Red Hat OpenStack Platform 14

Custom Block Storage Back End Deployment Guide

A Guide to Deploying a Custom Block Storage Back End in a Red Hat OpenStack Platform Overcloud

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Abstract

This document describes how to deploy a custom, non-integrated back end for the Block Storage service in a Red Hat OpenStack Platform 14 Overcloud.

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CHAPTER 1. INTRODUCTION

The Red Hat OpenStack Platform Director is a toolset for installing and managing a complete OpenStack environment. It is based primarily on the upstream TripleO (*OpenStack-on-OpenStack*) project. The Director's primary objective is to fully orchestrate a functional, Enterprise-grade OpenStack deployment with minimal manual configuration. It helps address many of the issues inherent in manually configuring individual OpenStack components.

The end-result OpenStack deployment provided by the Director is called the *Overcloud*. The Overcloud houses all the components that provide services to end users, including Block Storage. This document provides guidance on how to deploy custom back ends to the Overcloud's Block Storage service.

This document presumes existing knowledge of concepts relating to manual Block Storage configuration. In a test deployment of OpenStack (for example, through Packstack), configuring this service involves editing its host node's `/etc/cinder/cinder.conf`. Most of the Block Storage settings in that file are documented in better detail elsewhere; this document describes how to apply those same settings to the Overcloud in order to attach a *custom back end*.

WARNING

This procedure has been tested successfully in limited use cases. Ensure that you test your planned deployment on a non-production environment first. If you have any questions, contact Red Hat support.

1.1. CUSTOM BACK ENDS

For the purposes of this document, a custom back end is defined as a storage server/appliance or configuration that has yet to be integrated fully into the Red Hat OpenStack Platform Director. Some supported Block Storage back ends are already integrated into the Director; this means that pre-configured Director files are already provided out-of-the-box. An integrated back end can be configured and deployed to the Overcloud through these files. Examples of integrated back ends include Red Hat Ceph and single-back end configurations of Dell EMC PS Series, Dell Storage Center, and NetApp appliances.

Further, some storage appliances already integrated into Director only support a single-instance back end. For example, the pre-configured Director files for Dell Storage Center only allow for the deployment of a single back end. Deploying multiple back end instances of this appliance requires a custom configuration, as demonstrated in this document.

While you can manually configure the Block Storage service by directly editing its node's `/etc/cinder/cinder.conf`, the Director will overwrite your configuration once you run **openstack overcloud deploy** (as you do later on in Chapter 4, *Deploy the Configured Back Ends*). As such, the recommended method for deploying a Block Storage back end is through the Director, as doing so will ensure that your settings persist through Overcloud deployments and updates.

If a back end configuration is already fully integrated, you can simply edit and invoke its packaged environment files. With custom back ends, however, you need to write your own environment file. This document includes an annotated sample that you can edit for your own deployment, namely /home/stack/templates/custom-env.yaml. This sample file is suitable for configuring the Block Storage service to use two NetApp back ends.

1.2. REQUIREMENTS

Other than prior knowledge on manually configuring Block Storage and the back end you want to deploy, this document also assumes that:

- If you are using third-party back end appliances, then they must already be properly configured as storage repositories.
- The Overcloud has already been deployed through Director, per instructions in Director Installation and Usage.
- 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 Creating a Director Installation User, the **`stack`** user is created for this purpose.
- You have already mapped out the resulting configuration you want for the Block Storage back end in **`/etc/cinder/cinder.conf`**. With this, all that remains is the orchestration of your planned configuration through the Director.

CHAPTER 2. PROCESS DESCRIPTION

The Block Storage service's settings are stored in **`/etc/cinder/cinder.conf`**; these settings include *back end definitions*. Most third-party back ends usable with (or even supported by) the Block Storage service provide setup instructions that involve editing **`/etc/cinder/cinder.conf`** settings. As mentioned in Chapter 1, *Introduction*, doing so will configure the Block Storage service; however, those settings will get overwritten in future Overcloud updates.

Regardless, any documentation relating to manual configuration through **`/etc/cinder/cinder.conf`** is still useful for Overcloud deployments. The Director, after all, applies the same configuration to **`/etc/cinder/cinder.conf`**, albeit through **heat**. As such, planning the back end configuration requires that you:

- Thoroughly plan the Block Storage back end configuration you want, and
- Map out the resulting **`/etc/cinder/cinder.conf`** file for this configuration.

Once you map out the resulting **`/etc/cinder/cinder.conf`** file, create the environment file that will orchestrate the back end settings. environment file describes this step in greater detail, using the sample file **`/home/stack/templates/custom-env.yaml`**. Having the environment file handy will help ensure that the back end settings persist through future Overcloud updates.

CHAPTER 3. CREATE THE ENVIRONMENT FILE

The environment file contains the settings for each back end you want to define. It also contains other settings relevant to the deployment of a custom back end. For more information about environment files, see Environment Files (in the Advanced Overcloud Customization guide).

The following sample environment file defines two NetApp back ends, namely **netapp1** and **netapp2**:

/home/stack/templates/custom-env.yaml

```
parameter_defaults: # 1
  CinderEnableIscsiBackend: false
  CinderEnableRbdBackend: false
  CinderEnableNfsBackend: false
  NovaEnableRbdBackend: false
  GlanceBackend: file # 2

parameter_defaults:
  ControllerExtraConfig: # 3
    cinder::config::cinder_config:
        netapp1/volume_driver: # 4
            value: cinder.volume.drivers.netapp.common.NetAppDriver
        netapp1/netapp_storage_family:
            value: ontap_7mode
        netapp1/netapp_storage_protocol:
            value: iscsi
        netapp1/netapp_server_hostname:
            value: 10.35.64.11
        netapp1/netapp_server_port:
            value: 80
        netapp1/netapp_login:
            value: root
        netapp1/netapp_password:
            value: p@$$w0rd
        netapp1/volume_backend_name:
            value: netapp1
        netapp2/volume_driver: # 5
            value: cinder.volume.drivers.netapp.common.NetAppDriver # 6
        netapp2/netapp_storage_family:
            value: ontap_7mode
        netapp2/netapp_storage_protocol:
            value: iscsi
        netapp2/netapp_server_hostname:
            value: 10.35.64.11
        netapp2/netapp_server_port:
            value: 80
        netapp2/netapp_login:
            value: root
        netapp2/netapp_password:
            value: p@$$w0rd
        netapp2/volume_backend_name:
            value: netapp2
    cinder_user_enabled_backends: ['netapp1','netapp2'] # 7
```

1. The following parameters are set to **`false`**, and thereby disable other back end types:
   - **`CinderEnableIscsiBackend`**: other iSCSI back ends.
   - **`CinderEnableRbdBackend`**: Red Hat Ceph.
   - **`CinderEnableNfsBackend`**: NFS.
   - **`NovaEnableRbdBackend`**: ephemeral Red Hat Ceph storage.
2. The **GlanceBackend** parameter sets what the Image service should use to store images. The following values are supported:
   - **`file`**: store images on **`/var/lib/glance/images`** on each Controller node.
   - **`swift`**: use the Object Storage service for image storage.
   - **`cinder`**: use the Block Storage service for image storage.
3. **`ControllerExtraConfig`** defines custom settings that will be applied to all Controller nodes. The **`cinder::config::cinder_config`** class means the settings should be applied to the Block Storage (**`cinder`**) service. This, in turn, means that the back end settings will ultimately end in the **`/etc/cinder/cinder.conf`** file of each Controller node.
4. The **`netapp1/volume_driver`** and **`netapp2/volume_driver`** settings follow the *section*/*setting* syntax. With the Block Storage service, each back end is defined in its own section in **`/etc/cinder/cinder.conf`**. Each setting that uses the **`netapp1`** prefix will be defined in a new **`[netapp1]`** back end section.
5. Likewise, **`netapp2`** settings are defined in a separate **`[netapp2]`** section.
6. The **`value`** prefix configures the preceding setting.
7. The **`cinder_user_enabled_backends`** class sets and enables custom back ends. As the name implies, this class should only be used for user-enabled back ends; specifically, those defined in the **`cinder::config::cinder_config`** class.

   Do not use **`cinder_user_enabled_backends`** to list back ends you can enable natively through Director. These include Red Hat Ceph, NFS, and single back ends for supported NetApp or Dell appliances. For example, if you are also enabling a Red Hat Ceph back end, do not list it in **`cinder_user_enabled_backends`**; rather, enable it using **`CinderEnableRbdBackend: true`**.

NOTE

For more information on defining a Red Hat Ceph back end for OpenStack Block Storage, see Deploying an Overcloud with Containerized Red Hat Ceph.

Chapter 4, *Deploy the Configured Back Ends* describes how to use the environment file /home/stack/templates/custom-env.yaml to orchestrate the custom back end's deployment. To see the resulting **`/etc/cinder/cinder.conf`** settings from **`/home/stack/templates/custom-env.yaml`**, see Section A.2, "Resulting Configuration from Sample Environment File".

CHAPTER 4. DEPLOY THE CONFIGURED BACK ENDS

Once you have created the custom-env.yaml file in **/home/stack/templates/**, log in as the **stack** user. Then, deploy the custom back end configuration by running:

```
$ openstack overcloud deploy --templates -e /home/stack/templates/custom-env.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 Modifying the Overcloud Environment (from Director Installation and Usage).

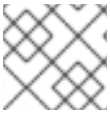
Once the Director completes the orchestration, test the back end. See Chapter 5, *Test the Configured Back End* for instructions.

CHAPTER 5. TEST THE CONFIGURED BACK END

After deploying the back ends to the Overcloud, test whether you can successfully create volumes on them. Doing so will require loading the necessary environment variables first. These variables are defined in **/home/stack/overcloudrc** by default.

To load these variables, run the following command as the **stack** user:

```
$ source /home/stack/overcloudrc
```



NOTE

For more information, see Accessing the Basic Overcloud.

Next, create a *volume type* for each back end. Log in to the Controller node of the Overcloud as the **stack** user and run the following:

```
$ cinder type-create backend1
$ cinder type-create backend2
```

These commands will create the volume types **backend1** and **backend2**, one for each back end defined through the **cinder::config::cinder_config** class of xref:envfile.

Finally, map each volume type to the **volume_backend_name** of a back end enabled through the **cinder_user_enabled_backends** class of xref:envfile. The following commands will map the volume type **backend1** to **netapp1** and **backend2** to **netapp2**:

```
$ cinder type-key backend1 set volume_backend_name=netapp1
$ cinder type-key backend2 set volume_backend_name=netapp2
```

At this point, you should now be ready to test each back end. To do start, create a 1GB volume named **netapp_volume_1** on the **netapp1** back end by invoking the **backend1** volume type:

```
$ cinder create --volume-type backend1 --display_name netappvolume_1 1
```

Likewise, create a similar volume on the **netapp2** back end by invoking the **backend2** volume type:

```
$ cinder create --volume-type backend2 --display_name netappvolume_2 1
```

APPENDIX A. APPENDIX

A.1. THE STACK USER

The Creating a Director Installation User section instructs readers to create a user named **stack**, which in turn will be used to deploy the Overcloud. You can use the **stack** account to run commands that require elevated privileges, such as deploying the back end (Chapter 4, *Deploy the Configured Back Ends*) or loading the necessary environment variables for accessing the Overcloud (Chapter 5, *Test the Configured Back End*).

Presumably, if you followed the instructions in Director Installation and Usage, the **stack** user would already exist. As such, it would be convenient to use it as needed.

A.2. RESULTING CONFIGURATION FROM SAMPLE ENVIRONMENT FILE

The environment file in xref:envfile will configure the Block Storage service to use two NetApp back ends. The following snippet displays the relevant settings:

```
enabled_backends = netapp1,netapp2

[netapp1]
volume_backend_name=netapp_1
volume_driver=cinder.volume.drivers.netapp.common.NetAppDriver
netapp_login=root
netapp_storage_protocol=iscsi
netapp_password=p@$$w0rd
netapp_storage_family=ontap_7mode
netapp_server_port=80
netapp_server_hostname=10.35.64.11

[netapp2]
volume_backend_name=netapp_2
volume_driver=cinder.volume.drivers.netapp.common.NetAppDriver
netapp_login=root
netapp_storage_protocol=iscsi
netapp_password=p@$$w0rd
netapp_storage_family=ontap_7mode
netapp_server_port=80
netapp_server_hostname=10.35.64.11
```