Red Hat OpenShift Container Storage 4.8

Deploying OpenShift Container Storage in external mode

How to install and set up your environment

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Red Hat OpenShift Container Storage 4.8 Deploying OpenShift Container Storage in external mode

How to install and set up your environment

Legal Notice

Abstract

Read this document for instructions on installing Red Hat OpenShift Container Storage 4.8 to use an external Red Hat Ceph Storage cluster.

Table of Contents

MAKING OPEN SOURCE MORE INCLUSIVE

Red Hat is committed to replacing problematic language in our code, documentation, and web properties. We are beginning with these four terms: master, slave, blacklist, and whitelist. Because of the enormity of this endeavor, these changes will be implemented gradually over several upcoming releases. For more details, see our CTO Chris Wright's message.

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CHAPTER 1. OVERVIEW OF DEPLOYING IN EXTERNAL MODE

Red Hat OpenShift Container Storage can use an externally hosted Red Hat Ceph Storage (RHCS) cluster as the storage provider. This deployment type is supported for VMware and user-provisioned bare metal environments. See Planning your deployment for more information.

For instructions regarding how to install a RHCS 4 cluster, see Installation guide.

Follow these steps to deploy OpenShift Container Storage in external mode:

1. If you use Red Hat Enterprise Linux hosts for worker nodes, Enable file system access for containers.
   Skip this step if you use Red Hat Enterprise Linux CoreOS (RHCOS) hosts.

2. Install the OpenShift Container Storage Operator .

3. Create the OpenShift Container Storage Cluster Service .

CHAPTER 2. ENABLING FILE SYSTEM ACCESS FOR CONTAINERS ON RED HAT ENTERPRISE LINUX BASED NODES

Deploying OpenShift Container Storage on an OpenShift Container Platform with worker nodes on a Red Hat Enterprise Linux base in a user provisioned infrastructure (UPI) does not automatically provide container access to the underlying Ceph file system.

NOTE

Skip this section for hosts based on Red Hat Enterprise Linux CoreOS (RHCOS).

Procedure

1. Log in to the Red Hat Enterprise Linux based node and open a terminal.
2. For each node in your cluster:
   a. Verify that the node has access to the rhel-7-server-extras-rpms repository.

   ```
   # subscription-manager repos --list-enabled | grep rhel-7-server
   ```

   If you do not see both **rhel-7-server-rpms** and **rhel-7-server-extras-rpms** in the output, or if there is no output, run the following commands to enable each repository.

   ```
   # subscription-manager repos --enable=rhel-7-server-rpms
   # subscription-manager repos --enable=rhel-7-server-extras-rpms
   ```

   b. Install the required packages.

   ```
   # yum install -y policycoreutils container-selinux
   ```

   c. Persistently enable container use of the Ceph file system in SELinux.

   ```
   # setsebool -P container_use_cephfs on
   ```

CHAPTER 3. INSTALLING RED HAT OPENSHIFT CONTAINER STORAGE OPERATOR

You can install Red Hat OpenShift Container Storage Operator using the Red Hat OpenShift Container Platform Operator Hub.

Prerequisites

- Access to an OpenShift Container Platform cluster using an account with cluster-admin and operator installation permissions.
- For additional resource requirements, see Planning your deployment.

NOTE

- When you need to override the cluster-wide default node selector for OpenShift Container Storage, you can use the following command to specify a blank node selector for the **openshift-storage** namespace:

```
$ oc annotate namespace openshift-storage openshift.io/node-selector=
```

Procedure

1. Log in to OpenShift Web Console.
2. Click **Operators → OperatorHub**.
3. Search for **OpenShift Container Storage** from the list of operators and click on it.
4. Click **Install**.
5. Set the following options on the **Install Operator** page:
   a. Channel as **stable-4.8**.
   b. Installation Mode as **A specific namespace on the cluster**.
   c. Installed Namespace as **Operator recommended namespace openshift-storage**. If Namespace **openshift-storage** does not exist, it will be created during the operator installation.
   d. **Approval Strategy** as **Automatic** or **Manual**.
   e. Click **Install**.
   If you select **Automatic** updates, the Operator Lifecycle Manager (OLM) automatically upgrades the running instance of your operator without any intervention.

   If you select **Manual** updates, the OLM creates an update request. As a cluster administrator, you must then manually approve that update request to have the operator updated to the new version.

Verification step

- Verify that the **OpenShift Container Storage** Operator shows a green tick indicating successful installation.

CHAPTER 4. CREATING AN OPENSHIFT CONTAINER STORAGE CLUSTER SERVICE FOR EXTERNAL MODE

You need to create a new OpenShift Container Storage cluster service after you install OpenShift Container Storage operator on OpenShift Container Platform deployed on VMware vSphere or user-provisioned bare metal infrastructures.

Prerequisites

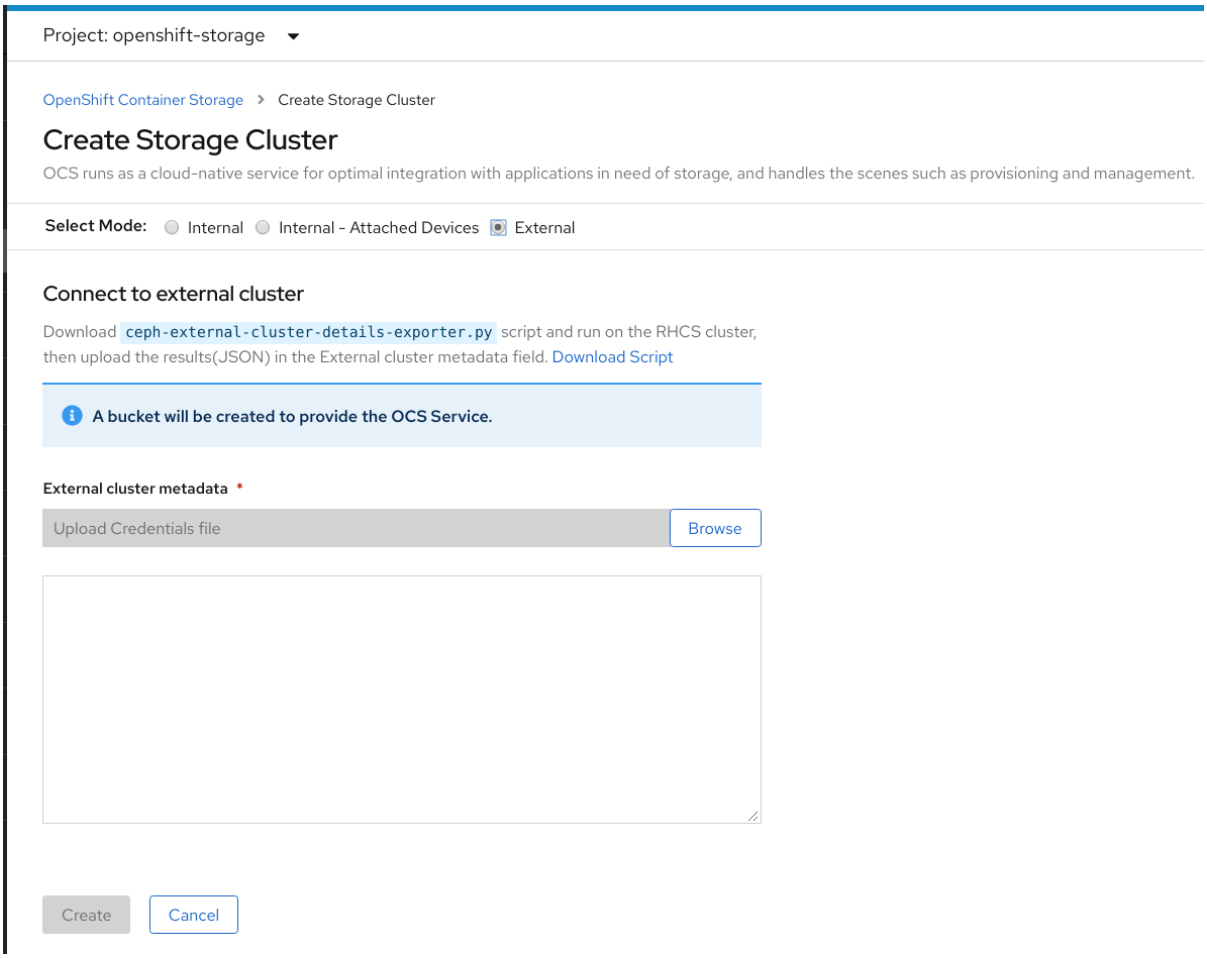
- Ensure the OpenShift Container Platform version is 4.8 or above before deploying OpenShift Container Storage 4.8.
- OpenShift Container Storage operator must be installed. For more information, see Installing OpenShift Container Storage Operator using the Operator Hub.
- Red Hat Ceph Storage version 4.2z1 or later is required for the external cluster. For more information, see this knowledge base article on Red Hat Ceph Storage releases and corresponding Ceph package versions.
  If you have updated the Red Hat Ceph Storage cluster from a version lower than 4.1.1 to the latest release and is not a freshly deployed cluster, you must manually set the application type for CephFS pool on the Red Hat Ceph Storage cluster to enable CephFS PVC creation in external mode.

  For more details, see Troubleshooting CephFS PVC creation in external mode .
- Red Hat Ceph Storage must have Ceph Dashboard installed and configured. For more information, see Ceph Dashboard installation and access .
- Red Hat recommends that the external Red Hat Ceph Storage cluster has the PG Autoscaler enabled. For more information, see The placement group autoscaler section in the Red Hat Ceph Storage documentation.
- The external Ceph cluster should have an existing RBD pool pre-configured for use. If it does not exist, contact your Red Hat Ceph Storage administrator to create one before you move ahead with OpenShift Container Storage deployment. Red Hat recommends to use a separate pool for each OpenShift Container Storage cluster.

Procedure

1. Click **Operators → Installed Operators** to view all the installed operators.
   Ensure that the **Project** selected is **openshift-storage**.
2. Click **OpenShift Container Storage → Create Instance** link of Storage Cluster.
3. Select Mode as **External**. By default, Internal is selected as deployment mode.

Figure 4.1. Connect to external cluster section on Create Storage Cluster form

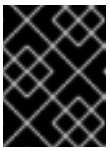


4. In the Connect to external cluster section, click on the **Download Script** link to download the python script for extracting Ceph cluster details.

5. For extracting the Red Hat Ceph Storage (RHCS) cluster details, contact the RHCS administrator to run the downloaded python script on a Red Hat Ceph Storage node with **admin key**.

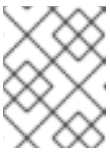
   a. Run the following command on the RHCS node to view the list of available arguments.

   ```
   # python3 ceph-external-cluster-details-exporter.py --help
   ```

   IMPORTANT

   Use **python** instead of **python3** if the Red Hat Ceph Storage 4.x cluster is deployed on Red Hat Enterprise Linux 7.x (RHEL 7.x) cluster.

   NOTE

   You can also run the script from inside a MON container (containerized deployment) or from a MON node (rpm deployment).

   b. To retrieve the external cluster details from the RHCS cluster, run the following command

   ```
   # python3 ceph-external-cluster-details-exporter.py \
   --rbd-data-pool-name <rbd block pool name>  [optional arguments]
   ```

For example:

```
# python3 ceph-external-cluster-details-exporter.py --rbd-data-pool-name ceph-rbd --monitoring-endpoint xxx.xxx.xxx.xxx --monitoring-endpoint-port xxxx --rgw-endpoint xxx.xxx.xxx.xxx:xxxx --run-as-user client.ocs
```

In the above example,

- **--rbd-data-pool-name** is a mandatory parameter used for providing block storage in OpenShift Container Storage.
- **--rgw-endpoint** is optional. Provide this parameter if object storage is to be provisioned through Ceph Rados Gateway for OpenShift Container Storage. Provide the endpoint in the following format: **<ip_address>:<port>**
- **--monitoring-endpoint** is optional. It is the IP address of the active **ceph-mgr** reachable from the OpenShift Container Platform cluster. If not provided, the value is automatically populated.
- **--monitoring-endpoint-port** is optional. It is the port associated with the **ceph-mgr** Prometheus exporter specified by **--monitoring-endpoint**. If not provided, the value is automatically populated.
- **-- run-as-user** is an optional parameter used for providing a name for the Ceph user which is created by the script. If this parameter is not specified, a default user name **client.healthchecker** is created. The permissions for the new user is set as:
  - caps: [mgr] allow command config
  - caps: [mon] allow r, allow command quorum_status, allow command version
  - caps: [osd] allow rwx pool=**RGW_POOL_PREFIX.rgw.meta**, allow r pool=**.rgw.root**, allow rw pool=**RGW_POOL_PREFIX.rgw.control**, allow rx pool=**RGW_POOL_PREFIX.rgw.log**, allow x pool=**RGW_POOL_PREFIX.rgw.buckets.index**

Example of JSON output generated using the python script:


```
[{"name": "rook-ceph-mon-endpoints", "kind": "ConfigMap", "data": {"data": "xxx.xxx.xxx.xxx:xxxx", "maxMonId": "0", "mapping": "{}"}}, {"name": "rook-ceph-mon", "kind": "Secret", "data": {"admin-secret": "admin-secret", "fsid": "<fs-id>", "mon-secret": "mon-secret"}}, {"name": "rook-ceph-operator-creds", "kind": "Secret", "data": {"userID": "client.healthchecker", "userKey": "<user-key>"}}, {"name": "rook-csi-rbd-node", "kind": "Secret", "data": {"userID": "csi-rbd-node", "userKey": "<user-key>"}}, {"name": "ceph-rbd", "kind": "StorageClass", "data": {"pool": "ceph-rbd"}}, {"name": "monitoring-endpoint", "kind": "CephCluster", "data": {"MonitoringEndpoint": "xxx.xxx.xxx.xxx", "MonitoringPort": "xxxx"}}, {"name": "rook-csi-rbd-provisioner", "kind": "Secret", "data": {"userID": "csi-rbd-provisioner", "userKey": "<user-key>"}}, {"name": "rook-csi-cephfs-provisioner", "kind": "Secret", "data": {"adminID": "csi-cephfs-provisioner", "adminKey": "<admin-key>"}}, {"name": "rook-csi-cephfs-node", "kind": "Secret", "data": {"adminID": "csi-cephfs-node", "adminKey": "<admin-key>"}}, {"name": "cephfs", "kind": "StorageClass", "data": {"fsName": "cephfs", "pool": "cephfs_data"}}, {"name": "ceph-rgw", "kind": "StorageClass", "data": {"endpoint": "xxx.xxx.xxx.xxx:xxxx", "poolPrefix": "default"}}]
```

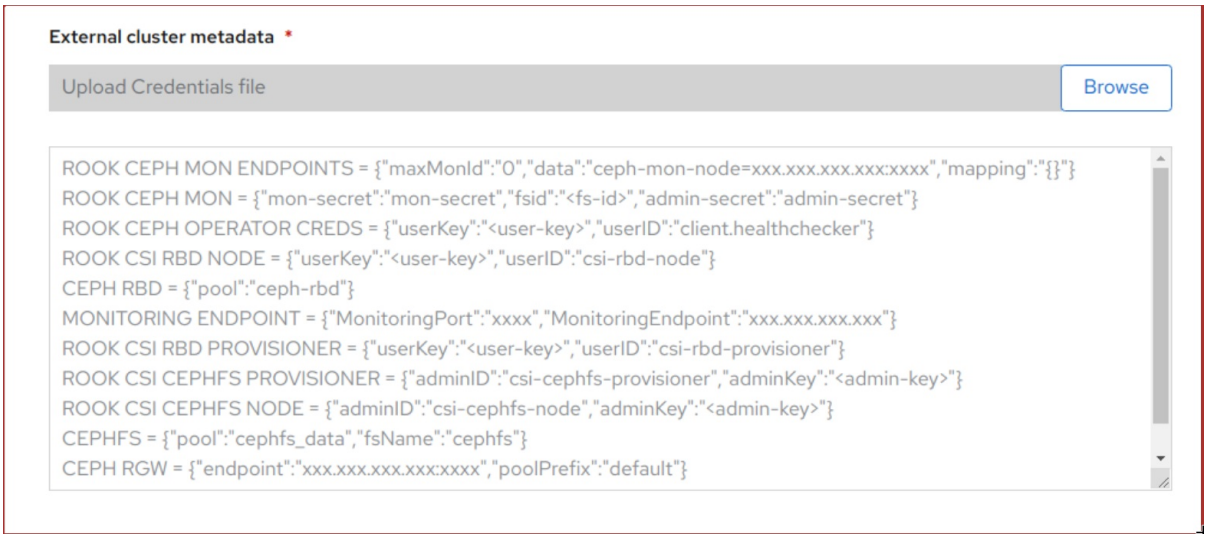
c. Save the JSON output to a file with **.json** extension

NOTE

For OpenShift Container Storage to work seamlessly, ensure that the parameters (RGW endpoint, CephFS details, RBD pool, and so on) to be uploaded using the JSON file remains unchanged on the RHCS external cluster after the storage cluster creation.

6. Click **External cluster metadata → Browse**to select and upload the JSON file.
The content of the JSON file is populated and displayed in the text box.

Figure 4.2. Json file content



7. Click **Create**.
The Create button is enabled only after you upload the **.json** file.

Verification steps

1. Verify that the final **Status** of the installed storage cluster shows as **Phase: Ready** with a green tick mark.

   - Click **Operators → Installed Operators → Storage Cluster**link to view the storage cluster installation status.

   - Alternatively, when you are on the Operator **Details** tab, you can click on the **Storage Cluster** tab to view the status.

2. To verify that OpenShift Container Storage, pods and StorageClass are successfully installed, see Verifying your external mode OpenShift Container Storage installation .

CHAPTER 5. VERIFYING YOUR OPENSHIFT CONTAINER STORAGE INSTALLATION FOR EXTERNAL MODE

Use this section to verify that OpenShift Container Storage is deployed correctly.

5.1. VERIFYING THE STATE OF THE PODS

1. Click **Workloads → Pods** from the left pane of the OpenShift Web Console.
2. Select **openshift-storage** from the **Project** drop down list.
   For more information on the expected number of pods for each component and how it varies depending on the number of nodes, see Table 5.1, "Pods corresponding to OpenShift Container Storage components"
3. Verify that the following pods are in running state:

Table 5.1. Pods corresponding to OpenShift Container Storage components

Component	Corresponding pods
OpenShift Container Storage Operator	• **ocs-operator-*** (1 pod on any worker node) • **ocs-metrics-exporter-***
Rook-ceph Operator	**rook-ceph-operator-*** (1 pod on any worker node)
Multicloud Object Gateway	• **noobaa-operator-*** (1 pod on any worker node) • **noobaa-core-*** (1 pod on any worker node) • **noobaa-db-pg-*** (1 pod on any worker node) • **noobaa-endpoint-*** (1 pod on any worker node)

Component	Corresponding pods

CSI	• **cephfs**
	  ◦ **csi-cephfsplugin-*** (1 pod on each worker node)
	  ◦ **csi-cephfsplugin-provisioner-*** (2 pods distributed across worker nodes)
	 
	NOTE
	If an MDS is not deployed in the external cluster, the csi-cephfsplugin pods will not be created.
	• **rbd**
	  ◦ **csi-rbdplugin-*** (1 pod on each worker node)
	  ◦ **csi-rbdplugin-provisioner-*** (2 pods distributed across worker nodes)

5.2. VERIFYING THAT THE OPENSHIFT CONTAINER STORAGE CLUSTER IS HEALTHY

- Click **Storage → Overview** from the left pane of the OpenShift Web Console and click **Block and File** tab.
- In the **Status card**, verify that *Storage Cluster* has a green tick mark.
- In the **Details card**, verify that the cluster information is displayed as follows:

  Service Name
  OpenShift Container Storage

  Cluster Name
  ocs-external-storagecluster

  Provider
  VSphere

  Mode
  External

  Version
  ocs-operator-4.8.0

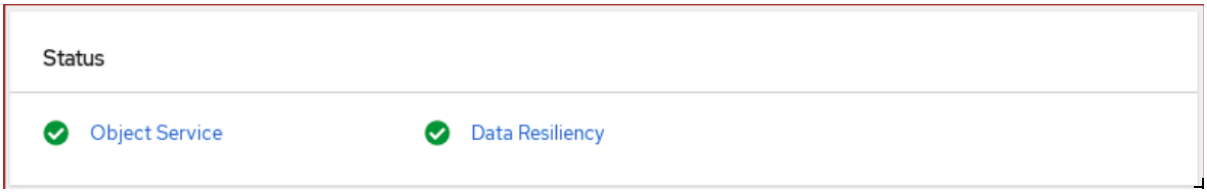
For more information on the health of OpenShift Container Storage cluster using the Block and File dashboard, see Monitoring OpenShift Container Storage .

5.3. VERIFYING THAT THE MULTICLOUD OBJECT GATEWAY IS HEALTHY

- Click **Storage → Overview** from the left pane of the OpenShift Web Console and click the **Object** tab.

- In the **Status card**, verify that both *Object Service* and *Data Resiliency* are in **Ready** state (green tick).

Figure 5.1. Health status card in Object Dashboard



- In the **Details card**, verify that the MCG information is displayed appropriately as follows:

Service Name

OpenShift Container Storage

System Name

Multicloud Object Gateway
RADOS Object Gateway

Provider

VSphere

Version

ocs-operator-4.8.0

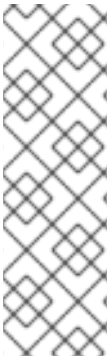
NOTE

The RADOS Object Gateway is only listed in case RADOS Object Gateway endpoint details were included while deploying OpenShift Container Storage in external mode.

For more information on the health of OpenShift Container Storage cluster using the object dashboard, see Monitoring OpenShift Container Storage .

5.4. VERIFYING THAT THE STORAGE CLASSES ARE CREATED AND LISTED

- Click **Storage → Storage Classes**from the left pane of the OpenShift Web Console.
- Verify that the following storage classes are created with the OpenShift Container Storage cluster creation:
  - **ocs-external-storagecluster-ceph-rbd**
  - **ocs-external-storagecluster-ceph-rgw**
  - **ocs-external-storagecluster-cephfs**
  - **openshift-storage.noobaa.io**



NOTE

- If an MDS is not deployed in the external cluster, **ocs-external-storagecluster-cephfs** storage class will not be created.
- If an RGW is not deployed in the external cluster, the **ocs-external-storagecluster-ceph-rgw** storage class will not be created.

For more information regarding MDS and RGW, see Red Hat Ceph Storage documentation

5.5. VERIFYING THAT CEPH CLUSTER IS CONNECTED

Run the following command to verify if the OpenShift Container Storage cluster is connected to the external Red Hat Ceph Storage cluster.

```
$ oc get cephcluster -n openshift-storage
```

```
NAME                                DATADIRHOSTPATH     MONCOUNT    AGE      PHASE
MESSAGE                   HEALTH
ocs-external-storagecluster-cephcluster                                31m15s   Connected   Cluster
connected successfully   HEALTH_OK
```

5.6. VERIFYING THAT STORAGE CLUSTER IS READY

Run the following command to verify if the storage cluster is ready and the **External** option is set to true.

```
$ oc get storagecluster -n openshift-storage
```

```
NAME                          AGE      PHASE EXTERNAL  CREATED AT             VERSION
ocs-external-storagecluster 31m15s   Ready true      2021-02-29T20:43:04Z    4.8.0
```

CHAPTER 6. UNINSTALLING OPENSHIFT CONTAINER STORAGE

6.1. UNINSTALLING OPENSHIFT CONTAINER STORAGE IN EXTERNAL MODE

Use the steps in this section to uninstall OpenShift Container Storage. Uninstalling OpenShift Container Storage does not remove the RBD pool from the external cluster, or uninstall the external Red Hat Ceph Storage cluster.

Uninstall Annotations

Annotations on the Storage Cluster are used to change the behavior of the uninstall process. To define the uninstall behavior, the following two annotations have been introduced in the storage cluster:

- **uninstall.ocs.openshift.io/cleanup-policy: delete**
- **uninstall.ocs.openshift.io/mode: graceful**

NOTE

The **uninstall.ocs.openshift.io/cleanup-policy** is not applicable for external mode.

The below table provides information on the different values that can used with these annotations:

Table 6.1. uninstall.ocs.openshift.io uninstall annotations descriptions

Annotation	Value	Default	Behavior
cleanup-policy	delete	Yes	Rook cleans up the physical drives and the **DataDirHostPath**
cleanup-policy	retain	No	Rook does **not** clean up the physical drives and the **DataDirHostPath**
mode	graceful	Yes	Rook and NooBaa **pauses** the uninstall process until the PVCs and the OBCs are removed by the administrator/user
mode	forced	No	Rook and NooBaa proceeds with uninstall even if PVCs/OBCs provisioned using Rook and NooBaa exist respectively

You can change the uninstall mode by editing the value of the annotation by using the following commands:

```
$ oc annotate storagecluster ocs-external-storagecluster uninstall.ocs.openshift.io/mode="forced" --
overwrite
storagecluster.ocs.openshift.io/ocs-external-storagecluster annotated
```

Prerequisites

- Ensure that the OpenShift Container Storage cluster is in a healthy state. The uninstall process can fail when some of the pods are not terminated successfully due to insufficient resources or nodes. In case the cluster is in an unhealthy state, contact Red Hat Customer Support before uninstalling OpenShift Container Storage.
- Ensure that applications are not consuming persistent volume claims (PVCs) or object bucket claims (OBCs) using the storage classes provided by OpenShift Container Storage.

Procedure

1. Delete the volume snapshots that are using OpenShift Container Storage.
   a. List the volume snapshots from all the namespaces

   ```
   $ oc get volumesnapshot --all-namespaces
   ```

   b. From the output of the previous command, identify and delete the volume snapshots that are using OpenShift Container Storage.

   ```
   $ oc delete volumesnapshot <VOLUME-SNAPSHOT-NAME> -n <NAMESPACE>
   ```

2. Delete PVCs and OBCs that are using OpenShift Container Storage.
   In the default uninstall mode (graceful), the uninstaller waits till all the PVCs and OBCs that use OpenShift Container Storage are deleted.

   If you wish to delete the Storage Cluster without deleting the PVCs beforehand, you may set the uninstall mode annotation to "forced" and skip this step. Doing so will result in orphan PVCs and OBCs in the system.

   a. Delete OpenShift Container Platform monitoring stack PVCs using OpenShift Container Storage.
   See Removing monitoring stack from OpenShift Container Storage

   b. Delete OpenShift Container Platform Registry PVCs using OpenShift Container Storage.
   Removing OpenShift Container Platform registry from OpenShift Container Storage

   c. Delete OpenShift Container Platform logging PVCs using OpenShift Container Storage.
   Removing the cluster logging operator from OpenShift Container Storage

   d. Delete other PVCs and OBCs provisioned using OpenShift Container Storage.

   - Given below is a sample script to identify the PVCs and OBCs provisioned using OpenShift Container Storage. The script ignores the PVCs and OBCs that are used internally by Openshift Container Storage.

   ```
   #!/bin/bash
   ```

```
RBD_PROVISIONER="openshift-storage.rbd.csi.ceph.com"
CEPHFS_PROVISIONER="openshift-storage.cephfs.csi.ceph.com"
NOOBAA_PROVISIONER="openshift-storage.noobaa.io/obc"
RGW_PROVISIONER="openshift-storage.ceph.rook.io/bucket"

NOOBAA_DB_PVC="noobaa-db"
NOOBAA_BACKINGSTORE_PVC="noobaa-default-backing-store-noobaa-pvc"

# Find all the OCS StorageClasses
OCS_STORAGECLASSES=$(oc get storageclasses | grep -e
"$RBD_PROVISIONER" -e "$CEPHFS_PROVISIONER" -e
"$NOOBAA_PROVISIONER" -e "$RGW_PROVISIONER" | awk '{print $1}')

# List PVCs in each of the StorageClasses
for SC in $OCS_STORAGECLASSES
do
        echo
"============================================================================
=="
        echo "$SC StorageClass PVCs and OBCs"
        echo
"============================================================================
=="
        oc get pvc  --all-namespaces --no-headers 2>/dev/null | grep $SC | grep -v -e
"$NOOBAA_DB_PVC" -e "$NOOBAA_BACKINGSTORE_PVC"
        oc get obc  --all-namespaces --no-headers 2>/dev/null | grep $SC
        echo
done
```

- Delete the OBCs.

  ```
  $ oc delete obc <obc name> -n <project name>
  ```

- Delete the PVCs.

  ```
  $ oc delete pvc <pvc name> -n <project-name>
  ```

  Ensure that you have removed any custom backing stores, bucket classes, etc., created in the cluster.

3. Delete the Storage Cluster object and wait for the removal of the associated resources.

   ```
   $ oc delete -n openshift-storage storagecluster --all --wait=true
   ```

4. Delete the namespace and wait until the deletion is complete. You will need to switch to another project if **openshift-storage** is the active project.
   For example:

   ```
   $ oc project default
   $ oc delete project openshift-storage --wait=true --timeout=5m
   ```

   The project is deleted if the following command returns a **NotFound** error.

   ```
   $ oc get project openshift-storage
   ```

NOTE

While uninstalling OpenShift Container Storage, if the namespace is not deleted completely and remains in **Terminating** state, perform the steps in Troubleshooting and deleting remaining resources during Uninstall to identify objects that are blocking the namespace from being terminated.

5. Confirm all PVs provisioned using OpenShift Container Storage are deleted. If there is any PV left in the **Released** state, delete it.

```
$ oc get pv
$ oc delete pv <pv name>
```

6. Delete the Multicloud Object Gateway storageclass.

```
$ oc delete storageclass openshift-storage.noobaa.io --wait=true --timeout=5m
```

7. Remove **CustomResourceDefinitions**.

```
$ oc delete crd backingstores.noobaa.io bucketclasses.noobaa.io
cephblockpools.ceph.rook.io cephclusters.ceph.rook.io cephfilesystems.ceph.rook.io
cephnfses.ceph.rook.io cephobjectstores.ceph.rook.io cephobjectstoreusers.ceph.rook.io
noobaas.noobaa.io ocsinitializations.ocs.openshift.io storageclusters.ocs.openshift.io
cephclients.ceph.rook.io cephobjectrealms.ceph.rook.io cephobjectzonegroups.ceph.rook.io
cephobjectzones.ceph.rook.io cephrbdmirrors.ceph.rook.io --wait=true --timeout=5m
```

8. To ensure that OpenShift Container Storage is uninstalled completely, on the OpenShift Container Platform Web Console,

   a. Click **Storage**.

   b. Verify that **Overview** no longer appears under Storage.

6.2. REMOVING MONITORING STACK FROM OPENSHIFT CONTAINER STORAGE

Use this section to clean up the monitoring stack from the OpenShift Container Storage.

The PVCs that are created as a part of configuring the monitoring stack are in the **openshift-monitoring** namespace.

Prerequisites

- PVCs are configured to use OpenShift Container Platform monitoring stack.
  For more information, see configuring monitoring stack.

Procedure

1. List the pods and PVCs that are currently running in the **openshift-monitoring** namespace.

```
$ oc get pod,pvc -n openshift-monitoring
NAME                        READY   STATUS    RESTARTS   AGE
pod/alertmanager-main-0     3/3     Running   0          8d
```

```
pod/alertmanager-main-1          3/3     Running   0          8d
pod/alertmanager-main-2          3/3     Running   0          8d
pod/cluster-monitoring-
operator-84457656d-pkrxm         1/1     Running   0          8d
pod/grafana-79ccf6689f-2ll28     2/2     Running   0          8d
pod/kube-state-metrics-
7d86fb966-rvd9w                  3/3     Running   0          8d
pod/node-exporter-25894          2/2     Running   0          8d
pod/node-exporter-4dsd7          2/2     Running   0          8d
pod/node-exporter-6p4zc          2/2     Running   0          8d
pod/node-exporter-jbjvg          2/2     Running   0          8d
pod/node-exporter-jj4t5          2/2     Running   0          6d18h
pod/node-exporter-k856s          2/2     Running   0          6d18h
pod/node-exporter-rf8gn          2/2     Running   0          8d
pod/node-exporter-rmb5m          2/2     Running   0          6d18h
pod/node-exporter-zj7kx          2/2     Running   0          8d
pod/openshift-state-metrics-
59dbd4f654-4clng                 3/3     Running   0          8d
pod/prometheus-adapter-
5df5865596-k8dzn                 1/1     Running   0          7d23h
pod/prometheus-adapter-
5df5865596-n2gj9                 1/1     Running   0          7d23h
pod/prometheus-k8s-0             6/6     Running   1          8d
pod/prometheus-k8s-1             6/6     Running   1          8d
pod/prometheus-operator-
55cfb858c9-c4zd9                 1/1     Running   0          6d21h
pod/telemeter-client-
78fc8fc97d-2rgfp                 3/3     Running   0          8d

NAME                                                STATUS   VOLUME
CAPACITY   ACCESS MODES   STORAGECLASS                 AGE
persistentvolumeclaim/my-alertmanager-claim-alertmanager-main-0   Bound    pvc-0d519c4f-
15a5-11ea-baa0-026d231574aa   40Gi       RWO           ocs-external-storagecluster-ceph-rbd
8d
persistentvolumeclaim/my-alertmanager-claim-alertmanager-main-1   Bound    pvc-
0d5a9825-15a5-11ea-baa0-026d231574aa   40Gi       RWO           ocs-external-
storagecluster-ceph-rbd   8d
persistentvolumeclaim/my-alertmanager-claim-alertmanager-main-2   Bound    pvc-
0d6413dc-15a5-11ea-baa0-026d231574aa   40Gi       RWO           ocs-external-
storagecluster-ceph-rbd   8d
persistentvolumeclaim/my-prometheus-claim-prometheus-k8s-0        Bound    pvc-0b7c19b0-
15a5-11ea-baa0-026d231574aa   40Gi       RWO           ocs-external-storagecluster-ceph-rbd
8d
persistentvolumeclaim/my-prometheus-claim-prometheus-k8s-1        Bound    pvc-0b8aed3f-
15a5-11ea-baa0-026d231574aa   40Gi       RWO           ocs-external-storagecluster-ceph-rbd
8d
```

2. Edit the monitoring **configmap**.

```
$ oc -n openshift-monitoring edit configmap cluster-monitoring-config
```

3. Remove any **config** sections that reference the OpenShift Container Storage storage classes as shown in the following example and save it.

Before editing

```
.
.
.
apiVersion: v1
data:
  config.yaml: |
    alertmanagerMain:
      volumeClaimTemplate:
        metadata:
          name: my-alertmanager-claim
        spec:
          resources:
            requests:
              storage: 40Gi
          storageClassName: ocs-external-storagecluster-ceph-rbd
    prometheusK8s:
      volumeClaimTemplate:
        metadata:
          name: my-prometheus-claim
        spec:
          resources:
            requests:
              storage: 40Gi
          storageClassName: ocs-external-storagecluster-ceph-rbd
kind: ConfigMap
metadata:
  creationTimestamp: "2019-12-02T07:47:29Z"
  name: cluster-monitoring-config
  namespace: openshift-monitoring
  resourceVersion: "22110"
  selfLink: /api/v1/namespaces/openshift-monitoring/configmaps/cluster-monitoring-config
  uid: fd6d988b-14d7-11ea-84ff-066035b9efa8


.
.
.
```

After editing

```
.
.
.
apiVersion: v1
data:
  config.yaml: |
kind: ConfigMap
metadata:
  creationTimestamp: "2019-11-21T13:07:05Z"
  name: cluster-monitoring-config
  namespace: openshift-monitoring
  resourceVersion: "404352"
  selfLink: /api/v1/namespaces/openshift-monitoring/configmaps/cluster-monitoring-config
  uid: d12c796a-0c5f-11ea-9832-063cd735b81c
.
.
.
```

In this example, **alertmanagerMain** and **prometheusK8s** monitoring components are using the OpenShift Container Storage PVCs.

4. List the pods consuming the PVC.
   In this example, the **alertmanagerMain** and **prometheusK8s** pods that were consuming the PVCs are in the **Terminating** state. You can delete the PVCs once these pods are no longer using OpenShift Container Storage PVC.

```
$ oc get pod,pvc -n openshift-monitoring
NAME                                          READY   STATUS      RESTARTS AGE
pod/alertmanager-main-0                       3/3     Terminating 0      10h
pod/alertmanager-main-1                       3/3     Terminating 0      10h
pod/alertmanager-main-2                       3/3     Terminating 0      10h
pod/cluster-monitoring-operator-84cd9df668-zhjfn  1/1     Running     0      18h
pod/grafana-5db6fd97f8-pmtbf                  2/2     Running     0      10h
pod/kube-state-metrics-895899678-z2r9q        3/3     Running     0      10h
pod/node-exporter-4njxv                       2/2     Running     0      18h
pod/node-exporter-b8ckz                       2/2     Running     0      11h
pod/node-exporter-c2vp5                       2/2     Running     0      18h
pod/node-exporter-cq65n                       2/2     Running     0      18h
pod/node-exporter-f5sm7                       2/2     Running     0      11h
pod/node-exporter-f852c                       2/2     Running     0      18h
pod/node-exporter-l9zn7                       2/2     Running     0      11h
pod/node-exporter-ngbs8                       2/2     Running     0      18h
pod/node-exporter-rv4v9                       2/2     Running     0      18h
pod/openshift-state-metrics-77d5f699d8-69q5x  3/3     Running     0      10h
pod/prometheus-adapter-765465b56-4tbxx        1/1     Running     0      10h
pod/prometheus-adapter-765465b56-s2qg2        1/1     Running     0      10h
pod/prometheus-k8s-0                          6/6     Terminating 1      9m47s
pod/prometheus-k8s-1                          6/6     Terminating 1      9m47s
pod/prometheus-operator-cbfd89f9-ldnwc        1/1     Running     0      43m
pod/telemeter-client-7b5ddb4489-2xfpz         3/3     Running     0      10h

NAME                                          STATUS  VOLUME
```

```
CAPACITY   ACCESS MODES   STORAGECLASS                 AGE
persistentvolumeclaim/ocs-alertmanager-claim-alertmanager-main-0   Bound    pvc-
2eb79797-1fed-11ea-93e1-0a88476a6a64   40Gi       RWO           ocs-external-
storagecluster-ceph-rbd   19h
persistentvolumeclaim/ocs-alertmanager-claim-alertmanager-main-1   Bound    pvc-
2ebeee54-1fed-11ea-93e1-0a88476a6a64   40Gi       RWO           ocs-external-
storagecluster-ceph-rbd   19h
persistentvolumeclaim/ocs-alertmanager-claim-alertmanager-main-2   Bound    pvc-2ec6a9cf-
1fed-11ea-93e1-0a88476a6a64   40Gi       RWO           ocs-external-storagecluster-ceph-rbd
19h
persistentvolumeclaim/ocs-prometheus-claim-prometheus-k8s-0        Bound    pvc-3162a80c-
1fed-11ea-93e1-0a88476a6a64   40Gi       RWO           ocs-external-storagecluster-ceph-rbd
19h
persistentvolumeclaim/ocs-prometheus-claim-prometheus-k8s-1        Bound    pvc-
316e99e2-1fed-11ea-93e1-0a88476a6a64   40Gi       RWO           ocs-external-
storagecluster-ceph-rbd   19h
```

5. Delete relevant PVCs. Make sure you delete all the PVCs that are consuming the storage classes.

```
$ oc delete -n openshift-monitoring pvc <pvc-name> --wait=true --timeout=5m
```

6.3. REMOVING OPENSHIFT CONTAINER PLATFORM REGISTRY FROM OPENSHIFT CONTAINER STORAGE

Use this section to clean up OpenShift Container Platform registry from OpenShift Container Storage. If you want to configure an alternative storage, see image registry

The PVCs that are created as a part of configuring OpenShift Container Platform registry are in the **openshift-image-registry** namespace.

Prerequisites

- The image registry should have been configured to use an OpenShift Container Storage PVC.

Procedure

1. Edit the **configs.imageregistry.operator.openshift.io** object and remove the content in the **storage** section.

```
$ oc edit configs.imageregistry.operator.openshift.io
```

Before editing

```
.
.
.
storage:
  pvc:
    claim: registry-cephfs-rwx-pvc
.
.
.
```

After editing

```
.
.
.
storage:
  emptyDir: {}
.
.
.
```

In this example, the PVC is called **registry-cephfs-rwx-pvc**, which is now safe to delete.

2. Delete the PVC.

```
$ oc delete pvc <pvc-name> -n openshift-image-registry --wait=true --timeout=5m
```

6.4. REMOVING THE CLUSTER LOGGING OPERATOR FROM OPENSHIFT CONTAINER STORAGE

To clean the cluster logging operator from the OpenShift Container Storage, follow the steps in the procedure.

The PVCs created as a part of configuring cluster logging operator are in the **openshift-logging** namespace.

Prerequisites

- The cluster logging instance must be configured to use OpenShift Container Storage PVCs.

Procedure

1. Remove the **ClusterLogging** instance in the namespace.

```
$ oc delete clusterlogging instance -n openshift-logging --wait=true --timeout=5m
```

The PVCs in the **openshift-logging** namespace are now safe to delete.

2. Delete PVCs.

```
$ oc delete pvc <pvc-name> -n openshift-logging --wait=true --timeout=5m
```