Red Hat OpenShift Container Storage 4.5

Troubleshooting OpenShift Container Storage

How to troubleshoot errors and issues in OpenShift Container Storage
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Abstract

Read this document for instructions on troubleshooting Red Hat OpenShift Container Storage.
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CHAPTER 1. OVERVIEW

Troubleshooting OpenShift Container Storage is written to help administrators understand how to troubleshoot and fix their Red Hat OpenShift Container Storage cluster.

Most troubleshooting tasks focus on either a fix or a workaround. This document is divided into chapters based on the errors that an administrator may encounter:

- **Chapter 2, Downloading log files and diagnostic information using must-gather** shows you how to use the must-gather utility in OpenShift Container Storage.

- **Chapter 3, Commonly required logs for troubleshooting** shows you how to obtain commonly required log files for OpenShift Container Storage.

- **Chapter 5, Troubleshooting alerts and errors in OpenShift Container Storage** shows you how to identify the encountered error and perform required actions.
CHAPTER 2. DOWNLOADING LOG FILES AND DIAGNOSTIC INFORMATION USING MUST-GATHER

If Red Hat OpenShift Container Storage is unable to automatically resolve a problem, use the must-gather tool to collect log files and diagnostic information so that you or Red Hat support can review the problem and determine a solution.

Procedure

- Run the `must-gather` command from the client connected to the OpenShift Container Storage cluster:

  ```bash
  $ oc adm must-gather --image=registry.redhat.io/ocs4/ocs-must-gather-rhel8:v4.5 --dest-dir=<directory-name> --node-name=<node-name>
  ```

  where `<node-name>` is any master node in Ready state.

  **NOTE**
  
  `--node-name` is optional and needs to be used specifically for situations when either one or more worker nodes are not in Ready state.

  **IMPORTANT**

  When OpenShift Container Storage is deployed in external mode, must-gather only collects logs from the Redhat OpenShift Container Storage cluster and does not collect debug data and logs from the external Red Hat Ceph Storage cluster.

  To collect debug logs from the external Red Hat Ceph Storage cluster, see Red Hat Ceph Storage Troubleshooting guide and contact your Red Hat Ceph Storage Administrator.

  This collects the following information in the specified directory:

  - Collects all OpenShift Container Storage cluster related Custom Resources (CRs) with their namespaces.
  - Collects pod logs of all the OpenShift Container Storage related pods.
  - Collects output of some standard Ceph commands like Status, Cluster health, and others.
CHAPTER 3. COMMONLY REQUIRED LOGS FOR TROUBLESHOOTING

Some of the commonly used logs for troubleshooting OpenShift Container Storage are listed, along with the commands to generate them.

- Generating logs for a specific pod:
  
  $ oc logs <pod-name> -n <namespace>

- Generating logs for Ceph or OpenShift Container Storage cluster:
  
  $ oc logs rook-ceph-operator-<ID> -n openshift-storage

- Generating logs for plugin pods like cephfs or rbd to detect any problem in the PVC mount of the app-pod:
  
  $ oc logs csi-cephfsplugin-<ID> -n openshift-storage -c csi-cephfsplugin
  
  $ oc logs csi-rbdplugin-<ID> -n openshift-storage -c csi-rbdplugin

  - To generate logs for all the containers in the CSI pod:
    
    $ oc logs csi-cephfsplugin-<ID> -n openshift-storage --all-containers
    
    $ oc logs csi-rbdplugin-<ID> -n openshift-storage --all-containers

- Generating logs for cephfs or rbd provisioner pods to detect problems if PVC is not in BOUND state:
  
  $ oc logs csi-cephfsplugin-provisioner-<ID> -n openshift-storage -c csi-cephfsplugin
  
  $ oc logs csi-rbdplugin-provisioner-<ID> -n openshift-storage -c csi-rbdplugin

  - To generate logs for all the containers in the CSI pod:
    
    $ oc logs csi-cephfsplugin-provisioner-<ID> -n openshift-storage --all-containers
    
    $ oc logs csi-rbdplugin-provisioner-<ID> -n openshift-storage --all-containers

- Generating OpenShift Container Storage logs using cluster-info command:
  
  $ oc cluster-info dump -n openshift-storage --output-directory=<directory-name>

- Check the OpenShift Container Storage operator logs and events.
  
  - To check the operator logs:
    
    # oc logs <ocs-operator> -n openshift-storage
To check the operator events:

```
# oc get events --sort-by=metadata.creationTimestamp -n openshift-storage
```

- Get the OpenShift Container Storage operator version and channel.

```
# oc get csv -n openshift-storage
```

Example output:

<table>
<thead>
<tr>
<th>NAME</th>
<th>DISPLAY VERSION</th>
<th>REPLACES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ocs-operator.v4.5.2</td>
<td>OpenShift Container Storage</td>
<td>4.5.2</td>
</tr>
<tr>
<td>Succeeded</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

```
# oc get subs -n openshift-storage
```

Example output:

<table>
<thead>
<tr>
<th>NAME</th>
<th>PACKAGE</th>
<th>SOURCE</th>
<th>CHANNEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>ocs-operator</td>
<td>ocs-operator</td>
<td>redhat-operators</td>
<td>stable-4.5</td>
</tr>
</tbody>
</table>

- Confirm that the installplan is created.

```
# oc get installplan -n openshift-storage
```

- Verify the image of the components post updating OpenShift Container Storage.

  - Check the node on which the pod of the component you want to verify the image is running.

```
# oc get pods -o wide | grep <component-name>
```

For Example:

```
# oc get pods -o wide | grep rook-ceph-operator
```

Example output:

```
rook-ceph-operator-566cc677fd-bjqnb 1/1 Running 20 4h6m 10.128.2.5 rook-ceph-operator-566cc677fd-bjqnb 1/1 Running 20 4h6m 10.128.2.5 dell-r440-12.gsslab.pnq2.redhat.com <none> <none>
```

```
<none> <none>
```

dell-r440-12.gsslab.pnq2.redhat.com is the node-name.
- Check the image ID.
  
  ```bash
  # oc debug node/<node-name>
  ```

  `<node-name>`
  
  Is the name of the node on which the pod of the component you want to verify the image is running.

  ```bash
  # chroot /host
  # crictl images | grep <component>
  ```

  For Example:

  ```bash
  # crictl images | grep rook-ceph
  ```

  Example output:

<table>
<thead>
<tr>
<th>IMAGE</th>
<th>TAG</th>
<th>IMAGEID</th>
<th>SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>registry.redhat.io/ocs4/rook-ceph-rhel8-operator@sha256</td>
<td>&lt;none&gt;</td>
<td>5600a36370df4</td>
<td>1.55GB</td>
</tr>
</tbody>
</table>

  Take a note of the `IMAGEID` and map it to the Digest ID on the Rook Ceph Operator page.

Additional resources
- Using must-gather
CHAPTER 4. OVERRIDING THE CLUSTER-WIDE DEFAULT NODE SELECTOR FOR OPENSSHIFT CONTAINER STORAGE POST DEPLOYMENT

When a cluster-wide default node selector is used for OpenShift Container Storage, the pods generated by CSI daemonsets are able to start only on the nodes that match the selector. To be able to use OpenShift Container Storage from nodes which do not match the selector, override the cluster-wide default node selector by performing the following steps in the command line interface:

Procedure

1. Specify a blank node selector for the openshift-storage namespace.
   
   ```
   $ oc annotate namespace openshift-storage openshift.io/node-selector=
   ```

2. Delete the original pods generated by the DaemonSets.
   
   ```
   oc delete pod -l app=csi-cephfsplugin -n openshift-storage
   oc delete pod -l app=csi-rbdplugin -n openshift-storage
   ```
CHAPTER 5. TROUBLESHOOTING ALERTS AND ERRORS IN OPENSHIFT CONTAINER STORAGE

5.1. RESOLVING ALERTS AND ERRORS

Red Hat OpenShift Container Storage can detect and automatically resolve a number of common failure scenarios. However, some problems require administrator intervention.

To know the errors currently firing, check one of the following locations:

- Monitoring → Alerting → Firing option
- Home → Overview → Overview tab
- Home → Overview → Persistent Storage tab
- Home → Overview → Object Service tab

Copy the error displayed and search it in the following section to know its severity and resolution:

Name: CephMonVersionMismatch

Message: There are multiple versions of storage services running.

Description: There are {{ $value }} different versions of Ceph Mon components running.

Severity: Warning

Resolution: Fix

Procedure: Inspect the user interface and log, and verify if an update is in progress.
  - If an update in progress, this alert is temporary.
  - If an update is not in progress, restart the upgrade process.

Name: CephOSDVersionMismatch

Message: There are multiple versions of storage services running.

Description: There are {{ $value }} different versions of Ceph OSD components running.

Severity: Warning

Resolution: Fix

Procedure: Inspect the user interface and log, and verify if an update is in progress.
  - If an update in progress, this alert is temporary.
  - If an update is not in progress, restart the upgrade process.
<table>
<thead>
<tr>
<th>Name: CephClusterCriticallyFull</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Message:</strong> Storage cluster is critically full and needs immediate expansion</td>
</tr>
<tr>
<td><strong>Description:</strong> Storage cluster utilization has crossed 85%.</td>
</tr>
<tr>
<td><strong>Severity:</strong> Critical</td>
</tr>
<tr>
<td><strong>Resolution:</strong> Fix</td>
</tr>
<tr>
<td><strong>Procedure:</strong> Remove unnecessary data or expand the cluster.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name: CephClusterNearFull</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fixed:</strong> Storage cluster is nearing full. Expansion is required.</td>
</tr>
<tr>
<td><strong>Description:</strong> Storage cluster utilization has crossed 75%.</td>
</tr>
<tr>
<td><strong>Severity:</strong> Warning</td>
</tr>
<tr>
<td><strong>Resolution:</strong> Fix</td>
</tr>
<tr>
<td><strong>Procedure:</strong> Remove unnecessary data or expand the cluster.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name: NooBaaBucketErrorState</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Message:</strong> A NooBaa Bucket Is In Error State</td>
</tr>
<tr>
<td><strong>Description:</strong> A NooBaa bucket {{ $labels.bucket_name }} is in error state for more than 6m</td>
</tr>
<tr>
<td><strong>Severity:</strong> Warning</td>
</tr>
<tr>
<td><strong>Resolution:</strong> Workaround</td>
</tr>
<tr>
<td><strong>Procedure:</strong> Resolving NooBaa Bucket Error State</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name: NooBaaBucketExceedingQuotaState</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Message:</strong> A NooBaa Bucket Is In Exceeding Quota State</td>
</tr>
<tr>
<td><strong>Description:</strong> A NooBaa bucket {{ $labels.bucket_name }} is exceeding its quota - {{ printf &quot;%.0f&quot; $value }}% used message: A NooBaa Bucket Is In Exceeding Quota State</td>
</tr>
<tr>
<td><strong>Severity:</strong> Warning</td>
</tr>
<tr>
<td><strong>Resolution:</strong> Fix</td>
</tr>
<tr>
<td><strong>Procedure:</strong> Resolving NooBaa Bucket Exceeding Quota State</td>
</tr>
<tr>
<td>Name</td>
</tr>
<tr>
<td>-------------------------------</td>
</tr>
<tr>
<td>NooBaaBucketLowCapacityState</td>
</tr>
<tr>
<td>NooBaaBucketNoCapacityState</td>
</tr>
<tr>
<td>NooBaaBucketReachingQuotaState</td>
</tr>
<tr>
<td>NooBaaResourceErrorState</td>
</tr>
<tr>
<td>Name</td>
</tr>
<tr>
<td>-----------------------</td>
</tr>
<tr>
<td>NooBaaSystemCapacityWarning100</td>
</tr>
<tr>
<td>NooBaaSystemCapacityWarning85</td>
</tr>
<tr>
<td>NooBaaSystemCapacityWarning95</td>
</tr>
<tr>
<td>CephMdsMissingReplicas</td>
</tr>
</tbody>
</table>

Procedure:

1. Check for alerts and operator status.
2. If the issue cannot be identified, contact Red Hat support.
Name: CephMgrIsAbsent

Message: Storage metrics collector service not available anymore.

Description: Ceph Manager has disappeared from Prometheus target discovery.

Severity: Critical

Resolution: Contact Red Hat support

Procedure:

1. Inspect the user interface and log, and verify if an update is in progress.
   - If an update in progress, this alert is temporary.
   - If an update is not in progress, restart the upgrade process.
2. Once the upgrade is complete, check for alerts and operator status.
3. If the issue persists or cannot be identified, contact Red Hat support

Name: CephNodeDown

Message: Storage node {{ $labels.node }} went down

Description: Storage node {{ $labels.node }} went down. Please check the node immediately.

Severity: Critical

Resolution: Contact Red Hat support

Procedure:

1. Check which node stopped functioning and its cause.
2. Take appropriate actions to recover the node. If node cannot be recovered:
   - See Replacing storage nodes for OpenShift Container Storage
   - Contact Red Hat support
<table>
<thead>
<tr>
<th>Name</th>
<th>Message</th>
<th>Description</th>
<th>Severity</th>
<th>Resolution</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CephClusterErrorState</strong></td>
<td><strong>Storage cluster is in error state</strong></td>
<td><strong>Storage cluster is in error state for more than 10m.</strong></td>
<td>Critical</td>
<td><strong>Contact Red Hat support</strong></td>
<td>1. Check for alerts and operator status.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2. If the issue cannot be identified, download log files and diagnostic information using must-gather.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3. Open a Support Ticket with Red Hat Support with an attachment of the output of must-gather.</td>
</tr>
<tr>
<td><strong>CephClusterWarningState</strong></td>
<td><strong>Storage cluster is in degraded state</strong></td>
<td><strong>Storage cluster is in warning state for more than 10m.</strong></td>
<td>Warning</td>
<td><strong>Contact Red Hat support</strong></td>
<td>1. Check for alerts and operator status.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2. If the issue cannot be identified, download log files and diagnostic information using must-gather.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3. Open a Support Ticket with Red Hat Support with an attachment of the output of must-gather.</td>
</tr>
<tr>
<td><strong>CephDataRecoveryTakingTooLong</strong></td>
<td><strong>Data recovery is slow</strong></td>
<td><strong>Data recovery has been active for too long.</strong></td>
<td>Warning</td>
<td><strong>Contact Red Hat support</strong></td>
<td></td>
</tr>
<tr>
<td><strong>CephOSDDiskNotResponding</strong></td>
<td><strong>Disk not responding</strong></td>
<td><strong>Disk device {{ $labels.device }} not responding, on host {{ $labels.host }}.</strong></td>
<td>Critical</td>
<td><strong>Contact Red Hat support</strong></td>
<td></td>
</tr>
</tbody>
</table>
Name: CephOSDDiskUnavailable
Message: Disk not accessible
Description: Disk device {{ $labels.device }} not accessible on host {{ $labels.host }}.
Severity: Critical
Resolution: Contact Red Hat support

Name: CephPGRepairTakingTooLong
Message: Self heal problems detected
Description: Self heal operations taking too long.
Severity: Warning
Resolution: Contact Red Hat support

Name: CephMonHighNumberOfLeaderChanges
Message: Storage Cluster has seen many leader changes recently.
Description: 'Ceph Monitor "{ $labels.job }": instance {{ $labels.instance }} has seen {{ $value printf "%.2f" }} leader changes per minute recently.'
Severity: Warning
Resolution: Contact Red Hat support

Name: CephMonQuorumAtRisk
Message: Storage quorum at risk
Description: Storage cluster quorum is low.
Severity: Critical
Resolution: Contact Red Hat support

5.2. RESOLVING NOOBAA BUCKET ERROR STATE

Procedure

1. Log in to OpenShift Web Console and click **Object Service**.
2. In the **Details** card, click the link under **System Name** field.
3. In the left pane, click **Buckets** option and search for the bucket in error state.
4. Click on it’s **Bucket Name**. Error encountered in bucket is displayed.
5. Depending on the specific error of the bucket, perform one or both of the following:
a. For space related errors:
   i. In the left pane, click Resources option.
   ii. Click on the resource in error state.
   iii. Scale the resource by adding more agents.

b. For resource health errors:
   i. In the left pane, click Resources option.
   ii. Click on the resource in error state.
   iii. Connectivity error means the backing service is not available and needs to be restored.
   iv. For access/permissions errors, update the connection’s Access Key and Secret Key.

5.3. RESOLVING NOOBAA BUCKET EXCEEDING QUOTA STATE

To resolve A NooBaa Bucket Is In Exceeding Quota State error perform one of the following:

- Cleanup some of the data on the bucket.
- Increase the bucket quota by performing the following steps:
  1. Log in to OpenShift Web Console and click Object Service.
  2. In the Details card, click the link under System Name field.
  3. In the left pane, click Buckets option and search for the bucket in error state.
  4. Click on it’s Bucket Name. Error encountered in bucket is displayed.
  5. Click Bucket Policies → Edit Quota and increase the quota.

5.4. RESOLVING NOOBAA BUCKET CAPACITY OR QUOTA STATE

Procedure

1. Log in to OpenShift Web Console and click Object Service.
2. In the Details card, click the link under System Name field.
3. In the left pane, click Resources option and search for the PV pool resource.
4. For the PV pool resource with low capacity status, click on it’s Resource Name.
5. Edit the pool configuration and increase the number of agents.

5.5. RECOVERING PODS

When a first node (say NODE1) goes to NotReady state because of some issue, the hosted pods that are using PVC with ReadWriteOnce (RWO) access mode try to move to the second node (say NODE2) but get stuck due to multi-attach error. In such a case, you can recover MON, OSD, and application pods by using the following steps.
Procedure

1. Power off NODE1 (from AWS or vSphere side) and ensure that NODE1 is completely down.

2. Force delete the pods on NODE1 by using the following command:

   ```bash
   $ oc delete pod <pod-name> --grace-period=0 --force
   ```

5.6. RECOVERING FROM EBS VOLUME DETACH

When an OSD or MON elastic block storage (EBS) volume where the OSD disk resides is detached from the worker Amazon EC2 instance, the volume gets reattached automatically within one or two minutes. However, the OSD pod gets into a CrashLoopBackOff state. To recover and bring back the pod to Running state, you must restart the EC2 instance.
CHAPTER 6. CHECKING FOR LOCAL STORAGE OPERATOR DEPLOYMENTS

OpenShift Container Storage clusters with Local Storage Operator are deployed using local storage devices. To find out if your existing cluster with OpenShift Container Storage was deployed using local storage devices, use the following procedure:

Prerequisites

- OpenShift Container Storage is installed and running in the `openshift-storage` namespace.

Procedure

By checking the storage class associated with your OpenShift Container Storage cluster’s persistent volume claims (PVCs), you can tell if your cluster was deployed using local storage devices.

1. Check the storage class associated with OpenShift Container Storage cluster’s PVCs with the following command:

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

2. Check the output. For clusters with Local Storage Operator, the PVCs associated with `ocs-deviceset` use the storage class `localblock`. The output looks similar to the following:

   ```
   NAME                      STATUS   VOLUME                                     CAPACITY   ACCESS
   MODES   STORAGECLASS                  AGE
   db-noobaa-db-0            Bound    pvc-d96c747b-2ab5-47e2-b07e-1079623748d8   50Gi  RWO
   RWO            ocs-storagecluster-ceph-rbd   114s
   ocs-deviceset-0-0-lzfrd   Bound    local-pv-7e70c77c                          1769Gi     RWO
   localblock                    2m10s
   ocs-deviceset-1-0-7rggl   Bound    local-pv-b19b3d48                          1769Gi     RWO
   localblock                    2m10s
   ocs-deviceset-2-0-znhk8   Bound    local-pv-e9f22cdc                          1769Gi     RWO
   localblock                    2m10s
   ```

Additional Resources

- [Deploying OpenShift Container Storage using local storage devices on AWS](#)
- [Deploying OpenShift Container Storage using local storage devices on VMware](#)
Occasionally some of the custom resources managed by an operator may remain in "Terminating" status waiting on the finalizer to complete, although you have performed all the required cleanup tasks. In such an event you need to force the removal of such resources. If you do not do so, the resources remain in the "Terminating" state even after you have performed all the uninstall steps.

1. Check if the openshift-storage namespace is stuck in Terminating state upon deletion.

   
   ```
   $ oc get project openshift-storage
   
   Output:
   
   NAME          DISPLAY NAME   STATUS
   openshift-storage     Terminating
   ```

2. Check for the `NamespaceFinalizersRemaining` and `NamespaceContentRemaining` messages in the `STATUS` section of the command output and perform the next step for each of the listed resources.

   
   ```
   $ oc get project openshift-storage -o yaml
   
   Example output:
   
   status:
   conditions:
   - lastTransitionTime: "2020-07-26T12:32:56Z"
     message: All resources successfully discovered
     reason: ResourcesDiscovered
     status: "False"
     type: NamespaceDeletionDiscoveryFailure
   - lastTransitionTime: "2020-07-26T12:32:56Z"
     message: All legacy kube types successfully parsed
     reason: ParsedGroupVersions
     status: "False"
     type: NamespaceDeletionGroupVersionParsingFailure
   - lastTransitionTime: "2020-07-26T12:32:56Z"
     message: All content successfully deleted, may be waiting on finalization
     reason: ContentDeleted
     status: "False"
     type: NamespaceDeletionContentFailure
   - lastTransitionTime: "2020-07-26T12:32:56Z"
     message: 'Some resources are remaining: cephobjectstoreusers.ceph.rook.io has 1 resource instances'
     reason: SomeResourcesRemain
     status: "True"
     type: NamespaceContentRemaining

   - lastTransitionTime: "2020-07-26T12:32:56Z"
     message: 'Some content in the namespace has finalizers remaining: cephobjectstoreuser.ceph.rook.io in 1 resource instances'
   ```
reason: SomeFinalizers Remain  
status: "True"  
type: NamespaceFinalizersRemaining

3. Delete all the remaining resources listed in the previous step.
   For each of the resources to be deleted, do the following:

   a. Get the object kind of the resource which needs to be removed. See the message in the above output.
      Example:

      message: Some content in the namespace has finalizers remaining:
      cephobjectstoreuser.ceph.rook.io

      Here cephobjectstoreuser.ceph.rook.io is the object kind.

   b. Get the Object name corresponding to the object kind.

      $ oc get <Object-kind> -n <project-name>

      Example:

      $ oc get cephobjectstoreusers.ceph.rook.io -n openshift-storage

      Example output:

      NAME                          AGE
      noobaa-ceph-objectstore-user  26h

   c. Patch the resources.

      $ oc patch -n <project-name> <object-kind>/<object-name> --type=merge -p "{"metadata": {"finalizers":null}}"

      Example:

      $ oc patch -n openshift-storage cephobjectstoreusers.ceph.rook.io/noobaa-ceph-objectstore-user
      --type=merge -p "{"metadata": {"finalizers":null}}"

      Output:

      cephobjectstoreuser.ceph.rook.io/noobaa-ceph-objectstore-user patched

4. Verify that the openshift-storage project is deleted.

   $ oc get project openshift-storage

   Output:

   Error from server (NotFound): namespaces "openshift-storage" not found

   If the issue persists, reach out to Red Hat Support.
CHAPTER 8. TROUBLESHOOTING CEPHFS PVC CREATION IN EXTERNAL MODE

If you have updated the Red Hat Ceph Storage cluster to version 4.1.1 or later from a previous 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.

1. Check for CephFS pvc stuck in Pending status.

   $ oc get pvc

   Example output:

   NAME                      STATUS    VOLUME
   CAPACITY  ACCESS MODES    STORAGECLASS                        AGE
   ngx-fs-pxknkcix20-pod     Pending
   ocs-external-storagecluster-cephfs  28h

2. Check the describe output to see the events for respective pvc.

   Expected error message is cephfs_metadata/csi.volumes.default/csi.volume.pvc-xxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxx: (1) Operation not permitted

   # oc describe pvc ngx-fs-pxknkcix20-pod -n nginx-file

   Example output:

   Name:          ngx-fs-pxknkcix20-pod
   Namespace:     nginx-file
   StorageClass:  ocs-external-storagecluster-cephfs
   Status:        Pending
   Volume:
   Labels:        <none>
   Annotations:   volume.beta.kubernetes.io/storage-provisioner: openshift-storage.csi.ceph.com
   Finalizers:    [kubernetes.io/pvc-protection]
   Capacity:
   Access Modes:
   VolumeMode:    Filesystem
   Mounted By:    ngx-fs-oyoe047v2bn2ka42fgg-pod-hqhzf
   Events:

   Warning ProvisioningFailed 107m (x245 over 22h) openshift-storage.csi.ceph.com_csi-cephfsplugin-provisioner-5f8b66cc96-hvcqp_6b7044af-c904-4795-9ce5-bf0cf63cc4a4

   [...]

   Warning ProvisioningFailed 107m (x245 over 22h) openshift-storage.csi.ceph.com_csi-cephfsplugin-provisioner-5f8b66cc96-hvcqp_6b7044af-c904-4795-9ce5-bf0cf63cc4a4
csi.volumes.default csi.volume.pvc-1ac0c6e6-9428-445d-bbd6-1284d54ddb47 /tmp/omap-get-186436239 --namespace=csi]) occurred, command output streams is ( error getting omap value
cephfs_metadata/csi.volumes.default/csi.volume.pvc-1ac0c6e6-9428-445d-bbd6-1284d54ddb47: (1) Operation not permitted)

3. Check the settings for the `<cephfs metadata pool name>` (here cephfs_metadata) and `<cephfs data pool name>` (here cephfs_data). For running the command, you will need jq preinstalled in the Red Hat Ceph Storage client node.

```bash
# ceph osd pool ls detail --format=json | jq '.[] | select(.pool_name| startswith("cephfs")) | .pool_name, .application_metadata' "cephfs_data"
{
  "cephfs": {}
}
"cephfs_metadata"
{
  "cephfs": {}
}
```

4. Set the application type for CephFS pool.

- Run the following commands on the Red Hat Ceph Storage client node:

```bash
# ceph osd pool application set <cephfs metadata pool name> cephfs metadata cephfs

# ceph osd pool application set <cephfs data pool name> cephfs data cephfs
```

5. Verify if the settings are applied.

```bash
# ceph osd pool ls detail --format=json | jq '.[] | select(.pool_name| startswith("cephfs")) | .pool_name, .application_metadata' "cephfs_data"
{
  "cephfs": {
    "data": "cephfs"
  }
"cephfs_metadata"
{
  "cephfs": {
    "metadata": "cephfs"
  }
}
```

6. Check the CephFS PVC status again. The PVC should now be in Bound state.

```bash
# oc get pvc
```

Example output:

```
NAME                      STATUS    VOLUME CAPACITY  ACCESS MODES    STORAGECLASS                        AGE
ngx-fs-pxknkcix20-pod     Bound     pvc-1ac0c6e6-9428-445d-bbd6-1284d54ddb47
```
1Mi   RWO   ocs-external-storagecluster-cephfs  29h

[...]

CHAPTER 8. TROUBLESHOOTING CEPHFS PVC CREATION IN EXTERNAL MODE