



Red Hat OpenStack Platform 17.1

Integrating the overcloud with an existing Red Hat Ceph Storage Cluster

Configuring the overcloud to use a standalone Red Hat Ceph Storage cluster

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OpenStack Team
rhos-docs@redhat.com

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Abstract

You can use Red Hat OpenStack Platform (RHOSP) director to integrate an overcloud with an existing, standalone Red Hat Ceph Storage cluster.

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CHAPTER 1. INTEGRATING AN OVERCLOUD WITH CEPH STORAGE

Red Hat OpenStack Platform director creates a cloud environment called the overcloud. You can use director to configure extra features for an overcloud, such as integration with Red Hat Ceph Storage. You can integrate your overcloud with Ceph Storage clusters created with director or with existing Ceph Storage clusters. The default integration with Ceph configures the Image service (glance), the Block Storage service (cinder), and the Compute service (nova) to use block storage over the Rados Block Device (RBD) protocol. Additional integration options for File and Object storage might also be included.

For more information about Red Hat Ceph Storage, see the [Red Hat Ceph Storage Architecture Guide](#).

1.1. RED HAT CEPH STORAGE COMPATIBILITY

RHOSP 17.1 supports connection to external Red Hat Ceph Storage 6 and Red Hat Ceph Storage 7 clusters.

1.2. DEPLOYING THE SHARED FILE SYSTEMS SERVICE WITH EXTERNAL CEPHFS

You can deploy the Shared File Systems service (manila) with CephFS by using Red Hat OpenStack Platform (RHOSP) director. You can use the Shared File Systems service with the NFS protocol or the native CephFS protocol.



IMPORTANT

You cannot use the Shared File Systems service with the CephFS native driver to serve shares to Red Hat OpenShift Container Platform through Manila CSI. Red Hat does not support this type of deployment. For more information, contact Red Hat Support.

The Shared File Systems service with CephFS-NFS fully supports serving shares to Red Hat OpenShift Container Platform through Manila CSI. This solution is not intended for large scale deployments. For more information about CSI workload recommendations, see <https://access.redhat.com/articles/6667651>.

To use native CephFS shared file systems, clients require access to the Ceph public network. When you integrate an overcloud with an existing Ceph Storage cluster, director does not create an isolated storage network to designate as the Ceph public network. This network is assumed to already exist. Do not provide direct access to the Ceph public network; instead, allow tenants to create a router to connect to the Ceph public network.

NFS-Ganesha gateway

When you use CephFS through the NFS protocol, director deploys the NFS-Ganesha gateway on Controller nodes managed by Pacemaker (PCS). PCS manages cluster availability by using an active-passive configuration.

The NFS-Ganesha gateway is supported with Red Hat Ceph Storage 5.x (Ceph package 16.x) and Red Hat Ceph Storage 6.x (Ceph package 17.x). For information about how to determine the Ceph Storage release installed on your system, see [Red Hat Ceph Storage releases and corresponding Ceph package versions](#).

Prerequisites

Before you configure the Shared File Systems service with an external Ceph Storage cluster, complete the following prerequisites:

- Verify that your external Ceph Storage cluster has an active Metadata Server (MDS):

```
$ ceph -s
```

- The external Ceph Storage cluster must have a CephFS file system that is supported by CephFS data and metadata pools.
 - Verify the pools in the CephFS file system:

```
$ ceph fs ls
```

- Note the names of these pools to configure the director parameters, **ManilaCephFSDataPoolName** and **ManilaCephFSMetadataPoolName**. For more information about this configuration, see [Creating a custom environment file](#).
- The external Ceph Storage cluster must have a **cephx** client name and key for the Shared File Systems service.
 - Verify the keyring:

```
$ ceph auth get client.<client name>
```

- Replace **<client name>** with your **cephx** client name.

1.3. CONFIGURING CEPH OBJECT STORE TO USE EXTERNAL CEPH OBJECT GATEWAY

Red Hat OpenStack Platform (RHOSP) director supports configuring an external Ceph Object Gateway (RGW) as an Object Store service. To authenticate with the external RGW service, you must configure RGW to verify users and their roles in the Identity service (keystone).

For more information about how to configure an external Ceph Object Gateway, see [Configuring the Ceph Object Gateway to use Keystone authentication](#) in the *Using Keystone with the Ceph Object Gateway Guide*.

CHAPTER 2. PREPARING OVERCLOUD NODES

The overcloud deployment that is used to demonstrate how to integrate with a Red Hat Ceph Storage cluster consists of Controller nodes with high availability and Compute nodes to host workloads. The Red Hat Ceph Storage cluster has its own nodes that you manage independently from the overcloud by using the Ceph management tools, not through director. For more information about Red Hat Ceph Storage, see the product documentation for [Red Hat Ceph Storage](#).

2.1. CONFIGURING THE EXISTING RED HAT CEPH STORAGE CLUSTER

To configure your Red Hat Ceph Storage cluster, you create object storage daemon (OSD) pools, define capabilities, and create keys and IDs directly on the Ceph Storage cluster. You can execute commands from any machine that can reach the Ceph Storage cluster and has the Ceph command line client installed.

Procedure

1. Log in to the external Ceph admin node.
2. Open an interactive shell to access Ceph commands:

```
[user@ceph ~]$ sudo cephadm shell
```

3. Create the following RADOS Block Device (RBD) pools in your Ceph Storage cluster, relevant to your environment:

- Storage for OpenStack Block Storage (cinder):

```
$ ceph osd pool create volumes <pgnum>
```

- Storage for OpenStack Image Storage (glance):

```
$ ceph osd pool create images <pgnum>
```

- Storage for instances:

```
$ ceph osd pool create vms <pgnum>
```

- Storage for OpenStack Block Storage Backup (cinder-backup):

```
$ ceph osd pool create backups <pgnum>
```

4. If your overcloud deploys the Shared File Systems service (manila) with Red Hat Ceph 5 (Ceph package 16) or later, you do not need to create data and metadata pools for CephFS. You can create a filesystem volume. For more information, see [Management of MDS service using the Ceph Orchestrator](#) in the Red Hat Ceph Storage *Operations Guide*.
5. Create a **client.openstack** user in your Ceph Storage cluster with the following capabilities:
 - **cap_mgr: allow ***
 - **cap_mon: profile rbd**

- **cap_osd: profile rbd pool=volumes, profile rbd pool=vms, profile rbd pool=images, profile rbd pool=backups**

```
$ ceph auth add client.openstack mgr 'allow *' mon 'profile rbd' osd 'profile rbd
pool=volumes, profile rbd pool=vms, profile rbd pool=images, profile rbd pool=backups'
```

6. Note the Ceph client key created for the **client.openstack** user:

```
$ ceph auth list
...
[client.openstack]
key = <AQC+vYNXgDAgAhAAc8UoYt+OTz5uhV7ItLdwUw==>
caps mgr = "allow *"
caps mon = "profile rbd"
caps osd = "profile rbd pool=volumes, profile rbd pool=vms, profile rbd pool=images, profile
rbd pool=backups"
...
```

- The **key** value in the example, **AQC+vYNXgDAgAhAAc8UoYt+OTz5uhV7ItLdwUw==**, is your Ceph client key.
7. If your overcloud deploys the Shared File Systems service with CephFS, create the **client.manila** user in your Ceph Storage cluster. The capabilities required for the **client.manila** user depend on whether your deployment exposes CephFS shares through the native CephFS protocol or the NFS protocol.

- If you expose CephFS shares through the native CephFS protocol, the following capabilities are required:

- **cap_mgr: allow rw**
- **cap_mon: allow r**

```
$ ceph auth add client.manila mgr 'allow rw' mon 'allow r'
```

- If you expose CephFS shares through the NFS protocol, the following capabilities are required:

- **cap_mgr: allow rw**
- **cap_mon: allow r**
- **cap_osd: allow rw pool=manila_data**

The specified pool name must be the value set for the **ManilaCephFSDataPoolName** parameter, which defaults to **manila_data**.

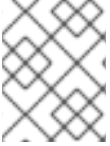
```
$ ceph auth add client.manila mgr 'allow rw' mon 'allow r' osd 'allow rw
pool=manila_data'
```

8. Note the manila client name and the key value to use in overcloud deployment templates:

```
$ ceph auth get-key client.manila
<AQDQ991cAAAAABAA0aXFrTnjH9aO39P0iVvYyg==>
```

- Note the file system ID of your Ceph Storage cluster. This value is specified in the **fsid** field, under the **[global]** section of the configuration file for your cluster:

```
[global]
fsid = 4b5c8c0a-ff60-454b-a1b4-9747aa737d19
...
```



NOTE

Use the Ceph client key and file system ID, and the Shared File Systems service client IDs and key when you create the custom environment file.

Additional resources

- [Creating a custom environment file](#)
- [Red Hat Ceph Storage releases and corresponding Ceph package versions](#)
- [Red Hat Ceph Storage *Configuration Guide*](#)

CHAPTER 3. INTEGRATING WITH AN EXISTING RED HAT CEPH STORAGE CLUSTER

Use the procedures and information in this section to integrate Red Hat OpenStack Platform (RHOSP) with an existing Red Hat Ceph Storage cluster. You can create custom environment files to override and provide values for configuration options within OpenStack components.

3.1. CREATING A CUSTOM ENVIRONMENT FILE

Director supplies parameters to **tripleo-ansible** to integrate with an external Red Hat Ceph Storage cluster through the environment file:

- **/usr/share/openstack-tripleo-heat-templates/environments/external-ceph.yaml**

If you deploy the Shared File Systems service (manila) with external CephFS, separate environment files supply additional parameters.

- For native CephFS, the environment file is **/usr/share/openstack-tripleo-heat-templates/environments/manila-cephfsnative-config.yaml**.
- For CephFS-NFS, the environment file is **/usr/share/openstack-tripleo-heat-templates/environments/manila-cephfsganeshha-config.yaml**.

To configure integration of an existing Ceph Storage cluster with the overcloud, you must supply the details of your Ceph Storage cluster to director by using a custom environment file. Director invokes these environment files during deployment.

Procedure

1. Create a custom environment file:

```
/home/stack/templates/ceph-config.yaml
```

2. Add a **parameter_defaults**: section to the file:

```
parameter_defaults:
```

3. Use **parameter_defaults** to set all of the parameters that you want to override in **/usr/share/openstack-tripleo-heat-templates/environments/external-ceph.yaml**. You must set the following parameters at a minimum:

- **CephClientKey**: The Ceph client key for the **client.openstack** user in your Ceph Storage cluster. This is the value of **key** that you retrieved in [Configuring the existing Ceph Storage cluster](#). For example, **AQDLOh1VgEp6FRAAFzT7Zw+Y9V6JJExQAsRnRQ==**.
- **CephClusterFSID**: The file system ID of your Ceph Storage cluster. This is the value of **fsid** in your Ceph Storage cluster configuration file, which you retrieved in [Configuring the existing Ceph Storage cluster](#). For example, **4b5c8c0a-ff60-454b-a1b4-9747aa737d19**.
- **CephExternalMonHost**: A comma-delimited list of the IPs of all MON hosts in your Ceph Storage cluster, for example, **172.16.1.7, 172.16.1.8**.

For example:

```
parameter_defaults:
  CephClientKey: <AQDLOh1VgEp6FRAAFzT7Zw+Y9V6JJExQAsRnRQ==>
```

```
CephClusterFSID: <4b5c8c0a-ff60-454b-a1b4-9747aa737d19>
CephExternalMonHost: <172.16.1.7, 172.16.1.8, 172.16.1.9>
```

4. Optional: You can override the Red Hat OpenStack Platform (RHOSP) client username and the following default pool names to match your Ceph Storage cluster:

- **CephClientUserName:** <openstack>
- **NovaRbdPoolName:** <vms>
- **CinderRbdPoolName:** <volumes>
- **GlanceRbdPoolName:** <images>
- **CinderBackupRbdPoolName:** <backups>

5. Optional: If you are deploying the Shared File Systems service with CephFS, you can override the following default data and metadata pool names:

```
ManilaCephFSDataPoolName: <manila_data>
ManilaCephFSMetadataPoolName: <manila_metadata>
```

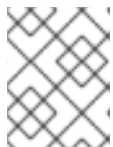


NOTE

Ensure that these names match the names of the pools you created.

6. Set the client key that you created for the Shared File Systems service. You can override the default Ceph client username for that key:

```
ManilaCephFSCephFSAuthId: <manila>
CephManilaClientKey: <AQDQ991cAAAAABAA0aXFrTnjH9aO39P0iVvYyg==>
```



NOTE

The default client username **ManilaCephFSCephFSAuthId** is **manila**, unless you override it. **CephManilaClientKey** is always required.

After you create the custom environment file, you must include it when you deploy the overcloud.

Additional resources

- [Deploying the overcloud](#)

3.2. CEPH CONTAINERS FOR RED HAT OPENSTACK PLATFORM WITH RED HAT CEPH STORAGE

You must have a Ceph Storage container to configure Red Hat Openstack Platform (RHOSP) to use Red Hat Ceph Storage with NFS Ganesha. You do not require a Ceph Storage container if the external Ceph Storage cluster only provides Block (through RBD), Object (through RGW), or File (through native CephFS) storage.

RHOSP 17.1 will deploy Red Hat Ceph Storage 6.x (Ceph package 17.x). The Ceph Storage 6.x containers are hosted at registry.redhat.io, a registry that requires authentication. For more information, see [Container image preparation parameters](#).

3.3. DEPLOYING THE OVERCLOUD

Deploy the overcloud with the environment file that you created.

Procedure

- The creation of the overcloud requires additional arguments for the **openstack overcloud deploy** command:

```
$ openstack overcloud deploy --templates \
  -e /usr/share/openstack-tripleo-heat-templates/environments/external-ceph.yaml \
  -e /home/stack/templates/ceph-config.yaml \
  -e --ntp-server pool.ntp.org \
  ...
```

This example command uses the following options:

- **--templates** - Creates the overcloud from the default heat template collection, **/usr/share/openstack-tripleo-heat-templates/**.
 - **-e /usr/share/openstack-tripleo-heat-templates/environments/external-ceph.yaml** - Sets the director to integrate an existing Ceph Storage cluster to the overcloud.
 - **-e /home/stack/templates/ceph-config.yaml** - Adds a custom environment file to override the defaults set by **-e /usr/share/openstack-tripleo-heat-templates/environments/external-ceph.yaml**.
 - **--ntp-server pool.ntp.org** - Sets the NTP server.

3.3.1. Adding environment files for the Shared File Systems service with CephFS

If you deploy an overcloud that uses the Shared File Systems service (manila) with CephFS, you must add additional environment files.

Procedure

1. Create and add additional environment files:
 - If you deploy an overcloud that uses the native CephFS back-end driver, add **/usr/share/openstack-tripleo-heat-templates/environments/manila-cephfsnative-config.yaml**.
 - If you deploy an overcloud that uses CephFS-NFS, add **/usr/share/openstack-tripleo-heat-templates/environments/manila-cephfsганеша-config.yaml**.
Red Hat recommends that you deploy the Ceph-through-NFS driver with an isolated StorageNFS network where shares are exported. You must deploy the isolated network to overcloud Controller nodes. To enable this deployment, director includes the following file and role:

- An example custom network configuration file that includes the StorageNFS network (/usr/share/openstack-tripleo-heat-templates/network_data_ganesha.yaml). Review and customize this file as necessary.
 - A ControllerStorageNFS role.
2. Modify the **openstack overcloud deploy** command depending on the CephFS back end that you use.

- For native CephFS:

```
$ openstack overcloud deploy --templates \
  -e /usr/share/openstack-tripleo-heat-templates/environments/external-ceph.yaml \
  -e /usr/share/openstack-tripleo-heat-templates/environments/manila-cephfsnative-
  config.yaml \
  -e /home/stack/templates/ceph-config.yaml \
  -e --ntp-server pool.ntp.org
  ...
```

- For CephFS-NFS:

```
$ openstack overcloud deploy --templates \
  -n /usr/share/openstack-tripleo-heat-templates/network_data_ganesha.yaml \
  -r /home/stack/custom_roles.yaml \
  -e /usr/share/openstack-tripleo-heat-templates/environments/external-ceph.yaml \
  -e /usr/share/openstack-tripleo-heat-templates/environments/manila-cephfsganesha-
  config.yaml \
  -e /home/stack/templates/ceph-config.yaml \
  -e --ntp-server pool.ntp.org
  ...
```



NOTE

The custom **ceph-config.yaml** environment file overrides parameters in the **external-ceph.yaml** file and either the **manila-cephfsnative-config.yaml** file or the **manila-cephfsganesha-config.yaml** file. Therefore, include the custom **ceph-config.yaml** environment file in the deployment command after **external-ceph.yaml** and either **manila-cephfsnative-config.yaml** or **manila-cephfsganesha-config.yaml**.

Example environment file

```
parameter_defaults:
  CinderEnableScsiBackend: false
  CinderEnableRbdBackend: true
  CinderEnableNfsBackend: false
  NovaEnableRbdBackend: true
  GlanceBackend: rbd
  CinderRbdPoolName: "volumes"
  NovaRbdPoolName: "vms"
  GlanceRbdPoolName: "images"
  CinderBackupRbdPoolName: "backups"
  CephClusterFSID: <cluster_ID>
  CephExternalMonHost: <IP_address>,<IP_address>,<IP_address>
  CephClientKey: "<client_key>"
```

```
CephClientUserName: "openstack"
ManilaCephFSDataPoolName: manila_data
ManilaCephFSMetadataPoolName: manila_metadata
ManilaCephFSCephFSAuthId: 'manila'
CephManilaClientKey: '<client_key>'
ExtraConfig:
```

- Replace **<cluster_ID>**, **<IP_address>**, and **<client_key>** with values that are suitable for your environment.

Additional resources

- For more information about generating a custom roles file, see [Deploying the Shared File Systems service with CephFS-NFS](#).

3.3.2. Adding an additional environment file for external Ceph Object Gateway (RGW) for Object storage

If you deploy an overcloud that uses an already existing RGW service for Object storage, you must add an additional environment file.

Procedure

1. Add the following **parameter_defaults** to a custom environment file, for example, **swift-external-params.yaml**, and adjust the values to suit your deployment:

```
parameter_defaults:
  ExternalSwiftPublicUrl: 'http://<Public RGW endpoint or
loadbalancer>:8080/swift/v1/AUTH_%(project_id)s'
  ExternalSwiftInternalUrl: 'http://<Internal RGW endpoint>:8080/swift/v1/AUTH_%(
project_id)s'
  ExternalSwiftAdminUrl: 'http://<Admin RGW endpoint>:8080/swift/v1/AUTH_%(project_id)s'
  ExternalSwiftUserTenant: 'service'
  SwiftPassword: 'choose_a_random_password'
```

NOTE

The example code snippet contains parameter values that might differ from values that you use in your environment:

- The default port where the remote RGW instance listens is **8080**. The port might be different depending on how the external RGW is configured.
- The **swift** user created in the overcloud uses the password defined by the **SwiftPassword** parameter. You must configure the external RGW instance to use the same password to authenticate with the Identity service by using the **rgw_keystone_admin_password**.

2. Add the following code to the Ceph config file to configure RGW to use the Identity service. Replace the variable values to suit your environment:

```
rgw_keystone_api_version = 3
rgw_keystone_url = http://<public Keystone endpoint>:5000/
rgw_keystone_accepted_roles = member, Member, admin
```

```

rgw_keystone_accepted_admin_roles = ResellerAdmin, swiftoperator
rgw_keystone_admin_domain = default
rgw_keystone_admin_project = service
rgw_keystone_admin_user = swift
rgw_keystone_admin_password =
<password_as_defined_in_the_environment_parameters>
rgw_keystone_implicit_tenants = true
rgw_s3_auth_use_keystone = true
rgw_swift_versioning_enabled = true
rgw_swift_account_in_url = true
rgw_max_attr_name_len = 128
rgw_max_attrs_num_in_req = 90
rgw_max_attr_size = 256
rgw_keystone_verify_ssl = false

```



NOTE

Director creates the following roles and users in the Identity service by default:

- rgw_keystone_accepted_admin_roles: ResellerAdmin, swiftoperator
- rgw_keystone_admin_domain: default
- rgw_keystone_admin_project: service
- rgw_keystone_admin_user: swift

3. Deploy the overcloud with the additional environment files with any other environment files that are relevant to your deployment:

```

openstack overcloud deploy --templates \
-e <your_environment_files>
-e /usr/share/openstack-tripleo-heat-templates/environments/swift-external.yaml
-e swift-external-params.yaml

```

CHAPTER 4. VERIFYING EXTERNAL CEPH STORAGE CLUSTER INTEGRATION

After you deploy the overcloud, confirm that Red Hat OpenStack Platform (RHOSP) services can write to the Red Hat Ceph Storage cluster.

4.1. GATHERING IDS

To verify that you integrated a Red Hat Ceph Storage cluster, you must first create an image, a Compute instance, a Block Storage volume, and a file share and gather their respective IDs.

Procedure

1. Create an image by using the Image service (glance). For more information about how to create an image, see [Importing an image](#) in *Creating and managing images*.
2. Record the image ID for later use.
3. Create a Compute (nova) instance. For more information about how to create an instance, see [Creating an instance](#) in the *Creating and managing instances* guide.
4. Record the instance ID for later use.
5. Create a Block Storage (cinder) volume. For more information about how to create a Block Storage volume, see [Creating Block Storage volumes](#) in the *Configuring persistent storage* guide.
6. Record the volume ID for later use.
7. Create a file share by using the Shared File Systems service (manila).
8. List the export path of the share and record the UUID in the suffix for later use.

For more information about how to create file shares and list the export path of a share, see [Performing operations with the Shared File Systems service \(manila\)](#) in the *Configuring persistent storage* guide.

4.2. VERIFYING THE RED HAT CEPH STORAGE CLUSTER

When you configure an external Red Hat Ceph Storage cluster, you create pools and a **client.openstack** user to access those pools. After you deploy the overcloud, you can use the file that contains the credentials of the **client.openstack** user to list the contents of Red Hat OpenStack Platform (RHOSP) pools.

List the contents of the pools and confirm that the IDs of the Image service (glance) image, the Compute (nova) instance, the Block Storage (cinder) volume, and the Shared File Systems service (manila) file share exist on the Ceph Storage cluster.

Procedure

1. Log in to the undercloud as the **stack** user and source the **stackrc** credentials file:

```
$ source ~/stackrc
```

2. List the available servers to retrieve the IP addresses of nodes on the system:

```
$ metalsmith list
```

```
+-----+-----+-----+
| ID | Name | Status | Networks | Image | Flavor |
+-----+-----+-----+
| d5a621bd-d109-41ae-a381-a42414397802 | compute-0 | ACTIVE | ctlplane=192.168.24.31
| overcloud-full | compute |
| 496ab196-d6cb-447d-a118-5bafc5166cf2 | controller-0 | ACTIVE | ctlplane=192.168.24.37 |
overcloud-full | controller |
| c01e730d-62f2-426a-a964-b31448f250b3 | controller-2 | ACTIVE | ctlplane=192.168.24.55 |
overcloud-full | controller |
| 36df59b3-66f3-452e-9aec-b7e7f7c54b86 | controller-1 | ACTIVE | ctlplane=192.168.24.39 |
overcloud-full | controller |
| f8f00497-246d-4e40-8a6a-b5a60fa66483 | compute-1 | ACTIVE | ctlplane=192.168.24.10 |
overcloud-full | compute |
```

- Use SSH to log in to any Compute node:

```
$ ssh tripleo-admin@192.168.24.31
```

- Confirm that the files **ceph.conf** and **/ceph.client.openstack.keyring** exist in the **CephConfigPath** provided by director. This path is **/var/lib/tripleo-config/ceph** by default but an override might exist.

```
[tripleo-admin@compute-0 ~]$ sudo ls -l /var/lib/tripleo-config/ceph/ceph.conf
```

```
-rw-r--r--. 1 root root 1170 Sep 29 23:25 /var/lib/tripleo-config/ceph/ceph.conf
```

```
[tripleo-admin@compute-0 ~]$ sudo ls -l /var/lib/tripleo-
config/ceph/ceph.client.openstack.keyring
```

```
-rw----- . 1 ceph ceph 253 Sep 29 23:25 /var/lib/tripleo-
config/ceph/ceph.client.openstack.keyring
```

- Enter the following command to force the **nova_compute** container to use the **rbd** command to list the contents of the appropriate pool.

```
$ sudo podman exec nova_compute /usr/bin/rbd --conf /etc/ceph/ceph.conf --keyring
/etc/ceph/ceph.client.openstack.keyring --cluster ceph --id openstack ls vms
```

The pool name must match the pool names of the images, VMs, volumes, and shares that you created when you configured the Ceph Storage cluster. The IDs of the image, Compute instance, volume, and share must match the IDs that you recorded in [Gathering IDs](#).



NOTE

The example command is prefixed with **podman exec nova_compute** because **/usr/bin/rbd**, which is provided by the **ceph-common** package, is not installed on overcloud nodes by default. However, it is available in the **nova_compute** container. The command lists block device images. For more information about listing block device images, see [Listing the block device images](#) in the Red Hat Ceph Storage *Block Device Guide*.

The following examples show how to confirm whether an ID for each service is present for each pool by using the IDs from [Gathering IDs](#).

```
$ sudo podman exec nova_compute /usr/bin/rbd --conf /etc/ceph/ceph.conf --keyring /etc/ceph/ceph.client.openstack.keyring --cluster ceph --id openstack ls images | grep 4485d4c0-24c3-42ec-a158-4d3950fa020b
```

```
$ sudo podman exec nova_compute /usr/bin/rbd --conf /etc/ceph/ceph.conf --keyring /etc/ceph/ceph.client.openstack.keyring --cluster ceph --id openstack ls vms | grep 64bcb731-e7a4-4dd5-a807-ee26c669482f
```

```
$ sudo podman exec nova_compute /usr/bin/rbd --conf /etc/ceph/ceph.conf --keyring /etc/ceph/ceph.client.openstack.keyring --cluster ceph --id openstack ls volumes | grep aeac15e8-b67f-454f-9486-46b3d75daff4
```

6. To verify the existence of the Shared File Systems service share, you must log into a Controller node:

```
$ sudo podman exec openstack-manila-share-podman-0 ceph -n client.manila fs subvolume ls cephfs | grep ec99db3c-0077-40b7-b09e-8a110e3f73c1
```

4.3. TROUBLESHOOTING FAILED VERIFICATION

If the verification procedures fail, verify that the Ceph key for the **openstack.client** user and the Red Hat Ceph Storage monitor IPs or hostnames can be used together to read, write, and delete from the Ceph Storage pools that you created for the Red Hat OpenStack Platform (RHOSP).

Procedure

1. To shorten the amount of typing you must do in this procedure, log in to a Compute node and create an alias for the **rbd** command:

```
$ alias rbd="podman exec nova_compute /usr/bin/rbd --conf /etc/ceph/ceph.conf --keyring /etc/ceph/ceph.client.openstack.keyring --cluster ceph --id openstack"
```

2. Confirm that you can write test data to the pool as a new object:

```
$ rbd create --size 1024 vms/foo
```

3. Confirm that you can see the test data:

```
$ rbd ls vms | grep foo
```

4. Delete the test data:

```
$ rbd rm vms/foo
```

**NOTE**

If this procedure fails, contact your Ceph Storage administrator for assistance. If this procedure succeeds, but you cannot create Compute (nova) instances, Image service (glance) images, Block Storage (cinder) volumes, or Shared File Systems service (manila) shares, contact Red Hat Support.