Red Hat OpenStack Platform 16.0

Block Storage Backup Guide

Understanding, using, and managing the Block Storage backup service in OpenStack

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Abstract

This document describes how to deploy the OpenStack Block Storage Backup Service. The instructions herein are specific to an overcloud deployment. The OpenStack director can configure Red Hat Ceph Storage, NFS, and Object Storage (swift) as back ends. Google Cloud Storage can also be configured as a backup back end.
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PREFACE

Red Hat OpenStack Platform (RHOSP) provides the foundation to build a private or public Infrastructure-as-a-Service (IaaS) cloud on top of Red Hat Enterprise Linux. It offers a massively scalable, fault-tolerant platform for the development of cloud-enabled workloads.

This guide describe procedures for creating and managing the Block Storage backup service.

You can manage some features of the backup service using either the OpenStack dashboard or the command line clients. Most procedures can be accomplished using either method; some of the more advanced procedures can only be run on the command line. This guide provides procedures for the dashboard where possible.

NOTE

For the complete suite of documentation for Red Hat OpenStack Platform, see Red Hat OpenStack Platform Documentation.
CHAPTER 1. OVERVIEW

The Block Storage service (cinder) provides a horizontally scalable backup service that you can use to back up cinder volumes using diverse storage back ends. Using the Block Storage service, you can create full or incremental backups and restore these backups. The service is volume-array independent.

The Red Hat OpenStack Platform (RHOSP) director is a tool set for installing and managing a complete RHOSP environment. The RHOSP director orchestrates a functional, Enterprise-grade RHOSP deployment with minimal manual configuration. It helps address many of the issues inherent in manually configuring individual RHOSP components.

The resulting RHOSP deployment provided by the director is called the overcloud. The overcloud houses all the components that provide services to end users, including Block Storage. The Block Storage backup service is an optional service deployed on Controller nodes.

This guide describes how to deploy the Block Storage backup service to use a specific back end. This guide also describes planning, installing, configuring, and using the Block Storage backup service.

1.1. WHAT IS A BACKUP?

A volume backup is a persistent copy of the contents of a volume. Volume backups are typically created as object stores. By default, they are managed through the OpenStack Object Storage service (swift). Optionally, you can configure Red Hat Ceph Storage and NFS as alternative back ends for backups.

When you create a volume backup, all of the backup metadata is stored in the Block Storage service database. The cinder-backup service uses the metadata to restore a volume from the backup. When you recover data from catastrophic database loss, you must restore the Block Storage service database before restoring any volumes from backups. This recovery scenario presumes that the Block Storage service database is restored with all of the original volume backup metadata intact.

If you want to configure volume backups for only a subset of data, you must export the backup metadata for the volume. Volume metadata backups enable you to re-import the metadata to the Block Storage database, through the REST API or the cinder client, and restore the volume backup as normal.

Volume backups are different from snapshots. Backups preserve the data contained in the volume and are used to prevent data loss. Snapshots preserve the state of a volume at a specific point in time and are used to facilitate cloning. You cannot delete a volume if it has existing snapshots.

To minimize latency during cloning, snapshot back ends are typically co-located with volume back ends. In a typical enterprise deployment, a backup repository is located in a separate location from the volume back end, such as on a different node, physical storage, or geographical location. This practice protects the backup repository from damage that might occur to the volume back end.

For more information about volume snapshots, see "Create, Use, or Delete Volume Snapshots" in the Storage Guide.

1.2. HOW DO BACKUPS AND RESTORES WORK?

Volume backups and restores have similar workflows, illustrated below.

1.2.1. Volume backup workflow

When the Block Storage backup service performs a back up, it receives a request from the cinder API to backup a targeted volume. The request is completed and the backup content is stored on the back end.
The diagram below illustrates how the request interacts with the cinder services to perform the backup.

1. The client issues request to backup a Cinder volume by invoking the Cinder REST API (via the dashboard, client, etc.).

2. The Cinder API service receives the request (from HAProxy) and validates the request, user credentials, etc.

3. Creates the backup record in the SQL database.

4. Makes an asynchronous RPC call to the cinder-backup service via AMQP to backup the volume.

5. Returns current Backup record, with an ID, to the API caller.

6. RPC create message arrives on one of the backup services.

7. The cinder-backup service does a synchronous RPC call to get_backup_device.

8. The cinder-volume service ensures the right device is returned to the caller. Normally, it is the same volume, but if the volume is in use, the service will return instead a temporary cloned volume or a temporary snapshot, depending on the configuration.

9. The cinder-backup service issues another synchronous RPC to cinder-volume to expose the source device.

10. The cinder-volume service exports and maps the source device (volume or snapshot) returning the appropriate connection information.

11. The cinder-backup service attaches source volume using connection information.

12. The cinder-backup service calls the Backup Driver, with the device already attached, which begins the data transfer to the backup destination.

13. The volume is detached from the Backup host.
14. The cinder-backup service issues a synchronous RPC to cinder-volume to disconnect the source device.

15. The cinder-volume service unmaps and removes the export for the device.

16. If a temporary volume or temporary snapshot was created, cinder-backup calls cinder-volume to remove it.

17. The cinder-volume service removes the temporary volume.

18. Once the backup is completed, the Backup record is updated in the database.

1.2.2. Volume restore workflow

The following diagram illustrates the steps that occur when a user requests that a Block Storage backup be restored.

1. The client issues request to restore a Cinder backup by invoking the CinderREST API (via the dashboard, client, etc.).

2. The Cinder API receives the request (from HAProxy) and validates the request, user credentials, etc.

3. If the request didn’t contain an existing volume as the destination, the API will make an asynchronous RPC call to create a new volume and polls the status of the volume until it becomes available.

4. The cinder-scheduler selects a volume service and makes the RPC call to create the volume.

5. Selected cinder-volume service creates the volume.
6. Once `cinder-api` detects that the volume is available, the backup record is created in the database.

7. Makes an asynchronous RPC call to the backup service via AMQP to restore the backup.

8. Returns the current volume ID, backup ID, and volume name to the API caller.

9. RPC create message arrives on one of the backup services.

10. The `cinder-backup` service makes a synchronous RPC call to `cinder-volume` to expose the destination volume.

11. The `cinder-volume` service exports and maps the Destination Volume returning the appropriate connection information.

12. The `cinder-backup` service attaches source volume using connection information.

13. The `cinder-backup` service calls the driver with the device already attached which begins the data restoration to the volume destination.

14. The volume is detached from the Backup host.

15. The `cinder-backup` service issues a synchronous RPC to `cinder-volume` to disconnect the source device.

16. The `cinder-volume` service unmaps and removes the export for the device.

17. Once the backup is completed, the Backup record is updated in the database.

### 1.3. CLOUD STORAGE VERSUS LOCAL STORAGE

The Google Cloud Storage driver is the only cloud driver supported by the Block Storage backup service. By default, the Google Cloud Storage driver uses the least expensive storage solution, nearline, which is meant for this type of backup.

Updating configuration settings may improve performance. For example, if you are creating backups from Europe and you leave the backup default region (US), performance may be slower because you are backing up to a region that is a farther away.

**NOTE**

Google Cloud Storage requires special configuration that is explained in section Appendix A, Google Cloud Storage configuration.

The table below compares pros and cons for cloud storage and local storage based upon the situation.

<table>
<thead>
<tr>
<th>Situation</th>
<th>Cloud</th>
<th>Local</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offsite backup</td>
<td>Cloud storage is in another company’s data center and therefore automatically offsite. Access to data from many locations. Remote copy for disaster recovery.</td>
<td>Requires additional planning and expense.</td>
</tr>
<tr>
<td>Situation</td>
<td>Cloud</td>
<td>Local</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Hardware control</td>
<td>Relies on the availability of another service and their expertise.</td>
<td>Complete control over storage hardware. Requires management and expertise.</td>
</tr>
<tr>
<td>Cost considerations</td>
<td>Different pricing policies or tiers depending upon the services you use from the vendor.</td>
<td>Known cost to add additional hardware as needed.</td>
</tr>
<tr>
<td>Network speed and data access</td>
<td>Overall data access is slower and requires Internet access. Speed and latency depend upon multiple factors.</td>
<td>Immediate and fast access to data. No Internet access required.</td>
</tr>
</tbody>
</table>
CHAPTER 2. BLOCK STORAGE BACKUP SERVICE DEPLOYMENT

The Block Storage backup service is optional. It is not installed by default and must be added to the overcloud deployment.

To deploy the backup service, you need:

- An existing OpenStack installation or be setting up a new one
- An available storage source with a compatible backup driver: Object Storage (swift; default), Ceph, NFS, or Google Cloud storage.

**NOTE**

Google Cloud Storage requires additional configuration explained in Appendix A, Google Cloud Storage configuration.

The examples in this section assume that you are deploying the backend service in a standard OpenStack environment that uses Pacemaker (default installation).

2.1. CONFIGURING BACKEND OPTIONS

The backup service is enabled by including the `cinder-backup.yaml` environment file, which resides in the `/usr/share/openstack-tripleo-heat-templates/environments/` directory.

The default settings in this file set up a swift back end for the Block Storage backup service with Pacemaker.

**Procedure**

The next step is to create a custom environment file, for example `cinder-backup-settings.yaml`, that contains the parameter settings for the backup service and configuration options for the driver.

1. Create a copy of the `cinder-backup.yaml` file and store it in the same location as other custom templates.

   ```bash
   cp /usr/share/openstack-tripleo-heat-templates/environments/cinder-backup.yaml /home/stack/templates/cinder-backup-settings.yaml
   ```

2. Modify the appropriate options for the backup back end that you are using (see instructions in the sections below).

3. Save the changes to the file.

2.1.1. Object storage (swift)

Swift is the default value for the `CinderBackupBackend` option. If you are using swift, no additional changes are needed.

**Example**

```
resource_registry:
  OS::TripleO::Services::CinderBackup: /usr/share/openstack-tripleo-heat-templates/environments/cinder-backup.yaml
```
# For non-pcmk managed implementation

### Parameter Defaults

<table>
<thead>
<tr>
<th>Setting</th>
<th>Options</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>CinderBackupBackend</td>
<td>swift (default)</td>
<td>Swift is the default selection in the <code>cinder-backup.yaml</code> template.</td>
</tr>
</tbody>
</table>

## 2.1.2. Red Hat Ceph Storage

If you are using Red Hat Ceph Storage as a backup back end, then you have the option of changing the RBD pool name used for the backup. The default value is `backups`.

### Example

```yaml
resource_registry:
  OS::TripleO::Services::CinderBackup: /usr/share/openstack-tripleo-heat-templates/deployment/cinder/cinder-backup-pacemaker-puppet.yaml
  # For non-pcmk managed implementation
  # OS::TripleO::Services::CinderBackup: /usr/share/openstack-tripleo-heat-templates/deployment/cinder/cinder-backup-container-puppet.yaml

parameter_defaults:
  CinderBackupBackend: ceph
  CinderBackupRbdPoolName: backups
```

<table>
<thead>
<tr>
<th>Setting</th>
<th>Options</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>CinderBackupBackend</td>
<td>ceph</td>
<td>Required. Change the value to <code>ceph</code>.</td>
</tr>
<tr>
<td>CinderBackupRbdPoolName</td>
<td>backups (default name)</td>
<td>Optional. No other settings need to be change unless you are using a custom RBD pool name.</td>
</tr>
</tbody>
</table>

## 2.1.3. NFS

To use NFS as a back end for the backup service, you need to provide the NFS share to be mounted.

### Example

```yaml
resource_registry:
  OS::TripleO::Services::CinderBackup: /usr/share/openstack-tripleo-heat-templates/deployment/cinder/cinder-backup-pacemaker-puppet.yaml
```
# For non-pcmk managed implementation
# OS::TripleO::Services::CinderBackup: /usr/share/openstack-tripleo-heat-templates/deployment/cinder/cinder-backup-container-puppet.yaml

parameter_defaults:
  CinderBackupBackend: nfs
  CinderBackupNfsShare: '192.168.122.1:/export/cinder/backups'
  CinderBackupNfsMountOptions: "

<table>
<thead>
<tr>
<th>Setting</th>
<th>Options</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>CinderBackupBackend</td>
<td>nfs</td>
<td>Required. Set nfs as the value.</td>
</tr>
<tr>
<td>CinderBackupNfsShare</td>
<td></td>
<td>Required. Enter the NFS share to be mounted. Default value is empty.</td>
</tr>
<tr>
<td>CinderNfsMountOptions</td>
<td></td>
<td>Optional. Backup NFS Mount options can be left blank. If you need to specify mount options, include them here.</td>
</tr>
</tbody>
</table>

Additional configuration options are described in Appendix A, Google Cloud Storage configuration.

2.2. DEPLOYING THE BLOCK STORAGE BACKUP SERVICE

After you create the environment file in /home/stack/templates/, log in as the stack user and deploy the configuration by running:

```
$ openstack overcloud deploy --templates \
-e /home/stack/templates/cinder-backup-settings.yaml
```

**IMPORTANT**

If you passed any extra environment files when you created the overcloud, pass them again here using the -e option to avoid making undesired changes to the overcloud.

For more information, see the Including Environment Files in Overcloud Creation in the Director Installation and Usage Guide and the Environment Files section of the Advanced Overcloud Customization Guide.
CHAPTER 3. USING THE BLOCK STORAGE BACKUP SERVICE

This chapter explains how to use the Block Storage backup service to perform full or incremental backups, and how to restore a backup to a volume. Basic troubleshooting tips are also provided.

3.1. FULL BACKUPS

3.1.1. Creating a full volume backup

Use the `cinder backup-create` command to back up a volume.

By default, this command creates a full backup of the volume. If the volume has existing backups, you can create an incremental backup instead. For more information, see *Create an Incremental Volume Backup*.

**NOTE**

Prior to Red Hat OpenStack Platform version 16, the `cinder backup-create` command created incremental backups after the first full Ceph volume backup to a Ceph Storage back end. In RHOSP version 16 and later, you must use the `--incremental` option to create incremental volume backups. If the `--incremental` option is not used with the `cinder backup-create` command, the default setting creates full backups. For more information, see *Create an Incremental Volume Backup*.

You can create backups of volumes you have access to. This means that users with administrative privileges can back up any volume, regardless of owner. For more information, see Section 3.1.2, “Creating a volume backup as an admin”.

**Procedure**

1. View the ID or Display Name of the volume you want to back up:

   `# cinder list`

2. Back up the volume:

   `# cinder backup-create _VOLUME_`

3. Replace `VOLUME` with the **ID** or **Display Name** of the volume you want to back up. For example:

   +-----------------+--------------------------------------+
   | Property      | Value                      |
   +-----------------+--------------------------------------+
   | id             | e9d15fc7-eeae-4ca4-aa72-d52536dc551d |
   | name           | None                        |
   | volume_id      | 5f75430a-abff-4cc7-b74e-f808234fa6c5 |
   +-----------------+--------------------------------------+

   The **volume_id** of the resulting backup is identical to the ID of the source volume.

4. Verify that the volume backup creation is complete:
5. The volume backup creation is complete when the **Status** of the backup entry is available.

### 3.1.2. Creating a volume backup as an admin

Users with administrative privileges (such as the default admin account) can back up any volume managed by OpenStack. When an admin backs up a volume owned by a non-admin user, the backup is hidden from the volume owner by default.

As an admin, you can still back up a volume and make the backup available to a specific tenant. To do so, run:

```
# cinder --os-auth-url _KEYSTONEURL_ --os-tenant-name _TENANTNAME_ --os-username _USERNAME_ --os-password _PASSWD_ backup-create _VOLUME_
```

Where:

- **TENANTNAME** is the name of the tenant where you want to make the backup available.
- **USERNAME** and **PASSWD** are the username/password credentials of a user within **TENANTNAME**.
- **VOLUME** is the name or ID of the volume you want to back up.
- **KEYSTONEURL** is the URL endpoint of the Identity service (typically http:// IP:5000/v2, where IP is the IP address of the Identity service host). When performing this operation, the resulting backup’s size counts against the quota of **TENANTNAME** rather than the admin’s tenant.

### 3.1.3. Exporting a volume backup’s metadata

You can also export and store the volume backup’s metadata. This allows you to restore the volume backup, even if the Block Storage database suffers a catastrophic loss.

To do so, run:

```
# cinder backup-export _BACKUPID_
```

Where **BACKUPID** is the ID or name of the volume backup. For example,

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>backup_service</td>
<td>cinder.backup.drivers.swift</td>
</tr>
<tr>
<td>backup_url</td>
<td>eyJzdGF0dXMiOiAiYXZhaWxhYmxliiwgIyI6IDF9</td>
</tr>
</tbody>
</table>

The volume backup metadata consists of the **backup_service** and **backup_url** values.

### 3.1.4. Backing up an in-use volume

You can also use the `cinder backup-create` command to create a backup of an in-use volume by adding the **--force** option.
NOTE

The --force option relies on Block Storage back end snapshot support and should be supported by most drivers. You can verify snapshot support by checking the documentation for the back end you are using.

By using the --force option, you acknowledge that you are not quiescing the drive before performing the backup. Using this method creates a crash-consistent (but not application-consistent) backup. In other words, the backup will not have an awareness of which applications were running when the backup was performed. However, the data will be intact.

Procedure

To create a backup of an in-use volume, run:

```bash
# cinder backup-create _VOLUME_ --incremental --force
```

3.1.5. Backing up a snapshot

When creating a backup from a snapshot, you can do a full backup or an incremental backup (by including the --incremental option). You must identify the volume ID associated with the snapshot.

Procedure

1. Locate the snapshot ID of the snapshot to backup using cinder snapshot list.

   ```bash
   # cinder snapshot-list --volume-id _VOLUME_ID_
   ```

2. If the snapshot is named, then you can use this example to locate the ID:

   ```bash
   # cinder snapshot-show _SNAPSHOT_NAME_
   ```

3. Create the backup of a snapshot:

   ```bash
   # cinder backup-create _VOLUME_ --snapshot-id=_SNAPSHOT_ID_
   ```

3.2. INCREMENTAL BACKUPS

Using the Block Storage backup service, you can perform incremental backups.

3.2.1. Performance considerations

Some backup features, such as incremental backup and data compression, may impact performance. Incremental backups can impact performance because all of the data in a volume must be read and checksummed for each incremental backup as well as for the full backup.

Data compression can be used with non-Ceph backends. Enabling data compression requires additional CPU power, but uses less network bandwidth and storage space overall.

Multipath configuration can also impact performance. If multiple volumes are attached without multipathing enabled, for example, you may be unable to connect to the network.
For more information about enabling or disabling compression, defining the number of processes, or adding additional CPU resources, see Appendix B, Advanced Block Storage backup configuration options.

3.2.1.1. Backup from a snapshot

Some back ends support creating a backup from a snapshot. A driver that supports this feature can directly attach a snapshot to the host, which is more efficient than cloning the snapshot to a volume and attaching the volume to the host. However, this feature can affect performance because of the extra step of creating the volume from a snapshot.

3.2.2. Performing incremental backups

By default, the cinder backup-create command creates a full backup of a volume. However, if the volume has existing backups, you can create an incremental backup.

Incremental backups are fully supported on NFS, Object Storage (swift), and Red Hat Ceph Storage backup repositories.

An incremental backup captures any changes to the volume since the last backup (full or incremental). Performing numerous, regular, full backups of a volume can become resource intensive as the size of the volume increases over time. Incremental backups allow you to capture periodic changes to volumes while minimizing resource consumption.

To create an incremental volume backup, use the --incremental option with the following command:

```
# cinder backup-create _VOLUME_ --incremental
```

Replace _VOLUME_ with the ID or Display Name of the volume you want to back up.

**NOTE**

You cannot delete a full backup if it already has an incremental backup. If a full backup has multiple incremental backups, you can only delete the latest one.

3.3. CANCELING A BACKUP

To cancel a backup, an admin must request a force delete on the backup:

```
# cinder backup-delete --force BACKUP ID
```

Even if the backup is immediately deleted and no longer appears in the listings, the cancellation may take longer to complete. Check the status of the source resource to verify when the status no longer equals backing-up.

**NOTE**

Before Red Hat OpenStack version 12, the backing-up status was stored in the volume, even when backing up a snapshot. Therefore, when backing up a snapshot, any delete operation on the snapshot that followed a cancellation could result in an error if the snapshot was still mapped. In Red Hat OpenStack Platform version 13 and later, ongoing restoration operations can be canceled on any of the supported backup drivers.
3.4. VIEWING AND MODIFYING TENANT BACKUP QUOTA

Normally, you can use the dashboard to modify tenant storage quotas, for example, the number of volumes, volume storage, snapshots, or other operational limits that a tenant can have. However, the functionality to modify backup quotas with the dashboard is not yet available.

You must use the command line interface to modify backup quotas with the `cinder quota-update` command.

Procedure

1. To view the storage quotas of a specific tenant (`TENANT_ID`), run the following command:

   ```
   # cinder quota-show TENANT_ID
   ```

2. To update the maximum number of backups (`MAXNUM`) that can be created in a specific tenant, run the following command:

   ```
   # cinder quota-update --backups MAXNUM TENANT_ID
   ```

3. To update the maximum total size of all backups (`MAXGB`) within a specific tenant, run the following command:

   ```
   # cinder quota-update --backup-gigabytes MAXGB TENANT_ID
   ```

4. To view the storage quota usage of a specific tenant, run the following command:

   ```
   # cinder quota-usage TENANT_ID
   ```

3.5. RESTORING FROM BACKUPS

3.5.1. Restoring a volume from a backup

These steps create a new volume from a backup.

1. Find the ID of the volume backup you want to use:

   ```
   # cinder backup-list
   ```

   **NOTE**

   The Volume ID should match the ID of the volume you want to restore.

2. Restore the volume backup:

   ```
   # cinder backup-restore _BACKUP_ID_
   ```

   Where `BACKUP_ID` is the ID of the volume backup you wish to use.

3. If you no longer need the backup, delete it:
4. If you need to restore a backed up volume to a volume of a particular type, use the `--volume` option to restore a backup to a specific volume:

   # cinder backup-restore _BACKUP_ID_ --volume VOLUME_ID_

3.5.2. Restoring a volume after a Block Storage database loss

Typically, a Block Storage database loss prevents you from restoring a volume backup, because the Block Storage database contains metadata required by the volume backup service (openstack-cinder-backup). This metadata consists of `backup_service` and `backup_url` values, which you can export after creating the volume backup. For more information see Section 3.1.1, “Creating a full volume backup”.

If you exported and stored this metadata, then you can import it to a new Block Storage database, which allows you to restore the volume backup.

**NOTE**

For incremental backups, you must import all exported data before you can restore one of the incremental backups.

**Procedure**

1. As a user with administrative privileges, run the following command:

   # cinder backup-import _backup_service_ _backup_url_

   Where `backup_service` and `backup_url` are from the metadata you exported. For example, using the exported metadata from Section 3.1.1, “Creating a full volume backup”:

   # cinder backup-import cinder.backup.drivers.swift eyJzdGF0dXMi...c2l6ZSI6IDF9

   +----------+--------------------------------------+
   | Property |                Value                 |
   +----------+--------------------------------------+
   |    id    | 77951e2f-4aff-4365-8c64-f833802eaa43 |
   |   name   |                 None                 |
   +----------+--------------------------------------+

2. After you import the metadata into the Block Storage service database, you can restore the volume as normal (see Section 3.5.1, “Restoring a volume from a backup”)

3.5.3. Canceling a backup restore

To cancel a backup restore operation, alter the status of the backup to anything other than `restoring`. You can use the error state to minimize confusion regarding whether the restore was successful or not. Alternatively, you can change the value to `available`.

   $ openstack volume backup set --state error BACKUP_ID

   **NOTE**

   For incremental backups, you must import all exported data before you can restore one of the incremental backups.
NOTE
Backup cancellation is an asynchronous action, because the backup driver must detect the status change before it cancels the backup. When the status changes to available in the destination volume, the cancellation is complete.

NOTE
This feature is not currently available on RBD backups.

WARNING
If a restore operation is canceled after it starts, the destination volume is useless, because there is no way of knowing how much data, if any, was actually restored.

3.6. TROUBLESHOOTING
You can diagnosed many issues by verifying that services are available and by looking in log files for error messages.

Two scenarios account for many issues with the backup service:

- When the cinder-backup service starts, it connects to its configured back end and uses the back end as a target for backups. Problems with this connection can cause the service to be down.
- When backups are requested, the backup service connects to the volume service and attaches the requested volume. You will not notice connection problems until backup time.

In either case, review the logs for error messages.

For general information, log locations, and troubleshooting suggestions, see to the Logging, Monitoring and Troubleshooting Guide. Log files and services are listed in the Log Files for OpenStack Services section.

3.6.1. Verifying services
Verify that the necessary services are available and check the logs for error messages. For more information about key services and their interactions, see Section 1.2, “How do backups and restores work?”.

After you verify the status of the services, check the cinder-backup.log file. The Block Storage Backup service log is located in /var/log/containers/cinder/cinder-backup.log.

Procedure

1. Run the cinder show command on the volume to see if it is stored by the host:

```bash
# cinder show
```
2. Run the **cinder service-list** command to view running services:

```
# cinder service-list
+------------------+--------------------+------+---------+-------+----------------------------+--------------
| Binary           | Host               | Zone | Status  | State | Updated_at                 | Disabled Reason |
+------------------+--------------------+------+---------+-------+----------------------------+--------------
| cinder-backup    | hostgroup          | nova | enabled | up    | 2017-05-15T02:42:25.000000 | -             |
| cinder-scheduler | hostgroup          | nova | enabled | up    | 2017-05-15T02:42:25.000000 | -             |
| cinder-volume    | hostgroup@sas-pool | nova | enabled | down  | 2017-05-14T03:04:01.000000 | -             |
| cinder-volume    | hostgroup@ssd-pool | nova | enabled | down  | 2017-05-14T03:04:01.000000 | -             |
+------------------+--------------------+------+---------+-------+----------------------------+--------------
```

3. Verify that the expected services are available.

### 3.6.2. Troubleshooting tips

Backups are asynchronous. The Block Storage backup service performs a small number of static checks upon receiving an API request, such as checking for an invalid volume reference (missing) or a volume that is in-use or attached to an instance. The in-use case requires you to use the **--force** option.

**NOTE**

Using the **--force** option means that I/O will not be quiesced and the resulting volume image may be corrupt.

If the API accepts the request, the backup occurs in the background. The CLI returns immediately, even if the backup has failed or is about to fail. The status of a backup can be queried using the cinder backup API. If an error occurs, review the logs for the cause.

### 3.6.3. Pacemaker

The Block Storage backup service is deployed with Pacemaker by default. By configuring virtual IP addresses, containers, services, and other features as resources in a cluster, Pacemaker makes sure that the defined set of Red Hat OpenStack cluster resources are running and available. When a service or an entire node in a cluster fails, Pacemaker can restart the resource, take the node out of the cluster, or reboot the node. Requests to most of those services are done through HAProxy.

For information on using Pacemaker for troubleshooting, see Using Pacemaker in the Understanding Red Hat OpenStack Platform High Availability guide.
APPENDIX A. GOOGLE CLOUD STORAGE CONFIGURATION

Configuring the Block Storage service to use Google Cloud Storage as a backup back end involves the following steps:

- Creating and downloading the service account credentials of your Google account.
- Creating an environment file to map out the Block Storage settings required. This environment file will also use the service account credentials created in the previous step.
- Re-deploying the overcloud using the environment file you created.

A.1. REQUIREMENTS

Deploying Google Cloud Storage for backups requires that:

- You have the username and password of an account with elevated privileges. You can use the same account that was created to deploy the overcloud; in the Director Installation and Usage Guide, a user named stack is created for this purpose.
- You have a Google account with access to Google Cloud Platform. This account will be used by the Block Storage service to access and use Google Cloud for storing backups.

A.2. CREATING THE GCS CREDENTIALS FILE

The Block Storage service needs your Google credentials to access and use Google Cloud for backups. You can provide these credentials to Block Storage by creating a service account key.

Procedure

1. Log in to the Google developer console (http://console.developers.google.com) using your Google account.
2. Click the Credentials tab. From there, select Service account key from the Create credentials dropdown.
3. In the **Create service account key** screen, select the service account that the Block Storage service should use from the **Service account** dropdown:
4. In the same screen, select **JSON** from the **Key type** section and click **Create**.

5. The browser will then download the key to its default download location:

6. Open the file and note the value of the **project_id** parameter:

   ```json
   {
     "type": "service_account",
     "project_id": "cloud-backup-1370",
     ...
   }
   
   7. Save a copy of the GCS JSON credentials to `/home/stack/templates/Cloud-Backup.json`
NOTE

Make sure to name the file `Cloud-Backup.json` and do not change the file name. This JSON file needs to be in the same directory location as the `[filename]` `cinder-backup-gcs.yaml` file created in the next section.

A.3. CREATING CINDER-BACKUP-GCS.YAML

Using the example file provided, create the `cinder-backup-gcs.yaml` file.

NOTE

The white space and format used in this the example (and in your file) are critical. If the white space is changed, then the file may not function as expected.

Procedure

1. Copy the text below, paste it into the new file. Do not make any modifications to the file contents.

```yaml
heat_template_version: rocky

description: >
    Post-deployment for configuration cinder-backup to GCS

parameters:
    servers:
        type: json
    DeployIdentifier:
        type: string

resources:
    CinderBackupGcsExtraConfig:
        type: OS::Heat::SoftwareConfig
        properties:
            group: script
            config:
                str_replace:
                    template: |
                        #!/bin/bash
                        GCS_FILE=/var/lib/config-data/puppet-generated/cinder/etc/cinder/Cloud-Backup.json
                        HOSTNAME=$(hostname -s)
                        for NODE in $(hiera -c /etc/puppet/hiera.yaml cinder_backup_short_node_names | tr -d '[],'); do
                            if [ $NODE == $HOSTNAME ]; then
                                cat <<EOF > $GCS_FILE
                                    GCS_JSON_DATA
                                EOF
                                chmod 0640 $GCS_FILE
                                chown root:42407 $GCS_FILE
                            fi
                        done
        params:
            GCS_JSON_DATA: {get_file: Cloud-Backup.json}
```

APPENDIX A. GOOGLE CLOUD STORAGE CONFIGURATION
CinderBackupGcsDeployment:
  type: OS::Heat::SoftwareDeploymentGroup
  properties:
    servers: {get_param: servers}
    config: {get_resource: CinderBackupGcsExtraConfig}
    actions: ['CREATE', 'UPDATE']
    input_values:
      deploy_identifier: {get_param: DeployIdentifier}

2. Save the file as /home/stack/templates/cinder-backup-gcs.yaml.

A.4. CREATING THE ENVIRONMENT FILE

The environment file contains the settings you want to apply to the Block Storage service. In this case, the Block Storage service will be configured to store volume backups to Google Cloud. For more information about environment files, see the Director Installation and Usage guide.

Use the example environment file below and update the backup_gcs_project_id with the project ID listed in the Cloud-Backup.json file. You may also wish to change the backup_gcs_bucket_location location from US to a location closer to you. See the Google Cloud Backup Storage backup back end configuration options table for a list of options.

Procedure

1. Copy the environment file example below. Make sure to retain the white space usage.

2. Paste the content into a new file: /home/stack/templates/cinder-backup-settings.yaml

3. Change the value for backup_gcs_project_id from cloud-backup-1370 to the project ID listed in the Cloud-Backup.json file.

4. Save the file.

Environment file example

Each setting is defined in the environment file. Available options are explained in the table below.

```
resource_registry:
  OS::TripleO::Services::CinderBackup: /usr/share/openstack-tripleo-heat-templates/deployment/cinder/cinder-backup-pacemaker-puppet.yaml
  # For non-pcmk managed implementation
  # OS::TripleO::Services::CinderBackup: /usr/share/openstack-tripleo-heat-templates/deployment/cinder/cinder-backup-container-puppet.yaml
  OS::TripleO::NodeExtraConfigPost: /home/stack/templates/cinder-backup-gcs.yaml

parameter_defaults:
  CinderBackupBackend: swift
  ExtraConfig:
    cinder::backup::swift::backup_driver: cinder.backup.drivers.gcs.GoogleBackupDriver
    cinder::config::cinder_config:
      DEFAULT/backup_gcs_credential_file:
        value: /etc/cinder/Cloud-Backup.json
      DEFAULT/backup_gcs_project_id:
        value: cloud-backup-1370
      DEFAULT/backup_gcs_bucket:
```
Table A.1. Google Cloud Storage backup back end configuration options

<table>
<thead>
<tr>
<th>PARAM</th>
<th>Default</th>
<th>CONFIG Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>backup_gcs_project_id</td>
<td></td>
<td>Required. The project ID of the service account you are using, as noted in the project_id of the service account key from Section A.2, “Creating the GCS credentials file”.</td>
</tr>
<tr>
<td>backup_gcs_credential_file</td>
<td></td>
<td>The absolute path to the service account key file you created earlier in Section A.2, “Creating the GCS credentials file”.</td>
</tr>
<tr>
<td>backup_gcs_bucket</td>
<td></td>
<td>The GCS bucket (or object storage repository) to use, which may or may not exist. If you specify a non-existent bucket, the Google Cloud Storage backup driver creates one using the name you specify here. See Buckets and Bucket name requirements for more information.</td>
</tr>
<tr>
<td>backup_gcs_bucket_location</td>
<td>us</td>
<td>The location of the GCS bucket. This value is only used if you specify a non-existent bucket in backup_gcs_bucket; in which case, the Google Cloud Storage backup driver will specify this as the GCS bucket location.</td>
</tr>
<tr>
<td>backup_gcs_object_size</td>
<td>52428800</td>
<td>The size (in bytes) of GCS backup objects.</td>
</tr>
<tr>
<td>backup_gcs_block_size</td>
<td>32768</td>
<td>The size (in bytes) that changes are tracked for incremental backups. This value must be a multiple of the backup_gcs_object_size value.</td>
</tr>
<tr>
<td>backup_gcs_user_agent</td>
<td>gcscinder</td>
<td>The HTTP user-agent string for the GCS API.</td>
</tr>
<tr>
<td>backup_gcs_reader_chunk_size</td>
<td>2097152</td>
<td>GCS objects will be downloaded in chunks of this size (in bytes).</td>
</tr>
<tr>
<td>PARAM</td>
<td>Default</td>
<td>CONFIG Description</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>backup_gcs_writer_chunk_size</td>
<td>2097152</td>
<td>GCS objects will be uploaded in chunks of this size (in bytes). To upload files as a single chunk instead, use the value -1.</td>
</tr>
<tr>
<td>backup_gcs_num_retries</td>
<td>3</td>
<td>Number of retries to attempt.</td>
</tr>
<tr>
<td>backup_gcs_storage_class</td>
<td>NEARLINE</td>
<td>Storage class of the GCS bucket. This value is only used if you specify a non-existent bucket in backup_gcs_bucket; in which case, the Google Cloud Storage backup driver will specify this as the GCS bucket storage class. See Storage Classes for more information.</td>
</tr>
<tr>
<td>backup_gcs_retry_error_codes</td>
<td>429</td>
<td>List of GCS error codes.</td>
</tr>
<tr>
<td>backup_gcs_enable_progress_timer</td>
<td>True</td>
<td>Boolean to enable or disable the timer for sending periodic progress notifications to the Telemetry service (ceilometer) during volume backups. This is enabled by default (True)</td>
</tr>
</tbody>
</table>

**WARNING**

When creating new buckets, Google Cloud Storage charges based on your chosen storage class (`backup_gcs_storage_class`). The default `NEARLINE` class is appropriate for backup services.

In addition, you cannot edit the location or class of a bucket once it is created. For more information, see [Managing a bucket’s storage class or location](#).

**A.5. DEPLOYING THE OVERCLOUD**

Once you have created the environment file file in `/home/stack/templates/`, deploy the overcloud then restart the cinder-backup service:

**Procedure**

1. Log in as the `stack` user.
2. Deploy the configuration by running:

```
$ openstack overcloud deploy --templates \n  -e /home/stack/templates/cinder-backup-settings.yaml
```

**IMPORTANT**

If you passed any extra environment files when you created the overcloud, pass them again here using the -e option to avoid making undesired changes to the overcloud.

3. Restart the `cinder-backup` service after the deployment finishes.

For more information, see the Including Environment Files in Overcloud Creation in the *Director Installation and Usage Guide* and the Environment Files section of the *Advanced Overcloud Customization Guide*. 
APPENDIX B. ADVANCED BLOCK STORAGE BACKUP CONFIGURATION OPTIONS

Prior to director-deployed installations, the cinder.conf file was used to configure the Block Storage service and the backup service. When a value from cinder.conf does not have a Heat template equivalent, the values can still be passed from director using a custom environment. The values are added to an ExtraConfig section in the parameter_defaults section of a custom environment file (like cinder-backup-settings.yaml).

ExtraConfig provides a method for additional hiera configuration to inject into the cluster on all nodes. These settings are included on a dedicated backup node, for example, if you used ExtraConfig. If you used ControllerExtraConfig instead of ExtraConfig, then those settings would only be installed on controller nodes and not on a dedicated backup node.

You can substitute DEFAULT/[cinder.conf setting] for the setting that would be used in the DEFAULT section of the cinder.conf file. The example below shows how the ExtraConfig and entries appear in a YAML file.

```
parameter_defaults:
  ExtraConfig:
    cinder::config::cinder_config:
      DEFAULT/backup_compression_algorithm:
        value: None
```

The options below provide a sample of the backup-related options.

Table B.1. Block Storage backup service configuration options

<table>
<thead>
<tr>
<th>Option</th>
<th>Type</th>
<th>Default Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>backup_service_inithost_offload</td>
<td>Optional</td>
<td>True</td>
<td>Offload pending backup delete during backup service startup. If false, the backup service remains down until all pending backups are deleted.</td>
</tr>
<tr>
<td>use_multipath_for_image_xfer</td>
<td>Optional</td>
<td>False</td>
<td>Attach volumes using multipath, if available, during backup and restore procedures. This affects all cinder attach operations, such as create volume from image, generic cold migrations, and so forth.</td>
</tr>
<tr>
<td>num_volume_device_scan_tries</td>
<td>Optional</td>
<td>3</td>
<td>The maximum number of times to rescan targets to find volume during attach.</td>
</tr>
<tr>
<td>Option</td>
<td>Type</td>
<td>Default Value</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------</td>
<td>--------------</td>
<td>---------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>backup_workers</td>
<td>Optional</td>
<td>1</td>
<td>Number of backup processes to run. Performance gains will be significant when running multiple concurrent backups or restores with compression.</td>
</tr>
<tr>
<td>backup_native_threads_pool_size</td>
<td>Optional</td>
<td>60</td>
<td>Size of the native threads pool for the backups. Most backup drivers rely heavily on this. The value can be decreased for specific drivers that don’t rely on this option.</td>
</tr>
<tr>
<td>backup_share</td>
<td>Required</td>
<td></td>
<td>Set to <code>HOST_EXPORT_PATH</code>.</td>
</tr>
<tr>
<td>backup_container</td>
<td>Optional</td>
<td>None</td>
<td>(String) Custom directory to use for backups.</td>
</tr>
<tr>
<td>backup_enable_progress_timer</td>
<td>Optional</td>
<td>True</td>
<td>Enable (true) or disable (false) the timer to send the periodic progress notifications to Ceilometer when backing up the volume to the backend storage.</td>
</tr>
<tr>
<td>backup_mount_options</td>
<td>Optional</td>
<td></td>
<td>Comma-separated list of options to be specified when mounting the NFS export specified in backup_share.</td>
</tr>
<tr>
<td>backup_mount_point_base</td>
<td>Optional</td>
<td>$state_path/backup_mount</td>
<td>(String) Base directory containing mount point for NFS share.</td>
</tr>
<tr>
<td>Option</td>
<td>Type</td>
<td>Default Value</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>----------</td>
<td>---------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>backup_compression_algorithm</td>
<td>Optional</td>
<td>zlib</td>
<td>The compression algorithm to be used when sending backup data to the repository. Valid values are zlib, bz2, and None.</td>
</tr>
<tr>
<td>backup_file_size</td>
<td>Optional</td>
<td>1999994880</td>
<td>Data from cinder volumes larger than this will be stored as multiple files in the backup repository. This option must be a multiple of backup_sha_block_size_bytes.</td>
</tr>
<tr>
<td>backup_sha_block_size_bytes</td>
<td>Optional</td>
<td>32768</td>
<td>Size of cinder volume blocks for digital signature calculation.</td>
</tr>
</tbody>
</table>