check box	• Enable **Keystone v3**. • Click **Offline Validation** . • When Offline Validation is successful, click **Reconfigure** to commence the process.
ENABLE_ESC_PRIV	• Enable **ENABLE_ESC_PRIV** . • Click **Offline Validation** . • When Offline Validation is successful, click **Reconfigure** to commence the process.

Name	Description
Autobackup check box	• Enable/Disable **Autobackup**. • Click **Offline Validation** . • When Offline Validation is successful, click **Reconfigure** to commence the process.
External LB VIP TLS check box	• Enable **External LB VIP TLS**. • Click **Offline Validation** . • When Offline Validation is successful, click **Reconfigure** to commence the process.
External LB VIP FQDN check box	• Enter input as a string. • Click **Offline Validation** . • When Offline Validation is successful, click **Reconfigure** to commence the process.
Pod Name	• Enter Input as a string. • Click **Offline Validation** . • When Offline Validation is successful, click **Reconfigure** to commence the process.
Tenant Vlan Ranges	• Augment tenant vlan ranges input. For Example: 3310:3315. • Click **Offline Validation** . • When Offline Validation is successful, click **Reconfigure** to commence the process.
Provider VLAN Ranges	• Enter input to tenant vlan ranges. For Example: 3310:3315. • Click **Offline Validation** . • When Offline Validation is successful, click **Reconfigure** to commence the process.
Install Mode	• Select **Connected** or **Disconnected**, any one form the drop-down list. • Click **Offline Validation** . • When Offline Validation is successful, click **Reconfigure** to commence the process.

Name	Description
VAULT	• Enable Vault, if it is not deployed on day 0. • Click **Offline Validation** • If offline validation is successful, click **Reconfigure** to commence the process.
Cloud Settings	Following are the options for Cloud Settimgs: • **keystone_lockout_failure_attempts**: Number of incorrect password attempts before the user is locked out. Values are 0 by default for no lockout, and can be in the range of 0 to 10. • **keystone_lockout_duration**: Number of seconds a user is locked out. By default, it is 1800 for 30 minutes. Values are in the range of 300 (5 minutes) to a maximum of 86400 (24 hours). • **keystone_unique_last_password_count:** Forces the user to change their password to a value not used before. Default is 0 for no history check.Values are in the range of 0 to 10. • **keystone_minimum_password_age**: Restricts you to change their password at most every this many days. Default is 0 for no limit. Values are in the range of 0 to 2. • **horizon_session_timeout**: Number of seconds of inactivity before Horizon dashboard is logged out. Default is 1800 for 30 minutes. Values are in the range of 300 (5 minutes) to maximum of 86400 (24 hours). Click **Offline Validation**. If **Offline Validation** is successful, click **Reconfigure** to commence the process.

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>Registry Setup Settings</b> checkbox</td><td>For Registry Setup:
• Enter the <b>Registry User Name</b>. It is a mandatory field
• Enter the <b>Registry Password</b>. The minimum length of the password is three.
• Enter the <b>Registry Email</b>. It is a mandatory field.
• Enter the <b>Registry Name</b>. For example, Registry FQDN name. It is a mandatory field, only when Cisco VIM Software Hub is enabled.
• Click <b>Offline Validation</b>
• If offline validation is successful, click <b>Reconfigure</b> to commence the process.
.</td></tr>
<tr><td><b>Syslog Export Settings</b></td><td>Following are the options for Syslog Settings:
<table>
<tr><td><b>Remote Host</b></td><td>Enter Syslog IP Address.</td></tr>
<tr><td><b>Facility</b></td><td>Defaults to local5</td></tr>
<tr><td><b>Severity</b></td><td>Defaults to debug</td></tr>
<tr><td><b>Clients</b></td><td>Defaults to ELK</td></tr>
<tr><td><b>Port</b></td><td>Defaults to 514 but is modified by the User.</td></tr>
<tr><td><b>Protocol</b></td><td>Supports only UDP</td></tr>
</table>
Click <b>Offline Validation</b> .
• When Offline Validation is successful, click <b>Reconfigure</b> to commence the process.</td></tr>
<tr><td><b>Configure ToR</b> checkbox</td><td><b>True</b> or <b>False</b>. Default is false.</td></tr>
</table>

<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>ToR Switch Information</b></td><td>Click + to add information for ToR Switch.
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><b>Name</b></td><td>ToR switch name.</td></tr>
<tr><td><b>Username</b></td><td>ToR switch username.</td></tr>
<tr><td><b>Password</b></td><td>ToR switch Password.</td></tr>
<tr><td><b>SSH IP</b></td><td>ToR switch SSH IP Address.</td></tr>
<tr><td><b>SSN Num</b></td><td>ToR switch ssn num. output of show license host-id.</td></tr>
<tr><td><b>VPC Peer Keepalive</b></td><td>Peer Management IP. You need not define if there is no peer.</td></tr>
<tr><td><b>VPC Domain</b></td><td>Need not define if there is no peer.</td></tr>
<tr><td><b>VPC Peer port</b></td><td>Interface for vpc peer ports.</td></tr>
<tr><td><b>VPC Peer VLAN Info</b></td><td>vlan ids for vpc peer ports (optional).</td></tr>
<tr><td><b>BR Management Port Info</b></td><td>Management interface of the build node.</td></tr>
<tr><td><b>BR Management PO Info</b></td><td>Port channel number for the management interface of the build node.</td></tr>
</table>
Click <b>Save</b>
• Click <b>Offline Validation</b> .
• When Offline Validation is successful, click <b>Reconfigure</b> to commence the process.</td></tr>
</table>

Note When setup data is ACI VLAN with TOR then reconfigure options are:

<table>
<tr>
<td><b>TORSwitch Information</b> mandatory table if you want to enter ToR information</td>
<td>Click + to add information for ToR Switch.
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td>Host Name</td><td>ToR switch name.</td></tr>
<tr><td><b>VPC Peer Keepalive</b></td><td>Peer Management IP.</td></tr>
<tr><td><b>VPC Domain</b></td><td>Do not define if there is no</td></tr>
<tr><td><b>Node ID</b></td><td>Integer, unique across all switches</td></tr>
</table>
Click <b>Save</b>
• Click <b>Offline Validation</b> .
• When Offline Validation is successful, click <b>Reconfigure</b> to commence the process.</td>
</tr>
<tr>
<td><b>NFVBench</b></td>
<td>Enable check box which by default is false.
Add ToR information connected to switch:
• Select a ToR Switch and enter the Switch name.
• Enter the port number. For example: eth1/5
• <b>NIC Ports</b>: INT1 and INT2 optional input, enter the two port numbers of the 4-port 10G Intel NIC at the management node used for NFVBench.
For mechanism driver VPP, there are two optional fields in NFVBENCH if network option is available:
• <b>VTEP IPs</b>: Mandatory for NFVBench with VXLAN. It must be comma separated IP pair in vxlan-tenant network, but not in the tenant pool.
• <b>VNIs</b>: Mandatory for NFVBench with VXLAN, and must be comma separated vnid_id pairs.
For mechanism driver VTS:
<b>VTEP IPs</b>: Mandatory for VTS/VXLAN only. It must be comma separated IP pair belonging to tenant network segment, but not in the tenant network pool.
• Click <b>Offline Validation</b> .
• When Offline Validation is successful, click <b>Reconfigure</b> to commence the process.
<b>Note</b> If ToR is already present in setup-data or already deployed, Tor info need not be added. By default ToR information switch name is mapped in NFV bench.</td>
</tr>
</table>

<table>
<tr>
<td><b>Swiftstack</b>
SwiftStack is only supported with Keystone v2. If you select Keystone v3, swiftstack will not be available for configuration.</td>
<td>
<table>
<tr><td><b>Cluster End Point</b></td><td>IP address of PAC (proxy-account-container) endpoint.</td></tr>
<tr><td><b>Admin User</b></td><td>Admin user for swift to authenticate in keystone.</td></tr>
<tr><td><b>Admin Tenant</b></td><td>The service tenant corresponding to the Account-Container used by Swiftstack.</td></tr>
<tr><td><b>Reseller Prefix</b></td><td>Reseller_prefix as configured for Keystone Auth,AuthToken support in Swiftstack E.g KEY_</td></tr>
<tr><td><b>Admin Password</b></td><td>swiftstack_admin_password</td></tr>
<tr><td><b>Protocol</b> drop-down list</td><td>http or https</td></tr>
</table>
<ul>
<li>Click <b>Offline Validation</b> .</li>
<li>When Offline Validation is successful, click <b>Reconfigure</b> to commence the process.</li>
</ul>
</td>
</tr>
</table>

LDAP with Keystone v3	**Domain Name** field	Enter the Domain name.
	Object Class for Users field	Enter a string as input.
	Object Class for Groups	Enter a string.
	Domain Name Tree for Users	Enter a string.
	Domain Name Tree for Groups field	Enter a string.
	Suffix for Domain Name field	Enter a string.
	URL field	Enter a URL with port number.
	Domain Name for Bind User field	Enter a string.
	Password field	Enter Password as string format.
	User Filter	Enter filter name as string.
	User ID Attribute	Enter a string.
	User Name Attribute	Enter a string.
	User Mail Attribute	Enter a string.
	Group Name Attribute	Enter a string.
	• Click **Offline Validation** . • When Offline Validation is successful, click **Reconfigure** to commence the process.	

<table>
<tr>
<td><b>NFVI Monitoring</b></td>
<td>Followings are the field values for NFVI monitoring:
<table>
<tr><td><b>Master Admin IP</b></td><td>Enter the input in IP format.</td></tr>
<tr><td><b>Master 2 Admin IP</b> field.</td><td>Enter the input in IP format.</td></tr>
<tr><td><b>Collector Management IP</b></td><td>Enter the input in IP format.</td></tr>
<tr><td><b>Collector VM1 info</b></td><td></td></tr>
<tr><td><b>Host Name</b> field</td><td>Enter Host Name as a string.</td></tr>
<tr><td><b>CCUSER</b> password field</td><td>Enter Password.</td></tr>
<tr><td><b>Password</b> field</td><td>Enter password.</td></tr>
<tr><td><b>Admin IP</b> field</td><td>Enter Input as IP format.</td></tr>
<tr><td><b>Management IP</b> field</td><td>Enter Input as IP format.</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Collector VM2 info</td><td></td></tr>
<tr><td><b>Host Name</b>field</td><td>Enter a string.</td></tr>
<tr><td><b>CCUSER</b> field</td><td>Enter Password.</td></tr>
<tr><td><b>Management IP</b> field</td><td>Enter Input as IP format.</td></tr>
<tr><td></td><td></td></tr>
<tr><td><b>Dispatcher</b></td><td></td></tr>
<tr><td><b>Rabbit MQ Username</b> Field</td><td>Enter a string.</td></tr>
<tr><td><b>NFVIMON_ADMIN</b></td><td>Enter a single string. Can have only one and is optional.</td></tr>
</table>
<ul>
<li>Click <b>Offline Validation</b> .</li>
<li>When Offline Validation is successful, click <b>Reconfigure</b> to commence the process.</li>
</ul>
</td>
</tr>
<tr>
<td><b>VTS Parameter</b></td>
<td>Following are the fields to reconfigure for VTS parameters
<table>
<tr><td><b>VTC SSH Username</b> field.</td><td>Enter the string.</td></tr>
<tr><td><b>VTC SSH Username</b> field.</td><td>Enter the password.</td></tr>
</table>
<ul>
<li>Click <b>Offline Validation</b> .</li>
<li>When Offline Validation is successful, click <b>Reconfigure</b> to commence the process.</li>
</ul>
</td>
</tr>
</table>

<table>
<tr>
<td>**VMTP**</td>
<td>
Check one of the check boxes to specify a VMTP network:

- Provider Network
- External Network

For the Provider Network complete the following:

<table>
<tr><td>**Network Name** field.</td><td>Enter the name for the external network.</td></tr>
<tr><td>**IP Start** field.</td><td>Enter the starting floating IPv4 address.</td></tr>
<tr><td>**IP End** field.</td><td>Enter the ending floating IPv4 address.</td></tr>
<tr><td>**Gateway field**</td><td>Enter the IPv4 address for the Gateway.</td></tr>
<tr><td>**DNS Server** field.</td><td>Enter the DNS server IPv4 address.</td></tr>
<tr><td>**Segmentation ID** field.</td><td>Enter the segmentation ID.</td></tr>
<tr><td>**Subnet**</td><td>Enter the Subnet for Provider Network.</td></tr>
<tr><td></td><td></td></tr>
</table>

For **External Network** fill in the following details:

<table>
<tr><td>**Network Name** field.</td><td>Enter the name for the external network.</td></tr>
<tr><td>**Network IP Start** field.</td><td>Enter the starting floating IPv4 address.</td></tr>
<tr><td>**Network IP End** field.</td><td>Enter the ending floating IPv4 address.</td></tr>
<tr><td>**Network Gateway field**</td><td>Enter the IPv4 address for the Gateway.</td></tr>
<tr><td>**DNS Server** field.</td><td>Enter the DNS server IPv4 address.</td></tr>
<tr><td>**Subnet**</td><td>Enter the Subnet for External Network.</td></tr>
</table>

- Click **Offline Validation** .
- When Offline Validation is successful, click **Reconfigure** to commence the process.
</td>
</tr>
</table>

Networking In Reconfigure optional services networking, you can reconfigure IP tables, or add http_proxy/https_proxy.	

To reconfigure networking, update the relevant information:

IP Tables	Click **Add(+)** to add a table. Enter input as subnet format. E.g. 12.1.0.1/2
http_proxy_server	Enter HTTP_PROXY_SERVER E.g. <a.b.c.d:port>
https_proxy_server	Enter HTTP_PROXY_SERVER E.g. <a.b.c.d:port>
NTP Server	Click Add (+) to add server • You can delete or edit the entered value • You cannot delete all the data (minimum 1 server should be present) • Maximum of four NTP servers can be present.
Domain Name Server	Click Add (+) to add server • You can delete or edit the entered value. • You cannot delete all the data (minimum 1 server must be present) • Maximum of three DNS servers can be present.
Head-end replication	Add VTEP IP address and comma separated VNI IDs. Multiple entries are allowed. You can change VTEP IP for individual compute/control servers. **Note** Whenever HER is removed from both vxlan-tenant and vxlan-tenant, all the vtep ips associated with

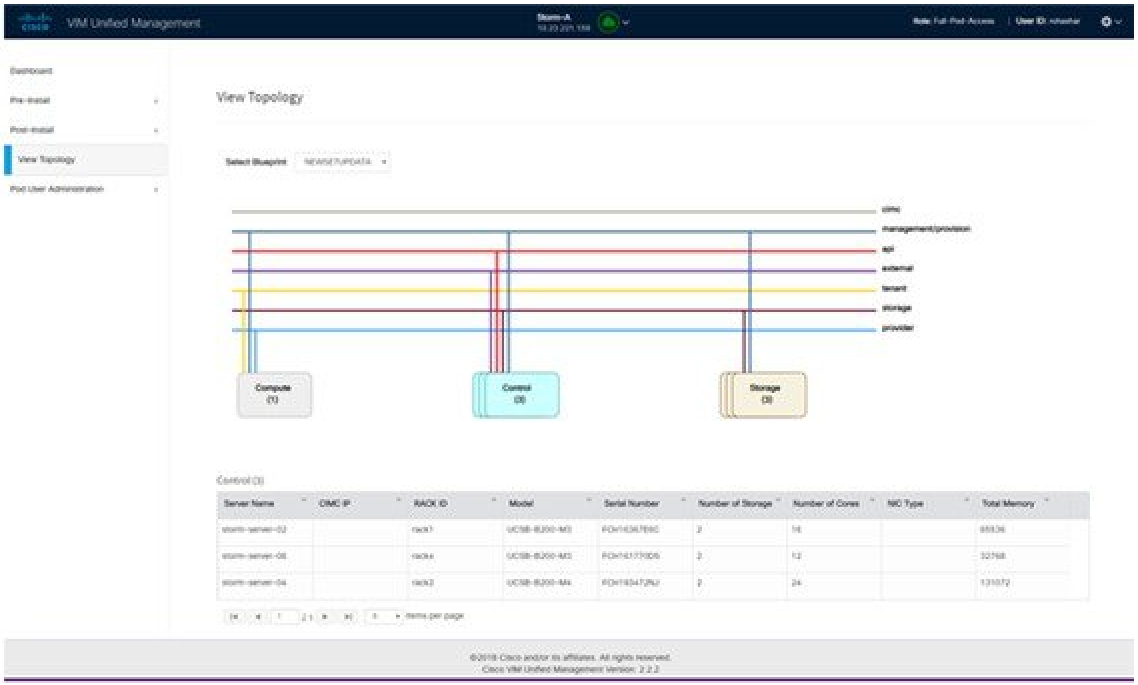
<table>
<tr>
<td></td>
<td>
<table>
<tr><td></td><td>the computes are removed.</td></tr>
<tr><td>Layer 3 BGP Adjacency</td><td>Applicable to control servers only when VXLAN is enabled in NETWORK OPTIONS.IPs are picked up from management subnet, but not from IP pool. You can change the existing IP values if required.</td></tr>
</table>
<ul>
<li>Click <b>Save</b>.</li>
<li>Click <b>Offline Validation</b>.</li>
<li>When Offline Validation is successful, click <b>Reconfigure</b> to commence the process.</li>
</ul>
</td>
</tr>
<tr>
<td><b>APICINFO</b>
<b>Note</b> Reconfigure optional services only APIC hosts can be reconfigure.</td>
<td>To reconfigure APICINFO, follow the process:
<ul>
<li>Enter input for APIC hosts format. <ip1|host1>:[port] or eg.12.1.0.12</li>
<li>Click <b>Save</b>.</li>
<li>Click <b>Offline Validation</b>.</li>
<li>When Offline Validation is successful, click <b>Reconfigure</b> to commence the process.</li>
</ul>
<b>Note</b> APIC hosts can be reconfigure minimum 1 host and max 3 but not 2 hosts.</td>
</tr>
<tr>
<td><b>Vim_admins</b></td>
<td>To reconfigure vim_admins, follow the process:
<ul>
<li>To add a new root user, Click + and add the Username and admin hash password (Starting with $6). At least, one Vim Admin must be configured, when Permit root login is false.</li>
<li>To remove the existing user, Click <b>-</b>.</li>
<li>When Offline Validation is successful, click <b>Reconfigure</b> to commence the process.</li>
</ul>
</td>
</tr>
</table>

Cobbler	To reconfigure Cobbler, follow the process: • Generate the admin password hash by executing the below command: `python -c 'import crypt; print crypt.crypt ("<plaintext_strong_password>")' on the management node.` • Validate that the admin_password_hash starts with '$6' • Enter Admin Password Hash. • Click **Offline Validation**. • When Offline Validation is successful, click **Reconfigure** to commence the process.
ES Remote Backup	To reconfigure Elastic Search Remote Backup: **Service** field displays NFS by default, if the remote NFS server is used. • Enter the **Remote Host**, which is IP of the NFS server. • Enter the **Remote Path.** . It is the path of the backup location in the remote server. • Click **Offline Validation**. • If Offline Validation is successful, click **Reconfigure** to commence the process.
CVIM-MON	To reconfigure CVIM-MON, enter the following details: • Enter the **Low Frequency**, such that it is higher than medium frequency. Minimum value is 1 minute. By default, it is set to 1 minute. • Enter the **Medium Frequency**such that it is more than high frequency. Minimum value is 30 seconds. By default, it is set to 30 seconds. • Enter the **High Frequency** such that the minimum value is 10 seconds. By default, it is set to 10 seconds. • Click **Offline Validation**. • If Offline Validation is successful, click **Reconfigure** to commence the process. • Set **ui_access** to True in deployed Blueprint, to enable the Cisco VIM monitor link. This property is reconfigurable. If set to False, the link is disabled.

NETAPP_SUPPORT	To reconfigure NETAPP_SUPPORT, enter the following details: • Select the **Server Port**. It is the port of NetApp management or API server. Select 80 for HTTP and 443 for HTTPS. • Select the **Transport Type** of the NetApp management or API server. It can be HTTP or HTTPS. • Select the **NetApp Cert Path**. It is the root ca path for NetApp cluster, only if protocol is HTTPS. • Click **Offline Validation**. • If Offline Validation is successful, click **Reconfigure** to commence the process.

View Topology

You can view the graphical representation of the control, compute, and storage node that is associated with the various network segments.



Control (3)

Server Name	CIMC IP	RACK ID	Model	Serial Number	Number of Storage	Number of Cores	NIC Type	Total Memory
storm-server-02		rack1	UCSB-B200-M3	FCH1636T89C	2	16		65536
storm-server-06		rack4	UCSB-B200-M3	FCH1617T0D6	2	12		32768
storm-server-04		rack2	UCSB-B200-M4	FCH1934T2NJ	2	24		131072

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Cisco VIM Unified Management Version: 2.2.2

You can click Control, Compute, or Storage from the topology, to view the details of respective node.

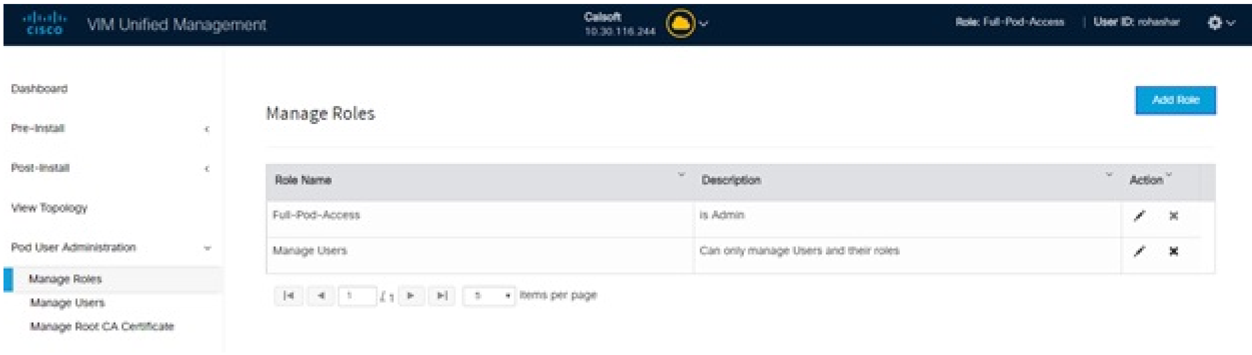
Pod User Administration

Cisco VIM UM offers Users (Pod Admins or Pod Users) to manage Users and roles that are associated with them.

Managing Roles

User can create multiple Roles and assign them to other pod users. System has a default role that is named as Full-Pod-Access which is assigned to the person who registers the Pod.

Manage Roles



Manage Roles

Role Name	Description	Action
Full-Pod-Access	is Admin	
Manage Users	Can only manage Users and their roles	

Step 1 Click **Login as POD User.**

Step 2 Navigate to **Pod User Administration** and click **Manage Roles**. By default you see full-pod-access role in the table.

Step 3 Click **Add New Role** to create a new role.

Step 4 Complete the following fields in the **Add Roles** page in Cisco VIM UM:

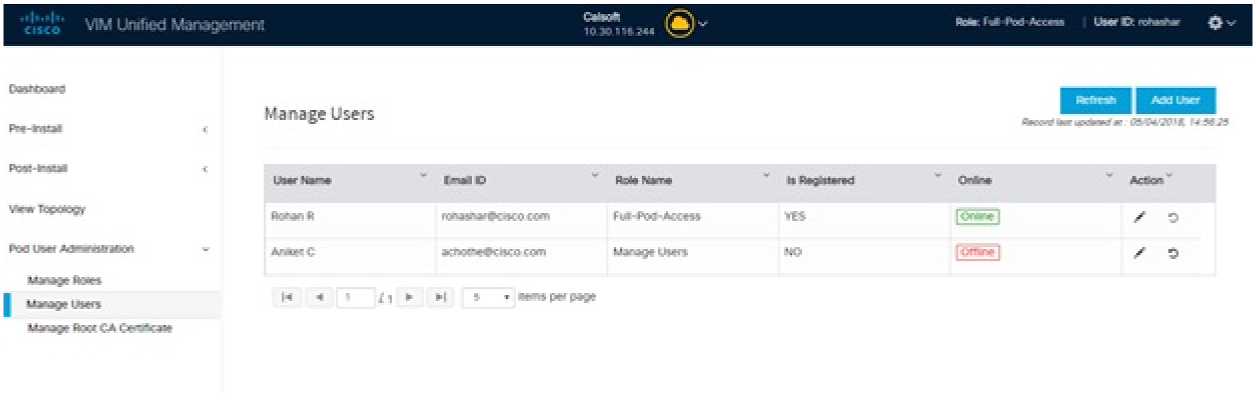
Field Name	Field Description
Role	Enter the name of the role.
Description	Enter the description of the role.
Permission	Check the **Permission** check box to select the permission.
Click **Save**.	Once the Blueprint is in Active state all the permissions are same for C-series and B-series Pods other than Reconfigure CIMC Password which is missing for B-series Pod.

Note Permissions are divided in the granular level where viewing Dashboard is the default role that is implicitly added while creating a role.

Note Permissions are divided in the granular level where viewing **Dashboard** is the default role that is implicitly added while creating a role.

Managing Users

This section allows you to add the users. It shows all the users associated with the Pod. You can check the online status of all the user. Click**Refresh** on upper right corner to check the status.



Manage Users

Record last updated at : 05/04/2018, 14:56:25

User Name	Email ID	Role Name	Is Registered	Online	Action
Rohan R	rohashar@cisco.com	Full-Pod-Access	YES	Online	
Aniket C	achothe@cisco.com	Manage Users	NO	Offline	

To add a new user:

Step 1 Click **Login as POD User**.

Step 2 Navigate to **POD User Administration** and click **Manage Users** .

Step 3 Click **Add Users** to add a new user.

Step 4 Complete the following fields in the **Add Users** pane of the Cisco VIM Unified Management:

Field Name	Field Description
User auth	Select the User auth for the new user. This option is enabled only if LDAP mode is True.
Select User	• While adding new pod-user, a drop-down appears in the user-registration form containing all users with pod-user permissions. • Only available when DISPLAY_ALL_POD_USERS is set to True.
Registration Type	Registration type can be User/Group only when User Auth is LDAP. Following fields are available when the Registration Type is 'Group': • Group Dn – Enter the distinguished name of the LDAP group. • Group Name – Enter the name of the LDAP group
Email ID	Enter the Email ID of the user or the LDAP user id if LDAP user attribute is set to uid.
User Name	Enter the User Name if the User is new. If the User is already registered to the Unified Management the User-Name gets auto-populated.
Role	Select the Role from the drop-down list.

Step 5 Click **Save** Once the Blueprint is in Active state all the permissions are same for C-series and B-series Pods other than Reconfigure CIMC Password which is missing for B-series Pod.

Revoke Users

User with Full-Pod-Access or Manage Users permission can revoke other users from the specific Pod.

To revoke users:

Step 1 Click **Undo** icon. A confirmation pop up will appear.

Step 2 Click **Proceed** to continue.

Note Self revoke is not permitted. After revoking the another user, if the user is not associated with any other pod then the revoked user will be auto deleted from the system.

Edit Users

User with Full-Pod-Access or Manage Users permission can edit other user's permission for that specific Pod.

To edit user's permission

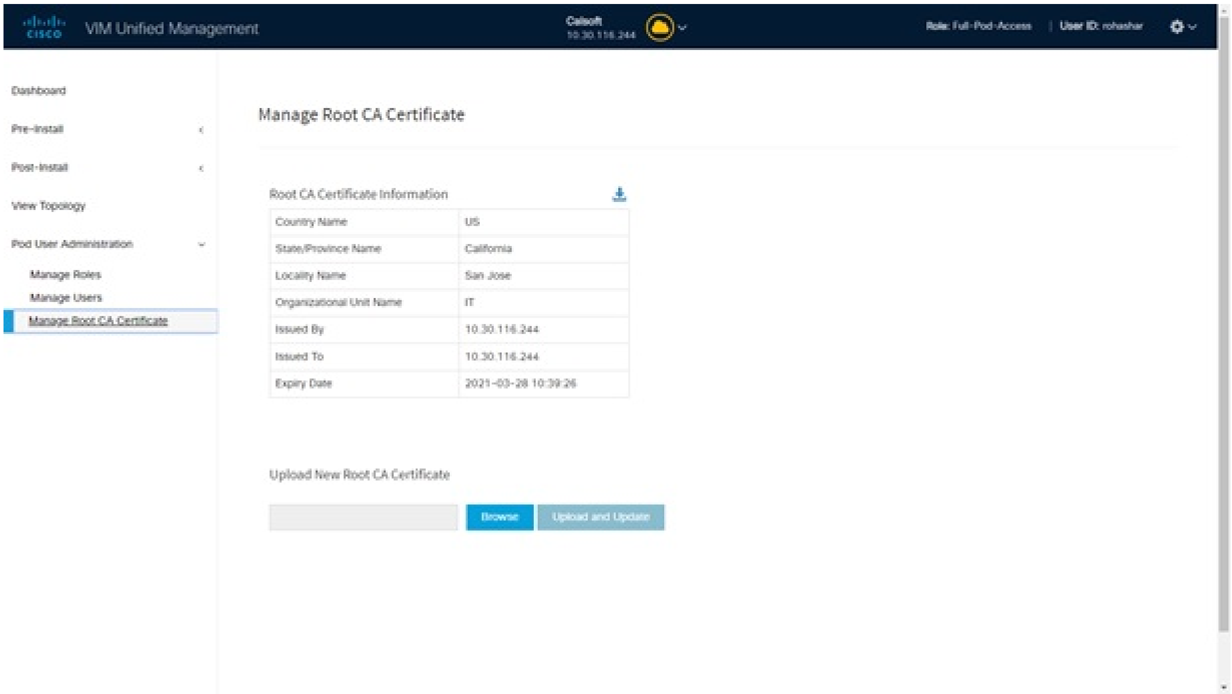
Step 1 Click **Edit** icon.

Step 2 Update the permission.

Step 3 Click **Save**. The Grid will get refreshed automatically.

Managing Root CA Certificate

You can update the CA Certificate during the registration of the POD. Once, logged in as POD User and if you have the permission to update the certificate you can view under POD User Administration>> Manage Root CA Certificate.



Manage Root CA Certificate

Root CA Certificate Information

Country Name	US
State/Province Name	California
Locality Name	San Jose
Organizational Unit Name	IT
Issued By	10.30.116.244
Issued To	10.30.116.244
Expiry Date	2021-03-28 10:39:26

Upload New Root CA Certificate

To update the Certificate:

Step 1 Click **Login as POD User**

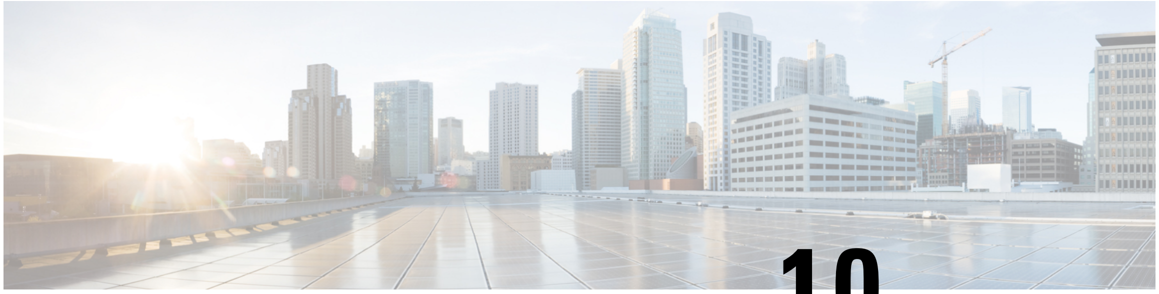
Step 2 Navigate to **POD User Administration>>Manage Root CA certificate**.

Step 3 Click **Browse** and select the certificate that you want to upload.

Step 4 Click **Upload.**

- If the certificate is Invalid, and does not matches with the certificate on the management node located at (var/www/mercury/mercury-ca.crt) then Unified Management reverts the certificate which was working previously.
- If the Certificate is valid, Unified Management runs a management node health check and then update the certificate with the latest one.

Note The CA Certificate which is uploaded should be same as the one which is in the management node.



CHAPTER 10

Day 2 Operations of Cisco VIM Unified Management

The following topic guides you the details about the Day 2 Operations of Cisco VIM Unified Management.

Shutting Down Cisco VIM Unified Management

To stop the Cisco VIM Unified Management Container services, shut down Cisco UCS VIM Unified Management by running the **systemctl stop `service`** command.

Step 1 Log in to a server in which the Unified Management container is running.

Step 2 Stop the Unified Management service by running the following command from the Shell window:

```
systemctl stop docker-insight
```

a) Check the status of Unified Management Container by running the following command: **docker ps -a | grep** insight.

```
STATUS
Up 6 seconds
```

b) Check the status of the service by running the following command:

```
systemctl staus docker-insight
```

The following information is displayed

```
Docker-insight.service – Insight Docker Service
Loaded: loaded (/usr/lib/systemd/system/docker-insight.service; enabled; vendor preset: disabled)
Active: inactive (dead) since <Date and Time since it was last active>
```

Restarting Cisco VIM Unified Management

Step 1 Log In to the server in which the Unified Management container was stopped.

Step 2 Restart the Unified Management service by running the following command from the shell window:

```
systemctl restart docker-insight
```

a) Check the status of Unified Management container by running the following command: **docker ps -a | grep** insight.

```
STATUS
Up 6 seconds
```

b) Check the status of the service by running the following command:

```
systemctl status docker-insight
```

The following output is displayed:

```
Docker-insight.service – Insight Docker Service
Loaded: loaded (/usr/lib/systemd/system/docker-insight.service; enabled; vendor preset: disabled)
Active: active (running) since <Date and Time when it got active.>
```

Restoring VIM Unified Management

Cisco VIM Unified Management can be restored to its previous running state which existed at the time of backup.

Note It is not recommended to run the Unified Management on the node on which restore operation is performed.

Step 1 Re-image the Unified Management management node with the ISO version with which you want to restore the node, and with the same IP address that is used before the failure of the node.

Note Skip Step 1 if re-image is done with the ISO during management node restore. Unified Management restore can also be performed without re-image with ISO. Uninstall the Unified Management through bootstrap_insight.py and then restoring it by following below mentioned steps but this needs to be only done when you face issues with Unified Management and not in case of management node failure.

Step 2 Navigate to `/var/cisco/insight_backup/` directory at the remote server where the backup directory was copied during the backup operation.

Step 3 Copy the backup file to the `/var/cisco/insight_backup/` directory of the re-imaged management node. For example, to copy the backup directory from the remote host 20.0.0.5 to the management node /var/cisco/insight_backup/directory, execute the following command sequence: `rsync -e ssh -go -rtvpX --numeric-ids root@20.0.0.5:/var/cisco/insight_backup/backup_2017-01-09_14-04-38 /var/cisco/insight_backup`.

Step 4 In `/var/cisco/insight_backup/backup_<date-time>` directory, execute the following command:

```
# ./insight_restore –h

insight_restore  : Cisco VIM Insight Restore Script
----------------------------------------------------

 Usage: ./insight_restore


 -v          : Enable verbose mode

 -h          : To display this help message


    # ./insight_restore
    This will initiate an Insight install with the backed up data.

VIM Insight restore logs are at: /var/log/insight/<bootstrap_insight_<date>_<time>.log

Management Node Validations!
+-------------------------------+--------+-------+
| Rule        | Status | Error |
+-------------------------------+--------+-------+
| Check Kernel Version    |  PASS | None |
| Check Docker Version    |  PASS | None |
| Check Management Node Tag     |  PASS | None |
| Check Bond Intf. Settings     |  PASS | None |
| Root Password Check           |  PASS | None |
| Check Boot Partition Settings |  PASS | None |
| Check LV Swap Settings        |  PASS | None |
| Check Docker Pool Settings    |  PASS | None |
| Check Home Dir Partition      |  PASS | None |
| Check Root Dir Partition      |  PASS | None |
| Check /var Partition          |  PASS | None |
| Check LVM partition           |  PASS | None |
| Check RHEL Pkgs Install State |  PASS | None |
+-------------------------------+--------+-------+

Insight standalone Input Validations!
+-------------------------------------------+--------+-------+
| Rule        | Status| Error |
+-------------------------------------------+--------+-------+
| Insight standalone schema validation      |  PASS | None |
| Valid key check in Insight Setup Data     |  PASS | None |
| Duplicate key check In Insight Setup Data |  PASS | None |
| CVIM/Insight workspace conflict check     |  PASS | None |
| Check registry connectivity               |  PASS | None |
| Check Email server for Insight            |  PASS | None |
+-------------------------------------------+--------+-------+

Setting up Insight, Kindly wait!!!
Cisco VIM Insight Installed successfully!
+-----------------------+------------+-----------------------------------------------------+
| Description     | Status     | Details |
+-----------------------+--------+-----------------------------------------------------+
| VIM Insight UI URL    | PASS | https://<br_api:9000> |
| VIM UI Admin Email ID | PASS | Check for info @: <abs path of insight_setup_data.yaml> |
| | |                          |
| VIM UI Admin Password | PASS | Check for info @ /opt/cisco/insight/secrets.yaml |
| VIM Insight Workspace | PASS | /root/<insight_ws>                                      |
+-------------------+-------+---------------------------------------------------------+

Cisco VIM Insight Autobackup Service Info!
+------------------------+--------+------------------------------------------------+
| Description            | Status | Details                                        |
+------------------------+--------+------------------------------------------------+
| VIM Insight Autobackup | PASS   | [ACTIVE]: Running 'insight-autobackup.service' |
+------------------------+--------+------------------------------------------------+

VIM Insight restore successfully completed!

Done with VIM Insight restore!
VIM Insight restore logs are at: /var/log/insight/bootstrap_insight/

As the summary table describes, your VIM Insight workspace is restored and hence you need to use
bootstrap_insight.py from the mentioned workspace for performing any actions from here on.
```

Step 5 Run the following command, to verify Unified Management status after the restore operation.

```
# cd /root/<insight_ws>
# ./bootstrap_insight.py –a install-status
                        Cisco VIM Insight Install Status!
+-----------------------+------------+--------------------------------------------------+
| Description           | Status     | Details                                          |
+-----------------------+--------+------------------------------------------------------+
| VIM Insight Setup     | PASS | Success                                          |
| VIM Insight Version   | PASS | <release_tag>                                    |
| VIM Insight UI URL    | PASS | https://<br_api:9000>                            |
| VIM Insight Container | PASS | insight_<tag_id>                                 |
| VIM Mariadb Container | PASS | mariadb_<tag_id>                                 |
| VIM Insight Autobackup| PASS       | [ACTIVE]: Running 'insight-autobackup.service'|
| VIM Insight Workspace | PASS | /root/installer-<tag_id>/insight                 |
+-----------------------+--------+------------------------------------------------------+
```

Reconfiguring VIM Unified Management

UM reconfigure action provides you with three major functionalities:

1. Reconfigure Unified Management TLS Certificate.
2. Switch from Self Signed TLS Certificate to third-party TLS Certificate.
3. Reconfigure Unified Management MySQL Database Password.

Note Unified Managment reconfiguration is not allowed after an update as the update is an intermediate stage between rollback and commit.

Reconfiguring Unified Management TLS Certificate

As the Unified Management web-service is protected by TLS, hence reconfigure action provides flexibility to change the existing TLS Certificate. As there were two approaches to configure it, there are also two approaches to change it.

Reconfiguring Third-party TLS Certificate

If you had provided your own TLS Certificate before Insight Installation through PEM_PATH key in insight_setup_data.yaml, then perform the following steps to reconfigure it.

Step 1 Enter the command:`# cd <path insight_setup_data.yaml>`

Step 2 Open the insight_setup_data.yaml file using the command `# vi insight_setup_data.yaml`

Step 3 Edit the insight_setup_data.yaml to change the value of PEM_PATH and/or SSL_CERT_CHAIN_FILE key to point to the path of your new valid TLS/Cert Chain File Certificate. Then, save the file.

For example:

```
 PEM_PATH: "/root/new_tls.pem"
 SSL_CERT_CHAIN_FILE: “/root/new_ssl.crt”
```

Step 4 Enter the following commands:

```
# cd <insight_ws>

          # ./bootstrap_insight.py –a reconfigure –f <path_to insight_setup_data.yaml>

    VIM Insight reconfigure logs are at: /var/log/insight/<bootstrap_insight_<date>_<time>.log

           Perform the action. Continue (Y/N)y

Management node validation!
+-------------------------------+--------+-------+
| Rule | Status | Error |
+-------------------------------+--------+-------+
| Check Kernel Version |  PASS | None |
| Check Docker Version |  PASS | None |
| Check Management Node Tag |  PASS | None |
| Check Bond Intf. Settings |  PASS | None |
| Root Password Check |  PASS | None |
| Check Boot Partition Settings |  PASS | None |
| Check LV Swap Settings |  PASS | None |
| Check Docker Pool Settings |  PASS | None |
| Check Home Dir Partition |  PASS | None |
| Check Root Dir Partition |  PASS | None |
| Check /var Partition |  PASS | None |
| Check LVM partition |  PASS | None |
| Check RHEL Pkgs Install State |  PASS | None |
+-------------------------------+--------+-------+


Insight standalone input validation!
+-------------------------------------------+--------+-------+
| Rule                                      | Status | Error |
+-------------------------------------------+--------+-------+
| Insight standalone schema validation      |  PASS  | None  |
| Valid key check in Insight setup data     |  PASS  | None  |
| Duplicate key check In Insight setup data |  PASS  | None  |
| CVIM/Insight workspace conflict check     |  PASS  | None  |
| Check registry connectivity               |  PASS  | None  |
| Check Email server for Insight            |  PASS  | None  |
+-------------------------------------------+--------+-------+

WARNING!! reconfigure will have few secs of Outage for Insight!

Cisco VIM Insight Already Exists!
+-----------------------+--------+----------------------------------------------------------+
| Description           | Status | Details                                                  |
+-----------------------+--------+----------------------------------------------------------+
| VIM Insight UI URL    | PASS   | https://<br_api:9000>                                    |
| VIM UI Admin Email ID | PASS   | Check for info @: <abs path of insight_setup_data.yaml> |
|                       |        |                                  |
| VIM UI Admin Password | PASS   | Check for info @ /opt/cisco/insight/secrets.yaml         |
| VIM Insight Workspace | PASS   | /root/<insight_ws>                                          |
         +-----------------------+--------+--------------------------------------------------------+


Cisco VIM Insight backup Info!
+-----------------------+--------+---------------------------------------------------------------+
| Description           | Status | Details                                                       |
+-----------------------+--------+---------------------------------------------------------------+
| Insight backup Status | PASS   | Backup done @                                                 |
|                       |        | /var/cisco/insight_backup/backup-<release_tag>-<date_time>    |
+-----------------------+--------+---------------------------------------------------------------+

Done with VIM Insight reconfigure!
VIM Insight reconfigure logs are at: "/var/log/insight/bootstrap_insight/"

As the summary table describes Insight gets autobacked up after reconfigure at /var/cisco/insight_backup
 to preserve the latest state of Insight.
```

Reconfiguring Self Signed TLS Certificate

If you had created a new TLS Certificate through tls_insight_cert_gen.py before Unified Management Installation, follow the steps to reconfigure it.

Step 1 Run the following commands to reconfigure the self signed TLS certificate:

```
# cd <insight_ws>
# ./tls_insight_cert_gen.py -h
usage: tls_insight_cert_gen.py [-h] [--overwrite] --file INSIGHTSETUPDATA
TLS cert generator Insight

optional arguments:
  -h, --help          show this help message and exit
--overwrite, -o      Overwrite Insight certificates if already present in   openstack config directory
--file INSIGHTSETUPDATA, -f INSIGHTSETUPDATA
 Location of insight_setup_data.yaml
     # ./tls_insight_cert_gen.py -f <path insight_setup_data.yaml> --overwrite
  This will overwrite the existing TLS certificate.

Management node validation
+---------------------------------+-------+-------+
| Rule                            |Status | Error |
+---------------------------------+-------+-------+
| Check Kernel Version           |  PASS  | None |
| Check Ansible Version          |  PASS  | None |
| Check Docker Version           |  PASS  | None |
| Check Management Node Tag      |  PASS  | None |
| Check Bond Intf. Settings      |  PASS  | None |
| Root Password Check            |  PASS  | None |
| Check Boot Partition Settings  |  PASS  | None |
| Check LV Swap Settings         |  PASS  | None |
| Check Docker Pool Settings     |  PASS  | None |
| Check Home Dir Partition       |  PASS  | None |
| Check Root Dir Partition       |  PASS  | None |
| Check /var Partition           |  PASS  | None |
| Check LVM partition            |  PASS  | None |
| Check RHEL Pkgs Install State  |  PASS  | None |
+--------------------------------+--------+-------+

Insight standalone input validation
+-------------------------------------------+--------+-------+
| Rule                                      | Status | Error |
+-------------------------------------------+--------+-------+
| Insight standalone schema validation      | PASS   | None  |
| Valid key check in Insight setup data     | PASS   | None  |
| Duplicate key check In Insight setup data | PASS   | None  |
| CVIM/Insight workspace conflict check     | PASS   | None  |
| Check registry connectivity               | PASS   | None  |
| Check Email server for Insight            | PASS   | None  |
+-------------------------------------------+--------+-------+

Generating a 4096 bit RSA private key
.....................................................................................++
.......++
writing new private key to '../openstack-configs/insight.key'
```

Step 2 Use the following command, to run the bootstrap:

```
# ./bootstrap_insight.py –a reconfigure –f <path_to insight_setup_data.yaml>
VIM Insight reconfigure logs are at: /var/log/insight/<bootstrap_insight_<date>_<time>.log

Perform the action. Continue (Y/N)y

Management node validations
+--------------------------------+--------+-------+
| Rule                           | Status | Error |
+--------------------------------+--------+-------+
| Check Kernel Version           |  PASS | None |
| Check Ansible Version          |  PASS | None |
| Check Docker Version           |  PASS | None |
| Check Management Node Tag      |  PASS | None |
| Check Bond Intf. Settings      |  PASS | None |
| Root Password Check            |  PASS | None |
| Check Boot Partition Settings  |  PASS | None |
| Check LV Swap Settings         |  PASS | None |
| Check Docker Pool Settings     |  PASS | None |
| Check Home Dir Partition       |  PASS | None |
| Check Root Dir Partition       |  PASS | None |
| Check /var Partition           |  PASS | None |
| Check LVM partition            |  PASS | None |
| Check RHEL Pkgs Install state  |  PASS | None |
+--------------------------------+--------+-------+

Insight standalone input validation
+-------------------------------------------+--------+-------+
| Rule                                      | Status | Error |
+-------------------------------------------+--------+-------+
| Insight standalone schema validation      |  PASS   | None  |
| Valid key check in Insight setup data     |  PASS   | None  |
| Duplicate key check In Insight setup data |  PASS   | None  |
| CVIM/Insight workspace conflict check     |  PASS   | None  |
| Check registry connectivity               |  PASS   | None  |
| Check Email server for Insight            |  PASS   | None  |
+-------------------------------------------+--------+-------+

WARNING!! Reconfiguration will have few secs of outage for Insight
Cisco VIM Insight Already Exists!
+-----------------------+--------+---------------------------------------------------+
| Description           | Status | Details                                           |
+-----------------------+--------+---------------------------------------------------+
| VIM Insight UI URL    | PASS   | https://<br_api:9000>                             |
| VIM UI Admin Email ID | PASS   | Check for info @: <abs path of insight_setup_data.yaml> |
|                       |        |                           |
| VIM UI Admin Password | PASS   | Check for info @ /opt/cisco/insight/secrets.yaml        |
| VIM Insight Workspace | PASS   | /root/<insight_ws>                                      |
+-----------------------+--------+---------------------------------------------------+


Cisco VIM Insight backup Info!
+----------------------+-------+-------------------------------------------------------------------+
| Description          | Status| Details
|
+----------------------+-------+-------------------------------------------------------------------+
| Insight backup Status| PASS  | Backup done @
|
|                      |       | /var/cisco/insight_backup/insight_backup_<release_tag>_<date_time>|
+----------------------+-------+-------------------------------------------------------------------+

Done with VIM Insight reconfigure!
VIM Insight reconfigure logs are at: "/var/log/insight/bootstrap_insight/"

Insight gets autobacked up after reconfiguration at /var/cisco/insight_backup, to preserve the latest
 state of Insight.
```

Switch from Self Signed TLS Certificate to Third-party TLS Certificate

If you had created a new TLS certificate through tls_insight_cert_gen.py before Insight Installation and want to switch to your own TLS Certificate, then perform the following steps.

Note You cannot switch from thrid-party TLS certificate to Self-signed TLS certificate.

Step 1 To switch from self-signed TLS certificate to third-party TLS certificate, open the insight_setup_data.yaml using the following command:

```
# cd <path insight_setup_data.yaml>
# vi insight_setup_data.yaml
```

Step 2 Edit the insight_setup_data.yaml to add PEM_PATH and SSL_CERT_CHAIN_FILE key to point to path of your new valid TLS and SSL_CERT_CHAIN certificate. Save the file after editing.

For example:

```
PEM_PATH: “/root/new_tls.pem”
SSL_CERT_CHAIN_FILE: “/root/new_ssl.crt”
```

Step 3 Following is the command to run the bootstrap:

```
# cd <insight_ws>
 # ./bootstrap_insight.py –a reconfigure –f <path_to insight_setup_data.yaml>

VIM Insight reconfigure logs are at: /var/log/insight/<bootstrap_insight_<date>_<time>.log
Perform the action. Continue (Y/N)y

Management node validation
+-------------------------------+--------+-------+
| Rule                          | Status | Error |
+-------------------------------+--------+-------+
| Check Kernel Version          |  PASS  | None |
| Check Ansible Version         |  PASS  | None |
| Check Docker Version          |  PASS  | None |
| Check Management Node Tag     |  PASS  | None |
| Check Bond Intf. Settings     |  PASS  | None |
| Root Password Check           |  PASS  | None |
| Check Boot Partition Settings |  PASS  | None |
| Check LV Swap Settings        |  PASS  | None |
| Check Docker Pool Settings    |  PASS  | None |
| Check Home Dir Partition      |  PASS  | None |
| Check Root Dir Partition      |  PASS  | None |
| Check /var Partition          |  PASS  | None |
| Check LVM partition           |  PASS  | None |
| Check RHEL Pkgs Install State |  PASS  | None |
+-------------------------------+--------+-------

Insight standalone input validation
+-------------------------------------------+--------+-------+
| Rule                                      | Status | Error |
+-------------------------------------------+--------+-------+
| Insight standalone schema validation      | PASS   | None  |
| Valid key check in Insight setup data     | PASS   | None  |
| Duplicate key check In Insight setup data | PASS   | None  |
| CVIM/Insight workspace conflict check     | PASS   | None  |
| Check registry connectivity               | PASS   | None  |
| Check Email server for Insight            | PASS   | None  |
+-------------------------------------------+--------+-------+

WARNING!! Reconfiguration will have few secs of outage for Insight!

Cisco VIM Insight Already Exists!
+-----------------------+--------+---------------------------------------------------------+
| Description           | Status | Details                                                 |
+-----------------------+--------+---------------------------------------------------------+
| VIM Insight UI URL    | PASS   | https://<br_api:9000>                                   |
| VIM UI Admin Email ID | PASS   | Check for info @: <abs path of insight_setup_data.yaml> |
|                       |        |                                  |
| VIM UI Admin Password | PASS   | Check for info @ /opt/cisco/insight/secrets.yaml        |
| VIM Insight Workspace | PASS   | /root/<insight_ws>                                          |
         +-----------------------+--------+---------------------------------------------------------+

Cisco VIM Insight backup Info!
```

```
+----------------------+-------+-------------------------------------------------------------------+
| Description          | Status| Details
|
+----------------------+-------+-------------------------------------------------------------------+
| Insight backup Status| PASS  | Backup done @
|
|                      |       | /var/cisco/insight_backup/insight_backup_<release_tag>_<date_time>|
+----------------------+-------+-------------------------------------------------------------------+

Done with VIM Insight reconfigure!
VIM Insight reconfigure logs are at: "/var/log/insight/bootstrap_insight/"

Insight gets autobacked up after reconfiguration at /var/cisco/insight_backup to preserve the latest
 state of Insight.
```

Reconfiguring Unified Management MySQL Database Password

There are two approaches to reconfigure the MySQL DB password:

1. System generated Unified Management DB password.
2. User supplied Unified Management DB password.

System-generated Unified Management DB Password

Following are the steps to generate MySQL Unified Management DB password:

Step 1 To generate the Unified Management DB Password run the following command:

```
# cd <insight_ws>
 # ./bootstrap_insight.py –a reconfigure –f <path_to insight_setup_data.yaml> --regenerate_secrets

VIM Insight reconfigure logs are at: /var/log/insight/<bootstrap_insight_<date>_<time>.log
Perform the action. Continue (Y/N)y
Management node validation
+-------------------------------+--------+-------+
| Rule                          | Status | Error |
+-------------------------------+--------+-------+
| Check Kernel Version          |  PASS  | None  |
| Check Docker Version          |  PASS  | None  |
| Check Management Node Tag     |  PASS  | None  |
| Check Bond Intf. Settings     |  PASS  | None  |
| Root Password Check           |  PASS  | None  |
| Check Boot Partition Settings |  PASS  | None  |
| Check LV Swap Settings        |  PASS  | None  |
| Check Docker Pool Settings    |  PASS  | None  |
| Check Home Dir Partition      |  PASS  | None  |
| Check Root Dir Partition      |  PASS  | None  |
| Check /var Partition          |  PASS  | None  |
| Check LVM partition           |  PASS  | None  |
| Check RHEL Pkgs Install State |  PASS  | None  |
+-------------------------------+--------+-------+

Insight standalone input validation
+-------------------------------------------+--------+-------+
| Rule                                      | Status | Error |
+------------------------------------------+--------+-------+
| Insight standalone schema validation      | PASS   | None  |
| Valid key check in Insight setup data     | PASS   | None  |
| Duplicate key check In Insight setup data | PASS   | None  |
| CVIM/Insight workspace conflict check     | PASS   | None  |
| Check registry connectivity               | PASS   | None  |
| Check Email server for Insight            | PASS   | None  |
+------------------------------------------+--------+-------+

WARNING!! reconfiguration will have few secs of Outage for Insight!

Cisco VIM Insight Already Exists!
+-----------------------+--------+---------------------------------------------------------+
| Description           | Status | Details                                                 |
+-----------------------+--------+---------------------------------------------------------+
| VIM Insight UI URL    | PASS   | https://<br_api:9000>                                   |
| VIM UI Admin Email ID | PASS   | Check for info @: <abs path of insight_setup_data.yaml> |
|                       |        |                                  |
| VIM UI Admin Password | PASS   | Check for info @ /opt/cisco/insight/secrets.yaml        |
| VIM Insight Workspace | PASS   | /root/<insight_ws>                                          |
         +-----------------------+--------+---------------------------------------------------------+

Cisco VIM Insight backup Info!
+-----------------------+--------+--------------------------------------------------------------+
| Description           | Status | Details                                                      |
+-----------------------+--------+--------------------------------------------------------------+
| Insight backup Status | PASS   | Backup done @                                                |
|                       |        | /var/cisco/insight_backup/backup-<release_tag>-<date_time>   |
+-----------------------+--------+--------------------------------------------------------------+
Done with VIM Insight reconfigure!
VIM Insight reconfigure logs are at: "/var/log/insight/bootstrap_insight/"
As the summary table describes Insight gets autobacked up after reconfigure at /var/cisco/insight_backup
 to preserve the latest state of Insight.
```

Step 2 Verify the password change by running the following command:

```
# cat /opt/cisco/insight/secrets.yaml
 DB_ROOT_PASSWORD: <new_db_password>
```

User-supplied Unified Management DB Password

Step 1 To provide your own MYSQL DB Password follow the below steps:

Note Your new DB password must contain alphanumeric characters and should be at least 8 characters long.

```
# cd <insight_ws>
# ./bootstrap_insight.py –a reconfigure –f <path_to insight_setup_data.yaml> --setpassword

VIM Insight reconfigure logs are at: /var/log/insight/<bootstrap_insight_<date>_<time>.log
Perform the action. Continue (Y/N)y
Password for DB_ROOT_PASSWORD: <enter_valid_db_password>

Management node validation
+-------------------------------+--------+-------+
| Rule                          | Status | Error |
+-------------------------------+--------+-------+
| Check Kernel Version          |  PASS | None |
| Check Ansible Version         |  PASS | None |
| Check Docker Version          |  PASS | None |
| Check Management Node Tag     |  PASS | None |
| Check Bond Intf. Settings     |  PASS | None |
| Root Password Check           |  PASS | None |
| Check Boot Partition Settings |  PASS | None |
| Check LV Swap Settings        |  PASS | None |
| Check Docker Pool Settings    |  PASS | None |
| Check Home Dir Partition      |  PASS | None |
| Check Root Dir Partition      |  PASS | None |
| Check /var Partition          |  PASS | None |
| Check LVM partition           |  PASS | None |
| Check RHEL Pkgs Install State |  PASS | None |
+-------------------------------+--------+-------+

Insight standalone input validation
+-------------------------------------------+--------+-------+
| Rule                                      | Status | Error |
+-------------------------------------------+--------+-------+
| Insight standalone schema validation      | PASS   | None  |
| Valid key check in Insight setup data     | PASS   | None  |
| Duplicate key check In Insight setup data | PASS   | None  |
| CVIM/Insight workspace conflict check     | PASS   | None  |
| Check registry connectivity               | PASS   | None  |
| Check Email server for Insight            | PASS   | None  |
+-------------------------------------------+--------+-------+
WARNING!!Reconfiguration will have few secs of Outage for Insight!

Cisco VIM Insight Already Exists!
+-----------------------+--------+----------------------------------------------------------+
| Description           | Status | Details                                                  |
+-----------------------+--------+----------------------------------------------------------+
| VIM Insight UI URL    | PASS   | https://<br_api:9000>                                    |
| VIM UI Admin Email ID | PASS   | Check for info @: <abs path of insight_setup_data.yaml> |
|                       |        |                                  |
| VIM UI Admin Password | PASS   | Check for info @ /opt/cisco/insight/secrets.yaml        |
| VIM Insight Workspace | PASS   | /root/<insight_ws>                                          |
         +-----------------------+--------+--------------------------------------------------------+

Cisco VIM Insight backup Info!
+----------------------+-------+-------------------------------------------------------------------+
| Description          | Status| Details
|
+----------------------+-------+-------------------------------------------------------------------+
| Insight backup Status| PASS  | Backup done @
|
|                      |       | /var/cisco/insight_backup/insight_backup_<release_tag>_<date_time>|
+----------------------+-------+-------------------------------------------------------------------+
Done with VIM Insight reconfigure!
VIM Insight reconfigure logs are at: "/var/log/insight/bootstrap_insight/"

As the summary table describes Insight gets autobacked up after reconfigure at /var/cisco/insight_backup
 to preserve the latest state of Insight.
```

Step 2 Verify the password change by running the following command:

```
# cat /opt/cisco/insight/secrets.yaml
DB_ROOT_PASSWORD: <new_db_password>
```

Reconfiguring Unified Management SMTP Server

Unified Management requires a valid SMTP Server to send mails to users (Pod-Admin, UI-Admin, and regular users). If SMTP Server goes down, you can reconfigure it.

Following values can be reconfigured:

- INSIGHT_SMTP_SERVER
- INSIGHT_EMAIL_ALIAS_PASSWORD (only needed for Authenticated SMTP server)
- INSIGHT_EMAIL_ALIAS
- INSIGHT_SMTP_PORT (optional, defaults to 25)

Step 1 Run the following command to reconfigure the SMTP server:

```
# cd <path insight_setup_data.yaml>
Open insight_setup_data.yaml file
# vi insight_setup_data.yaml
Edit the insight_setup_data.yaml to change value of INSIGHT_SMTP_SERVER key. Save the file after
editing.
```

Step 2 Run the bootstrap command as follows:

```
# cd <insight_ws>
# ./bootstrap_insight.py –a reconfigure –f <path_to insight_setup_data.yaml>
VIM Insight reconfigure logs are at: /var/log/insight/<bootstrap_insight_<date>_<time>.log
Perform the action. Continue (Y/N)y

Management node validation
+-------------------------------+--------+-------+
| Rule                          | Status | Error |
+-------------------------------+--------+-------+
| Check Kernel Version          |  PASS  | None |
| Check Ansible Version         |  PASS  | None |
| Check Docker Version          |  PASS  | None |
| Check Management Node Tag     |  PASS  | None |
| Check Bond Intf. Settings     |  PASS  | None |
| Root Password Check           |  PASS  | None |
| Check Boot Partition Settings |  PASS  | None |
| Check LV Swap Settings        |  PASS  | None |
| Check Docker Pool Settings    |  PASS  | None |
| Check Home Dir Partition      |  PASS  | None |
| Check Root Dir Partition      |  PASS  | None |
| Check /var Partition          |  PASS  | None |
| Check LVM partition           |  PASS  | None |
| Check RHEL Pkgs Install State |  PASS  | None |
+-------------------------------+------- -+-------+

Insight standalone input validation
+-------------------------------------------+--------+-------+
| Rule                                      | Status | Error |
+-------------------------------------------+--------+-------+
| Insight standalone schema validation      | PASS   | None  |
| Valid key check in Insight setup data     | PASS   | None  |
| Duplicate key check In Insight setup data | PASS   | None  |
| CVIM/Insight workspace conflict check     | PASS   | None  |
| Check registry connectivity               | PASS   | None  |
| Check Email server for Insight            | PASS   | None  |
+-------------------------------------------+--------+-------+
WARNING!! Reconfiguration will have few secs of Outage for Insight!

Cisco VIM Insight Already Exists!
+-----------------------+--------+---------------------------------------------------------+
| Description           | Status | Details                                                 |
+-----------------------+--------+---------------------------------------------------------+
| VIM Insight UI URL    | PASS   | https://<br_api:9000>                                   |
| VIM UI Admin Email ID | PASS   | Check for info @: <abs path of insight_setup_data.yaml> |
|                       |        |                                  |
| VIM UI Admin Password | PASS   | Check for info @ /opt/cisco/insight/secrets.yaml        |
| VIM Insight Workspace | PASS   | /root/<insight_ws>                                           |
+-----------------------+--------+---------------------------------------------------------+

Cisco VIM Insight backup Info!
+----------------------+-------+-------------------------------------------------------------------+
| Description          | Status| Details
|
+----------------------+-------+-------------------------------------------------------------------+
| Insight backup Status| PASS  | Backup done @
|
|                      |       | /var/cisco/insight_backup/insight_backup_<release_tag>_<date_time>|
+----------------------+-------+-------------------------------------------------------------------+

Done with VIM Insight reconfigure!
VIM Insight reconfigure logs are at: "/var/log/insight/bootstrap_insight/"

Insight gets autobacked up after reconfiguration at /var/cisco/insight_backup to preserve the latest
 state of Insight.
```

Reconfiguring Unified Management LDAP Server

Unified Management supports both LDAP and LDAP over SSL (LDAPS) for an Active Directory (AD) environment. If the LDAP server is down or if you need to change any of its configuration, execute Unified Management reconfigure acion.

Step 1 Reconfigure the LDAP(s) server:

a) Run the following command to open insight_setup_data.yaml file:

```
# cd <path insight_setup_data.yaml>
```

b) Edit the insight_setup_data.yaml, using the following command, to change the value of LDAP keys.

:

```
# vi insight_setup_data.yaml
```

LDAP keys are listed below:

- LDAP_MODE: This key can be reconfigured only to 'True', to allow the user to switch only from No-LDAP to LDAP, and not vice-versa.
- LDAP_SERVER: This key is reconfigurable to switch to new LDAP server.
- LDAP_PORT: Reconfiguration of this key is allowed.
- LDAP_ADMIN: Reconfiguration of this key is allowed.

- LDAP_ADMIN_PASSWORD: Reconfiguration of this key is allowed.
- LDAP_SECURE: This key can be reconfigured only to ‘True’, to allow the user to switch from non-secure LDAP to secure LDAP connection, and not vice-versa.
- LDAP_CERT_PATH: This key can be reconfigured, to switch from self-signed certificate to CA-signed certificate, and not vice-versa.
- LDAP_USER_ID_ATTRIBUTE: This key can be reconfigured to point to new LDAP user id attribute.
- LDAP_GROUP_SEARCH_FILTER: This key be reconfigured to set new group search filter.
- LDAP_GROUP_USER_SEARCH_FILTER: This key can be reconfigured to set new group-user search filter.
- UM_ADMIN_GROUP: This key can be reconfigured to map LDAP role/group to Insight UM-Admin(s). This key is used when Insight authorization is via LDAP server.
- POD_ADMIN_GROUP: This key can be reconfigured to map LDAP role/group to Insight Pod-Admin(s). This key is used when Insight authorization is via LDAP server.
- POD_USER_GROUP: This key can be reconfigured to map LDAP role/group to Insight pod users with 'Full-pod-access'. This key is used, when Insight authorization is via LDAP server.
- READ_ONLY_POD_USER_GROUP: This key can be reconfigured to map LDAP role/group to Insight pod users with 'Read-only-access'. This key is used when Insight authorization is via LDAP server.

c) Save the edited file.

Step 2 Run the bootstrap command

```
# cd <insight_ws>
# ./bootstrap_insight.py –a reconfigure –f <path_to insight_setup_data.yaml>

VIM Insight reconfigure logs are at: /var/log/insight/<bootstrap_insight_<date>_<time>.log
Perform the action. Continue (Y/N)y

Management node validation
+-------------------------------+--------+-------+
| Rule                          | Status | Error |
+-------------------------------+--------+-------+
| Check Kernel Version          |  PASS  | None |
| Check Ansible Version         |  PASS  | None |
| Check Docker Version          |  PASS  | None |
| Check Management Node Tag     |  PASS  | None |
| Check Bond Intf. Settings     |  PASS  | None |
| Root Password Check           |  PASS  | None |
| Check Boot Partition Settings |  PASS  | None |
| Check LV Swap Settings        |  PASS  | None |
| Check Docker Pool Settings    |  PASS  | None |
| Check Home Dir Partition      |  PASS  | None |
| Check Root Dir Partition      |  PASS  | None |
| Check /var Partition          |  PASS  | None |
| Check LVM partition           |  PASS  | None |
| Check RHEL Pkgs Install State |  PASS  | None |
+-------------------------------+--------+-------

Insight standalone input validation
+-------------------------------------------+--------+-------+
| Rule                                      | Status | Error |
+-------------------------------------------+--------+-------+
| Insight standalone schema validation      | PASS   | None  |
| Valid key check in Insight setup data     | PASS   | None  |
| Duplicate key check In Insight setup data | PASS   | None  |
| CVIM/Insight workspace conflict check     | PASS   | None  |
| Check registry connectivity               | PASS   | None  |
| Check LDAP connectivity                   | PASS   | None  |
| Check Email server for Insight            | PASS   | None  |
+-------------------------------------------+--------+-------+

WARNING!! Reconfiguration will have few secs of Outage for Insight!

Cisco VIM Insight Already Exists!
+-----------------------+--------+---------------------------------------------------+
| Description           | Status | Details                                           |
+-----------------------+--------+---------------------------------------------------+
| VIM Insight UI URL    | PASS   | https://<br_api:9000>                             |
| VIM UI Admin Email ID | PASS   | Check for info @: <abs path of insight_setup_data.yaml> |
|                       |        |                                |
| VIM UI Admin Password | PASS   | Check for info @ /opt/cisco/insight/secrets.yaml        |
| VIM Insight Workspace | PASS   | /root/<insight_ws>                                      |
+-----------------------+--------+---------------------------------------------------+

Cisco VIM Insight backup Info!
+----------------------+-------+-------------------------------------------------------------------+
| Description          | Status| Details
|
+----------------------+-------+-------------------------------------------------------------------+
| Insight backup Status| PASS  | Backup done @
|
|                      |       | /var/cisco/insight_backup/insight_backup_<release_tag>_<date_time>|
+----------------------+-------+-------------------------------------------------------------------+

Done with VIM Insight reconfigure!
VIM Insight reconfigure logs are at: "/var/log/insight/bootstrap_insight/"

Insight gets autobacked up after reconfiguration at /var/cisco/insight_backup to preserve the latest
 state of Insight.
```

Reconfiguring Unified Management Optional Features

Unified Management supports reconfiguration of optional features.

Step 1 Reconfigure the UM optional feature:

a) Run the following command to open insight_setup_data.yaml file.

```
# cd <path insight_setup_data.yaml>
```

b) Edit the insight_setup_data.yaml, using the following command, to change the value of optional feature keys

```
# vi insight_setup_data.yaml
```

Optional features keys are listed below:

- UM_ADMIN_AS_POD_ADMIN: When set to True, all UM-Admins are added as pod-users with **Full-Pod-Access** during pod registration.
- DISPLAY_ALL_POD_USERS: If set to True, a drop-down appears in the user-registration form with a list of all the users with pod-user permissions while adding a new pod-user.

c) Save the edited file

Step 2 Run the bootstrap command:

```
# cd <insight_ws>
# ./bootstrap_insight.py –a reconfigure –f <path_to insight_setup_data.yaml>

VIM Insight reconfigure logs are at: /var/log/insight/<bootstrap_insight_<date>_<time>.log Perform
the action. Continue (Y/N)y


Management node validation
+-------------------------------+--------+-------+
| Rule                          | Status | Error |
+-------------------------------+--------+-------+
| Check Kernel Version          |  PASS  | None |
| Check Ansible Version         |  PASS  | None |
| Check Docker Version          |  PASS  | None |
| Check Management Node Tag     |  PASS  | None |
| Check Bond Intf. Settings     |  PASS  | None |
| Root Password Check           |  PASS  | None |
| Check Boot Partition Settings |  PASS  | None |
| Check LV Swap Settings        |  PASS  | None |
| Check Docker Pool Settings    |  PASS  | None |
| Check Home Dir Partition      |  PASS  | None |
| Check Root Dir Partition      |  PASS  | None |
| Check /var Partition          |  PASS  | None |
| Check LVM partition           |  PASS  | None |
| Check RHEL Pkgs Install State |  PASS  | None |
+-------------------------------+--------+-------

Insight standalone input validation
+-------------------------------------------+--------+-------+
| Rule                                      | Status | Error |
+-------------------------------------------+--------+-------+
| Insight standalone schema validation      | PASS   | None  |
| Valid key check in Insight setup data     | PASS   | None  |
| Duplicate key check In Insight setup data | PASS   | None  |
| CVIM/Insight workspace conflict check     | PASS   | None  |
| Check registry connectivity               | PASS   | None  |
| Check LDAP connectivity                   | PASS   | None  |
| Check Email server for Insight            | PASS   | None  |
+-------------------------------------------+--------+-------+
WARNING!! Reconfiguration will have few secs of Outage for Insight

Cisco VIM Insight Already Exists!
+-----------------------+--------+---------------------------------------------------------+
| Description           | Status | Details                                                 |
+-----------------------+--------+---------------------------------------------------------+
| VIM Insight UI URL    | PASS   | https://<br_api:9000>                                   |
| VIM UI Admin Email ID | PASS   | Check for info @: <abs path of insight_setup_data.yaml> |
|                       |        |                             |
| VIM UI Admin Password | PASS   | Check for info @ /opt/cisco/insight/secrets.yaml        |
| VIM Insight Workspace | PASS   | /root/<insight_ws>                                      |
+-----------------------+--------+---------------------------------------------------------+

Cisco VIM Insight backup Info!
+----------------------+-------+-------------------------------------------------------------------+
| Description          | Status| Details
|
+----------------------+-------+-------------------------------------------------------------------+
| Insight backup Status| PASS  | Backup done @
|
|                      |       | /var/cisco/insight_backup/insight_backup_<release_tag>_<date_time>|
+---------------------+-------+--------------------------------------------------------------------+

Done with VIM Insight reconfigure!
VIM Insight reconfigure logs are at: "/var/log/insight/bootstrap_insight/"

Insight gets autobacked up after reconfiguration at /var/cisco/insight_backup to preserve the latest
 state of Insight.
```

Step 3 c).

Adding and Reconfiguring VIM Administrators

Cisco VIM UM supports management of the VIM Administrators.VIM administrator can log into the unified management node through SSH or the console using the configured password. By configuring to one VIM admin account, administrators do not have to share credentials. Administrators have individual accountability.

To enable one or more VIM administrators, perform the following steps:

Step 1 Take a backup of the setupdata file and update the file manually with the configurations listed as below:

```
vim_admins:
- vim_admin_username: <username>
  vim_admin_password_hash: <sha512-password-hash>
- vim_admin_username: <username>
  vim_admin_password_hash: <sha512-password-hash>
- vim_admin_username: <username>
  vim_admin_password_hash: <sha512-password-hash>

The value of password hash must be in the standard sha512 format. # To generate the hash
admin_password_hash should be the output from on the management node
#  python -c "import crypt; print crypt.crypt('<plaintext password>')"
```

Step 2 Run the following reconfiguration commands:

```
# cd <insight_ws>
# ./bootstrap_insight.py –a reconfigure –f <path_to insight_setup_data.yaml>
```

Note Cisco VIM administrators can manage their own passwords using the Linux passwd command. You can add or remove Cisco VIM administrator through the reconfigure option, while the passwords for their existing accounts remain unchanged.

Enabling Root Login Post UM Node Installation

To complement the management of VIM administrators, Cisco VIM supports an option to enable/disable root access at login. By default, this option is set to True. You can optionally disable this facility through reconfiguration.

Following are the steps to enable root login:

Step 1 Take a backup of the setupdata file and update the file manually with the configurations listed below:

```
permit_root_login: <True or False>  # if set to false, one has to use su to drop down to root and
execute administrator functionalities.
```

Step 2 Run the following reconfiguration commands:

```
# cd <insight_ws>
# ./bootstrap_insight.py –a reconfigure –f <path_to insight_setup_data.yaml>
```

Enabling Banner During SSH Login

Cisco VIM supports enabling of banner during ssh login to the management node. To enable banner during login, perform the following steps:

Step 1 Take a backup of the setupdata file and update the file manually with the configuration listed below:

```
ssh_banner:
  <your Banner Text>
```

Step 2 Run the following commands for reconfiguration:

```
# cd <insight_ws>
# ./bootstrap_insight.py –a reconfigure –f <path_to insight_setup_data.yaml>
```

Update VIM Unified Management

VIM Unified Management update allows you to switch to a new Unified Management release.

The update action makes the old docker containers of Unified Management and mariadb in exit state, and brings up new ones with the new tag. The old containers and images are restored until you perform the **Commit** action.

Update is an intermediate action and allows you to do either a **Commit** action to settle for the current version or do a **Rollback** to revert back to the old version.

The old workspace is preserved, if you want to do a rollback to the previous version.

After an update:

- Your Unified Management workspace is set as the new workspace that you just extracted out of the tarball.
- Backup and reconfigure action are not allowed either from old or new Unified Management workspace.

Update Scenarios

Following are the update scenarios:

- Insight and mariadb containers gets updated to a new tag.
- Either insight or mariadb container gets updated to a new tag.

Update VIM UM with Internet Access from 3.2.x to 3.4.1

Following are the steps to update VIM Unified Management:

Step 1 Get the new installer tar ball, which will be available after each release.

Extract the tar ball to get the new Unified Management workspace by running the following command:

```
# tar -xvzf mercury-installer.tar.gz
```

Step 2 Create an empty directory for Insight workspace: insight-<tag_id>

Step 3 Copy that extracted directory `installer-<tag_ig>` inside `insight-<tag_id>`

Step 4 Update the VIM UM by running the following commands:

```
# cd /root/<new_insight_ws>/insight/
/bootstrap_insight.py -a update

VIM Insight update logs are at: /var/log/insight/<bootstrap_insight_<date>_<time>.log
Management Node validation!
+-------------------------------+--------+-------+
| Rule                          | Status | Error |
+-------------------------------+--------+-------+
| Check Kernel Version          |  PASS | None |
| Check Docker Version          |  PASS | None |
| Check Management Node Tag     |  PASS | None |
| Check Bond Intf. Settings     |  PASS | None |
| Root Password Check           |  PASS | None |
| Check Boot Partition Settings |  PASS | None |
| Check LV Swap Settings        |  PASS | None |
| Check Docker Pool Settings    |  PASS | None |
| Check Home Dir Partition      |  PASS | None |
| Check Root Dir Partition      |  PASS | None |
| Check /var Partition          |  PASS | None |
| Check LVM partition           |  PASS | None |
| Check RHEL Pkgs Install State |  PASS | None |
+-------------------------------+--------+-------+

Insight standalone input validation
+--------------------------------------------+--------+-------+
| Rule                                       | Status | Error |
+--------------------------------------------+--------+-------+
| Insight standalone schema validation       | PASS   | None  |
| Valid key check in Insight setup data      | PASS   | None  |
| Duplicate key check In Insight setup data  | PASS   | None  |
| CVIM/Insight workspace conflict check      | PASS   | None  |
| Check registry connectivity                | PASS   | None  |
| Check Email server for Insight             | PASS   | None  |
+--------------------------------------------+--------+-------+

Downloading Updated VIM Insight Artifacts, will take time!!!
```

```
Cisco VIM Insight update Info!
   +-----------------------------------------+--------+------------------------------+
   | Description                             | Status | Details                       |
   +-----------------------------------------+--------+-------------------------------+
   | VIM Insight Container: insight_<new_tag> | PASS   | Updated from insight_<old_tag>|
   | VIM Mariadb Container: mariadb_<new_tag> | PASS   | Updated from mariadb_<old_tag>|
   +-----------------------------------------+--------+-------------------------------+
 Done with VIM Insight update!
 VIM Insight update logs are at: "/var/log/insight/bootstrap_insight/"
```

Step 5 Verify the Unified Management Update.

```
# ./bootstrap_insight.py -a update-status
Cisco VIM Insight Update Status!
+-----------------------------------------+--------+--------------------------------+
| Description                             | Status | Details                        |
+-----------------------------------------+--------+--------------------------------+
| VIM Insight Container: insight_<new_tag> | PASS   | Updated from insight_<old_tag> |
| VIM Mariadb Container: insight_<new_tag> | PASS   | Updated from mariadb_<old_tag> |
+-----------------------------------------+--------+--------------------------------+
```

Update VIM UM without Internet Access from 3.2.x to 3.4.1

Step 1 Copy the new installer tar ball to the Unified Management Node.

Extract the tar ball to get the new Unified Management workspace by running the following command:

```
# tar -xvzf mercury-installer.tar.gz
```

Step 2 To download the new Unified Management artifacts, follow the steps given in section Preparing to Install Cisco NFVI on Management Nodes Without Internet Access, of *Cisco VIM Install_Guide*.

Step 3 Run Import Artifacts:

```
# cd /root/installer_<tag_id>/tools
# ./import_artifacts.sh
This verifies that /var/cisco/artifacts on the management node has the following Insight artifacts,
 along with the other components 'insight-K9.tar' and  'mariadb-app-K9.tar'.'
```

Step 4 Update the Unified Management by running the following command:

```
 # cd insight/
 # ./bootstrap_insight.py -a update

VIM Insight update logs are at: /var/log/insight/<bootstrap_insight_<date>_<time>.log
Management node validations!
+-------------------------------+--------+-------+
| Rule                    | Status | Error |
+-------------------------------+--------+-------+
| Check Kernel Version          |  PASS  | None |
| Check Ansible Version         |  PASS  | None |
| Check Docker Version          |  PASS  | None |
| Check Management Node Tag     |  PASS  | None |
| Check Bond Intf. Settings     |  PASS  | None |
| Root Password Check           |  PASS  | None |
| Check Boot Partition Settings |  PASS  | None |
| Check LV Swap Settings        |  PASS  | None |
| Check Docker Pool Settings    |  PASS  | None |
| Check Home Dir Partition      |  PASS  | None |
| Check Root Dir Partition      |  PASS  | None |
| Check /var Partition          |  PASS  | None |
| Check LVM partition           |  PASS  | None |
| Check RHEL Pkgs Install State |  PASS  | None |
+-------------------------------+--------+-------+

Insight standalone input validation
+-------------------------------------------+--------+-------+
| Rule                                      | Status | Error |
+-------------------------------------------+--------+-------+
| Insight standalone schema validation      | PASS   | None  |
| Valid key check in Insight setup data     | PASS   | None  |
| Duplicate key check In Insight setup data | PASS   | None  |
| CVIM/Insight workspace conflict check     | PASS   | None  |
| Check registry connectivity               | PASS   | None  |
| Check Email server for Insight            | PASS   | None  |
+-------------------------------------------+--------+-------+

Updating VIM Insight, Kindly wait!!!
Cisco VIM Insight update Info!
+------------------------------------------+--------+-------------------------------+
| Description                              | Status | Details                       |
+------------------------------------------+--------+-------------------------------+
| VIM Insight UI URL                       | PASS   | https://<br_api:9000>         |
| VIM Insight Container: insight_<new_tag> | PASS   | Updated from insight_<old_tag>|
| VIM Mariadb Container: mariadb_<new_tag> | PASS   | Updated from mariadb_<old_tag>|
| VIM Insight Workspace                    | PASS   | /root/<new_insight_ws>        |
+------------------------------------------+--------+-------------------------------+
 Done with VIM Insight update!
 VIM Insight update logs are at: "/var/log/insight/bootstrap_insight/"
```

Step 5 Verify Unified Management update by running the following command:

```
# ./bootstrap_insight.py –a update-status
Cisco VIM Insight Update Status!
+------------------------------------------+--------+--------------------------------+
| Description                              | Status | Details                        |
+------------------------------------------+--------+--------------------------------+
| VIM Insight Container: insight_<new_tag> | PASS   | Updated from insight_<old_tag> |
| VIM Mariadb Container: insight_<new_tag> | PASS   | Updated from mariadb_<old_tag> |
+------------------------------------------+--------+--------------------------------+
```

Upgrade Cisco VIM UM from 2.4.x to 3.4.1

Following are the steps to upgrade Cisco VIM Unified Management from 2.4.x to 3.4.1.

Step 1 Get the installer tar ball for 3.4.1 release. Extract the tar ball to get the new UM workspace by running the following command:

```
# tar –xvzf mercury-installer.tar.gz
```

Step 2 Create an empty directory to take a backup of Cisco VIM UM node.

Step 3 Run Insight upgrade script with '-b'[backup] option:

```
# cd /root/installer_<tag_id>/tools
          # ./insight_upgrade.sh –b –d <path of backup directory>
```

Step 4 Copy the backup directory to the remote server. For example, to copy the backup directory `/var/cisco/insight_upgrade_backup/` from the management node to the remote host 20.0.0.5, execute the following command sequence:

```
rsync -e ssh -go -rtvpX --numeric-ids /var/cisco/insight_upgrade_backup/
root@20.0.0.5:/var/cisco/insight_upgrade_backup/
```

Note Ensure that the path `root@20.0.0.5:/var/cisco/insight_upgrade_backup/` is available at the remote location.

Step 5 Re-image the UM node with the 3.4.1 ISO release version and with the same IP address.

Step 6 Copy the backup directory from the remote server to the management node. For example, to copy the backup directory `/var/cisco/insight_upgrade_backup/` from remote host 20.0.0.5 to the management node, execute the following command sequence.

```
 rsync -e ssh -go -rtvpX --numeric-ids root@20.0.0.5:/var/cisco/insight_upgrade_backup/
/var/cisco/insight_upgrade_backup/.
```

Note

- Ensure that the path `/var/cisco/insight_upgrade_backup/` is present on UM node.
- For installation with Internet access, skip Step 7 and Step 8.

.

Step 7 To download the new UM artifacts, follow the steps given in section **Preparing to Install Cisco NFVI on Management Nodes Without Internet Access** of *Cisco Virtualiuzed Infrastructure Manager Installation Guide*.

Step 8 Run Import artifacts:

```
 #cd /root/installer_<tag_id>/tools
 # ./import_artifacts.sh
 This verifies that /var/cisco/artifacts on the management node contains the following Insight
artifacts, along with the other components 'insight-K9.tar' and 'mariadb-app-K9.tar'.'
```

Step 9 Run Insight upgrade with '-r'[restore] option:

```
# cd /root/installer_<tag_id>/tools
          # ./insight_upgrade.sh –r –d <path of backup directory>
```

Step 10 After successful execution of upgrade, use 'reconfigure' option of bootstrap_insight to enable new Insight features or 'install-status' to check Insight installation status:

```
# cd ../insight/
   # ./bootstrap_insight.py –a install-status
   # ./bootstrap_insight.py –a reconfigure –f <insight_setup_data.yaml>
```

Rollback VIM Unified Management

Cisco VIM Unified Management rollback feature allows you to revert to the old UM release which is used before the update.

Following are some of the key points:

- The rollback action removes the new docker containers of Unified Management and mariadb which is created after an update and bring up old ones with the old tag.
- The new workspace is used to update the operation later or the VIM may be running from it.
- After rollback, your UM workspace is the old workspace which you were using before the update.

Following are the steps to perform UM rollback:

Step 1 Run the following command to rollback VIM Unified Management:

```
# cd /root/<new_insight_ws>
# ./bootstrap_insight.py –a rollback

VIM Insight rollback logs are at: /var/log/insight/<bootstrap_insight_<date>_<time>.log

Management node validation!
+-------------------------------+--------+-------+
| Rule                          | Status | Error |
+-------------------------------+--------+-------+
| Check Kernel Version          |  PASS  | None |
| Check Ansible Version         |  PASS  | None |
| Check Docker Version          |  PASS  | None |
| Check Management Node Tag     |  PASS  | None |
| Check Bond Intf. Settings     |  PASS  | None |
| Root Password Check           |  PASS  | None |
| Check Boot Partition Settings |  PASS  | None |
| Check LV Swap Settings        |  PASS  | None |
| Check Docker Pool Settings    |  PASS  | None |
| Check Home Dir Partition      |  PASS  | None |
| Check Root Dir Partition      |  PASS  | None |
| Check /var Partition          |  PASS  | None |
| Check LVM partition           |  PASS  | None |
| Check RHEL Pkgs Install State |  PASS  | None |
+-------------------------------+--------+-------+


Insight standalone input validation
+-------------------------------------------+--------+-------+
| Rule                                      | Status | Error |
+-------------------------------------------+--------+-------+
| Insight standalone schema validation      | PASS   | None  |
| Valid key check in Insight setup data     | PASS   | None  |
| Duplicate key check In Insight setup data | PASS   | None  |
| CVIM/Insight workspace conflict check     | PASS   | None  |
| Check registry connectivity               | PASS   | None  |
| Check Email server for Insight            | PASS   | None  |
+-------------------------------------------+--------+-------+

 VIM Insight rollback in progress, Kindly wait!!!
 Cisco VIM Insight rollback Info!
 +-----------------------------------------+--------+-------------------------------+
 | Description                             | Status | Details                        |
 +-----------------------------------------+--------+--------------------------------+
 | VIM Insight UI URL                      | PASS   | https://<br_api:9000>          |
 | VIM Insight Container: insight_<old_tag> | PASS   | Rollback from insight_<new_tag>|
 | VIM Mariadb Container: mariadb_<old_tag> | PASS   | Rollback from mariadb_<new_tag>|
 | VIM Insight Workspace                   | PASS   | /root/<old_insight_ws>         |
 +-----------------------------------------+--------+--------------------------------+
 Done with VIM Insight rollback!
 VIM Insight rollback logs are at: "/var/log/insight/bootstrap_insight/"
```

Step 2 Verify the rollback status by running the following command:

```
# ./bootstrap_insight.py –a install-status
Cisco VIM Insight Install Status!
+----------------------+--------+----------------------------------+
| Description          | Status | Details                          |
+----------------------+--------+----------------------------------+
| VIM Insight Version   | PASS   | <release_tag>                    |
| VIM Insight UI URL    | PASS   | https://<br_api:9000>            |
| VIM Insight Container | PASS   | insight_<tag_id>                 |
| VIM Mariadb Container | PASS   | mariadb_<tag_id>                 |
| VIM Insight Workspace | PASS   | /root/<insight_ws>               |
+----------------------+--------+----------------------------------+
```

Commit VIM Unified Management

VIM Insight commit supports for a new Insight release after an update.

Following are some of the key points:

- The old workspace is not deleted and retained as it is.
- After the commit, your Unified Management workspace which has been used for the update is the new workspace.

Step 1 Run the following command to commit VIM Insight:

```
# cd /root/<new_insight_ws>/Insight
# ./bootstrap_insight.py –a commit
VIM Insight commit logs are at: /var/log/insight/<bootstrap_insight_<date>_<time>.log
Management Node Validation!
+-------------------------------+---------+-------+

| Rule                          |  Status | Error |
+-------------------------------+----------+-------+
| Check Kernel Version          |  PASS   | None |
| Check Ansible Version         |  PASS   | None |
| Check Docker Version          |  PASS   | None |
| Check Management Node Tag     |  PASS   | None |
| Check Bond Intf. Settings     |  PASS   | None |
| Root Password Check           |  PASS   | None |
| Check Boot Partition Settings |  PASS   | None |
| Check LV Swap Settings        |  PASS   | None |
| Check Docker Pool Settings    |  PASS   | None |
| Check Home Dir Partition      |  PASS   | None |
| Check Root Dir Partition      |  PASS   | None |
| Check /var Partition          |  PASS   | None |
| Check LVM partition           |  PASS   | None |
| Check RHEL Pkgs Install State |  PASS   | None |
+-------------------------------+--------+-------+
Insight standalone Input Validation!
+-------------------------------------------+--------+-------+
| Rule                                | Status | Error |
+-------------------------------------------+--------+-------+
| Insight standalone Schema Validation      | PASS   | None |
| Valid Key Check in Insight Setup Data     | PASS   | None |
| Duplicate Key Check In Insight Setup Data | PASS   | None |
| CVIM/Insight workspace conflict           | PASS   | None |
| Check registry connectivity               | PASS   | None |
| Check Email server for Insight            | PASS   | None |
+-------------------------------------------+--------+-------+

VIM Insight commit in progress, Kindly wait!!!
Cisco VIM Insight commit Info!
+----------------------------------------- +--------+-------------------------------------------
| Description                              | Status | Details                                   |
+------------------------------------------+--------+-------------------------------------------+
| VIM Insight UI URL                       | PASS   | https://<br_api:9000>                     |
| VIM Insight Container: insight_<old_tag> | PASS   | Old container: insight-<old_tag> removed> |
| VIM Mariadb Container: mariadb_<old_tag> | PASS   | Old container: mariadb-<old_tag> removed> |
| VIM Insight Workspace                    | PASS   | /root/<old_insight_ws>                    |
+------------------------------------------+--------+-------------------------------------------+
Done with VIM Insight commit!
VIM Insight commit logs are at: "/var/log/insight/bootstrap_insight/"
```

Note If update is done from 3.0.x to 3.4.1, the following warning message to reconfigure Insight is displayed.

Warning: Insight setup-data key 'UM_ADMIN_AS_POD_ADMIN' is deprecated from version 3.4.1 and Please 'reconfigure' using 'UM_ADMIN_WITH_FULL_POD_ACCESS' as a new name of the key

Step 2 Verify the commit status by running the following command:

```
# ./bootstrap_insight.py –a install-status
Cisco VIM Insight Install Status!
+-----------------------+--------+-----------------------+
| Description           | Status | Details               |
+-----------------------+--------+-----------------------+
| VIM Insight Version   | PASS   | <release_tag>         |
| VIM Insight UI URL    | PASS   | https://<br_api:9000> |
| VIM Insight Container | PASS   | insight_<tag_id>      |
| VIM Mariadb Container | PASS   | mariadb_<tag_id>      |
| VIM Insight Workspace | PASS   | /root/<insight_ws>    |
+-----------------------+--------+-----------------------+
```

Uploading Glance Images

On Day0, all the Glance Images to be uploaded are kept in a folder. To view those images under **Pod Image Management**, copy those images using the glance_image_copy.sh script.

1. The glance_image_copy.sh script is available in the insight folder, same as the bootstrap_insight.py level.

```
[root@gg34-bn insight]# ./glance_image_copy.sh -h
glance_image_copy.sh  : Cisco Glance Images Validator
----------------------------------------------------
-d          : Input Glance Images Directory.
              Allowed Images Formats:
```

```
            - 'raw', 'qcow2', 'iso', 'ami', 'ari', 'aki', 'vhd', 'vhdx', 'vmdk', 'vdi',
 'ploop'
-h          : To display this help
```

2. Use **-d** option, which represents the directory path of Glance Images to be uploaded, and copy the Glance Images by running the following command:

```
[root@gg34-bn insight]# ./glance_image_copy.sh -d /root/ImagesDir/
Copying /root/ImagesDir/mini.iso ...
Copying /root/ImagesDir/xenial-server-cloudimg-amd64-disk1.vmdk ...
Copying /root/ImagesDir/cirros-0.4.0-x86_64-disk.img ...
Copying /root/ImagesDir/CentOS-7-x86_64-GenericCloud-1905.raw ...
```

After copying images using the glance_image_copy.sh script, refresh Cisco VIM Unified Management appliance to view the Glance Images under Pod Image Management. Now, you can select multiple images and upload it.

CHAPTER 11

Overview to the Cisco Virtual Topology System

The Cisco Virtual Topology System (VTS) is an optional Cisco NFVI application that uses the Neutron driver and supports Cisco Vector Packet Processing. The following topics provide an overview to VTS architecture and features. When using VTS with Cisco NFVI, keep the following OpenStack tenant restrictions in mind:

Restriction	Description
Nova flavors: VM RAM > 512MB and equal to a multiple of 512MB	This limitation is due to NUMA and huge pages.
Nova Flavors: nova flavor-key m1.medium set hw:mem_page_size=large	VHOST mode is the only mode supported by the VTS installation at this time. To support VHOST connections nova needs the following configurations on each flavor that will be used.

Understanding Cisco VTS

The Cisco Virtual Topology System (VTS) is a standards-based, open, overlay management, and provisioning system for data center networks. It automates the DC overlay fabric provisioning for both physical and virtual workloads.

Cisco VTS provides a network virtualization architecture and software-defined networking (SDN) framework that meets the requirements of multitenant data centers for cloud services. It enables a policy-based approach for overlay provisioning.

Cisco VTS automates complex network overlay provisioning and management tasks through integration with cloud orchestration systems such as OpenStack and VMware vCenter. It reduces the complexity involved in managing heterogeneous network environments.

You can manage the solution in the following ways:

- Using the embedded Cisco VTS GUI
- Using a set of northbound Representational State Transfer (REST) APIs that can be consumed by orchestration and cloud management systems.

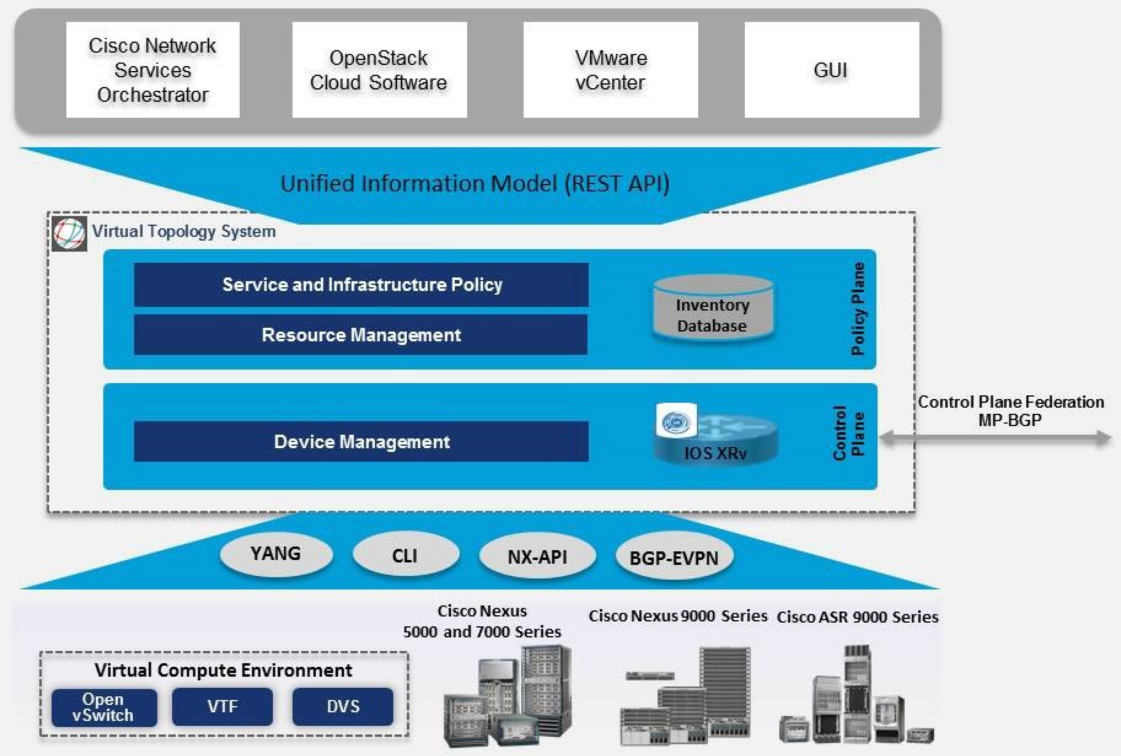
Cisco VTS provides:

- Fabric automation
- Programmability
- Open, scalable, standards-based solution
- Cisco Nexus 2000, 3000, 5000, 7000, and 9000 Series Switches. For more information, see Supported Platforms in *Cisco VTS 2.6.2.1 Installation Guide*.
- Software forwarder (Virtual Topology Forwarder [VTF])

Cisco VTS Architecture Overview

Cisco VTS architecture has two main components, namely, the Policy Plane and the Control Plane. These components perform core functions such as SDN control, resource allocation, and core management function.

Figure 24: Cisco VTS Architecture



- **Policy Plane:** The Policy Plane enables Cisco VTS to implement a declarative policy model which is designed to capture intent and render of the user into a specific device-level construct. The solution exposes a set of modular policy constructs that can be flexibly organized into user-defined services for use cases across service provider and cloud environments. These policy constructs are exposed using REST APIs that are consumed by orchestrators and applications or using the Cisco VTS GUI. The policy models are exposed as system policies or service policies.

System policies allow administrators to logically group devices into pods within or across data centers to define Admin Domains with common system parameters. For example, BGP-EVPN Control Plane with distributed Layer 2 and 3 gateways.

The inventory module maintains a database of the available physical entities (for example, data center interconnect [DCI] routers and top-of-rack leaf, spine, and border-leaf switches) and virtual entities (for example, VTFs) in the Virtual Topology System domain. The database also includes interconnections between these entities and details about the services instantiated within a Virtual Topology System domain.

The resource management module manages the available resource pools in the Virtual Topology System domain, including VLANs, VXLAN Network Identifiers (VNIs), IP addresses, and multicast groups.

- **Control Plane:** The Control Plane module serves as the SDN control subsystem that programs the various data planes including the VTFs residing on the x86 servers, hardware leafs, DCI gateways. The Control Plane hosts Service Routing (SR) module, which provides routing services to Cisco VTS. The Service Routing (SR) module calculates the L2 and L3tables and routes to provide connectivity between the different VMs for a given tenant and service chaining. The main components of this module are VTSR and VTF. VTSR is the controller and Virtual topology forwarder (VTF) runs on each compute server hosting the tenant VMs.

Virtual Topology Forwarder

Virtual Topology Forwarder (VTF) runs on each compute server in the DC and provides connectivity to all tenant VMs hosted on the compute server. VTF supports both intra and inter DC/WAN connectivity. VTF allows Cisco VTS to terminate the VXLAN tunnels on host servers by using the VTF as a Software VXLAN Tunnel Endpoint (VTEP). Cisco VTS also supports hybrid overlays by combining the physical and virtual endpoints into a single VXLAN segment.

VTF has two major components, namely, Cisco's VPP (Vector Packet Processing) and VPFA. VPFA is a Cisco agent running on each VMM compute resource. VPFA is the FIB agent that receives the L2/L3 table forwarding information from VTSR to provide connectivity to the local tenant VMs that are hosted on its compute, and programs them in the VPP.

VTF is deployed as a virtual machine or in vhost mode, to deliver a high-performance software Data Plane on a host server.

Overview to Cisco VTF and VPP

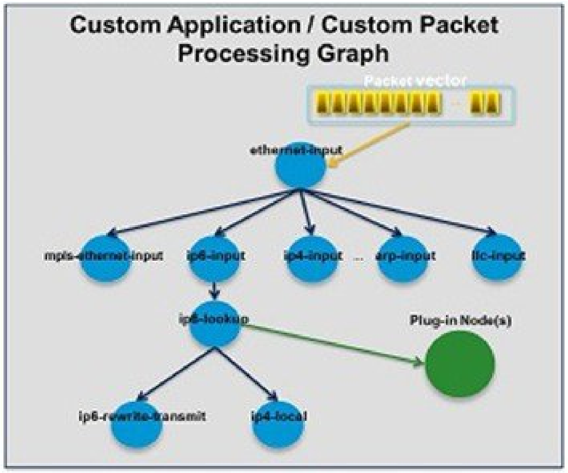
Cisco VTF is a Cisco Soft switch that is built on the Cisco Vector Packet Processing (VPP) technology.

The VPP platform is an extensible framework that provides productive and quality switch or router functionality. It is the open source version of the Cisco VPP technology, which is a high performance, packet-processing stack that can run on commodity CPUs.

The benefits of VPP are its high performance, proven technology, modularity, flexibility, and rich feature set.

The VPP platform is built on a packet-processing graph. This modular approach allows anyone to plugin new graph nodes. This makes extensibility rather simple, and the plugins can be customized for specific purposes.

Figure 25: VPP Platform



The VPP platform grabs all available packets from RX rings to form a vector of packets. A packet-processing graph is applied, node by node (including plugins) to the entire packet vector. Graph nodes are small and modular, and loosely coupled which makes it easy to include new graph nodes and rewire existing graph nodes.

A plugin can introduce new graph nodes or rearrange the packet-processing graph. You can also build a plugin independent from the VPP source and consider it as an independent component. A plugin can be installed by adding it to a plugin directory.

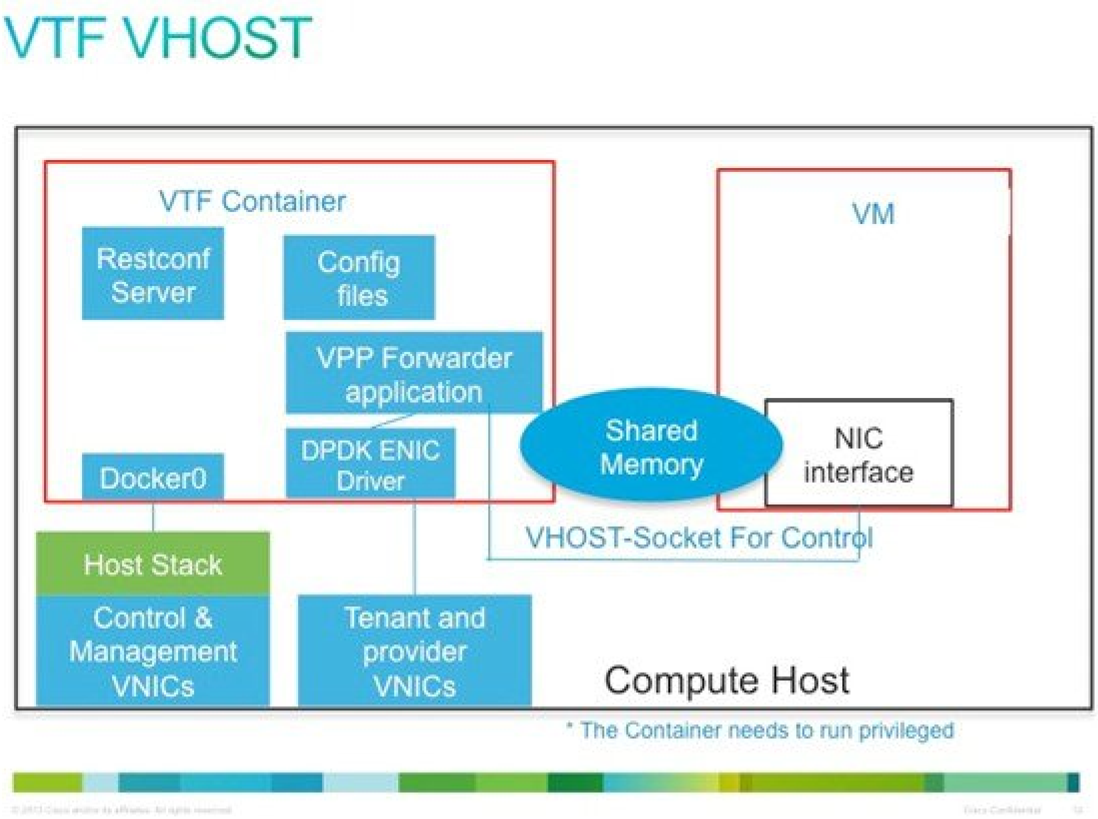
VTF uses remote plugin that binds into VPP using VPFA (VPF agent). The VPFA interacts with VPP application using low-level API. The VPFA exposes netconf or yang based API for remote devices to program the VTF through the VPFA.

VPP + VHOSTUSER

Vhost is a solution that allows the user space process to share a number of virtqueues directly with a Kernel driver. The transport mechanism in this case is the ability of the kernel side to access the user space application memory, and a number of ioeventfds and irqfds to serve as the kick mechanism. A QEMU guest uses an emulated PCI device, as the control plane to handle the QEMU. Once a virtqueue has been set up, the QEMU guest uses the Vhost API to pass direct control of a virtqueue to a Kernel driver.

In this model, a vhost_net driver directly passes the guest network traffic to a TUN device directly from the Kernel side, improving performance significantly.

Figure 26: VTF Vhost



In the above implementation, the guest NFV application directly writes packets into the TX rings, which are shared through a common vhost socket as the RX ring on the VPP. The VPP grabs these packets from the RX ring buffer and forwards the packets using the vector graphs it maintains.

Virtual Topology System High Availability

The Virtual Topology System solution is designed to support redundancy, with two solution instances running on separate hosts in an active-standby configuration.

During the initial setup, each instance is configured with an underlay IP address and a virtual IP address. Virtual Router Redundancy Protocol (VRRP) is used between the instances to determine the active instance.

The data from the active-instance is synchronized with the standby instance after each transaction to ensure consistency of the Control Plane information to accelerate failover after a failure. BGP peering is established from both VTS instances for the distribution of tenant-specific routes. During the switchover, you must perform a Nonstop Forwarding (NSF) and a graceful restart to ensure that services are not disrupted.

For more information on setting up high availability, refer to the *Installing VTS in the High Availability Mode* section of the *Cisco VTS 2.6.2.1 Installation Guide*.

CHAPTER 12

Managing Backup and Restore Operations

The following topics describe Cisco NFVI management node backup and restore operations.

Managing Backup and Restore Operations

The management node hosts critical services such as Cisco VIM REST API, Cobbler for PXE, ELK for Logging/Kibana dashboard, and VMTP for the cloud validation in Cisco VIM.

The management node is not redundant during the initial Cisco VIM offering, hence it is recommended to take backup of the management node. Using the saved management node information, you can restore the management node if you are facing any issues with the platform.

Backing Up the Management Node

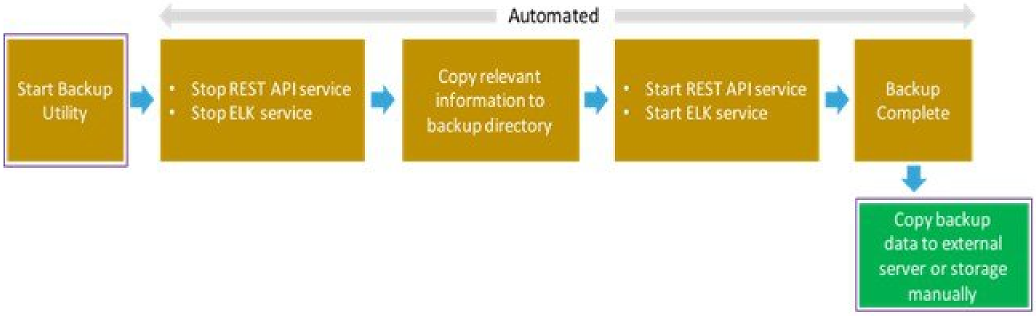
An administrator must maintain the number of backup snapshots on the management node. The backup of the management node is possible only after complete deployment of at least one Cisco VIM. Two copies of backup folders are maintained at the management node itself and the older copy will be overwritten when a next backup is performed.

During the backup operation, activities such as pod management, software update or upgrade, and addition or deletion or replacement of nodes cannot be performed.

The REST API and ELK services are stopped during the backup operation, the OpenStack Logs are cached on the control, compute, and storage nodes until the restoration of the management node is completed.

As part of the backup operation, two files are created: .backup_files and .backup_hash. .backup_files is a list of files that are backed up, while the second one is the hash. These two files are placed under the backup folder /var/cisco/backup_<tag>_<date-time> at the management node and also at the /var/cisco/ folder of all three controllers. These two files are used during the restore validation. When you attempt to restore from a particular backup, these two files within this backup are compared to the files that are kept in the controllers. If there is any discrepancy, the restore validation fails and you are prompted to either terminate the restore operation or continue despite the validation failure. Only one copy of the .backup_files and .backup_hash are kept at the controllers, that is every time a new backup is created, these two files are overwritten with the most recent ones. Hence the restore validation passes only when the latest backup is used for restore.

Figure 27: Cisco NFVI Management Node Backup Operation



Before you begin

- Save the management node information (for example, IP address of the management node) for use during the restore operation.
- Ensure that you have the br_mgmt and br_api IP addresses and respective network information.

Step 1 Launch a SSH session to the Cisco NFVI management node.

Step 2 Navigate to the `<installer-ws>/tools/mgmt/` directory.

Step 3 Execute **mgmt_node_backup.py**.

What to do next

The backup operation takes approximately 30 minutes and creates the `backup_<tag>_<date-time>` directory in the `/var/cisco/` path.

Copy the directory to a remote server, to recover the management node using rsync.

For example, to copy the backup directory to the remote server `20.0.0.5 /var/cisco/directory`, execute the following command sequence:

```
# autobackup triggered as part of POD management operation
rsync -e ssh -go -rtvpX --numeric-ids /var/cisco/autobackup_<version>_<date-time>
root@20.0.0.5:/var/cisco/
# manual backup triggered by admin
rsync -e ssh -go -rtvpX --numeric-ids /var/cisco/backup_<version>_<date-time>
root@20.0.0.5:/var/cisco/
```

Note On the remote server, protect the backup directory for any unauthorized access as the backup files may contain sensitive information. To preserve the file ownership and Linux markings, run as **root** to sync the remote server. The remote server must run RHEL or CentOS 7.x, so that no permission or markings are lost.

At the remote server, change directory to where the backup directory is copied to; in this example /var/cisco/backup_<version>_<date-time>/.

To verify if the backup is not corrupted or modified, execute **./check_integrity**.

Check_integrity depends on the following packages, the packages are installed on the server where check_integrity is executed.

```
python-prettytable
python-jinja2
python-babel
python-markupsafe
python-setuptools
pytz
```

Backup with Forwarding ELK Logs to External Syslog Server

When the feature Forwarding ELK Logs to External Syslog Server is enabled, during the backup process, in both the autobackup and manual backup, the ELK Logs are not collected. For manual backups, you can override by appending the -a or --add-elk option to the backup command. The -s or --skip-elk option is to skip the ELK Logs collection regardless of the forwarding feature is enabled or not.

```
# cd installer/tools/mgmt
# ./mgmt_node_backup.py --help
Usage:  ./mgmt_node_backup.py [options]
Options:
    -h, --help      show this help message and exit
    -s, --skip-elk  do not collect ELK logs during backup
    -a, --add-elk   force to also collect ELK logs on backup
```

Backing Up VIM UM

Administrator maintains the backup for Unified Management on the management node. The backup of the Unified Management is done only after the complete deployment of the Unified Management bootstrap. Only two copies of backup directory are maintained at the management node. The older copy is overwritten when a next Unified Management backup or autobackup takes place.

Unified Management backup is stored at the default backup location /var/cisco/insight_backup/insight_backup_<release_tag>_<date>_<time>. If you want to take a backup of Unified Management at a different location use -backupdir/-b option from bootstrap_insight; details of which are provided later in this section.

Unified Management UI triggers an autobackup whenever it detects an operation relating to MySQL database entry to preserve the latest state of Unified Management.

Note Unified Management backup is not allowed after an update. Update is an intermediate stage between rollback and commit. Any change that is made relating to MySQL database entry after an update from UM UI is not backed up.

Autobackup Unified Management

If there is a change, Unified Management Installation automatically run a daemon process to take the autobackup.

Live status of the process is determined by checking the log located at "/var/log/insight/insight_autobackup/insight_autobackup.logs" or systemctl status insight-autobackup.

Note Max of 10-log files of size 1024*1024 are maintained in the directory.

Following are the scenarios where autobackup is initiated:

Unified Management Operation	Auto-backup Performed
Adding or Deleting POD	Yes
Changing POD REST Password and Certificate	Yes
Add/Edit/Delete all types of users	Yes
Add/Edit/Delete Roles	Yes
Modify User and Role association	Yes
Revoking or Adding user permission	Yes
Log in or Logout	No
Context Switching	No
Change User Password	Yes

Step 1 To check the status of the Unified Management perform the following steps:

```
systemctl status insight-autobackup
insight-autobackup.service - Insight Autobackup Service
   Loaded: loaded (/usr/lib/systemd/system/insight-autobackup.service; enabled; vendor preset:
disabled)
   Active: active (running) since Wed 2017-08-30 01:17:18 PDT; 19s ago
 Main PID: 19949 (python)
   Memory: 12.4M
   CGroup: /system.slice/insight-autobackup.service
           └─19949 /usr/bin/python /root/<installer-tag>/insight/playbooks/../insight_autobackup.py
```

Step 2 To stop Unified Management autobackup do the following:

```
systemctl stop insight-autobackup
insight-autobackup.service - Insight Autobackup Service
   Loaded: loaded (/usr/lib/systemd/system/insight-autobackup.service; enabled; vendor preset:
disabled)
   Active: inactive (dead) since Mon 2017-09-04 00:43:43 PDT; 5s ago
  Process: 19993 ExecStop=/bin/kill ${MAINPID} (code=exited, status=0/SUCCESS)
 Main PID: 19984
   Memory: 56.0K
   CGroup: /system.slice/insight-autobackup.service
```

Step 3 The following are the steps to start Unified Management autobackup:

```
systemctl start insight-autobackup
insight-autobackup.service - Insight Autobackup Service
   Loaded: loaded (/usr/lib/systemd/system/insight-autobackup.service; enabled; vendor preset:
disabled)
   Active: active (running) since Wed 2017-08-30 01:17:18 PDT; 19s ago
 Main PID: 19949 (python)
   Memory: 12.4M
   CGroup: /system.slice/insight-autobackup.service
           └─19949 /usr/bin/python /root/<installer-tag>/insight/playbooks/../insight_autobackup.py
```

Step 4 The way Unified Management works is as follows:

a. **Install**

- As soon as galera db and Unified Management containers are up the script will be invoked.
- Log dir : tailf /var/log/insight/insight_autobackup_logs/insight_autobackup.log.
- It has a 10-seconds pulse which tells if the service is up or not.
  - [2017-09-04 00:49:01,504] INFO [Insight Autobackup] Insight Autobackup Service Running.
  - [2017-09-04 00:49:11,514] INFO [Insight Autobackup] Insight Autobackup Service Running.
  - [2017-09-04 00:49:21,525] INFO [Insight Autobackup] Insight Autobackup Service Running.
- If there is any change it takes a backup (time to check Sql diff is 30 seconds).
- It creates "rbac_latest.sql" and "insight_latest.tar.gz" and dump in the latest backup dir.
- During restore the bootstrap script checks if "rbac_latest.sql" or "insight_latest.tar.gz" is present in the backup dir.

b. **Update**

- During update bootstrap insight does not support backup.
- Autobackup service would be terminated and no backup would be maintained in the intermediate state.

c. **Rollback**

- Script are invoked again from the previous workspace.

d. **Commit**

- Script are invoked again from the new workspace.

e. **Uninstall**

- Service files are deleted.
- Log directory remains as the same.

Back Up Unified Management at Default Back Up Location

Step 1 Launch an SSH session to Cisco Unified Management management node and follow steps:

```
 # cd <insight-ws>
#./bootstrap_insight.py –help

usage: bootstrap_insight.py [-h]  --action ACTION
                            [--regenerate_secrets] [--setpassword]
                            [--file INSIGHTSETUPDATA] [--keep] [--verbose]
                            [--backupdir BACKUPDIR] [-y]

Insight install setup helper.
optional arguments:
  -h, --help            show this help message and exit
  --action ACTION, -a ACTION
                        install - Install Insight UI
                        install-status - Display Insight Install Status
reconfigure - Reconfigure Insight DB password or TLS                    Certificate
                        update - Update Insight UI
                        update-status - Display Insight Update Status
                        rollback - Rollback Insight UI update
                        commit - Commit Insight UI update
                        backup - Backup Insight UI
                        uninstall - Uninstall Insight UI
  --regenerate_secrets, -r
                        System generated INSIGHT_DB_PASSWORD
  --setpassword, -s     User supplied INSIGHT_DB_PASSWORD,
  --file INSIGHTSETUPDATA, -f INSIGHTSETUPDATA
                        Location of insight_setup_data.yaml
  --keep, -k            Preserve Insight artifacts during uninstall
  --verbose, -v         Verbose on/off
  --backupdir BACKUPDIR, -b BACKUPDIR
                        Path to backup Insight
  -y, --yes             Option to skip reconfigure or uninstall steps without prompt
```

Step 2 Run the bootstrap command to view the Cisco VIM Unified Management backup details:

```
# ./bootstrap_insight.py –a backup
VIM Insight backup logs are at: /var/log/insight/<bootstrap_insight_<date>_<time>.log

Cisco VIM Insight backup Info!
+----------------------+-------+-------------------------------------------------------------------+
| Description          | Status| Details
|
+----------------------+-------+-------------------------------------------------------------------+
| Insight backup Status| PASS  | Backup done @
|
|                      |       | /var/cisco/insight_backup/insight_backup_<release_tag>_<date_time>|
+----------------------+-------+-------------------------------------------------------------------+
Done with VIM Insight backup!
```

Backup Unified Management at User-defined Backup Location

Step 1 Launch a SSH session to Cisco Unified Management management node and follow the below steps:

```
# cd <insight-ws>
#./bootstrap_insight.py –help
usage: bootstrap_insight.py [-h]  --action ACTION
                            [--regenerate_secrets] [--setpassword]
                            [--file INSIGHTSETUPDATA] [--keep] [--verbose]
                            [--backupdir BACKUPDIR] [-y]

Insight install setup helper.
optional arguments:
  -h, --help            show this help message and exit
  --action ACTION, -a ACTION
                        install - Install Insight UI
                        install-status - Display Insight Install Status
reconfigure - Reconfigure Insight DB password or TLS                    Certificate
                        update - Update Insight UI
                        update-status - Display Insight Update Status
                        rollback - Rollback Insight UI update
                        commit - Commit Insight UI update
                        backup - Backup Insight UI
                        uninstall - Uninstall Insight UI
  --regenerate_secrets, -r
                        System generated INSIGHT_DB_PASSWORD
  --setpassword, -s     User supplied INSIGHT_DB_PASSWORD,
  --file INSIGHTSETUPDATA, -f INSIGHTSETUPDATA
                        Location of insight_setup_data.yaml
  --keep, -k            Preserve Insight artifacts during uninstall
  --verbose, -v         Verbose on/off
  --backupdir BACKUPDIR, -b BACKUPDIR
                        Path to backup Insight
  -y, --yes             Option to skip reconfigure or uninstall steps without prompt
```

Step 2 Run the following command to view the Cisco VIM Unified Management backup details:

```
# ./bootstrap_insight.py –a backup --backupdir <user_defined_path>
VIM Insight backup logs are at: /var/log/insight/<bootstrap_insight_<date>_<time>.log

Cisco VIM Insight backup Info!
+-----------------------+--------+----------------------------------------------------------+
| Description           | Status | Details                                                  |
+-----------------------+--------+----------------------------------------------------------+
| Insight backup Status | PASS   | Backup done @ <user_defined_path>                        |
|                       |        |                                                          |
+-----------------------+--------+----------------------------------------------------------+
 Done with VIM Insight backup!
```

What to do next

Copy the backup directory to a remote server using rsync to recover the Insight later. Cisco recommends you to copy backup directory using rsync as it preserves the permissions of the files.

For example, to copy the backup directory to the remote server `20.0.0.5 /var/cisco/insight_backup/directory`, execute the following command sequence: .

```
rsync -e ssh -go -rtvpX --numeric-ids
/var/cisco/insight_backup/insight_backup_2.1.5_2017-01-09_14-04-38
root@20.0.0.5:/var/cisco/insight_backup/
```

On the remote server, protect the backup directory for any unauthorized access, as the backup files may contain sensitive information

Restoring Management Node

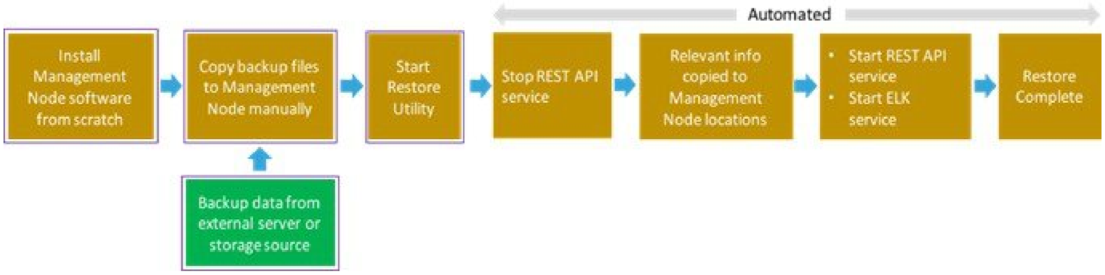
You have to reimage the management node with the running Cisco VIM release ISO version when the backup is performed, before initiating the restore operation. The restoration fails, when there is a version mismatch.

Note Version checking is available only for offline installation.

As part of the restore operation, system checks for the management node's IP address information to match the prior configuration. Logs are cached on the control, compute, and storage nodes from the moment of the management node fails until its restoration.

If you are using Cisco VIM Unified Management (in Tech Preview), in the same management node, you have to rebootstrap it for installation. During installation, RBAC and Pod registration information is lost, hence it is advised to make a note of the RBAC and Pod information.

Figure 28: Cisco NFVI Management Node Restore Operation


Automated
Install Management Node software from scratch
Copy backup files to Management Node manually
Start Restore Utility
Stop REST API service
Relevant info copied to Management Node locations
• Start REST API service
• Start ELK service
Restore Complete
Backup data from external server or storage source

Before you begin

Ensure that you have the br_mgmt and br_api IP addresses of the failed management node.

Step 1 Reimage the management node with the ISO version with which you want to restore the node, and with the same IP address that is used before the failure of the node.

Step 2 Navigate to /var/cisco/directory at the remote server where the backup folder is copied during the backup operation. Execute **./check_integrity** to verify if the backup is not corrupted or modified.

Step 3 Copy the backup file to the `/var/cisco/directory` of the reimaged management node.

For example, to copy the backup folder from the remote host 20.0.0.5 to the management node /var/cisco/directory, execute the following command sequence:

```
rsync -e ssh -go -rtvpX --numeric-ids root@20.0.0.5:/var/cisco/backup_2017-01-09_14-04-38 /var/cisco/
```

Step 4 Navigate to the backup folder and execute the following command to verify if the backup is not corrupted or modified.

```
# cd /var/cisco/backup_<date-time>
# ./check-integrity
```

Step 5 In /var/cisco/backup_<date-time> folder, execute the following command:

```
/var/cisco/backup_<date-time> # ./restore
```

The restore operation takes around 45 minutes.

Step 6 Before restoration, the restore script performs validation of the backup folder. If validation fails, restore operation is halted and an error message is displayed. The script also verifies the last performed backup folder in the Management Node, and if any defects are detected, the you does confirm to proceed with restore operation.

```
 …
2017-02-02 21:25:23 INFO Starting Cisco VIM restore...
 2017-02-02 21:25:23 INFO Cisco VIM restore: estimated run time is approx. 45 mins...
 2017-02-02 21:25:23 INFO Please see progress log for restore at
/var/log/mercury/installer/restore_2017-02-02_21:25:23.log
 2017-02-02 21:25:27 ERROR Error: Backup id is not the one expected
 Error: Found hashID file only in controller(s): j10-controller-2, j10-controller-3
 Management backup files are ok (as per j10-controller-2)
 Management backup files are ok (as per j10-controller-3)
 The management node changed after the last backup was stored. Do you still want to proceed restoring
 this management node? [Y/n] y
 2017-02-02 22:17:55 INFO Workspace restored to /root/installer-6518
 2017-02-02 22:17:55 INFO Cisco VIM restore: Executing restore playbook ...
 2017-02-02 22:18:47 INFO Cisco VIM restore: Executing bootstrap playbook ...
```

Note The default behavior is to continue by keying **Return** or **Y**. Keying **N** terminates the restore operation.

```
 …
2017-02-02 21:25:23 INFO Starting Cisco VIM restore...
2017-02-02 21:25:23 INFO Cisco VIM restore: estimated run time is approx. 45 mins...
2017-02-02 21:25:23 INFO Please see progress log for restore at
/var/log/mercury/installer/restore_2017-02-02_21:25:23.log
2017-02-02 21:25:27 ERROR Error: Backup id is not the one expected
Error: Found hashID file only in controller(s): j10-controller-2, j10-controller-3
Management backup files are ok (as per j10-controller-2)
Management backup files are ok (as per j10-controller-3)
The management node changed after the last backup was stored. Do you still want to proceed restoring
 this management node? [Y/n] n
 Aborting the restore operation as per user request
```

Once, restore operation ends, several health check points are automatically executed and the summary of results for that particular cloud avaliability is displayed.

Step 7 Run the following checks manually to verify the status of the restore:

- Check the status of the REST API server:

```
# cd installer-<tagid>/tools
#./restapi.py -a status
Status of the REST API Server: active (running) since Thu 2016-08-18 09:15:39 UTC; 9h ago
REST API launch directory: /root/installer-<tagid>/
```

- Check the setup_data and runtime consistency of the management node:

```
# cd installer-<tagid>/; ciscovim run --perform 1,3 -y
```

- Execute the cloud sanity using ciscovim command:

```
#ciscovim cloud-sanity create test all
```

- To view the results of cloud sanity, use the command `#ciscovim cloud-sanity show result all -id <uid of the test >`

Management Node Autobackup

After the successful completion of certain Pod management operations, a backup of the management node is performed automatically. Only one copy of the autobackup folder is kept at /var/cisco/ at any given time. Directory format for the autobackup_<tag>_<timestamp>.

Following are the list of operations:

- Fresh install of Cisco VIM
- Commit an update
- Replace controller
- Add or Remove compute nodes
- Add or Remove the storage node
- Reconfigure
- CVIM-MON

Enabling or disabling the variable autobackup, is defined in the setup_data.yaml file. It is enabled by default.

Add the following setup-data.yaml file snippet:

```
#####################################################
# AutoBackup configuration
#####################################################
#Default is True
#autobackup: True or False
```

The following tables shows when an auto-backup is performed during update or rollback or commit.

POD operation	Autobackup performed
Update	No
Rollback	No
Commit	Yes
Update fail with auto rollback	No

After creating a successful autobackup folder, you can copy it to an external server for later restoration as mentioned in Restoring Management Node, on page 456.

During the autobackup, if **Forwarding ELK Logs to the External Syslog server** option is enabled, the ElasticSearch database will not be maintained and the ELK Logs will not be recovered after restoring the management node.

Managing Cisco VIM Software Hub

Cisco VIM Software Hub helps mitigate the need to ship USBs across different pods during installing or updating Cisco VIM. To ensure the long-term viability of Cisco VIM Software Hub, it is designed to handle the following Day 2 scenarios:

- Updating Cisco VIM Software Hub TLS Certificate and Registry Credentials, on page 459
- Cisco VIM Software Hub Server Backup and Restore, on page 459
- Resolving Low Disk Space, on page 461
- Manually Updating Packages, on page 462

Updating Cisco VIM Software Hub TLS Certificate and Registry Credentials

Before installing the release artifacts from the Cisco VIM Software Hub server, you must provide a valid TLS certificate and Cisco VIM Software Hub registry credentials in the `sds_setup_data.yaml` file. Taking into account the security policies of an organization, Cisco VIM Software Hub allows you to update the TLS certificate and registry credentials on the Cisco VIM Software Hub server as required.

Step 1 Navigate to the last installed release workspace using the **ls –lrt** command.

Step 2 Replace the TLS certificate in the `openstack-configs` directory.

Step 3 Modify the credentials in the `sds_setup_data.yaml` file.

Step 4 Run the following command for the changes to take effect:

```
# cd /root/cvim_sds-<last-tag> # directory of last installed release and execute the following command.
```

```
# ./sds_runner/runner.py
```

This operation validates the changes in the `sds_setup_data.yaml` file and the new TLS certificate. It reconfigures the Cisco VIM Software Hub server components with this new information.

Note The Cisco VIM Software Hub registry credentials of the pods that rely on Cisco VIM Software Hub are also reconfigured.

Cisco VIM Software Hub Server Backup and Restore

Cisco VIM Software Hub triggers an autobackup operation when a new Cisco VIM release is installed on the Cisco VIM Software Hub server. It takes a backup of the relevant files from the Cisco VIM Software Hub server, and saves it in the following location on the Cisco VIM Software Hub server:

```
directory /var/cisco/autobackup_<tag>_<date-time>
```

Only the latest two backup directories are maintained on Cisco VIM Software Hub. The older copy is overwritten when the next autobackup operation is triggered. If you want to use an older backup directory for a restore operation later, you need to save it to another location before it is overwritten. You can use the **rsync** or **scp** commands to save it to an RHEL7/CentOS based system, which is outside the Cisco VIM Software Hub server.

Checking Integrity of Autobackup Files

You can use the script provided in the autobackup directory to check the integrity of the autobackup files after using the **rsync** or **scp** commands.

Before you begin

Ensure that the following packages are installed on the backup server using yum:

- python-prettytable
- python-jinja2
- python-babel
- python-markupsafe
- python-setuptools
- pytz

Step 1 Navigate to the autobackup directory.

Step 2 Execute the following command to run the script:

```
# ./check_integrity
```

Restoring Cisco VIM Software Hub from Backup

An Cisco VIM Software Hub restore operation is usually performed when the original Cisco VIM Software Hub server is being replaced by a new one.

Step 1 Re-image the Cisco VIM Software Hub server with the ISO version with which you want to restore the node, and with the same IP address that is used before the failure of the node.

Step 2 Navigate to the location where the backup directory is copied during the backup operation.

Step 3 Verify the integrity of the backup files as described in Checking Integrity of Autobackup Files, on page 460.

Step 4 Copy the backup file to the directory of the re-imaged Cisco VIM Software Hub node.

For example, you can copy the backup directory from the remote host 20.0.0.5 to the Cisco VIM Software Hub node directory `/var/cisco/` as follows:

```
rsync -e ssh -go -rtvpX --numeric-ids root@20.0.0.5:/var/cisco/autobackup_2017-01-09_14-04-38
/var/cisco/
```

Step 5 Navigate to the backup directory and execute the following command to verify if the backup is not corrupted or modified.

```
# cd /var/cisco/autobackup_<tag>_<date-time>
# ./check-integrity
```

Step 6 In the `/var/cisco/autobackup_<tag>_<date-time>` directory, execute the following commands:

```
# cd /var/cisco/backup_<date-time>
# ./restore
```

It may take about 45 minutes for the restore operation to complete.

Note Before restoring a backup directory, the restore script validates the backup directory. If the validation fails, the restore operation is interrupted and an error message is displayed. The restore script also verifies the latest backup directory in the Cisco VIM Software Hub Node. If defects are detected, you need to confirm whether you want to proceed with the restore operation.

For example:

```
2017-02-02 21:25:23 INFO Starting Cisco VIM restore...
2017-02-02 21:25:23 INFO Cisco VIM restore: estimated run time is approx. 45 mins...
2017-02-02 21:25:23 INFO Please see progress log for restore at
 /var/log/mercury/installer/restore_2017-02-02_21:25:23.log
2017-02-02 21:25:27 ERROR Error: Backup id is not the one expected
Error: Found hashID file only in controller(s): j10-controller-2, j10-controller-3 Management backup
 files are ok (as per j10controller-2)
Management backup files are ok (as per j10-controller-3)
The management node changed after the last backup was stored. Do you still want to proceed restoring
 this management node? [Y/n] y
2017-02-02 22:17:55 INFO Workspace restored to /root/installer-6518
2017-02-02 22:17:55 INFO Cisco VIM restore: Executing restore playbook ...
2017-02-02 22:18:47 INFO Cisco VIM restore: Executing bootstrap playbook ...
```

Note To continue the restore operation, you can press the **`Enter`** key or the **`Y`** key. If you want to abort the restore operation, you need to press the **`N`** key.

```
2017-02-02 21:25:23 INFO Starting Cisco VIM restore...
2017-02-02 21:25:23 INFO Cisco VIM restore: estimated run time is approx. 45 mins...
2017-02-02 21:25:23 INFO Please see progress log for restore at
/var/log/mercury/installer/restore_2017-02-02_21:25:23.log
2017-02-02 21:25:27 ERROR Error: Backup id is not the one expected
Error: Found hashID file only in controller(s): j10-controller-2, j10-controller-3 Management backup
 files are ok (as per j10controller-2)
Management backup files are ok (as per j10-controller-3)
The management node changed after the last backup was stored. Do you still want to proceed restoring
 this management node? [
Y/n] n
Aborting the restore operation as per user request
```

Resolving Low Disk Space

Installing releases on Cisco VIM Software Hub server is not allowed, if the free disk space is less than 20%. Hence, a utility to remove docker images from the container registry running on the Cisco VIM Software Hub server is provided. You can find the cleanup script at the following location:

```
/root/cvim_sds-<last-tag>/sds/registry_cleanup.py
```

Example of running the cleanup script:

```
# ./registry_cleanup.py -h
usage: registry_cleanup.py [-h] (--list | --delete DELETE | --unused_tags)
                           [-u USERNAME] [-p PASSWORD] [-r REGISTRY]

List/Delete image tags in the registry

optional arguments:
   -h, --help                Show this help message and exit
   --list                        List Image Tags in Registry
--delete DELETE      Delete Images of provided tags from registry
   --unused_tags         List unused Tags in SDS registry
   -u USERNAME, --username USERNAME
                         Registry Username
   -p PASSWORD, --password PASSWORD
                         Registry Password
-r REGISTRY, --registry REGISTRY
                         Registry URL
```

The cleanup script requires three mandatory parameters, namely, Registry URL, Registry username, and Registry password. The script supports the following three options:

- **List Image Tags**–The option lists all the images and corresponding tags present in the docker registry.
- **Unused Tags**–This option lists all the releases present on the Cisco VIM Software Hub server but are not used by any of the Cisco VIM pods. By default, the pods are registered with the Cisco VIM Software Hub server. When a pod is installed, updated, roll backed, or upgraded, the release information is sent to Cisco VIM Software Hub. You can use this command to identify the releases that can be safely removed from the Cisco VIM Software Hub server.
- **Delete Tags**–You can specify the releases that you want to remove from the docker registry. The script removes these images and frees the disk space.

A sample snippet of the command template is listed below:

```
#./registry_cleanup.py -u <username> -p <password> -r https://<sds_domian_name>/ --list
#./registry_cleanup.py -u <username> -p <password> -r https://<sds_domian_name>/ --delete
3.2.0
```

Manually Updating Packages

Cisco VIM Software Hub installs repositories inside docker containers so that all the packages to be installed are obtained from those repositories. These repositories are updated when you install a later version of Cisco VIM release on the Cisco VIM Software Hub server. Once the repositories are updated, all the packages, except httpd package and its dependencies are updated. Updating httpd is deferred because when httpd is updated, all downstream connections are disrupted thereby requiring you to restart the Cisco VIM pod install.

To update httpd and its dependent packages, you can use the update script found in the tools directory. Ensure that you run this script during the maintenance phase so that non of the Cisco VIM pods are currently attempting to get artifacts from the Cisco VIM Software Hub server.

Run the following command to execute the update script:

```
# cd /root/cvim_sds-<last-tag> # directory of last installed release and execute the following
 command.
# ./update_httpd.sh
```

CHAPTER 13

Troubleshooting

The following topics describe various Cisco NFVI troubleshooting operations:

Displaying Cisco NFVI Node Names and IP Addresses

Complete the following steps to display the Cisco NFVI node names and IP addresses.

Step 1 Log into the Cisco NFVI build node.

Step 2 The openstack-configs/mercury_servers_info file displays the node name and the address as follows.

```
# more openstack-configs/mercury_servers_info Total nodes: 5
Controller nodes: 3
+------------------+--------------+--------------+--------------+-----------------+---------+
| Server | CIMC | Management | Provision | Tenant | Storage |
+------------------+--------------+--------------+--------------+-----------------+---------+
| test-c-control-1 | 10.10.223.13 | 10.11.223.22 | 10.11.223.22 | 169.254.133.102 | None |
| | | | | | |
| test-c-control-3 | 10.10.223.9  | 10.11.223.23 | 10.11.223.23 | 169.254.133.103 | None |



| | | | | | |
| test-c-control-2 | 10.10.223.10 | 10.11.223.24 | 10.11.223.24 | 169.254.133.104 | None |
| | | | | | |
+------------------+--------------+--------------+--------------+-----------------+---------+
Compute nodes: 2
+------------------+--------------+--------------+--------------+-----------------+---------+
| Server | CIMC |  Management | Provision | Tenant | Storage |
+------------------+--------------+--------------+--------------+-----------------+---------+
| test-c-compute-1 | 10.10.223.11 | 10.11.223.25 | 10.11.223.25 | 169.254.133.105 | None |
| | | | | | |
| test-c-compute-2 | 10.10.223.12 | 10.11.223.26 | 10.11.223.26 | 169.254.133.106 | None |
| | | | | | |
+
```

Note During the Cisco NFVI deployment, SSH public keys for each node are added to .../.ssh/authorized_keys, so you should be able to log in from the build node into each of the Cisco NFVI nodes without passwords. If, for some reason you do need account information, see the openstack-configs/secrets.yaml file on the build node.

Verifying Cisco NFVI Node Interface Configurations

Complete the following steps to verify the interface configurations of Cisco NFVI nodes:

Step 1 SSH into the target node, for example, one of the Cisco VIM controllers:

```
[root@mgmt-node~]# ssh root@control-server-1
[root@control-server-1 ~]#
```

Step 2 Enter the ip a command to get a list of all interfaces on the node:

```
[root@control-server-1 ~]# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN link/loopback 00:00:00:00:00:00
 brd 00:00:00:00:00:00
inet 127.0.0.1/8 scope host lo
valid_lft forever preferred_lft forever
2: enp8s0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP qlen 1000 link/ether
54:a2:74:7d:42:1d brd ff:ff:ff:ff:ff:ff
3: enp9s0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP qlen 1000 link/ether
54:a2:74:7d:42:1e brd ff:ff:ff:ff:ff:ff
4: mx0: <BROADCAST,MULTICAST,SLAVE,UP,LOWER_UP> mtu 1500 qdisc mq master mx state UP qlen 1000
link/ether 54:a2:74:7d:42:21 brd ff:ff:ff:ff:ff:ff
5: mx1: <BROADCAST,MULTICAST,SLAVE,UP,LOWER_UP> mtu 1500 qdisc mq master mx state UP qlen 1000
link/ether 54:a2:74:7d:42:21 brd ff:ff:ff:ff:ff:ff
6: t0: <BROADCAST,MULTICAST,SLAVE,UP,LOWER_UP> mtu 1500 qdisc mq master t state UP qlen 1000 link/ether
 54:a2:74:7d:42:23 brd ff:ff:ff:ff:ff:ff
7: t1: <BROADCAST,MULTICAST,SLAVE,UP,LOWER_UP> mtu 1500 qdisc mq master t state UP qlen 1000 link/ether
 54:a2:74:7d:42:23 brd ff:ff:ff:ff:ff:ff
8: e0: <BROADCAST,MULTICAST,SLAVE,UP,LOWER_UP> mtu 1500 qdisc mq master e state UP qlen 1000 link/ether
 54:a2:74:7d:42:25 brd ff:ff:ff:ff:ff:ff
9: e1: <BROADCAST,MULTICAST,SLAVE,UP,LOWER_UP> mtu 1500 qdisc mq master e state UP qlen 1000 link/ether
 54:a2:74:7d:42:25 brd ff:ff:ff:ff:ff:ff
10: p0: <BROADCAST,MULTICAST,SLAVE,UP,LOWER_UP> mtu 1500 qdisc mq master p state UP qlen 1000 link/ether
```

```
 54:a2:74:7d:42:27 brd ff:ff:ff:ff:ff:ff
11: p1: <BROADCAST,MULTICAST,SLAVE,UP,LOWER_UP> mtu 1500 qdisc mq master p state UP qlen 1000 link/ether
 54:a2:74:7d:42:27 brd ff:ff:ff:ff:ff:ff
12: a0: <BROADCAST,MULTICAST,SLAVE,UP,LOWER_UP> mtu 1500 qdisc mq master a state UP qlen 1000 link/ether
 54:a2:74:7d:42:29 brd ff:ff:ff:ff:ff:ff
13: a1: <BROADCAST,MULTICAST,SLAVE,UP,LOWER_UP> mtu 1500 qdisc mq master a state UP qlen 1000
```

```
link/ether 54:a2:74:7d:42:29 brd ff:ff:ff:ff:ff:ff
14: bond0: <BROADCAST,MULTICAST,MASTER> mtu 1500 qdisc noop state DOWN link/ether 4a:2e:2a:9e:01:d1
 brd ff:ff:ff:ff:ff:ff
15: a: <BROADCAST,MULTICAST,MASTER,UP,LOWER_UP> mtu 1500 qdisc noqueue master br_api state UP link/ether
 54:a2:74:7d:42:29 brd ff:ff:ff:ff:ff:ff
16: br_api: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP link/ether
54:a2:74:7d:42:29 brd ff:ff:ff:ff:ff:ff
17: e: <BROADCAST,MULTICAST,MASTER,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP link/ether
54:a2:74:7d:42:25 brd ff:ff:ff:ff:ff:ff
18: mx: <BROADCAST,MULTICAST,MASTER,UP,LOWER_UP> mtu 1500 qdisc noqueue master br_mgmt state UP
link/ether 54:a2:74:7d:42:21 brd ff:ff:ff:ff:ff:ff
19: br_mgmt: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP link/ether
54:a2:74:7d:42:21 brd ff:ff:ff:ff:ff:ff
inet 10.23.221.41/28 brd 10.23.221.47 scope global br_mgmt valid_lft forever preferred_lft forever
20: p: <BROADCAST,MULTICAST,MASTER,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP link/ether
54:a2:74:7d:42:27 brd ff:ff:ff:ff:ff:ff
21: t: <BROADCAST,MULTICAST,MASTER,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP link/ether
54:a2:74:7d:42:23 brd ff:ff:ff:ff:ff:ff
inet 17.16.3.8/24 brd 17.16.3.255 scope global t valid_lft forever preferred_lft forever
22: docker0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc noqueue state DOWN link/ether
02:42:70:f6:8b:da brd ff:ff:ff:ff:ff:ff
inet 172.17.42.1/16 scope global docker0 valid_lft forever preferred_lft forever
24: mgmt-out@if23: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast master br_mgmt state
 UP qlen 1000
link/ether 5a:73:51:af:e5:e7 brd ff:ff:ff:ff:ff:ff link-netnsid 0
26: api-out@if25: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast master br_api state UP
 qlen 1000
link/ether 6a:a6:fd:70:01:f9 brd ff:ff:ff:ff:ff:ff link-netnsid 0
```

Displaying Cisco NFVI Node Network Configuration Files

Complete the following steps to view a Cisco NFVI node network configuration files:

Step 1 SSH into the target node, for example, one of the Cisco VIM controllers:

```
[root@mgmt-node~]# ssh root@control-server-1
[root@control-server-1 ~]#
```

Step 2 List all of the network configuration files in the /etc/sysconfig/network-scripts directory, for example:

```
[root@control-server-1 ~]# ls /etc/sysconfig/network-scripts/
ifcfg-a        ifcfg-enp15s0  ifcfg-mx0    ifdown-ib        ifup          ifup-ppp
ifcfg-a0       ifcfg-enp16s0  ifcfg-mx1    ifdown-ippp      ifup-aliases  ifup-routes
ifcfg-a1       ifcfg-enp17s0  ifcfg-p      ifdown-ipv6      ifup-bnep     ifup-sit
ifcfg-br_api   ifcfg-enp18s0  ifcfg-p0     ifdown-isdn      ifup-eth      ifup-Team
ifcfg-br_mgmt  ifcfg-enp19s0  ifcfg-p1     ifdown-post      ifup-ib       ifup-TeamPort
ifcfg-e        ifcfg-enp20s0  ifcfg-t      ifdown-ppp       ifup-ippp     ifup-tunnel
ifcfg-e0       ifcfg-enp21s0  ifcfg-t0     ifdown-routes    ifup-ipv6     ifup-wireless
```

```
ifcfg-e1       ifcfg-enp8s0   ifcfg-t1     ifdown-sit       ifup-isdn     init.ipv6-global
ifcfg-enp12s0  ifcfg-enp9s0   ifdown       ifdown-Team      ifup-plip     network-functions
ifcfg-enp13s0  ifcfg-lo       ifdown-bnep  ifdown-TeamPort  ifup-plusb    network-functions-ipv6
ifcfg-enp14s0  ifcfg-mx       ifdown-eth   ifdown-tunnel    ifup-post
```

Viewing Cisco NFVI Node Interface Bond Configuration Files

Complete the following steps to view the Cisco NFVI node interface bond configuration files:

Step 1 SSH into the target node, for example, one of the Cisco VIM controllers:

```
[root@mgmt-node~]# ssh root@control-server-1
[root@control-server-1 ~]#
```

Step 2 List all of the network bond configuration files in the /proc/net/bonding/ directory:

```
[root@control-server-1 ~]# ls /proc/net/bonding/
a  bond0  e  mx  p  t
```

Step 3 To view more information about a particular bond configuration, enter:

```
[root@control-server-1 ~]# more /proc/net/bonding/a
Ethernet Channel Bonding Driver: v3.7.1 (April 27, 2011)

Bonding Mode: load balancing (xor)
Transmit Hash Policy: layer3+4 (1)
MII Status: up
MII Polling Interval (ms): 100
Up Delay (ms): 0
Down Delay (ms): 0

Slave Interface: a0
MII Status: up
Speed: 10000 Mbps
Duplex: full
Link Failure Count: 1
Permanent HW addr: 54:a2:74:7d:42:29
Slave queue ID: 0

Slave Interface: a1
MII Status: up
Speed: 10000 Mbps
Duplex: full
Link Failure Count: 2
Permanent HW addr: 54:a2:74:7d:42:2a
Slave queue ID: 0
```

Viewing Cisco NFVI Node Route Information

Complete the following steps to view Cisco NFVI node route information. Note that this is not the HAProxy container running on the controller. The default gateway should point to the gateway on the management network using the br_mgmt bridge.

Step 1 SSH into the target node, for example, one of the Cisco VIM controllers:

```
[root@mgmt-node~]# ssh root@control-server-1
[root@control-server-1 ~]#
```

Step 2 View the routing table (verify the default gateway) of the Cisco NFVI node:

```
[root@control-server-1 ~]# route -n
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
0.0.0.0         10.23.221.33    0.0.0.0         UG    0      0        0 br_mgmt
10.23.221.32    0.0.0.0         255.255.255.240 U     0      0        0 br_mgmt
17.16.3.0       0.0.0.0         255.255.255.0   U     0      0        0 t
169.254.0.0     0.0.0.0         255.255.0.0     U     1016   0        0 br_api
169.254.0.0     0.0.0.0         255.255.0.0     U     1017   0        0 e
169.254.0.0     0.0.0.0         255.255.0.0     U     1019   0        0 br_mgmt
169.254.0.0     0.0.0.0         255.255.0.0     U     1020   0        0 p
169.254.0.0     0.0.0.0         255.255.0.0     U     1021   0        0 t
172.17.0.0      0.0.0.0         255.255.0.0     U     0      0        0 docker0
```

Viewing Linux Network Namespace Route Information

Complete the following steps to view the route information of the Linux network namespace that the HAProxy container uses on a Cisco NFVI controller node. The default gateway must point to the gateway on the API network using the API interface in the Linux network namespace.

Step 1 SSH into the target node. For example, one of the Cisco VIM controllers:

```
[root@mgmt-node~]# ssh root@control-server-1
[root@control-server-1 ~]#
```

Step 2 Enter the **`ip netns`** command to find the name of the network namespace:

```
[root@control-server-2 ~]# ip netns 17550 (id: 0)
```

Step 3 Enter the **`ip netns exec`** command to view the routing table (verify the default gateway) of the Linux network namespace:

```
[root@control-server-2 ~]# ip netns exec 17550 route -n
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
0.0.0.0         172.29.86.1     0.0.0.0         UG    0      0        0 api
10.23.221.32    0.0.0.0         255.255.255.240 U     0      0        0 mgmt
172.29.86.0     0.0.0.0         255.255.255.0   U     0      0        0 api
```

Pre-checks for Storage Removal Operation

Upon completion of the pod management operations like add-storage, you need to ensure that any subsequent operation such as remove-storage is done on the same storage node after accounting for all of the devices and their corresponding OSDs have been marked in the persistent crush map as shown in the output of the ceph osd crush tree.

Execute the following command on the storage node where a remove-storage pod operation is performed, to get a list of all the devices configured for ceph osds:

```
[root@storage-3 ~]$ df | grep -oh ceph-[0-9]*
[root@storage-3 ~]$ df | grep -oh ceph-[0-9]*
ceph-1
ceph-5
ceph-7
ceph-10
```

Login to any of the controller nodes and run the following commands within the ceph mon container:

```
$ cephmon
$ ceph osd crush tree
```

From the json output, locate the storage node to be removed and ensure all of the devices listed for ceph osds have corresponding osd entries for them by running the following commands:

```
{
                "id": -3,
                "name": "storage-3",
                "type": "host",
                "type_id": 1,
                "items": [
                    {
                        "id": 1,
                        "name": "osd.1",
                        "type": "osd",
                        "type_id": 0,
                        "crush_weight": 1.091095,
                        "depth": 2
                    },
                    {
                        "id": 5,
                        "name": "osd.5",
                        "type": "osd",
                        "type_id": 0,
                        "crush_weight": 1.091095,
                        "depth": 2
                    },
                    {
                        "id": 7,
                        "name": "osd.7",
                        "type": "osd",
                        "type_id": 0,
                        "crush_weight": 1.091095,
                        "depth": 2
                    },
                    {
                        "id": 10,
                        "name": "osd.10",
                        "type": "osd",
                        "type_id": 0,
                        "crush_weight": 1.091095,
                        "depth": 2
                    }
                ]
            },
```

Note If ToR_TYPE is Cisco NCS 5500, you must manually remove all the sub-interfaces that were manually configured on the NCS switch, as Cisco VIM automation does not unconfigure/configure the sub-interfaces for which the VLANs were not defined in the setup_data.yaml. If manual removal of sub-interface is not done, remove-compute operation is initiated.

Troubleshooting Cisco NFVI

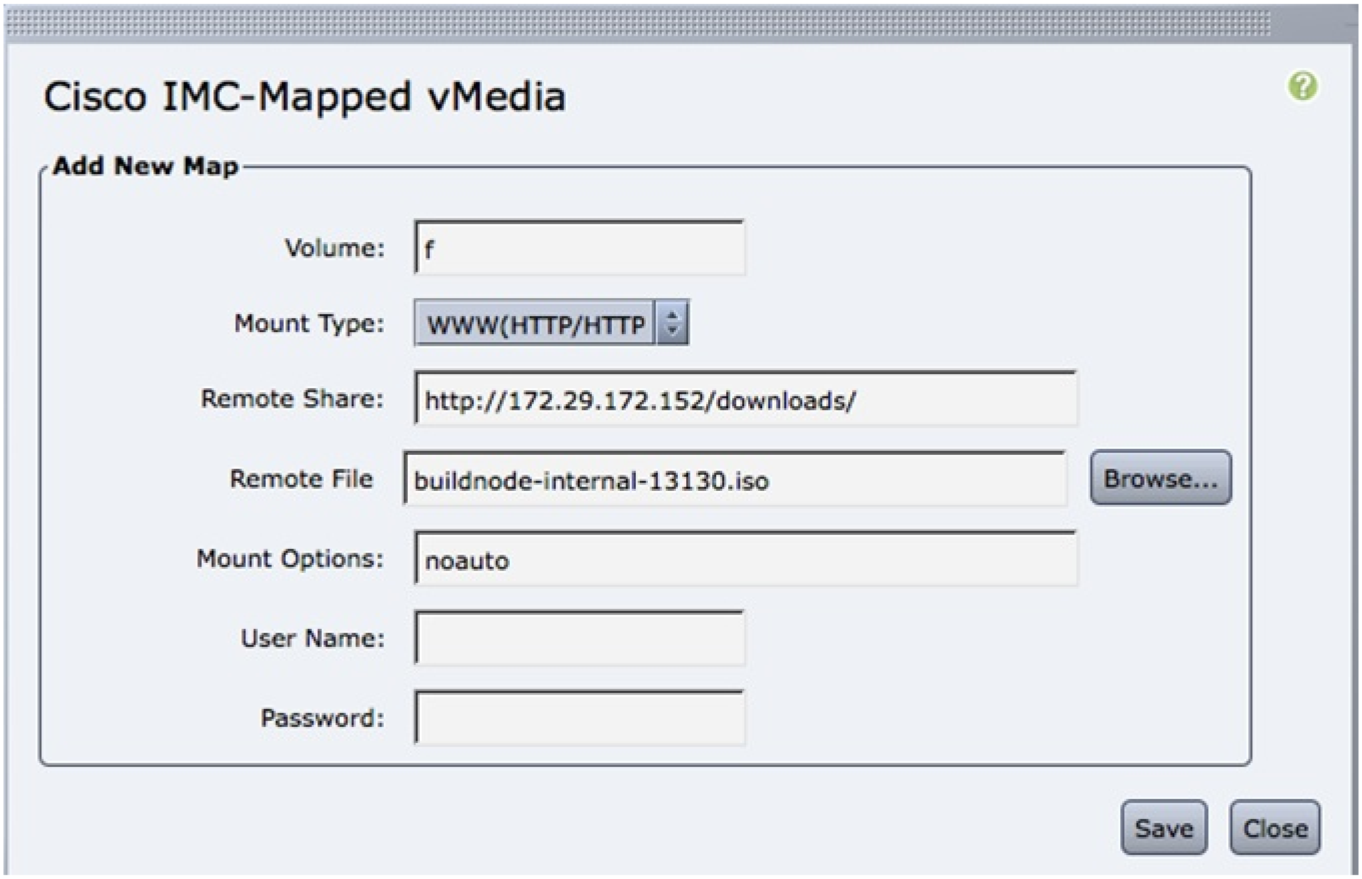
The following topics provide Cisco NFVI general troubleshooting procedures.

Managing CIMC and ISO Installation

When you are remote it is good to map the ISO through the CIMC Mapped vMedia.

To add new mapping:

Step 1 Click **Server > Remote Presence > Virtual Media > Add New Mapping.**



Cisco IMC-Mapped vMedia

Add New Map

Volume: f

Mount Type: WWW(HTTP/HTTP

Remote Share: http://172.29.172.152/downloads/

Remote File buildnode-internal-13130.iso

Mount Options: noauto

User Name:

Password:

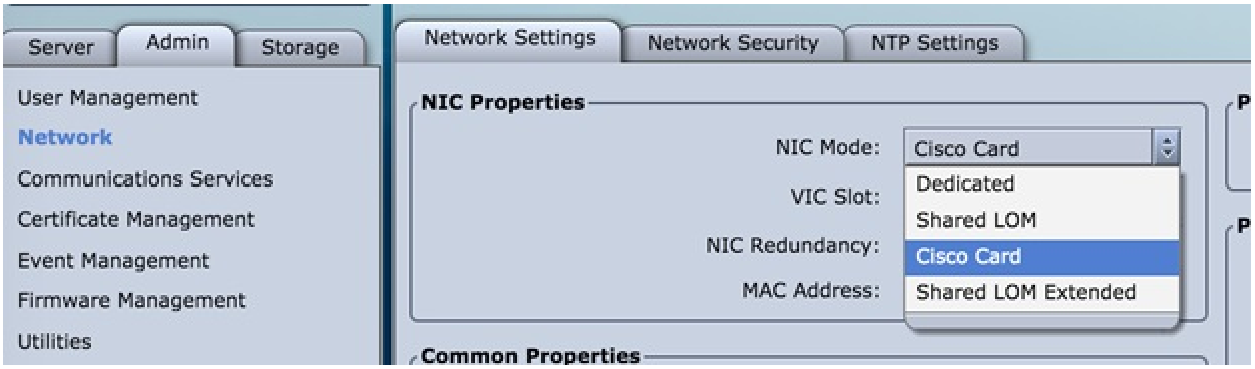
Step 2 Enter the field values such as the Volume, Mount Type, Remote Share, Remote File, User name, and Password.

Step 3 Click **Save.** .The CIMC pulls the ISO directly from the HTTP server.

Management Node Installation Fails

Management node installation fails if the CIMC is configured for cisco card mode.

Choose the dedicated mode in the following screen:



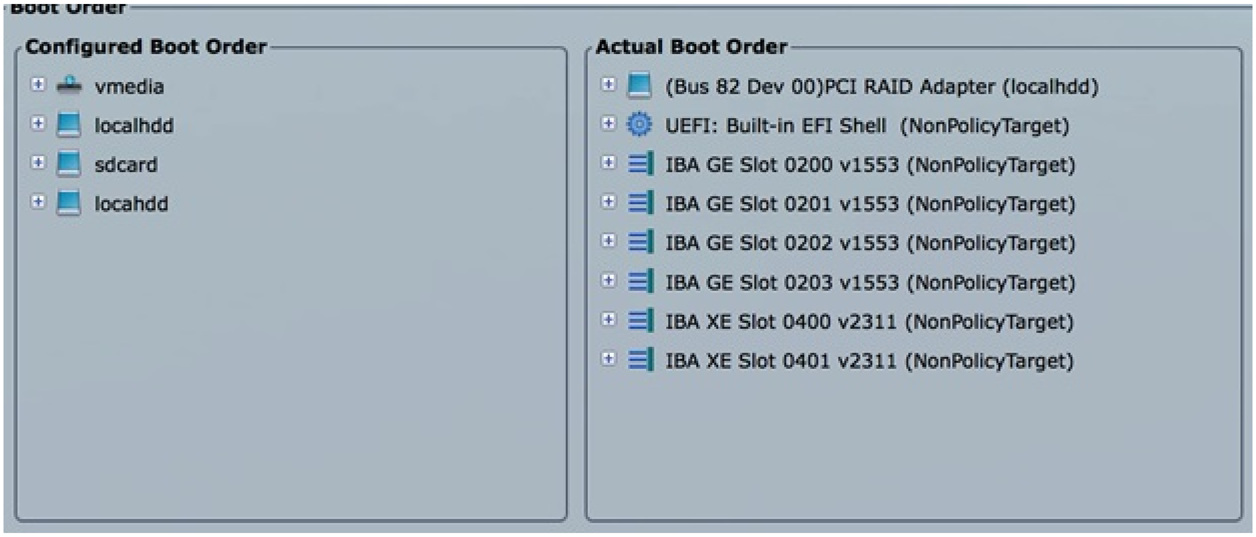
NIC Mode: Cisco Card

The selected method that is shown in the preceding screen is the incorrect mode.

Configuring Boot Order

Management node does not come up post reboot. It must boot from hard drive to check for the actual boot order.

Choose **Server** > **BIOS** > **Configure Boot Order** > **Boot Order.**



Boot Order

Configured Boot Order

- vmedia
- localhdd
- sdcard
- locahdd

Actual Boot Order

- (Bus 82 Dev 00)PCI RAID Adapter (localhdd)
- UEFI: Built-in EFI Shell (NonPolicyTarget)
- IBA GE Slot 0200 v1553 (NonPolicyTarget)
- IBA GE Slot 0201 v1553 (NonPolicyTarget)
- IBA GE Slot 0202 v1553 (NonPolicyTarget)
- IBA GE Slot 0203 v1553 (NonPolicyTarget)
- IBA XE Slot 0400 v2311 (NonPolicyTarget)
- IBA XE Slot 0401 v2311 (NonPolicyTarget)

PXE Failure Issue During Baremetal Step

Perform the following steps in case of PXE boot failure:

Step 1 Check log file /var/log/mercury/mercury_baremetal_install.log and connect to failing node CIMC KVM console to find out more on PXE boot failure reason.

Step 2 Ensure all validations (step 1) and hardware validations (step 3) pass.

Step 3 Check log file /var/log/mercury/<UUID>/mercury_baremetal_install.log.

Step 4 Connect to KVM console of failing node(s) to find out more on PXE boot failure.

Step 5 Check L2/L3 network connectivity between failing node(s) and management node.

Step 6 Check for VPC configuration and port-channel status of failing node(s) and ensure *no lacp suspend-individual* is configured on the port-channel.

Step 7 Check the actual PXE boot order must not differ from the boot-order configured.

Step 8 Perform tcpdump on the management node interface br_mgmt to watch for UDP port 67 (dhcp) or UDP pot 69 (tftp) tcpdump -I br_mgmt port 67 or port 69 # on the management node.

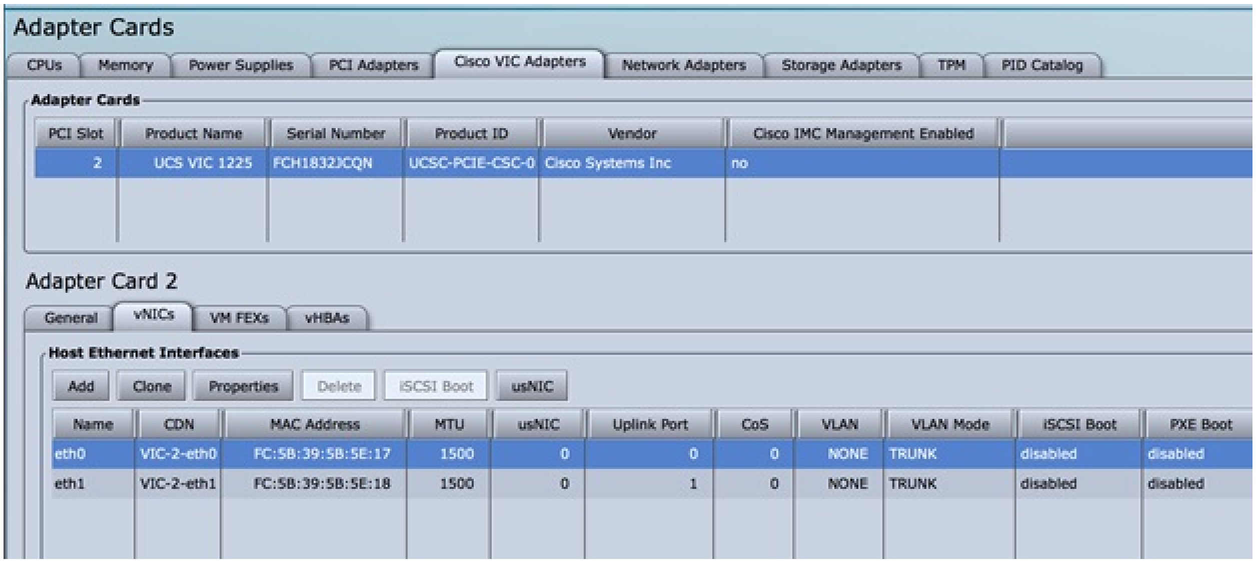
Step 9 Perform tcpdump on the management node management interfacebr_mgmt on TCP 80 tcpdump -I br_mgmt port 80 # on the management node.

Step 10 Check the apache log to watch the management IP address of failing node (if static allocated) tail -f /var/log/cobblerhttpd/access_log # on the management node.

Step 11 For Authorization Required error messages during bare metal (Step 4) with CIMC operations such as hardware validations or cleaning up vNIC, check whether the maximum allowed simultaneous connection (4) are in use. All four connections are run when the 3rd party application monitoring CIMC does not properly close CIMC. This makes CiscoVIM installer not to log in using xmlapi with valid username and password. Check Cisco IMC logs on CIMC (Server > Faults and Logs > Cisco IMC Logs) for the reason why user was denied the access (maximum session, incorrect credentials.). The workaround is to disable 3rd party monitoring, wait at least 10 minutes and then perform CiscoVIM operations.

Step 12 In case none of the nodes are getting DHCP address; DHCP requests arrive at the management node but no response goes out, then check CIMC VIC adapter settings. Server > Inventory > Cisco VIC Adapters > vNICs | VLAN & VLAN Mode. Ensure the VLAN (both id and mode) configured does not matche with that of N9K switch

Option	Description
CIMC	Trunk:None
Switch	Access:vlan_mgmt



Adapter Cards

Adapter Cards

PCI Slot	Product Name	Serial Number	Product ID	Vendor	Cisco IMC Management Enabled
2	UCS VIC 1225	FCH1832JCQN	UCSC-PCIE-CSC-0	Cisco Systems Inc	no

Adapter Card 2

Host Ethernet Interfaces

Name	CDN	MAC Address	MTU	usNIC	Uplink Port	CoS	VLAN	VLAN Mode	iSCSI Boot	PXE Boot
eth0	VIC-2-eth0	FC:5B:39:5B:5E:17	1500	0	0	0	NONE	TRUNK	disabled	disabled
eth1	VIC-2-eth1	FC:5B:39:5B:5E:18	1500	0	1	0	NONE	TRUNK	disabled	disabled

The following topics provide Cisco NFVI general troubleshooting procedures.

Container Download Problems

a. Check installer logs log file /var/log/mercury/mercury_buildorchestration.log for any build node orchestration failures including stuck "registry-Populate local registry". Downloaing the Docker container from your management node can be slow.

b. Check the network connectivity between the management node and the remote registry in defaults.yaml on the management node (grep "^registry:" openstack-configs/defaults.yaml).

c. Verify valid remote registry credentials are defined in setup_data.yaml file.

d. A proxy server is required to pull the container images from remote registry. If a proxy is required, exclude all IP addresses for your setup including management node.

Cisco IMC Connection Problems during Bare Metal Installation

The cause may be Cisco IMC has too many connections, so the installer cannot connect to it. Clear the connections by logging into your Cisco IMC, going into the Admin->Sessions tab and clearing the connections.

API VIP Connection Problems

Verify the active HAProxy container is running in one of the controller nodes. On that controller within the HAProxy container namespace verify the IP address is assigned to the API interface. Also, verify that your ToR and the network infrastructure connecting your ToR is provisioned with API network segment VLAN.

HAProxy Services Downtime after Initial Installation or HA Failover

The HAProxy web interface can be accessed on TCP port 1936

```
http://<external_lb_vip_address>:1936/
Username: haproxy
Password: <HAPROXY_PASSWORD> from secrets.yaml file
```

After initial installation, the HAProxy web interface can report to several OpenStack services with downtime depending upon when that OpenStack service was installed after HAProxy install. The counters are not synchronized between HAProxy active and standby. After HA proxy failover, the downtime timers can change based on the uptime of new active HAproxy container.

Management Node Problems

Service Commands

To identify all the services that are running, enter:

```
$ systemctl -a | grep docker | grep service
 On controller ignore status of:
docker-neutronlb
On compute ignore status of:
docker-neutronlb, docker-keystone
```

To start a service on a host, enter:

```
$ systemctl start <service_name>
```

To stop a service on a host, enter:

```
$ systemctl stop <service_name>
```

To restart a service on a host, enter:

```
$ systemctl restart <service_name>
```

To check service status on a host, enter:

```
$ systemctl status <service_name>
```

Connecting to Docker Container

To connect to the docket container do the following:

```
# generally, aliases are created for all containers
# use alias to identify those
alias | grep in_container
# checking specific alias by name
alias cobbler

# check docker containers
# alias created by CVIM
dp
# list docker containers
docker ps -a
# list docker images
docker images

# connecting to container
docker exec -it my_cobbler_<tag_id> /bin/bash

# connecting to docker container as privileged user
```

```
docker exec -it -u root my_cobbler_<tag_id> /bin/bash

# systemctl files
systemctl -a | egrep "docker-.*.service"

# check specific service
systemctl status mercury-restapi -l
systemctl status docker-vmtp

# restart specific service
systemctl restart docker-vmtp
```

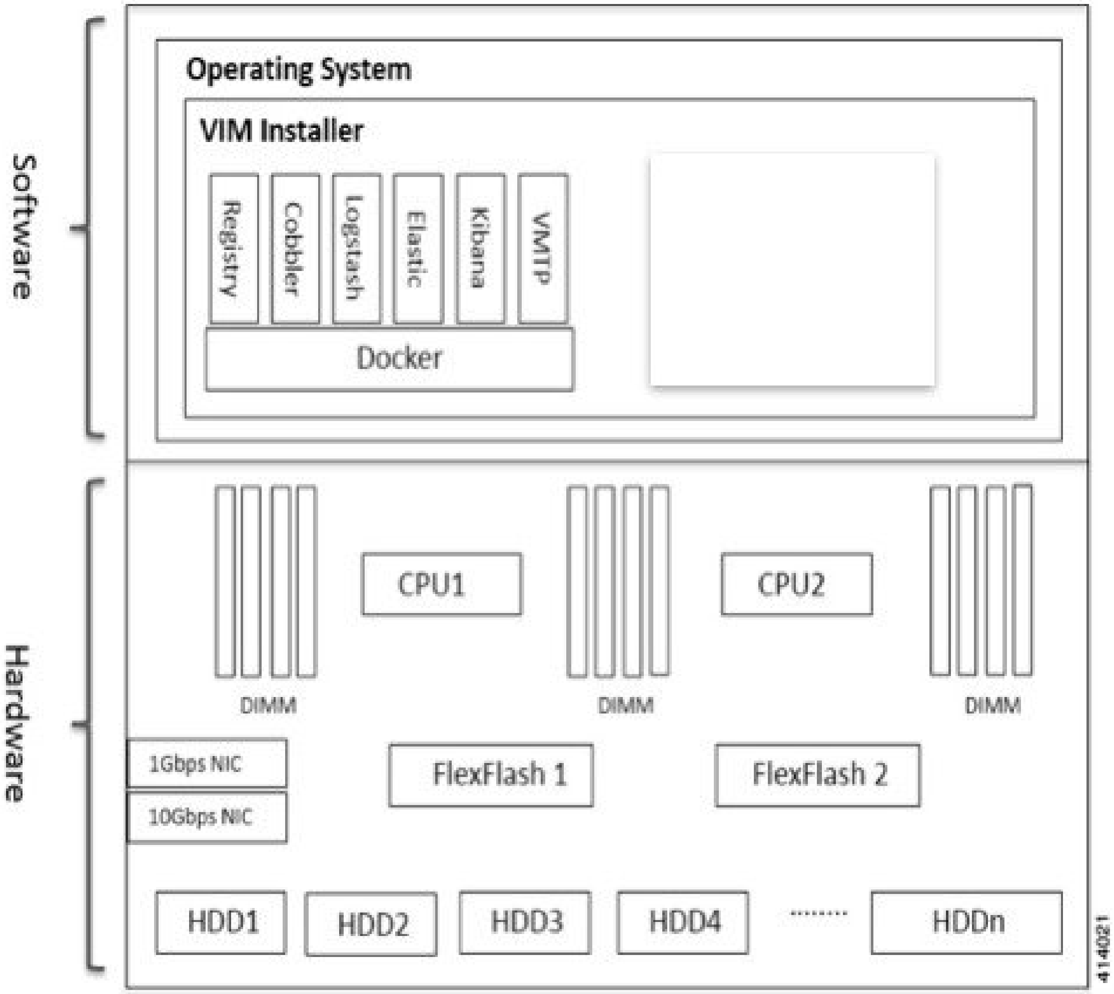
Management Node Recovery Scenarios

The Cisco NFVI management node hosts the Cisco VIM Rest API service, Cobbler for PXE services, ELK for Logging to Kibana dashboard services and VMTP for the cloud validation. As the maintenance node does not have redundancy, understanding its points of failure and recovery scenarios is important. Managing Node recovery scenarios are described in the following steps.

The management node architecture includes a Cisco UCS C240 M4 server with dual CPU socket. It has a 1-Gbps on-board (LOM) NIC and a 10-Gbps Cisco VIC mLOM. HDDs are used in 8,16, or 24 disk configurations.

The following figure shows the high-level maintenance node of the hardware and software architecture.

Figure 29: Cisco NFVI Management Node Architecture



Different management node hardware or software failures can cause Cisco NFVI service disruptions and outages. Some failed services can be recovered through manual intervention. In cases if the system is operational during a failure, double faults cannot be recoverable.

The following table lists the management node failure scenarios and their recovery options.

Table 18: Management Node Failure Scenarios

Scenario #	Failure or Trigger	Recoverable?	Operational Impact
1	Failure of 1 or 2 active HDD	Yes	No
2	Simultaneous failure of more than 2 active HDD	No	Yes
3	Spare HDD failure: 4 spare for 24 HDD; or 2 spare for 8 HDD	Yes	No

Scenario #	Failure or Trigger	Recoverable?	Operational Impact
4	Power outage/hard reboot	Yes	Yes
5	Graceful reboot	Yes	Yes
6	Docker daemon start failure	Yes	Yes
7	Service container (Cobbler, ELK) start failure	Yes	Yes
8	One link failure on bond interface	Yes	No
9	Two link failures on bond interface	Yes	Yes
10	REST API service failure	Yes	No
11	Graceful reboot with Cisco VIM Unified Management	Yes	Yes; CLI alternatives exist during reboot.
12	Power outage or hard reboot with Cisco VIM Unified Management	Yes	Yes
13	VIM Unified Management Container reinstallation	Yes	Yes; CLI alternatives exist during reinstall.
14	Cisco VIM Unified Management Container reboot	Yes	Yes; CLI alternatives exist during reboot.
15	Intel 1350 1Gbps LOM failure	Yes	Yes
16	Cisco VIC 1227 10-Gbps mLOM failure	Yes	Yes
17	DIMM memory failure	Yes	No
18	One CPU failure	Yes	No

Scenario 1: Failure of one or two active HDDs

The management node has either 8,16, or 24-HDDs. The HDDs are configured with RAID 6, which helps to enable data redundancy and storage performance and overcomes any unforeseen HDD failures.

- When 8 HDDs are installed, 7 are active disks and one is spare disk.
- When 16 HDDs are installed, 14 are active disks and two are spare disks.
- When 24 HDDs are installed, 20 are active disks and four are spare disks.

With RAID 6 up, two simultaneous active HDD failures can occur. When an HDD fails, the system begins automatic recovery by moving the spare disk to active state and begins recovering and rebuilding the new active HDD. It takes approximately 4 hours to rebuild the new disk and move to synchronized state. During this operation, the system is fully functional and no impacts are seen. However, you must monitor the system to ensure that more failures do not occur to enter into a double fault situation.

You can use the **storcli** commands to check the disk and RAID state as shown in the following commands:

Note Make sure that the node is running with hardware RAID by checking the storcli output and comparing to the one preceding.

```
[root@mgmt-node ~]# /opt/MegaRAID/storcli/storcli64 /c0 show

<…snip…>

TOPOLOGY:
========
-----------------------------------------------------------------------------
DG Arr Row EID:Slot DID Type  State BT       Size PDC  PI SED DS3  FSpace TR
-----------------------------------------------------------------------------
 0 -   -   -        -   RAID6 Optl  N    4.087 TB dflt N  N   dflt N      N
 0 0   -   -        -   RAID6 Optl  N    4.087 TB dflt N  N   dflt N      N       <== RAID
 6 in optimal state
 0 0   0   252:1    1   DRIVE Onln  N  837.258 GB dflt N  N   dflt -      N
 0 0   1   252:2    2   DRIVE Onln  N  837.258 GB dflt N  N   dflt -      N
 0 0   2   252:3    3   DRIVE Onln  N  930.390 GB dflt N  N   dflt -      N
 0 0   3   252:4    4   DRIVE Onln  N  930.390 GB dflt N  N   dflt -      N
 0 0   4   252:5    5   DRIVE Onln  N  930.390 GB dflt N  N   dflt -      N
 0 0   5   252:6    6   DRIVE Onln  N  930.390 GB dflt N  N   dflt -      N
 0 0   6   252:7    7   DRIVE Onln  N  930.390 GB dflt N  N   dflt -      N
 0 -   -   252:8    8   DRIVE DHS   -  930.390 GB -    -  -   -    -      N

-----------------------------------------------------------------------------

<…snip…>

PD LIST:
=======
-------------------------------------------------------------------------
EID:Slt DID State DG       Size Intf Med SED PI SeSz Model            Sp
-------------------------------------------------------------------------
252:1     1 Onln   0 837.258 GB SAS  HDD N   N  512B ST900MM0006      U   <== all disks
functioning
252:2     2 Onln   0 837.258 GB SAS  HDD N   N  512B ST900MM0006      U
252:3     3 Onln   0 930.390 GB SAS  HDD N   N  512B ST91000640SS     U
252:4     4 Onln   0 930.390 GB SAS  HDD N   N  512B ST91000640SS     U
252:5     5 Onln   0 930.390 GB SAS  HDD N   N  512B ST91000640SS     U
252:6     6 Onln   0 930.390 GB SAS  HDD N   N  512B ST91000640SS     U
252:7     7 Onln   0 930.390 GB SAS  HDD N   N  512B ST91000640SS     U
252:8     8 DHS    0 930.390 GB SAS  HDD N   N  512B ST91000640SS     D
-------------------------------------------------------------------------


[root@mgmt-node ~]# /opt/MegaRAID/storcli/storcli64 /c0 show

<…snip…>

TOPOLOGY :
========
-----------------------------------------------------------------------------
DG Arr Row EID:Slot DID Type  State BT       Size PDC  PI SED DS3  FSpace TR
-----------------------------------------------------------------------------
 0 -   -   -        -   RAID6 Pdgd  N    4.087 TB dflt N  N   dflt N      N    <== RAID 6
in degraded state
 0 0   -   -        -   RAID6 Dgrd  N    4.087 TB dflt N  N   dflt N      N
 0 0   0   252:8    8   DRIVE Rbld  Y  930.390 GB dflt N  N   dflt -      N
 0 0   1   252:2    2   DRIVE Onln  N  837.258 GB dflt N  N   dflt -      N
 0 0   2   252:3    3   DRIVE Onln  N  930.390 GB dflt N  N   dflt -      N
 0 0   3   252:4    4   DRIVE Onln  N  930.390 GB dflt N  N   dflt -      N
 0 0   4   252:5    5   DRIVE Onln  N  930.390 GB dflt N  N   dflt -      N
 0 0   5   252:6    6   DRIVE Onln  N  930.390 GB dflt N  N   dflt -      N
 0 0   6   252:7    7   DRIVE Onln  N  930.390 GB dflt N  N   dflt -      N
-----------------------------------------------------------------------------

<…snip…>

PD LIST :
=======
-------------------------------------------------------------------------
EID:Slt DID State DG       Size Intf Med SED PI SeSz Model            Sp
-------------------------------------------------------------------------
252:1     1 UGood -  837.258 GB SAS  HDD N   N  512B ST900MM0006      U    <== active disk
 in slot 1 disconnected from drive group 0
252:2     2 Onln  0  837.258 GB SAS  HDD N   N  512B ST900MM0006      U
252:3     3 Onln  0  930.390 GB SAS  HDD N   N  512B ST91000640SS     U
252:4     4 Onln  0  930.390 GB SAS  HDD N   N  512B ST91000640SS     U
252:5     5 Onln  0  930.390 GB SAS  HDD N   N  512B ST91000640SS     U
252:6     6 Onln  0  930.390 GB SAS  HDD N   N  512B ST91000640SS     U
252:7     7 Onln  0  930.390 GB SAS  HDD N   N  512B ST91000640SS     U
252:8     8 Rbld  0  930.390 GB SAS  HDD N   N  512B ST91000640SS     U    <== spare disk
in slot 8 joined drive group 0 and in rebuilding state
-------------------------------------------------------------------------



[root@mgmt-node ~]# /opt/MegaRAID/storcli/storcli64 /c0/e252/s8 show rebuild
Controller = 0
Status = Success
Description = Show Drive Rebuild Status Succeeded.

------------------------------------------------------
Drive-ID    Progress% Status      Estimated Time Left
------------------------------------------------------
/c0/e252/s8        20 In progress 2 Hours 28 Minutes     <== spare disk in slot 8 rebuild
status
------------------------------------------------------
```

To replace the failed disk and add it back as a spare:

```
[root@mgmt-node ~]# /opt/MegaRAID/storcli/storcli64 /c0/e252/s1 add hotsparedrive dg=0
Controller = 0
Status = Success
Description = Add Hot Spare Succeeded.


[root@mgmt-node ~]# /opt/MegaRAID/storcli/storcli64 /c0 show

<…snip…>

TOPOLOGY :
========
-----------------------------------------------------------------------------
DG Arr Row EID:Slot DID Type  State BT       Size PDC  PI SED DS3  FSpace TR
-----------------------------------------------------------------------------
 0 -   -   -        -   RAID6 Pdgd  N    4.087 TB dflt N  N   dflt N      N
 0 0   -   -        -   RAID6 Dgrd  N    4.087 TB dflt N  N   dflt N      N
 0 0   0   252:8    8   DRIVE Rbld  Y  930.390 GB dflt N  N   dflt -      N
 0 0   1   252:2    2   DRIVE Onln  N  837.258 GB dflt N  N   dflt -      N
 0 0   2   252:3    3   DRIVE Onln  N  930.390 GB dflt N  N   dflt -      N
 0 0   3   252:4    4   DRIVE Onln  N  930.390 GB dflt N  N   dflt -      N
 0 0   4   252:5    5   DRIVE Onln  N  930.390 GB dflt N  N   dflt -      N
 0 0   5   252:6    6   DRIVE Onln  N  930.390 GB dflt N  N   dflt -      N
 0 0   6   252:7    7   DRIVE Onln  N  930.390 GB dflt N  N   dflt -      N
 0 -   -   252:1    1   DRIVE DHS   -  837.258 GB -    -  -   -    -      N
-----------------------------------------------------------------------------

<…snip…>

PD LIST :
=======
-------------------------------------------------------------------------
EID:Slt DID State DG       Size Intf Med SED PI SeSz Model            Sp
-------------------------------------------------------------------------
252:1     1 DHS   0  837.258 GB SAS  HDD N   N  512B ST900MM0006      U    <== replacement
 disk added back as spare
252:2     2 Onln  0  837.258 GB SAS  HDD N   N  512B ST900MM0006      U
252:3     3 Onln  0  930.390 GB SAS  HDD N   N  512B ST91000640SS     U
252:4     4 Onln  0  930.390 GB SAS  HDD N   N  512B ST91000640SS     U
252:5     5 Onln  0  930.390 GB SAS  HDD N   N  512B ST91000640SS     U
252:6     6 Onln  0  930.390 GB SAS  HDD N   N  512B ST91000640SS     U
252:7     7 Onln  0  930.390 GB SAS  HDD N   N  512B ST91000640SS     U
252:8     8 Rbld  0  930.390 GB SAS  HDD N   N  512B ST91000640SS     U
-------------------------------------------------------------------------
```

Scenario 2: Simultaneous failure of more than two active HDDs

If more than two HDD failures occur at the same time, the management node goes into an unrecoverable failure state because RAID 6 allows for recovery of up to two simultaneous HDD failures. To recover the management node, reinstall the operating system.

Scenario 3: Spare HDD failure

When the management node has 24 HDDs, four are designated as spares. Failure of any of the disks does not impact the RAID or system functionality. Cisco recommends replacing these disks when they fail (see the steps in Scenario 1) to serve as standby disks and so when an active disk fails, an auto-rebuild is triggered.

Scenario 4: Power outage or reboot

If a power outage or hard system reboot occurs, the system boots up, and come back to operational state. Services running on the management node during down time gets disrupted. See the steps in Scenario 9 for the list of commands to check the services status after recovery.

Scenario 5: System reboot

If a graceful system reboot occurs, the system boots up and come back to operational state. Services running on the management node during down time gets disrupted. See the steps in Scenario 9 for the list of commands to check the services status after recovery.

Scenario 6: Docker daemon start failure

The management node runs the services using Docker containers. If the Docker daemon fails to come up, it causes services such as ELK, Cobbler, and VMTP to go into down state. You can use the **systemctl** command to check the status of the Docker daemon, for example:

```
# systemctl status docker
docker.service - Docker Application Container Engine
Loaded: loaded (/usr/lib/systemd/system/docker.service; enabled; vendor preset: disabled)
Active: active (running) since Mon 2016-08-22 00:33:43 CEST; 21h ago
Docs: http://docs.docker.com
Main PID: 16728 (docker)
```

If the Docker daemon is in down state, use the **systemctl restart docker** command to restart the Docker service. Run the commands that are listed in Scenario 9 to verify that all the Docker services are active.

Scenario 7: Service container (Cobbler, ELK) start failure

As described in Scenario 8, all the services run as Docker containers on the management node. To find all services running as containers, use the **docker ps –a** command. If any services are in Exit state, use the **systemctl** command and grep for Docker to find the exact service name, for example:

```
# systemctl | grep docker- | awk '{print $1}'
  docker-cobbler-tftp.service
  docker-cobbler-web.service
  docker-cobbler.service
  docker-container-registry.service
  docker-elasticsearch.service
  docker-kibana.service
  docker-logstash.service
  docker-vmtp.service
```

If any services need restarting, use the **systemctl** command. For example, to restart a Kibana service:

```
# systemctl restart docker-kibana.service
```

Scenario 8: One link failure on the bond Interface

management node is set up with two different networks: br_api and br_mgmt. The br_api interface is the external. It is used for accessing outside services such as the Cisco VIM REST API, Kibana, and Cobbler. The br_mgmt interface is internal. It is used for provisioning and to provide management connectivity to all OpenStack nodes (control, compute and storage). Each network has two ports that are bonded to provide redundancy. If one port fails, the system remains completely functional through the other port. If a port fails, check for physical network connectivity, and remote switch configuration to debug the underlying cause of the link failure.

Scenario 9: Two link failures on the bond Interface

As described in Scenario 10, each network is configured with two ports. If both ports are down, the system is not reachable and management node services could be disrupted. After the ports are back up, the system is fully operational. Check the physical network connectivity and the remote switch configuration to debug the underlying link failure cause.

Scenario 10: REST API service failure

The management node runs the REST API service for Cisco VIM clients to reach the server. If the REST service is down, Cisco VIM clients cannot reach the server to trigger any server operations. However, with the exception of the REST service, other management node services remain operational.

To verify the management node REST services are fully operational, use the following command to check that the httpd and mercury-restapi services are in active and running state:

```
# systemctl status httpd
httpd.service - The Apache HTTP Server
   Loaded: loaded (/usr/lib/systemd/system/httpd.service; enabled; vendor preset: disabled)

   Active: active (running) since Mon 2016-08-22 00:22:10 CEST; 22h ago

# systemctl status mercury-restapi.service
mercury-restapi.service - Mercury Restapi
   Loaded: loaded (/usr/lib/systemd/system/mercury-restapi.service; enabled; vendor preset:
 disabled)
   Active: active (running) since Mon 2016-08-22 00:20:18 CEST; 22h ago
```

A tool is also provided so that you can check the REST API server status and the location of the folder it is running from. To execute run the following command:

```
# cd installer-<tagid>/tools
#./restapi.py -a status
   Status of the REST API Server:  active (running) since Thu 2016-08-18 09:15:39 UTC; 9h
```

```
ago
   REST API launch directory: /root/installer-<tagid>/
```

Confirm the server status is active and check that the restapi launch folder matches the folder where the installation was launched. The restapi tool also provides the options to launch, tear down, and reset password for the restapi server as shown in the following command:

```
# ./restapi.py –h

usage: restapi.py [-h] --action ACTION [--yes] [--verbose]

REST API setup helper

optional arguments:
  -h, --help            show this help message and exit
  --action ACTION, -a ACTION
                        setup - Install and Start the REST API server.
                        teardown - Stop and Uninstall the REST API
       server.
                        restart - Restart the REST API server.
                        regenerate-password - Regenerate the password for
       REST API server.
                        reset-password - Reset the REST API password with
      user given password.
                        status - Check the status of the REST API server
  --yes, -y             Skip the dialog. Yes to the action.
  --verbose, -v         Perform the action in verbose mode.
```

If the REST API server is not running, execute **ciscovim** to show the following error message:

```
# cd installer-<tagid>/
# ciscovim -setupfile  ~/Save/<setup_data.yaml> run
```

If the installer directory or the REST API state is not correct or points to an incorrect REST API launch directory, go to the installer-<tagid>/tools directory and execute:

```
# ./restapi.py –action setup
```

To confirm that the REST API server state and launch directory is correct run the following command:

```
# ./restapi.py –action status
```

Scenario 11: Graceful reboot with Cisco VIM Unified Management

Cisco VIM Unified Management runs as a container on the management node. After a graceful reboot of the management node, the VIM Unified Management and its associated database containers comes up. So there is no impact on recovery.

Scenario 12: Power outage or hard reboot with VIM Unified Management

The Cisco VIM Unified Management container comes up automatically following a power outage or hard reset of the management node.

Scenario 13: Cisco VIM Unified Management reinstallation

If the management node which is running the Cisco VIM Unified Management fails and cannot come up, you must uninstall and reinstall the Cisco VIM UM. After the VM Unified Management container comes up, add the relevant bootstrap steps as listed in the install guide to register the pod. VIM Unified Management then automatically detects the installer status and reflects the present status appropriately.

To clean up and reinstall Cisco VIM UM run the following command:

```
# cd /root/installer-<tagid>/insight/
# ./bootstrap_insight.py –a uninstall –o standalone –f </root/insight_setup_data.yaml>
```

Scenario 14: VIM Unified Management Container reboot

On Reboot of the VIM Unified Management container, services continue to work as it is.

Scenario 15: Intel (I350) 1Gbps LOM failure

The management node is set up with an Intel (I350) 1-Gbps LOM for API connectivity. Two 1-Gbps ports are bonded to provide connectivity redundancy. No operational impact occurs if one of these ports goes down. However, if both ports fail, or the LOM network adapter fails, the system cannot be reached through the API IP address. If this occurs you must replace the server because the LOM is connected to the system motherboard. To recover the management node with a new server, complete the following steps. Make sure the new management node hardware profile, matches the existing server and the Cisco IMC IP address is assigned.

1. Shut down the existing management node.
2. Unplug the power from the existing and new management nodes.
3. Remove all HDDs from existing management node and install them in the same slots of the new management node.
4. Plug in the power to the new management node, but do not boot the node.
5. Verify the configured boot order is set to boot from local HDD.
6. Verify the Cisco NFVI management VLAN is configured on the Cisco VIC interfaces.
7. Boot the management node for the operating system to begin.

   After the management node is up, the management node bond interface is down due to the incorrect MAC address. It points to old node network card MAC address.
8. Update the MAC address under /etc/sysconfig/network-scripts.
9. Reboot the management node.

   It is fully operational. All interfaces has to be in an up state and be reachable.
10. Verify that Kibana and Cobbler dashboards are accessible.
11. Verify the Rest API services are up. See Scenario 15 for any recovery steps.

Scenario 16: Cisco VIC 1227 10Gbps mLOM failure

The management node is configured with a Cisco VIC 1227 dual port 10-Gbps mLOM adapter for connectivity to the other Cisco NFVI nodes. Two 10 Gbps ports are bonded to provide connectivity redundancy. If one of the 10-Gbps ports goes down, no operational impact occurs. However, if both Cisco VIC 10 Gbps ports fail, the system goes into an unreachable state on the management network. If this occurs, you must replace the VIC network adapters. Otherwise pod management and the Fluentd forwarding service isdisrupted. If you replace a Cisco VIC, update the management and provisioning VLAN for the VIC interfaces using Cisco IMC and update the MAC address in the interfaces under /etc/sysconfig/network-scripts interface configuration file.

Scenario 17: DIMM memory failure

The management node is set up with multiple DIMM memory across different slots. Failure of one or memory modules could cause the system to go into unstable state, depending on how many DIMM memory failures occur. DIMM memory failures are standard system failures like any other Linux system server. If a DIMM memory fails, replace the memory module(s) as soon as possible to keep the system in stable state.

Scenario 18: One CPU failure

Cisco NFVI management nodes have dual core Intel CPUs (CPU1 and CPU2). If one CPU fails, the system remains operational. However, always replace failed CPU modules immediately. CPU failures are standard system failures such as any other Linux system server. If a CPU fails, replace it immediately to keep the system in stable state.

Recovering Compute Node Scenario

The Cisco NFVI Compute node hosts the OpenStack services to provide processing, network, and storage resources to run instances. The node architecture includes a Cisco UCS C220 M4 server with dual CPU socket, 10-Gbps Cisco VIC mLOM, and two HDDs in RAID 1 configuration.

Failure of one active HDD

With RAID 1, data are shown and allows up to one active HDD failure. When an HDD fails, the node is still functional with no impacts. However, the data are no longer illustrated and losing another HDD results in unrecoverable and operational downtime. The failed disk has to be replaced soon as it takes approximately 2 hours to rebuild the new disk and move to synchronized state.

To check the disk and RAID state, run the storcli commands as follows:

Note Make sure that the node is running with hardware RAID by checking the storcli output and comparing to the one that is shown in the following command.

```
[root@compute-node ~]# /opt/MegaRAID/storcli/storcli64 /c0 show

<…snip…>

TOPOLOGY :
========
-----------------------------------------------------------------------------
DG Arr Row EID:Slot DID Type  State BT       Size PDC  PI SED DS3  FSpace TR
-----------------------------------------------------------------------------
 0 -   -   -        -   RAID1 Optl  N  837.258 GB dflt N  N   dflt N      N  <== RAID 1 in
 optimal state
 0 0   -   -        -   RAID1 Optl  N  837.258 GB dflt N  N   dflt N      N
 0 0   0   252:2    9   DRIVE Onln  N  837.258 GB dflt N  N   dflt -      N
 0 0   1   252:3    11  DRIVE Onln  N  837.258 GB dflt N  N   dflt -      N
-----------------------------------------------------------------------------

<…snip…>

Physical Drives = 2

PD LIST :
=======
-------------------------------------------------------------------------
EID:Slt DID State DG       Size Intf Med SED PI SeSz Model            Sp
-------------------------------------------------------------------------
252:2     9 Onln   0 837.258 GB SAS  HDD N   N  512B ST900MM0006      U   <== all disks
functioning
252:3    11 Onln   0 837.258 GB SAS  HDD N   N  512B ST900MM0006      U
-------------------------------------------------------------------------


[root@compute-node ~]# /opt/MegaRAID/storcli/storcli64 /c0 show
```

```
<…snip…>

TOPOLOGY :
========
-----------------------------------------------------------------------------
DG Arr Row EID:Slot DID Type  State BT       Size PDC  PI SED DS3  FSpace TR
-----------------------------------------------------------------------------
 0 -   -   -        -   RAID1 Dgrd  N  837.258 GB dflt N  N   dflt N      N  <== RAID 1 in
 degraded state.
 0 0   -   -        -   RAID1 Dgrd  N  837.258 GB dflt N  N   dflt N      N
 0 0   0   -        -   DRIVE Msng  -  837.258 GB -    -  -   -    -      N
 0 0   1   252:3    11  DRIVE Onln  N  837.258 GB dflt N  N   dflt -      N
-----------------------------------------------------------------------------

<…snip…>

PD LIST :
=======
-------------------------------------------------------------------------
EID:Slt DID State DG       Size Intf Med SED PI SeSz Model            Sp
-------------------------------------------------------------------------
252:2     9 UGood -  837.258 GB SAS  HDD N   N  512B ST900MM0006      U   <== active disk
in slot 2 disconnected from drive group 0
252:3    11 Onln  0  837.258 GB SAS  HDD N   N  512B ST900MM0006      U
-------------------------------------------------------------------------
```

To replace the failed disk and add it back as a spare run the following command:

```
[root@compute-node ~]# /opt/MegaRAID/storcli/storcli64 /c0/e252/s2 add hotsparedrive dg=0
Controller = 0
Status = Success
Description = Add Hot Spare Succeeded.


[root@compute-node ~]# /opt/MegaRAID/storcli/storcli64 /c0 show

<…snip…>

TOPOLOGY :
========
-----------------------------------------------------------------------------
DG Arr Row EID:Slot DID Type  State BT       Size PDC  PI SED DS3  FSpace TR
-----------------------------------------------------------------------------
 0 -   -   -        -   RAID1 Dgrd  N  837.258 GB dflt N  N   dflt N      N
 0 0   -   -        -   RAID1 Dgrd  N  837.258 GB dflt N  N   dflt N      N
 0 0   0   252:2    9   DRIVE Rbld  Y  837.258 GB dflt N  N   dflt -      N
 0 0   1   252:3    11  DRIVE Onln  N  837.258 GB dflt N  N   dflt -      N
-----------------------------------------------------------------------------

<…snip…>

PD LIST :
=======
-------------------------------------------------------------------------
EID:Slt DID State DG       Size Intf Med SED PI SeSz Model            Sp
-------------------------------------------------------------------------
252:2     9 Rbld   0 837.258 GB SAS  HDD N   N  512B ST900MM0006      U   <== replacement
disk in slot 2 joined device group 0 and in rebuilding state
252:3    11 Onln   0 837.258 GB SAS  HDD N   N  512B ST900MM0006      U
-------------------------------------------------------------------------



[root@compute-node ~]# /opt/MegaRAID/storcli/storcli64 /c0/e252/s2 show rebuild
Controller = 0
```

```
Status = Success
Description = Show Drive Rebuild Status Succeeded.


------------------------------------------------------
Drive-ID    Progress% Status      Estimated Time Left
------------------------------------------------------
/c0/e252/s2       10 In progress 1 Hours 9 Minutes    <== replacement disk in slot 2 rebuild
 status
------------------------------------------------------
```

Running the Cisco VIM Technical Support Tool

Cisco VIM includes a tech-support tool that you can use to gather Cisco VIM information to help solve issues working with Cisco Technical Support. The tech-support tool can be extended to execute custom scripts. It can be called after runner is executed at least once. The tech-support tool uses a configuration file that specifies what information to collect. The configuration file is located in the following location: /root/openstack-configs/tech-support/tech_support_cfg.yaml.

The tech-support tool checks the point where the Cisco VIM installer has executed and collects the output of files or commands that is indicated by the configuration file. For example, if the installer fails at Step 3 (VALIDATION), the tech-support provides information that is listed in the configuration file up to Step 3 (included). You can override this default behavior by adding the --stage option to the command.

The tech-support script is located at the management node /root/installer-{tag-id}/tech-support directory. To run it after the runner execution, enter the following command:

```
./tech-support/tech_support.py
```

The command creates a compressed tar file containing all the information that is gathered. The file location is displayed in the console at the end of the execution. You need not have to execute the command with any options. However, if you want to override any default behavior, you can use the following options:

```
#/tech_support.py --help
Usage: tech_support.py [options]

Tech-support collects information about your cloud

Options:
  -h, --help            show this help message and exit
  --stage=STAGE         specify the stage where installer left off
  --config-file=CFG_FILE
                        specify alternate configuration file name
  --tmp-dir=TMP_DIR     specify alternate temporary directory name
  --file-size=TAIL_SIZE
                        specify max size (in KB) of each file collected
  --host-list=HOST_LIST
                        List (comma separated) of the hostnames of the servers
                        to collect info from
  --ip-list=IP_LIST     List (comma separated) of the IPv4 of the hosts to
                        collect info from
  --exclude-mgmt-node   specify if mgmt node info needs to be excluded
  --include-cimc        specify if cimc techsupport needs to be included
  --include-hw-diags    specify if hardware diagnostics need to be included
```

Where:

- stage—tells at which state the installer left off. The possible values are: INPUT_VALIDATION, BUILDNODE_ORCHESTRATION, VALIDATION, BAREMETAL_INSTALL, COMMON_SETUP, CEPH, ORCHESTRATION or VMTP
- config-file—Provides the path for a specific configuration file. Make sure that your syntax is correct. Look at the default /root/tech-support/openstack-configs/tech_support_cfg.yaml file as an example on how to create a new config-file or modify the default file.
- tmp-dir—Provides the path to a temp directory tech-support can use to create the compressed tar file. The tech-support tool provides the infrastructure to execute standard Linux commands from packages that are included in the Cisco VIM installation. This infrastructure is extensible and you can add commands, files, or custom bash or Python scripts into the configuration file pane for the tool to collect the output of those commands or scripts. (See the README pane for more details.)
- file-size—Is an integer that specifies (in KB) the maximum file size that tech-support captures and tail the file if needed. By default, this value is set to 10 MB. For example, if no file-size option is provided and the tech-support has to collect /var/log/mercury/data.log and the data.log is more than 10 MB, tech-support gets the last 10 MB from /var/log/mercury/data.log.
- host-list—Provides the list of hosts one wants to collect from the tech-support through hostname, defaults to all hosts.
- ip-list—Provides the list of hosts to collect tech-support when their management IPv4 defaults to all hosts.
- exclude-mgmt-node—It is an option not to collect tech-support from the management node.
- include-cimc—(Only applied for Cisco servers) .This option allows to specify the list of hosts to get the CIMC tech-support. You can use this option along with the –host-list and –ip-list options.
- include-hw-diags—(Only applied for Quanta servers). This option allows to specify the list of hosts to get the hardware support information collected on Quanta servers. It also collects the hardware information of the management node if it is a Quanta server. This option can be used along with the –host-list option.

You can avail tech-support for CIMC via this tool. With the given design associated to the CIMC tech-support command, ensure that you do not use –include-cimc option by default. It is recommended to use tech-support for CIMC for specific servers where issues are seen. Ensure that you use a maximum of three servers at a time using the below command:

```
#./tech-support.py --include-cimc --host-list=server_hostname_1,server_hostname_2
or
#./tech-support.py –include-cimc --ip-list=cimc_ip_host1,cimc_ip_host2
```

Note When using the ip-list option, provide the list of the management IP addresses. The tech-support can figure out the CIMC IP address from the `setup_data.yaml` file.

Tech-Support Configuration File

Cisco VIM tech-support is a utility tool is designed to collect the VIM pod logs which help users to debug the issues offline. The administrator uses the tech-support configuration files to provide the list of commands or configuration files. The tech support tool of the Cisco VIM gathers list of commands or configuration files for the offline diagnostic or debugging purposes.

By default the tech-support configuration file is located at the /root/openstack-configs/tech-support/tech_support_cfg.yaml file. Alternatively, you can use a different one by specifying the -config-file option. The syntax of this configuration file must be as follows:

The tech-support configuration file section is divided into eight sections which corresponds to each of the installer stages:

- INPUT_VALIDATION
- BUILDNODE_ORCHESTRATION
- VALIDATION
- BAREMETAL_INSTALL
- COMMON_SETUP
- CEPH
- ORCHESTRATION
- VMTP

Inside each of these eight sections, there are tags divided on hierarchical levels. At the first level, the tag indicates the host(s) or path on which the command(s) run and from where the file(s) can be collected. The possible tags are as follows:

- - HOSTS_MANAGEMENT: Run in the Management node only
- - HOSTS_CONTROL: Run in all the Control nodes
- - HOSTS_COMPUTE: Run in all the Compute nodes
- - HOSTS_STORAGE: Run in all the Storage nodes
- - HOSTS_COMMON: Run in all the Compute and Control nodes
- - HOSTS_ALL: Run in all the Compute, Control and Storage nodes

Note In any of these eight sections, if HOSTS tag is not specified then no information is collected for that stage.

For each of the hosts mentioned above there is a second level tag which specifies where to run the command. The possible values of those tags are as follows:

- - SERVER_FILES: Path(s) to the file(s) that tech-support has to collect.
- - SERVER_COMMANDS: Command(s) or script name(s) which has to be executed directly on the server. The command(s) has to be included before in the $PATH. For the scripts, refer to the Custom Scripts paragraph below.
- - CONTAINERS: Indicates the tech-support tool that the command(s) has to be executed and the files to be gathered from inside a container. See the following steps for more specific information of what can be added in this section.

In the CONTAINERS section, indicate the path in which container the commands are executed or gathered from. This is done with a <container_name> tag The following are the shown to get the string for the <container_name> tag):

- all_containers: Execute inside all containers (regardless of the state).
- <container_name>: Container Name must be the name of a container and it indicates in which container to run the command or gather the information. It runs commands inside the container only if the mentioned container is up (as we cannot run commands on dead containers). Examples of how to get the container name:
  - Execute **docker ps** and get the name (without any numbers) of the last column of output **docker ps -a**.

    For example:

    ```
    CONTAINER ID  IMAGE                 COMMAND   <snip>  NAMES
    81bc4e54cbfb  <registry>/vmtp:4263  /bin/bash"        vmtp_4263
    ```

The tech-support runs the linux commands on the server (from packages that is included in RHEL7.3). Add the name of the commands under the SERVER_COMMANDS section of the configuration file to run the commands.

However, if the administrator wants to add a custom bash or python script to be executed in some set of servers in the cloud. In such case you need to add the script into the custom-scripts directory on the current directory path (/root/openstack-configs/tech-support/) and add the script name into the corresponding SERVER_COMMANDS section.

The tech-support tool will scp the script(s) included in the custom-scripts directory into the appropriate cloud nodes where it will be executed (as# indicated in this config file) and capture the output (stdout and stderr) and add it to the collection of files collected by the tech-support tool. It is assumed that the scripts are self-standing and independent and needs no external input.

Following is an example of a custom tech-support configuration file. This is just an example of what information the tech-support tool will gather if given the following configuration file:

```
COMMON_SETUP:
  HOSTS_ALL:   # All compute, control and storage hosts
    SERVER_FILES:
      - /usr/lib/docker-storage-setup
    SERVER_COMMANDS:
      - docker info
      - my_script.sh
    CONTAINERS:
      all_containers:  #execute in all containers (even if they are in down state)
        CONTAINER_COMMANDS:
          - docker inspect
          - docker logs
      logstash:
        CONTAINER_FILES:
          - /var/log/
        CONTAINER_COMMANDS:
          - ls -l
```

Given this example of configuration, and assuming that the installer ended in at least the COMMON_SETUP state, the tech-support tool will run under all OpenStack nodes (Compute, Control and Storage) and it will:

- Gather (if exists) the contents of /usr/lib/docker-storage-setup file.
- Run **docker info** command and collect the output.

- Run **my_script.sh** and collect the output. The **my_script.sh i**s an example of a bash script which the user previously added to the /root/openstack-configs/tech-support/custom-scripts directory.
- Collect the output of docker inspect and docker logs for all containers.
- Collect the files in /var/log inside the logstash container (if there is container with that name). This is equivalent to running the following command (where /tmp indicates a temporary location where the tech-support tool gathers all the information): **docker cp logstash_{tag}:/var/log/ /tmp.**
- Collect the output of the command **docker exec logstash_{{tag}}: ls -l.**

.

Tech-Support When Servers Are Offline

It is difficult to collect the information from the servers if one or more cloud nodes are not reachable. In this case, you can connect through the KVM console into those servers and run the local tech-support tool.

Step 1 To run the local tech-support tool run the following command:

```
/root/tech_support_offline
```

Step 2 Cisco VIM tech_support _offline collects the Logs and other troubleshooting output from the server and place it in the location of the other server:

```
/root/tech_support
```

Note After the server is reachable, you can use the Cisco VIM tech-support tool which collects all the files under the /root/tech-support/ directory which can be used to debug any issue which are offline.

Running Cisco VIM Software Hub Technical Support Tool

The Cisco VIM Software Hub technical support tool uses a configuration file that specifies the information to be collected. The configuration file is located in the following location:

```
/root/cvim_sds-{tag-id}/openstack-configs/tech-support/tech_support_sds.yaml
```

This tool checks the point where the Cisco VIM Software Hub has executed and collects the output of files or commands indicated by the configuration file.

The technical support script is available at the Software Hub node in the following location:

```
/root/cvim_sds-{tag-id}/tech-support/ directory.
```

To run the script, enter the following command:

```
./tech-support/tech_support_sds
```

This command execution creates a compressed tar file containing all the collected information and displays the file location.

Disk-Maintenance Tool to Manage Physical Drives

In VIM you can use the disk-maintenance tool to check the status of all physical drives that are present in running and operational nodes in the following roles -

- Management
- Control (all or specific nodes)
- Compute (all or specific nodes) (Expect for third party)

This provides the information about the present status of the physical drives - if they are in Online, Offline, Rebuilding, Unconfigured Good or JBOD states if all disks are ok. If not, the disks that have gone bad are displayed with the slot number and server information, that has to be replaced. When multiple disks have to be replaced, we recommend you to execute remove or add of the node.

- Physically remove and insert a new disk before attempting to replace.
- For smooth operation, wipe out disk before attempting replace operations.
- Call Cisco TAC if you face any issue. Do not reattempt.

Note Make sure that each node is running with hardware RAID, the steps for which can be found in the section titled Recovering Compute Node Scenario. Refer to step 15 of the section "Upgrading Cisco VIM Software Using a USB" on how to move the pod from hardware RAID to software RAID.

To check the status of the Diskmgmt log in to the management node and run the ciscovim command with the diskmgmt option. The design of the diskmgmt user interface follows a test job create, list, show, and delete the workflow.

Diskmgmt user workflow:

A database of disk operation results is maintained so that you can keep the results of multiple disk check or replace and view them at any time.

Step 1 Run the Help command to see all available command line options:

```
# ciscovim help diskmgmt
usage: ciscovim diskmgmt [--server <node1,node2,...>] [--id <id>]
                         [--locator {on,off}] [--json-display] [-y]
                         create|delete|list|show check-disks|replace-disks
                         all|management|control|compute

HDD maintenance helper

Positional arguments:
  create|delete|list|show         The control command to perform
  check-disks|replace-disks       The identity of the task/action
  all|management|control|compute  The role of the target host(s)

Optional arguments:
  --server <node1,node2,...>      List of specific control/compute host names
                                  within the target role.
  --id <id>                         ID used to identify specific item to
                                    show/delete.
  --locator {on,off}                Turn on|off locator LED for server with bad
                                    disks and for the physical drives.
  --json-display                    Shows output in JSON format.
  -y, --yes                         Yes option to perform the action
```

Step 2 Check disk operation creates check-disks operation for all control nodes in the POD. The system responds with a message indicating the Time, ID and when it was created. Run the following check-disk operation command:

```
# ciscovim diskmgmt create check-disks control
+------------+--------------------------------------+
| Field      | Value                                |
+------------+--------------------------------------+
| action     | check-disks                          |
| command    | create                               |
| created_at | 2018-03-07T21:12:20.684648+00:00     |
| id         | 0c6d27c8-bdac-493b-817e-1ea8640dae57 |
| locator    | False                                |
| result     |                                      |
| role       | control                              |
| servers    | None                                 |
| status     | not_run                              |
| updated_at | None                                 |
+------------+--------------------------------------+
```

Step 3 The cisco vim diskmgmt list command is used to monitor a currently running task, and the completed tasks. The list command can filter based on the role. Using ‘all’ command lists all the tests that are in the database.

```
# ciscovim diskmgmt list check-disks control
+--------------------------------------+-------------+---------+----------+---------------------------+
| ID                                   | Action      | Role    | Status   | Created
   |
+--------------------------------------+-------------+---------+----------+---------------------------+
| 861d4d73-ffee-40bf-9348-13afc697ee3d | check-disks | control | Complete | 2018-03-05 14:44:47+00:00
 |
| 0c6d27c8-bdac-493b-817e-1ea8640dae57 | check-disks | control | Running  | 2018-03-07 21:12:20+00:00
 |
+--------------------------------------+-------------+---------+----------+---------------------------+
[root@F24-Michigan ~]# ciscovim diskmgmt list check-disks compute
+--------------------------------------+-------------+---------+----------+---------------------------+
| ID                                   | Action      | Role    | Status   | Created
   |
+--------------------------------------+-------------+---------+----------+---------------------------+
| 0be7a55a-37fe-43a1-a975-cbf93ac78893 | check-disks | compute | Complete | 2018-03-05 14:45:45+00:00
 |
+--------------------------------------+-------------+---------+----------+---------------------------+
[root@F24-Michigan ~]# ciscovim diskmgmt list check-disks all
+--------------------------------------+-------------+---------+----------+---------------------------+
| ID                                   | Action      | Role    | Status   | Created
   |
+--------------------------------------+-------------+---------+----------+---------------------------+
| cdfd18c1-6346-47a2-b0f5-661305b5d160 | check-disks | all     | Complete | 2018-03-05 14:43:50+00:00
 |
| 861d4d73-ffee-40bf-9348-13afc697ee3d | check-disks | control | Complete | 2018-03-05 14:44:47+00:00
 |
| 0be7a55a-37fe-43a1-a975-cbf93ac78893 | check-disks | compute | Complete | 2018-03-05 14:45:45+00:00
 |
| 0c6d27c8-bdac-493b-817e-1ea8640dae57 | check-disks | control | Complete | 2018-03-07 21:12:20+00:00
 |
+--------------------------------------+-------------+---------+----------+---------------------------+
```

Step 4 Run the following command to show the detailed results of a diskmgmt check-disks operation:

```
# ciscovim diskmgmt show check-disks control --id 0c6d27c8-bdac-493b-817e-1ea8640dae57
+--------------------------+---------------------+-----------------------------+---------+-------------------------+
| Message                      | Host                  | Role                                | Server  | State
                     |
+--------------------------+---------------------+-----------------------------+---------+-------------------------+
| Raid Health Status         | f24-michigan-micro-1 | block_storage control compute | 7.7.7.7 |
Optimal                   |
|                            | f24-michigan-micro-2 | block_storage control compute | 7.7.7.6 |
Optimal                   |
|                            | f24-michigan-micro-3 | block_storage control compute | 7.7.7.5 |
Optimal                   |
|                            |                      |                               |         |
                      |
| VD Health Status           | f24-michigan-micro-1 | block_storage control compute | 7.7.7.7 |
Optimal                   |
|                            | f24-michigan-micro-2 | block_storage control compute | 7.7.7.6 |
Optimal                   |
|                            | f24-michigan-micro-3 | block_storage control compute | 7.7.7.5 |
Optimal                   |
|                            |                      |                               |         |
                      |
| RAID Level and Type        | f24-michigan-micro-1 | block_storage control compute | 7.7.7.7 | Type
 - HW; Level - RAID1 |
|                            | f24-michigan-micro-2 | block_storage control compute | 7.7.7.6 | Type
 - HW; Level - RAID1 |
|                            | f24-michigan-micro-3 | block_storage control compute | 7.7.7.5 | Type
 - HW; Level - RAID1 |
|                            |                      |                               |         |
                      |
| Number of Physical Disks   | f24-michigan-micro-1 | block_storage control compute | 7.7.7.7 | 8
                      |
|                            | f24-michigan-micro-2 | block_storage control compute | 7.7.7.6 | 8
                      |
|                            | f24-michigan-micro-3 | block_storage control compute | 7.7.7.5 | 8
                      |
|                            |                      |                               |         |
                      |
| Number of Virtual Disks    | f24-michigan-micro-1 | block_storage control compute | 7.7.7.7 | 1
                      |
|                            | f24-michigan-micro-2 | block_storage control compute | 7.7.7.6 | 1
                      |
|                            | f24-michigan-micro-3 | block_storage control compute | 7.7.7.5 | 1
                      |
|                            |                      |                               |         |
                      |
| Boot Drive Disk Media-Type | f24-michigan-micro-1 | block_storage control compute | 7.7.7.7 | HDD
                      |
|                            | f24-michigan-micro-2 | block_storage control compute | 7.7.7.6 | HDD
                      |
|                            | f24-michigan-micro-3 | block_storage control compute | 7.7.7.5 | SSD
                      |
+--------------------------+---------------------+-----------------------------+---------+-------------------------+
State Keys:
DHS-Dedicated Hot Spare|UGood-Unconfigured Good|GHS-Global Hotspare
UBad-Unconfigured Bad|Onln-Online|Offln-Offline
Rbld-Rebuilding|JBOD-Just a Bunch Of Disks
```

Step 5 Run the following command to delete the diskmgmt check-disks:

```
Delete a diskmgmt check-disks result:
```

Note Cisco recommends you to delete the tests which are not in use.

OSD-Maintenance Tool

You can use the osd-maintenance tool to check the status of all OSDs that are present in running and operational block storage nodes. OSD maintenance tool gives you the detailed information about the status of the OSDs - if they are Up or Down, in addition to what HDD corresponds to which OSD, including the slot number and server hostname.

- If it is down OSD is discovered after check_osds is performed, run the cluster recovery and recheck.
- If still down, wait 30 minutes before attempting replace - time for ceph-mon to sync.
- Physically remove and insert a new disk before attempting replace.
- For smooth operation, wipe out disk before attempting replace operations.
- Need a dedicated journal SSD for each storage server where osdmgmt is attempted.
- Only allowed to replace one OSD at a time. Space out each replace OSD by 30 minutes - time for ceph-mon to sync.
- Call TAC if any issue is hit. Do not reattempt.

To check the status of the osdmgmt tool log in the management node and run the ciscovim command with the osdmgmt option. The osdmgmt user interface allows you to create, list, show, and delete a workflow.

- Use ‘ciscovim osdmgmt create …’ command to initiate a check and replace OSD operation
- Use ‘ciscovim osdmgmt list …’ command to view summary and status of current OSD operations
- Use ‘ciscovim osdmgmt show … --id <ID>’ command to view detail OSD operation results
- Use ‘ciscovim osdmgmt delete … --id <ID>’ command to delete the results.

Examples of usage of this tool:

Step 1 Run the Help command to see all the option:

```
# ciscovim help osdmgmt
usage: ciscovim osdmgmt [--server <node1,node2,...>] [--detail] [--id <id>]
                        [--osd <osd_name>] [--locator {on,off}]
                        [--json-display] [-y]
                        create|delete|list|show check-osds|replace-osd

OSD maintenance helper

Positional arguments:
  create|delete|list|show     The control command to perform
  check-osds|replace-osd      The identity of the task/action

Optional arguments:
  --server <node1,node2,...>  List of specific block_storage hostnames
  --detail                    Display full OSD details
  --id <id>                    ID used to identify specific item to
                               show/delete.
  --osd <osd_name>             Name of down OSD to replace. Eg. 'osd.xx'
  --locator {on,off}           Turn on|off locator LED for server with bad OSDs
                               and for the physical drives.
  --json-display               Show output will be in JSON format.
  -y, --yes                    Yes option to perform the action

--+------------+----------+-----------+----------------------------+-----------+
```

Step 2 To check the osds run the following command:

```
# ciscovim osdmgmt create check-osds
+------------+--------------------------------------+
| Field      | Value                                |
+------------+--------------------------------------+
| action     | check-osds                           |
| command    | create                               |
| created_at | 2018-03-08T21:11:13.611786+00:00     |
| id         | 5fd4f9b5-786a-4a21-a70f-bffac70a3f3f |
| locator    | False                                |
| osd        | None                                 |
| result     |                                      |
| servers    | None                                 |
| status     | not_run                              |
| updated_at | None                                 |
+------------+--------------------------------------+
```

Step 3 Monitor the osdmgmt check operations using te list command. Cisco Vim Osd mgmt list commands are used to monitor the currently running test. It also helps you to view the tests that are run/ completed.

```
# ciscovim osdmgmt list check-osds
+--------------------------------------+------------+----------+---------------------------+
| ID                                   | Action     | Status   | Created                   |
+--------------------------------------+------------+----------+---------------------------+
| 5fd4f9b5-786a-4a21-a70f-bffac70a3f3f | check-osds | Complete | 2018-03-08 21:11:13+00:00 |
| 4efd0be8-a76c-4bc3-89ce-142de458d844 | check-osds | Complete | 2018-03-08 21:31:01+00:00 |
+--------------------------------------+------------+----------+---------------------------+
```

Step 4 To show the detailed results of osdmgmt check-osds operation, run the following command:

```
# ciscovim osdmgmt show check-osds  --id 5fd4f9b5-786a-4a21-a70f-bffac70a3f3f
+--------------------+----------------------+-------------------------------+---------+---------+
| Message            | Host                 | Role                          | Server  | State   |
+--------------------+----------------------+-------------------------------+---------+---------+
| Overall OSD Status | f24-michigan-micro-3 | block_storage control compute | 7.7.7.5 | Optimal |
|                    | f24-michigan-micro-1 | block_storage control compute | 7.7.7.7 | Optimal |
|                    | f24-michigan-micro-2 | block_storage control compute | 7.7.7.6 | Optimal |
|                    |                      |                               |         |         |
| Number of OSDs     | f24-michigan-micro-3 | block_storage control compute | 7.7.7.5 | 5       |
|                    | f24-michigan-micro-1 | block_storage control compute | 7.7.7.7 | 5       |
|                    | f24-michigan-micro-2 | block_storage control compute | 7.7.7.6 | 5       |
+--------------------+----------------------+-------------------------------+---------+---------+
+--------------------+--------+--------+----+----------+-----------+-------------------------+-----------+
| Host                 | OSDs   | Status | ID | HDD Slot  | Path      | Mount                    |
 Journal   |
+--------------------+--------+--------+----+----------+-----------+-------------------------+-----------+
| f24-michigan-micro-3 | osd.0  | up     | 0  |  4 (JBOD) | /dev/sda1 | /var/lib/ceph/osd/ceph-0  |
 /dev/sdf1 |
|                      | osd.1  | up     | 1  |  5 (JBOD) | /dev/sdb1 | /var/lib/ceph/osd/ceph-1  |
 /dev/sdf2 |
|                      | osd.3  | up     | 3  |  7 (JBOD) | /dev/sdc1 | /var/lib/ceph/osd/ceph-3  |
 /dev/sdf3 |
|                      | osd.5  | up     | 5  |  8 (JBOD) | /dev/sdd1 | /var/lib/ceph/osd/ceph-5  |
 /dev/sdf4 |
|                      | osd.6  | up     | 6  |  6 (JBOD) | /dev/sde1 | /var/lib/ceph/osd/ceph-6  |
 /dev/sdf5 |
|                      |        |        |    |           |           |                           |
           |
| f24-michigan-micro-1 | osd.2  | up     | 2  |  5 (JBOD) | /dev/sda1 | /var/lib/ceph/osd/ceph-2  |
 /dev/sdf1 |
|                      | osd.7  | up     | 7  |  7 (JBOD) | /dev/sdb1 | /var/lib/ceph/osd/ceph-7  |
 /dev/sdf2 |
|                      | osd.9  | up     | 9  |  8 (JBOD) | /dev/sdc1 | /var/lib/ceph/osd/ceph-9  |
 /dev/sdf3 |
|                      | osd.11 | up     | 11 |  6 (JBOD) | /dev/sdd1 | /var/lib/ceph/osd/ceph-11 |
 /dev/sdf4 |
|                      | osd.13 | up     | 13 |  4 (JBOD) | /dev/sde1 | /var/lib/ceph/osd/ceph-13 |
 /dev/sdf5 |
|                      |        |        |    |           |           |                           |
           |
| f24-michigan-micro-2 | osd.4  | up     | 4  |  8 (JBOD) | /dev/sda1 | /var/lib/ceph/osd/ceph-4  |
 /dev/sdf1 |
|                      | osd.8  | up     | 8  |  5 (JBOD) | /dev/sdb1 | /var/lib/ceph/osd/ceph-8  |
 /dev/sdf2 |
|                      | osd.10 | up     | 10 |  4 (JBOD) | /dev/sdc1 | /var/lib/ceph/osd/ceph-10 |
 /dev/sdf3 |
|                      | osd.12 | up     | 12 |  6 (JBOD) | /dev/sdd1 | /var/lib/ceph/osd/ceph-12 |
 /dev/sdf4 |
|                      | osd.14 | up     | 14 |  7 (JBOD) | /dev/sde1 | /var/lib/ceph/osd/ceph-14 |
 /dev/sdf5 |
+---------------------+--------+--------+----+-----------+-----------+-------------------------+-----------+
```

Step 5 To delete the check-disk osds, run the following command:

```
# ciscovim osdmgmt delete check-osds --id 5fd4f9b5-786a-4a21-a70f-bffac70a3f3f

Perform the action. Continue (Y/N)Y
Delete of UUID 5fd4f9b5-786a-4a21-a70f-bffac70a3f3f Successful

[root@F24-Michigan ~]# ciscovim osdmgmt list check-osds
+--------------------------------------+------------+----------+---------------------------+
| ID                                   | Action     | Status   | Created                   |
+--------------------------------------+------------+----------+---------------------------+
| 4efd0be8-a76c-4bc3-89ce-142de458d844 | check-osds | Complete | 2018-03-08 21:31:01+00:00 |
+---------------------+-------+-----+---------------++-----------+-------------+--------+-----+---------+
```

Note OSD maintenance is supported only on standalone OSD drives (based on HDD), but not when they are co-located with journaling.

Utility to Resolve Cisco VIM Hardware Validation Failures

The Cisco VIM Hardware Validation utility tool is used to perform hardware validation during the installation of UCS C-series servers. It captures the user and environmental hardware validation errors that occur during the installation process. The tool enables you to fix these errors that are based on the inputs you provide at the Command Line Interface (CLI). It validates the updated configurations to verify if the changes are applied properly. After the error is resolved, you can resume the installation from the point of failure.

The ciscovim hardware-mgmt user interface allows you to test the job validate orresolve-failures(create), list, show, and delete workflow

Hardware-mgmt user workflow:

1. Use “ciscovim hardware-mgmt validate …” command to initiate a validation.
2. Use “ciscovim hardware-mgmt list …” command to view summary/status of current test jobs.
3. Use “ciscovim hardware-mgmt show … --id <ID>” command to view detail test results
4. Use “ciscovim hardware-mgmt delete … --id <ID>” to delete test results.

A database of results is maintained so that the user can keep the results of multiple hardware-mgmt operations and view them at any time.

Note You cannot use the utility for the following tasks:

- Configuring BIOS settings for the B-series pods.
- Upgrading or changing the firmware version.
- Resolving hardware failures other than lom, hba, flexflash, pcie_slot, power, and vnic_pxe_boot.

Command Usage

To capture the list of failures that can be resolved by using the utility, go to the install directory and execute the help command:

# cd <installer-id>/clouddeploy

# python hw_validations.py -help .

The following shows the output of the help command.

```
usage: hw_validations.py [-h] [--resolve-failures RESOLVE_FAILURES]
[--validate VALIDATE_OF] [-y] [--host HOSTS]
[--file SETUP_FILE_LOCATION]
UCS Hardware Validations
optional arguments:
-h, --help show this help message and exit
--resolve-failures RESOLVE_FAILURES, -rf RESOLVE_FAILURES
                      all - Fix all the failures.
                      lom - Fix LOM port(s) status failures.
                      hba - Fix HBA port status failures.
                      flexflash - Fix Flexflash failures.
                      pcie_slot - Fix PCIe slot status failures.
                      power - Fix Power failures.
                      vnic_pxe_boot - Fix Vnic PXE_Boot statusfailures
-y, -yes
--host HOSTS Comma separated list of hostnames
--file SETUP_FILE_LOCATION, -f SETUP_FILE_LOCATION
            Provide a valid 'setup_data.yaml' file
```

Command Syntax

hw_validations.py [-h] [--resolve-failures RESOLVE_FAILURES] [--validate VALIDATE_OF] [-y] [--host HOSTS] [--file SETUP_FILE_LOCATION]

The following table provides the description of the parameters of the command.

Optional	Description
[-h], --help	Provides detailed information about the command.
[--resolve-failures RESOLVE_FAILURES], -rf RESOLVE_FAILURES	Enables you to specify the failure that you want to resolve. The optional arguments are as follows:
[-y]	Yes
[--host HOSTS]	Enables you to specify the hostname of the server for which you want to resolve failures. You cannot specify the IP address or CIMC IP address of servers as arguments. You can specify a list of hostnames as comma-separated arguments. If the -host option is not specified, the failures of all the servers that are specified in the setup_data.yaml file are resolved.
[--file SETUP_FILE_LOCATION] [-f SETUP_FILE_LOCATION]	Enables you to specify the name of a setup_data.yaml file.

Examples of Command Usage

The following table provides the commonly used commands along with their examples.

Purpose	Syntax	Example
To resolve all failures.	python hw_validations.py --resolve-failures all -y	python hw_validations.py --resolve-failures all -y
To simultaneously resolve one or more failures.	python hw_validations.py --resolve-failures <failure-1>,<failure-2> -y	To resolve the lom and hba status failures: python hw_validations.py --resolve-failures lom,hba -y
To resolve the errors by using the setup_data.yaml file.	python hw_validations.py --resolve-failures <failure-1>,<failure-2> -y --file <location-of-yaml file>	To resolve the LOM status failures by using ~/save/setup_data.yaml file: python hw_validations.py --resolve-failures lom,hba -y --file ~/save/setup_data.yaml
To resolve failures on a particular server as specified in the setup_data.yaml file by using the -- *host* option.	*python hw_validations.py --resolve-failures <failure-1> -y --host <name-of-host-server-1>,<name-of-host-server-2>*	To resolve the PCIe slot failures on hiccup-controller-1 server as specified in the setup_data.yaml: *python hw_validations.py --resolve-failures pcie_slot -y --host hiccup-controller-1*

Cisco VIM Client Debug Option

The --debug option enables you to get verbose logging on the ciscovim client console. You can use verbose logging to troubleshoot issues with the ciscovim client.

The debug option has the following parts:

- Curl Command: Curl command can be used for debugging. It can be executed standalone. Curl Command also displays the REST API Endpoint and the Request Payload.
- Response of REST API

Examples of Using debug Option to get list of passwords

```
# ciscovim --debug list-password-keys
2018-05-28 22:13:21,945 DEBUG [ciscovimclient.common.httpclient][MainThread] curl -i -X GET
 -H 'Content-Type: application/json' -H 'Authorization: ****' -H 'Accept: application/json'
 -H 'User-Agent: python-ciscovimclient' --cacert /var/www/mercury/mercury-ca.crt
https://172.31.231.17:8445/secrets
2018-05-28 22:13:21,972 DEBUG [ciscovimclient.common.httpclient][MainThread]
HTTP/1.1 200 OK
content-length: 1284
x-xss-protection: 1
x-content-type-options: nosniff
strict-transport-security: max-age=31536000
server: WSGIServer/0.1 Python/2.7.5
cache-control: no-cache, no-store, must-revalidate, max-age=0
date: Tue, 29 May 2018 05:13:21 GMT
x-frame-options: SAMEORIGIN
content-type: application/json; charset=UTF-8

{u'HEAT_KEYSTONE_PASSWORD': '****', u'CINDER_KEYSTONE_PASSWORD': '****',
u'METADATA_PROXY_SHARED_SECRET': '****', u'WSREP_PASSWORD': '****', u'ETCD_ROOT_PASSWORD':
 '****', u'HEAT_DB_PASSWORD': '****', u'CINDER_DB_PASSWORD': '****', u'KEYSTONE_DB_PASSWORD':
 '****', u'NOVA_DB_PASSWORD': '****', u'GLANCE_KEYSTONE_PASSWORD': '****',
u'CLOUDPULSE_KEYSTONE_PASSWORD': '****', u'VPP_ETCD_PASSWORD': '****', u'COBBLER_PASSWORD':
 '****', u'DB_ROOT_PASSWORD': '****', u'NEUTRON_KEYSTONE_PASSWORD': '****',
u'HEAT_STACK_DOMAIN_ADMIN_PASSWORD': '****', u'KIBANA_PASSWORD': '****',
u'IRONIC_KEYSTONE_PASSWORD': '****', u'ADMIN_USER_PASSWORD': '****', u'HAPROXY_PASSWORD':
'****', u'NEUTRON_DB_PASSWORD': '****', u'IRONIC_DB_PASSWORD': '****', u'GLANCE_DB_PASSWORD':
 '****', u'RABBITMQ_ERLANG_COOKIE': '****', u'NOVA_KEYSTONE_PASSWORD': '****',
u'CPULSE_DB_PASSWORD': '****', u'HORIZON_SECRET_KEY': '****', u'RABBITMQ_PASSWORD': '****'}

+----------------------------------+
| Password Keys                    |
+----------------------------------+
| ADMIN_USER_PASSWORD              |
| CINDER_DB_PASSWORD               |
| CINDER_KEYSTONE_PASSWORD         |
| CLOUDPULSE_KEYSTONE_PASSWORD     |
| COBBLER_PASSWORD                 |
| CPULSE_DB_PASSWORD               |
| DB_ROOT_PASSWORD                 |
| ETCD_ROOT_PASSWORD               |
| GLANCE_DB_PASSWORD               |
| GLANCE_KEYSTONE_PASSWORD         |
| HAPROXY_PASSWORD                 |
| HEAT_DB_PASSWORD                 |
| HEAT_KEYSTONE_PASSWORD           |
| HEAT_STACK_DOMAIN_ADMIN_PASSWORD |
| HORIZON_SECRET_KEY               |
| IRONIC_DB_PASSWORD                 |
| IRONIC_KEYSTONE_PASSWORD           |
| KEYSTONE_DB_PASSWORD               |
| KIBANA_PASSWORD                    |
| METADATA_PROXY_SHARED_SECRET       |
| NEUTRON_DB_PASSWORD                |
| NEUTRON_KEYSTONE_PASSWORD          |
| NOVA_DB_PASSWORD                   |
| NOVA_KEYSTONE_PASSWORD             |
| RABBITMQ_ERLANG_COOKIE             |
| RABBITMQ_PASSWORD                  |
| VPP_ETCD_PASSWORD                  |
| WSREP_PASSWORD                     |
+------------------------------------+
```

Examples of Using debug option to get list of nodes

```
# ciscovim --debug list-nodes
2018-05-28 22:13:31,572 DEBUG [ciscovimclient.common.httpclient][MainThread] curl -i -X GET
 -H 'Content-Type: application/json' -H 'Authorization: ****' -H 'Accept: application/json'
 -H 'User-Agent: python-ciscovimclient' --cacert /var/www/mercury/mercury-ca.crt
https://172.31.231.17:8445/nodes
2018-05-28 22:13:31,599 DEBUG [ciscovimclient.common.httpclient][MainThread]
HTTP/1.1 200 OK
content-length: 2339
x-xss-protection: 1
x-content-type-options: nosniff
strict-transport-security: max-age=31536000
server: WSGIServer/0.1 Python/2.7.5
cache-control: no-cache, no-store, must-revalidate, max-age=0
date: Tue, 29 May 2018 05:13:31 GMT
x-frame-options: SAMEORIGIN
content-type: application/json; charset=UTF-8

{u'nodes': {u'status': u'Active', u'uuid': u'6b1ea6ee-b15b-41ca-9d79-3bb9ec0002bc',
u'setupdata': u'fe78b5f9-5a46-447c-9317-2bf7362c1e81', u'node_data': {u'rack_info':
{u'rack_id': u'RackD'}, u'cimc_info': {u'cimc_ip': u'172.29.172.81'}, u'management_ip':
u'21.0.0.10'}, u'updated_at': u'2018-05-25T11:14:46+00:00', u'reboot_required': u'No',
u'mtype': u'control', u'install': u'372aa3c1-1ab0-4dd0-a8a8-1853a085133c', u'power_status':
 u'PowerOnSuccess', u'install_logs':
u'https://172.31.231.17:8008//edd3975c-8b7c-4d3c-93de-a033ae10a6b6', u'created_at':
u'2018-05-21T13:25:50+00:00', u'name': u'gg34-2'}}

+-----------+--------+---------+---------------+
| Node Name | Status |   Type  | Management IP |
+-----------+--------+---------+---------------+
|   gg34-1  | Active | control |   21.0.0.12   |
|   gg34-2  | Active | control |   21.0.0.10   |
|   gg34-3  | Active | control |   21.0.0.11   |
|   gg34-4  | Active | compute |   21.0.0.13   |
+-----------+--------+---------+---------------+
```

Example of Getting Response from REST API using Curl Commands

```
Get the REST API Password.
# cat /opt/cisco/ui_config.json
{
"Kibana-Url": "http://172.31.231.17:5601",
"RestAPI-Url": "https://172.31.231.17:8445",
"RestAPI-Username": "admin",
"RestAPI-Password": "*******************",
"RestDB-Password": "*******************",
"BuildNodeIP": "172.31.231.17"
}
```

```
Form the Curl Command.
curl -k -u <RestAPI-Username>:<RestAPI-Password>  <RestAPI-Url>/<Endpoint>
E.g. To get Nodes Info of Cloud
curl -k -u admin:**** http://172.31.231.17:5601/v1/nodes
```

Examples of Response of REST APIs

```
API “/”

# curl -k -u admin:**** https://172.31.231.17:8445/

{"default_version": {"id": "v1", "links": [{"href": "http://127.0.0.1:8083/v1/", "rel":
"self"}]}, "versions": [{"id": "v1", "links": [{"href": "http://127.0.0.1:8083/v1/", "rel":
 "self"}]}], "name": "Virtualized Infrastructure Manager Rest API", "description":
"Virtualized Infrastructure Manager Rest API is used to invoke installer from API."}


API “/v1/setupdata/”

# curl -k -u admin:**** https://172.31.231.17:8445/v1/setupdata/

{"setupdatas": [. . .]}


API “/v1/nodes”

# curl -k -u admin:**** https://172.31.231.17:8445/v1/nodes

{"nodes": [{"status": "Active", "uuid": "0adabc97-f284-425b-ac63-2d336819fbaf", "setupdata":
 "fe78b5f9-5a46-447c-9317-2bf7362c1e81", "node_data": "{\"rack_info\": {\"rack_id\":
\"RackC\"}, \"cimc_info\": {\"cimc_ip\": \"172.29.172.75\"}, \"management_ip\":
\"21.0.0.13\"}", "updated_at": "2018-05-21T15:11:05+00:00", "reboot_required": "No", "mtype":
 "compute", "install": "372aa3c1-1ab0-4dd0-a8a8-1853a085133c", "power_status":
"PowerOnSuccess", "install_logs":
"https://172.31.231.17:8008//edd3975c-8b7c-4d3c-93de-a033ae10a6b6", "created_at":
"2018-05-21T13:25:50+00:00", "name": "gg34-4"}, . . . . ]}


API “/v1/secrets”

# curl -k -u admin:**** https://172.31.231.17:8445/v1/secrets

{"HEAT_KEYSTONE_PASSWORD": "5oNff4jWsvAwnWk1", "CINDER_KEYSTONE_PASSWORD": "Hq4i6S5CnfQe7Z2W",
 "RABBITMQ_ERLANG_COOKIE": "XRMHBQHTLVJSVWDFKJUX", "METADATA_PROXY_SHARED_SECRET":
"XNzrhosqW4rwiz7c", "WSREP_PASSWORD": "z1oQqhKd1fXDxJTV", "ETCD_ROOT_PASSWORD":
"LMLC8gvi1IA3KiIc", "HEAT_DB_PASSWORD": "J8zt8ldMvdtJxAtG", "CINDER_DB_PASSWORD":
"BVX3y2280DSx2JkY", "KEYSTONE_DB_PASSWORD": "55fVNzxR1VxCNOdh", "NOVA_DB_PASSWORD":
"Rk1MK1OIJgsjGZal", "IRONIC_KEYSTONE_PASSWORD": "9tYZgIw6SZERZ1dZ", "ADMIN_USER_PASSWORD":
 "DjDQrk4QT7pgHy94", "GLANCE_KEYSTONE_PASSWORD": "w4REb8uhrHquCfRm", "HAPROXY_PASSWORD":
"oB0v7VJoo2IfB8OW", "CLOUDPULSE_KEYSTONE_PASSWORD": "q6QVvxBQhrqv6Zhx", "NEUTRON_DB_PASSWORD":
 "FZVMWgApcZR4us5q", "IRONIC_DB_PASSWORD": "dq3Udmu95DWyX1jy", "GLANCE_DB_PASSWORD":
"O7vQ2emuPDrrvD4x", "KIBANA_PASSWORD": "azHHhP4ewxpZVwcg", "VPP_ETCD_PASSWORD":
"NLyIAvECMW2qI7Bp", "NOVA_KEYSTONE_PASSWORD": "JUfMNGz0BZG7JwXV", "NEUTRON_KEYSTONE_PASSWORD":
 "QQ0lo8Q87BjFoAYQ", "CPULSE_DB_PASSWORD": "DaFthNtpX2RvwTSs", "COBBLER_PASSWORD":
"XoIJ9mbWcmVyzvvN", "HORIZON_SECRET_KEY":
"NHkA0qwHIWUSwhPZowJ8Ge3RyRd6oM8XjOT8PHnZdckxgm3kbb1MSltsw0TAQJnx", "DB_ROOT_PASSWORD":
"seqh5DRIKP6ZsKJ8", "HEAT_STACK_DOMAIN_ADMIN_PASSWORD": "Vu6LexEadAxscsvY",
"RABBITMQ_PASSWORD": "LBoYoxuvGsMsl1TX"}

API “/v1/nodes/mgmt._node”

# curl -k -u admin:**** https://172.31.231.17:8445/v1/nodes/mgmt_node
```

```
{"api_ip": "172.31.231.17", "mgmt_ip": "21.0.0.2"}
```