eSDK Enterprise Storage Plugins 2.6.4

User Guide (OpenStack Cinder Driver For PowerVC)

Issue 01

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About This Document

Intended Audience

This document is intended for:

- Technical support engineers
- O&M engineers

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
DANGER	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.
NOTE	Supplements the important information in the main text. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Change History

Issue	Date	Description
01	2024-12-30	This issue is the first official release.

Contents

1 Overview

This document describes how to connect IBM PowerVC to Huawei enterprise storage.

2 Installation and Deployment

2.1 Prerequisites

- The IBM PowerVC environment is running properly.
- A Huawei storage device is running properly.
- The IBM PowerVC environment is properly connected to the Huawei storage device through an FC switch, and the network between the environment and Huawei storage management plane is normal.

Table 2-1 Storage product versions supported by PowerVC

PowerVC Version	Storage Product Version
IBM PowerVC 2.0.0/2.0.1/2.0.2/2.0.3/2.1.0/2.1.1/2.2.0	OceanStor DoradoV3 V300R002 OceanStor V5 V500R007 OceanStor 6.1.3/6.1.5/6.1.6/6.1.7/6.1.8 OceanStor Dorado 6.1.0/6.1.2/6.1.3/6.1.5/6.1.6/6.1.7/6.1.8

Table 2-2 Function differences between Integrated Driver and Pluggable Storage Driver

Operation	Integrated Driver	Pluggable Storage Driver
Register storage using the PowerVC user interface (UI) or application programming interface (API).	Supported	Not supported
Register storage using the PowerVC CLI.	Not supported	Supported
Import and export images.	Supported	Supported
Take over existing VMs using the PowerVC UI or API.	Supported	Not supported (PowerVC 2.0.2 and later versions support the scenarios in **Table 2-3**)
Take over existing volumes of a storage device using the PowerVC UI or API.	Supported	Supported
Create and edit storage templates using the PowerVC UI.	Supported	Not supported
Create and edit storage templates using the Cinder API.	Supported	Supported
Check whether a volume is deleted from the storage side.	Supported	Not supported
View available storage pools of a storage device on the PowerVC UI.	Supported	Not supported
Use PowerVC to distribute VMs in NPIV mode.	Supported	Supported
Use PowerVC to distribute VMs in vSCSI mode.	Supported	Supported
Create and delete volumes.	Supported	Supported
Deploy captured VMs.	Supported	Supported
Attach volumes to or detach volumes from VMs.	Supported	Supported
Create snapshots, consistency groups, and generic volume groups.	Supported	Supported
Set the usage quota of a storage device.	Supported	Supported

Operation	Integrated Driver	Pluggable Storage Driver
IBM officially verifies and supports storage.	Supported	Not supported

Table 2-3 Supported VM takeover scenarios

Networking Mode	Supported Scenario	Remarks
NPIV	After a VM is created, the takeover of the VM on PowerVC is canceled. Then the VM can be taken over again.	-
	After a shared volume is attached to a created VM, the takeover of the VM on PowerVC is canceled. Then the VM can be taken over again.	VMs to which the shared volume has been attached must be taken over at the same time.
	After a HyperMetro volume is attached to a created VM, the takeover of the VM on PowerVC is canceled. Then the VM can be taken over again.	-
vSCSI	After a VM is created, the takeover of the VM on PowerVC is canceled. Then the VM can be taken over again.	-
	After a shared volume is attached to a created VM, the takeover of the VM on PowerVC is canceled. Then the VM can be taken over again.	VMs to which the shared volume has been attached must be taken over at the same time.
	After a HyperMetro volume is attached to a created VM, the takeover of the VM on PowerVC is canceled. Then the VM can be taken over again.	-
vSCSI + NPIV	After a VM is created, the takeover of the VM on PowerVC is canceled. Then the VM can be taken over again.	-
	After a shared volume is attached to a created VM, the takeover of the VM on PowerVC is canceled. Then the VM can be taken over again.	VMs to which the shared volume has been attached must be taken over at the same time.

Networking Mode	Supported Scenario	Remarks
	After a HyperMetro volume is attached to a created VM, the takeover of the VM on PowerVC is canceled. Then the VM can be taken over again.	-

2.2 Obtaining the Software Package

Step 1 Open a browser and enter **https://github.com/Huawei/OpenStack_Driver** in the address box.

Step 2 Click the **master** drop-down list and select the branch corresponding to the plug-in version to be downloaded, for example, **2.6.4**.

NOTE

The branch name must be the same as the plug-in version name. For example, branch 2.6.4 indicates plug-in version 2.6.4.

Step 3 Select **Download ZIP** from the **Code** drop-down list. Then Huawei PowerVC Plugin will be downloaded to a local path as a package.

Step 4 Decompress the package.

Step 5 Find the **PowerVC** directory (path: *../OpenStack_Driver-{version}/PowerVC*) in the directory generated upon decompression.

----End

2.3 Deploying the Plug-in

Step 1 Obtain the path of the **huawei** directory created in PowerVC.

NOTE

The absolute path may vary in different systems. You can search for it as follows:

- Method 1:

  Run the following command. In the command output, **/usr/lib/python2.7/site-packages/cinder/volume/drivers** is the path of the **huawei** directory.

  ```
  # python -c "from cinder.volume import drivers; print (drivers.__path__)"
  ['/usr/lib/python2.7/site-packages/cinder/volume/drivers']
  ```

- Method 2:

  Run the following command. In the command output, **/usr/lib/python3.7/site-packages/cinder/volume/drivers** is the path of the **huawei** directory.

  ```
  # python3 -c "from cinder.volume import drivers; print (drivers.__path__)"
  ['/usr/lib/python3.7/site-packages/cinder/volume/drivers']
  ```

Step 2 Run the following command to create the **huawei** directory in PowerVC based on the path obtained in **Step 1**.

```
# mkdir /usr/lib/<python-version>/site-packages/cinder/volume/drivers/huawei
```


Step 3 Upload all content in the **PowerVC** directory in **2.2 Obtaining the Software Package** to the directory created in **Step 2**.

```
# ls -l  /usr/lib/python3.6/site-packages/cinder/volume/drivers/huawei
drw-r--r-- 1 root root      6 Mar  4 23:40 extend
-rw-r--r-- 1 root root   4787 Mar  4 23:40 constants.py
-rw-r--r-- 1 root root  10316 Mar  4 23:40 fc_zone_helper.py
-rw-r--r-- 1 root root  17905 Mar  4 23:40 huawei_conf.py
-rw-r--r-- 1 root root 125657 Mar  4 23:48 huawei_driver.py
-rw-r--r-- 1 root root  24276 Mar  4 23:40 huawei_t.py
-rw-r--r-- 1 root root   6698 Mar  4 23:40 huawei_utils.py
-rw-r--r-- 1 root root  18437 Mar  4 23:40 hypermetro.py
-rw-r--r-- 1 root root      0 Mar  4 23:40 __init__.py
-rw-r--r-- 1 root root  38948 Mar  4 23:40 replication.py
-rw-r--r-- 1 root root  97236 Mar  4 23:40 rest_client.py
-rw-r--r-- 1 root root   8834 Mar  4 23:40 smartx.py
```

Step 4 Set the configuration file of Huawei Cinder Driver. Create and edit file **/etc/cinder/cinder_huawei_conf.xml**. The content is as follows:

```
<?xml version='1.0' encoding='UTF-8'?>
<config>
  <Storage>
    <Product>V5</Product>
    <Protocol>FC</Protocol>
    <RestURL>https://*.*.*.*:8088/deviceManager/rest/</RestURL>
    <UserName>*****</UserName>
    <UserPassword>******</UserPassword>
  </Storage>
  <LUN>
    <StoragePool>******</StoragePool>
    <LUNType>Thin</LUNType>
    <LUNCopySpeed>2</LUNCopySpeed>
    <DedupLicense>license1;licence2</DedupLicense>
    <CompressionLicense>license1;licence2</CompressionLicense>
  </LUN>
</config>
```

Table 2-4 Parameter description

Parameter	Description
Product	Huawei storage device model. The value can be **V5**, **V6**, or **Dorado**.
Protocol	Protocol used to connect to the Huawei storage device. The value is fixed at **FC**.
RestURL	REST interface access address of the Huawei storage device. Replace *.*.*.* with the actual management IP address of the Huawei storage device.
UserName	User name of the Huawei storage device administrator. **NOTICE** Do not directly use the super administrator account.
UserPassword	Password of the Huawei storage device administrator.
StoragePool	Storage pool name. A storage pool must be created on the Huawei storage device in advance.
LUNType	Default LUN type. The value can be **Thin** or **Thick**.

Parameter	Description
LUNCopySpeed	LUN copy speed. This parameter is optional. The default value is **2**. The value can be **1** (low), **2** (medium), **3** (high), or **4** (highest).
DedupLicense	License name of the deduplication feature. This parameter is optional and can be obtained from the license management page of a storage device. The name is in English. Separate multiple licenses with semicolons (;).
CompressionLicense	License name of the compression feature. This parameter is optional and can be obtained from the license management page of a storage device. The name is in English. Separate multiple licenses with semicolons (;).

Step 5 Set the properties file of Huawei Cinder Driver. Create and edit file **/etc/cinder/V5.conf**. The content is as follows:

```
[backend_defaults]
cinder_huawei_conf_file = /etc/cinder/cinder_huawei_conf.xml
```

Step 6 Change the user and user group of the Huawei Cinder Driver configuration file and properties file to **cinder**.

```
# chown cinder:cinder /etc/cinder/cinder_huawei_conf.xml
# chown cinder:cinder /etc/cinder/V5.conf
```

----End

2.4 (Optional) Configuring the HyperMetro Property

Set the properties file of Huawei Cinder Driver. Modify the **/etc/cinder/V5.conf** file to configure the remote device information.

```
[backend_defaults]
cinder_huawei_conf_file = /etc/cinder/cinder_huawei_conf.xml
hypermetro_device =
    storage_pool:***,
    san_address:https://*.*.*.*:8088/deviceManager/rest/,
    san_user:***,
    san_password:***,
    vstore_name:***,
    metro_domain:***
```

Table 2-5 Parameter description

Parameter	Description
storage_pool	Name of the remote storage pool.
san_address	Access address of the REST interface.
san_user	User name of a storage administrator or vStore of the remote device.
san_password	Password of a storage administrator or vStore of the remote device.

Parameter	Description
vstore_name	vStore name of the remote device. This parameter needs to be configured only when a vStore user is used.
metro_domain	HyperMetro domain name.

NOTE

The HyperMetro ALUA policy of storage devices supports only the load balancing mode.

2.5 Registering the Huawei Storage Device with PowerVC

Step 1 Run the following command to register the Huawei storage device with PowerVC.

```
# powervc-register -o add -r storage -d cinder.volume.drivers.huawei.huawei_driver.HuaweiFCDriver -n HuaweiStorage_test -p /etc/cinder/V5.conf
```

NOTE

The name of the registered Huawei storage device can be customized (**HuaweiStorage_test** in the preceding example).

Step 2 Run the following command to view the registered Huawei storage device.

```
# powervc-register -o list -r storage
Enter password for root:

Name              Display Name          Type
====              ============          ====
generic0          HuaweiStorage_test    generic
```

NOTE

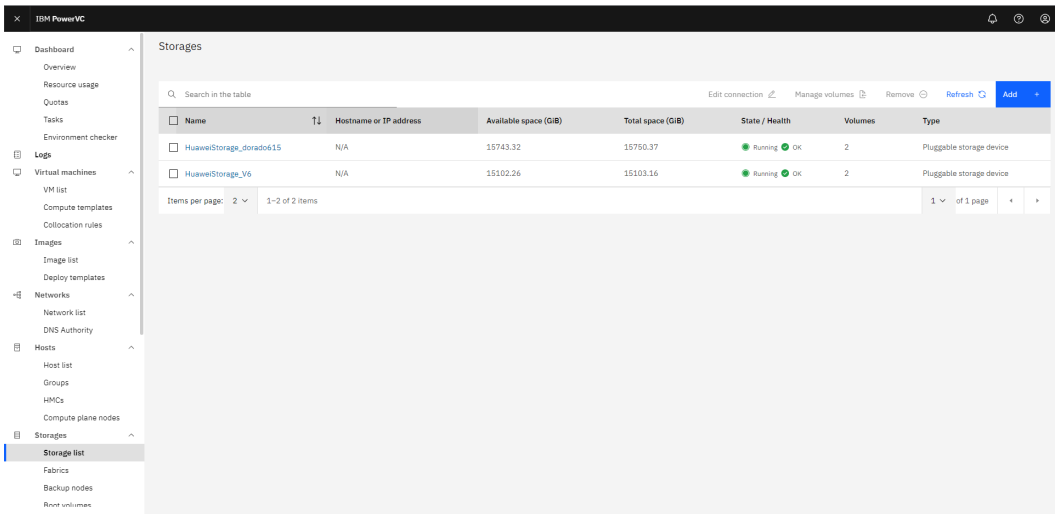
When using PowerVC 2.0.0, perform the following operations:

1. **Name** of the registered Huawei storage device is **generic0**. Therefore, comment out the **host_type = generic** configuration item in **/etc/cinder/cinder-generic0.conf**.
2. Restart Cinder Driver and wait for 30 seconds until the Cinder Driver service is successfully restarted.

   systemctl restart openstack-cinder-volume-generic0.service
3. Restore the configuration item commented out in **Step 2.1**.
4. Restart Cinder Driver.

   systemctl restart openstack-cinder-volume-generic0.service

Step 3 View the registered Huawei storage device on the management page.



Step 4 (Optional) Add the HyperMetro property for the Huawei storage device.

```
# cinder type-list
+--------------------------------------+-------------------------------------+-------------+-----------+
| ID                                   | Name                                | Description | Is_Public |
+--------------------------------------+-------------------------------------+-------------+-----------+
| 0b2f6524-e9d9-4376-a949-b41f3180be76 | HuaweiStorage_test base template    | -           | True      |
+--------------------------------------+-------------------------------------+-------------+-----------+

# cinder type-key  "HuaweiStorage_test base template" set capabilities:hypermetro='<is> true'
```

Step 5 (Optional) Configure a whitelist in **Volume Type**.

```
# cinder type-list
+--------------------------------------+-------------------------------------+-------------+-----------+
| ID                                   | Name                                | Description | Is_Public |
+--------------------------------------+-------------------------------------+-------------+-----------+
| 0b2f6524-e9d9-4376-a949-b41f3180be76 | HuaweiStorage_test base template    | -           | True      |
+--------------------------------------+-------------------------------------+-------------+-----------+

# cinder type-key  "HuaweiStorage_test base template" set
drivers:target_whitelist='target_wwn1,target_wwn2,...'
```

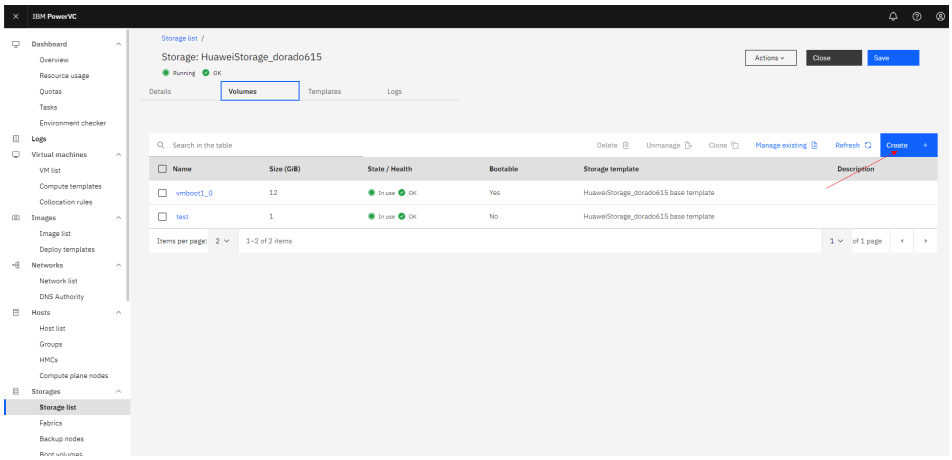
target_wwn1 and **target_wwn2** are target ports of the storage device, and are separated using commas (","). This configuration is only used in NPIV scenarios.

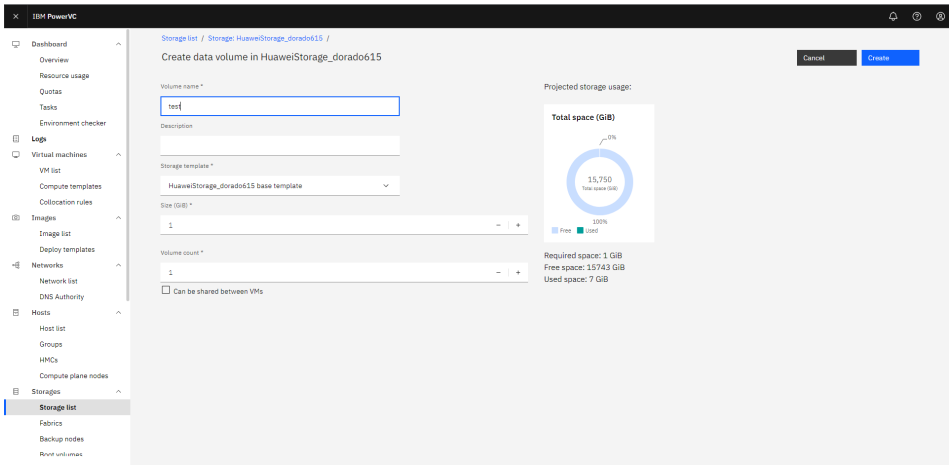
----End

2.6 (Optional) Verifying the Connection

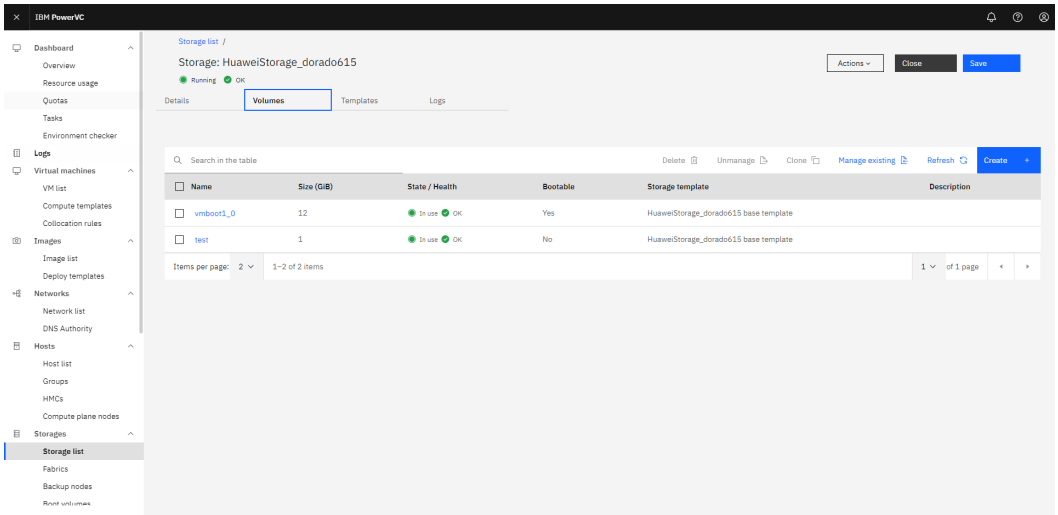
Step 1 Create a volume.

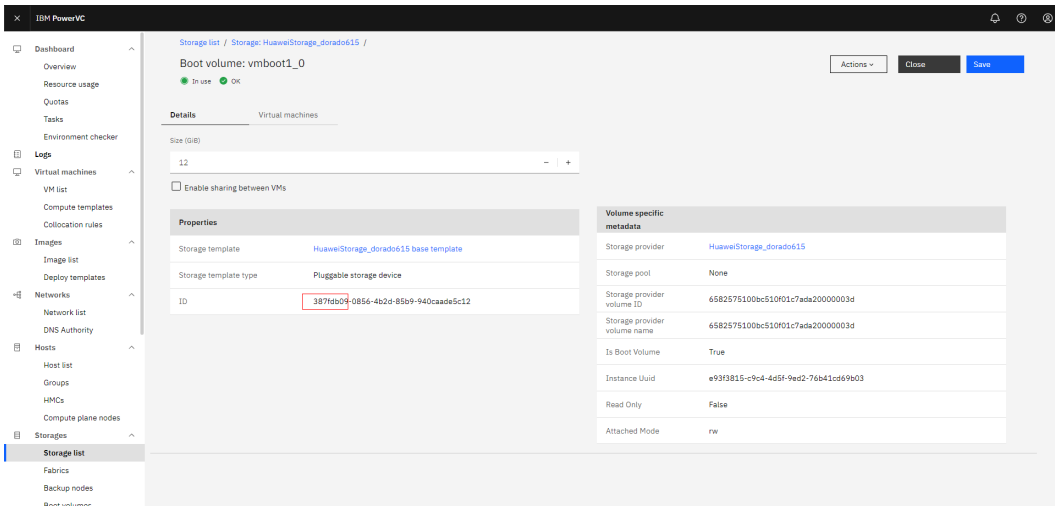
- Run the following command to create a volume.
  ```
  # cinder create --volume-type 'HuaweiStorage_test base template' --name volume1 999
  ```
- Create a volume on the PowerVC UI.



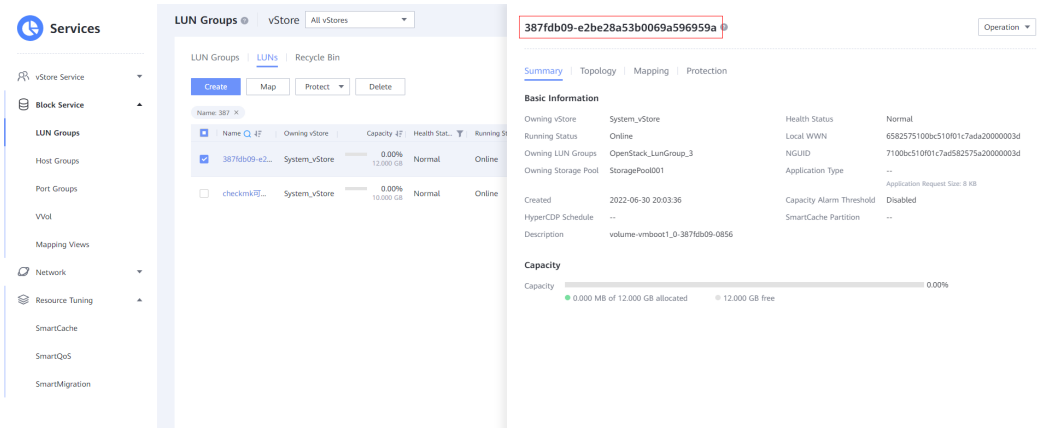


Step 2 View the volume on the PowerVC UI.





Step 3 View the created volume on the Huawei storage device.



----End

3 Configuring Advanced Features

3.1 Configuring the SmartDedupe Property

This section describes how to configure the SmartDedupe property. Only Thin volumes support this property.

Enabling SmartDedupe

Step 1 Create a volume type. *<name>* indicates the name of the volume type.

```
cinder type-create <name>
```

Step 2 Run the following command to enable SmartDedupe.

```
# cinder type-key <vtype> set capabilities:dedup='<is> true'
```

----End

CAUTION

Only OceanStor Dorado 6.1.0/6.1.2/6.1.3/6.1.5/6.1.6 storage devices support SmartDedupe.

3.2 Configuring the SmartCompression Property

This section describes how to configure the SmartCompression property. Only Thin volumes support this property.

Enabling SmartCompression

Step 1 Create a volume type. *<name>* indicates the name of the volume type.

```
cinder type-create <name>
```


Step 2 Run the following command to enable SmartCompression.

```
# cinder type-key <vtype> set capabilities:compression='<is> true'
```

----End

CAUTION

Only OceanStor Dorado 6.1.0/6.1.2/6.1.3/6.1.5/6.1.6 storage devices support SmartCompression.

3.3 Configuring Certificate Authentication

This section describes how to configure certificate authentication to connect to back-end storage.

Procedure

Step 1 Use a remote access tool, such as PuTTY, to log in to an OpenStack Cinder node through the management IP address.

Step 2 Set the configuration file of Huawei Cinder Driver. Add **SSLCertVerify** and **SSLCertPath** in the **<Storage>** section.

```
<?xml version='1.0' encoding='UTF-8'?>
<config>
  <Storage>
    ...
    <SSLCertVerify>True</SSLCertVerify>
    <SSLCertPath>***</SSLCertPath>
  </Storage>
  ...
</config>
```

NOTE

- **SSLCertVerify** indicates whether to enable certificate authentication. The value can be **True** or **False**. If the parameter is not set, the value is **False** by default. You are advised to enable certificate authentication.
- **SSLCertPath** indicates the certificate path for authentication and is valid only when **SSLCertVerify** is set to **True**.

----End

4 Constraints

- Before connecting to a Huawei storage device, do not create a host whose prefix is **O_s_** on the storage device and do not create a host group, LUN group, or mapping view whose prefix is **OpenStack_**.
- To reconnect the same Huawei storage device to the same PowerVC environment, if a host group, LUN group, or mapping view created using PowerVC exists on the storage device, delete it from the storage device.
- You need to manually configure switch zones for VIOS (required by VIOS, but not restricted by the driver). In a scenario (vSCSI, NPIV, or vSCSI-NPIV) where VMs are distributed, you do not need to manually configure switch zones.
- When PowerVC is used to distribute VMs in vSCSI mode, if storage devices of other vendors also exist, you need to delete the hdisk that is not taken over before taking over other vendors' storage or Huawei storage.
- In HyperMetro scenarios, it is recommended that VIOS have two or more HBA cards and two FC switches be connected to the storage system. In addition, the **Storage Connectivity Group** configuration needs to be modified.
- When PowerVC is used to distribute VMs in vSCSI mode, UltraPath cannot be installed on VIOS. (If PowerVC is not used to take over VIOS, UltraPath can be installed on VIOS.) You can install AIX ODM on VIOS or do not use multipathing software.
- When PowerVC is used to distribute VMs in NPIV mode, you do not need to install multipathing software on VIOS because LUNs are not mapped to VIOS.

