FusionStorage OpenStack Driver Configuration Guide

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About This Document

Intended Audience

This document is intended for:

- Technical support engineers
- O&M engineers
- Engineers with basic knowledge of storage and OpenStack

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	2023-06-30	This issue is the first official release.

Contents

1 Overview

Huawei FusionStorage Cinder Driver is a plug-in deployed on the OpenStack Cinder module. It can be used to provide functions such as the logical volume and snapshot for virtual machines (VMs) in OpenStack.

2 Version Mappings

This chapter describes the version mappings among Huawei FusionStorage Cinder Driver, FusionStorage, and OpenStack.

2.1 Storage Product Versions Supported by FusionStorage Cinder Driver

2.2 Support for FusionStorage Cinder Driver Features

2.1 Storage Product Versions Supported by FusionStorage Cinder Driver

Table 2-1 Storage product versions supported by FusionStorage Cinder Driver

OpenStack Version	Storage Product Version
Mitaka/Newton/Ocata/Pike/ Queens/Rocky/Stein/Train/Ussuri/ Victoria/Wallaby/Xena/Yoga/Zed	• FusionStorage Block 8.0.0/8.0.1 • OceanStor Pacific series 8.1.0/8.1.1/8.1.2/8.1.3/8.1.5

☐ NOTE

The Mitaka version supports only OceanStor Pacific series 8.1.0.

2.2 Support for FusionStorage Cinder Driver Features

Table 2-2 Support for FusionStorage Cinder Driver features (√: supported; x: not supported)

Feature	Mitaka	Newton/ Ocata/ Pike/ Queens/ Rocky/ Stein	Train/ Ussuri/ Victoria	Wallaby/ Xena/ Yoga/Zed	Remarks
Create Volume	√	√	√	√	-
Delete Volume	√	√	√	√	-
Attach Volume	√	√	√	√	-
Detach Volume	√	√	√	√	-
Extend Volume	√	√	√	√	-
Create Snapshot	√	√	√	√	-
Delete Snapshot	√	√	√	√	-
Create Volume from Snapshot	√	√	√	√	-
Create Volume from Image	√	√	√	√	-
Create Volume from Volume	√	√	√	√	-
Create Image from Volume	√	√	√	√	-
SmartThin	√	√	√	√	-
Manage/ Unmanage Volume	√	√	√	√	-

Feature	Mitaka	Newton/ Ocata/ Pike/ Queens/ Rocky/ Stein	Train/ Ussuri/ Victoria	Wallaby/ Xena/ Yoga/Zed	Remarks
Manage/ Unmanage Snapshot	x	√	√	√	-
Multipath	√	√	√	√	-
QoS	√	√	√	√	-
Retype	√	√	√	√	-
Migrate Volume	x	√	√	√	Only OceanStor Pacific 8.1.5 and later versions support cross-storage migration.
iSCSI	√ (limited commercial use)	√	√	√	-

Feature	Mitaka	Newton/ Ocata/ Pike/ Queens/ Rocky/ Stein	Train/ Ussuri/ Victoria	Wallaby/ Xena/ Yoga/Zed	Remarks
SCSI	√	x	√	x	x indicates that SCSI verification is not performed. To use SCSI, you need to install VBS. However, VBS has compatibility requirements on the operating system. To check whether this feature is supported, see the storage compatibility list at **https:// info.support.hu awei.com/ storage/ comp/#/ oceanstor-pacific**.
MultiAttach	x	√	√	√	-
Revert to Snapshot	x	√	√	√	-
Backup Volume	√	√	√	√	-
HyperMetro	x	x	x	x	-
Replication V2.1	x	x	x	x	-
HyperMetro Consistency Group	x	x	x	x	-
Backup Snapshot	x	x	x	x	-

Feature	Mitaka	Newton/ Ocata/ Pike/ Queens/ Rocky/ Stein	Train/ Ussuri/ Victoria	Wallaby/ Xena/ Yoga/Zed	Remarks
Snapshot Consistency Group	x	√	√	√	-
Consistency Group	x	√	√	√	-

3 Specifications and Restrictions

Table 3-1 Specifications and restrictions

Feature	Sub-feature	Description	Remarks
Mapping platform	Native OpenStack platform	OpenStack versions: Mitaka/Newton/Ocata/Pike/Queens/Rocky/Stein/Train/Ussuri/Victoria/Wallaby/Xena/Yoga/Zed	-
Configuration	Multipathing configuration	Host multipathing: You need to manually install multipathing software and enable the multipathing service.	-
		OpenStack multipathing: OpenStack multipathing is disabled by default. You need to manually modify Nova and Cinder configurations.	-
Policy	SmartQoS	The priority of **maxIOPS** is higher than that of **total_iops_sec**.	maxIOPS maxMBPS total_iops_sec total_bytes_sec qos_trigger_key
		The priority of **maxMBPS** is higher than that of **total_bytes_sec**.	
		When configuring the **qos_trigger_key** parameter, ensure that the storage system version is FusionStorage V100R008C00 or later.	
		When configuring the **qos_trigger_key** parameter, ensure that the user role is the super administrator.	

Feature	Sub-feature	Description	Remarks
		When configuring the **qos_trigger_key** parameter, ensure that the OpenStack environment time is the same as the storage system time.	

4 Installing FusionStorage Cinder Driver

4.1 Obtaining Huawei FusionStorage Cinder Driver

You can obtain Huawei FusionStorage Cinder Driver in either of the following ways:

- Method 1: OpenStack community warehouse.

  Since the Rocky version, Huawei FusionStorage Cinder Driver has been integrated into the OpenStack community warehouse. After OpenStack is installed, FusionStorage Cinder Driver is provided and stored in the *../cinder/cinder/volume/drivers/fusionstorage* directory.

- Method 2: Huawei warehouse. Perform the following steps.

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

Step 2 Click **Download ZIP** to download Huawei FusionStorage Cinder Driver package to a local PC.

Step 3 Decompress the package.

Step 4 In the decompressed directory, find the **Cinder** directory, which contains Huawei FusionStorage Cinder Driver of multiple OpenStack versions.

----End

📖 **NOTE**

- After OpenStack community versions are released, new features cannot be integrated. The bug fixing period is long and risks exist. Huawei OpenStack FusionStorage Cinder Driver warehouse versions ensure that new features are released and bugs are fixed in time. These versions are more stable than OpenStack community versions.

- The OpenStack community maintains only 2 stable versions. Huawei OpenStack FusionStorage Cinder Driver warehouse maintains 14 stable versions (M-Z), ensuring long-term stable running of historical versions.

- It is strongly recommended that OpenStack community versions be replaced by Huawei warehouse versions.

4.2 Deploying FusionStorage Cinder Driver for the Cinder Volume Service in Non-Containerized Mode

4.2.1 Deploying FusionStorage Cinder Driver for the Cinder Volume Service in Non-Containerized Mode (SCSI Networking of the Mitaka Version)

Step 1 Log in to each OpenStack controller node and run the **mkdir -p fsc_cli** command to create a directory named **fsc_cli**.

Step 2 Upload the *xx*_**Fsc_Cli_Mitaka.tar.gz** file to the **fsc_cli** directory and run the **tar zxvf** *xx*_**Fsc_Cli_Mitaka.tar.gz** command to decompress the installation package.

📖 **NOTE**

To download the Fsc_Cli package, visit **https://support.huawei.com/enterprise** for enterprise users or **https://support.huawei.com** for carrier users. Enter *xx* in the search box, where *xx* indicates the storage type, such as FusionStorage, OceanStor 100D, or OceanStor Pacific. Then click the suggested path to enter the corresponding product page. For enterprise users, click **Software Download**. For carrier users, click **Software**. Then, search for and download the software package of the desired version and its ***.asc** digital certificate file.

Step 3 Run the **sh appctl.sh install** command to install fsc_cli.

Step 4 Copy all files in the **Mitaka** directory to the **/usr/lib/python2.7/site-packages/cinder/volume/drivers** directory. If the directory does not exist, create it.

📖 **NOTE**

Replace **/usr/lib/python2.7/site-packages/cinder/volume/drivers** with the actual path.

Step 5 Change the owner of the **dsware.py** and **fspythonapi.py** files in the **/usr/lib/python2.7/site-packages/cinder/volume/drivers** directory to **root:root** and the file permission to **644**.

```
chown root:root /usr/lib/python2.7/site-packages/cinder/volume/drivers/dsware.py
chown root:root /usr/lib/python2.7/site-packages/cinder/volume/drivers/fspythonapi.py
chmod 644 /usr/lib/python2.7/site-packages/cinder/volume/drivers/dsware.py
chmod 644 /usr/lib/python2.7/site-packages/cinder/volume/drivers/fspythonapi.py
```

Step 6 Configure service parameters. For details, see **5 Configuring Basic Properties of FusionStorage Cinder Driver**.

Step 7 After the configuration is complete, run the following command to restart the Cinder Volume service.

```
systemctl restart openstack-cinder-volume.service
```

Step 8 Run the **cinder service-list** command to view the service startup details. If **State** of the Cinder Volume service is **up**, the service is started properly.

```
root@redhat:/# cinder service-list
 +-----------------+------------------------------------+------+---------+-------+--------------------------
+-----------------+
 |    Binary    |        Host              | Zone | Status | State |      Updated_at      | Disabled
Reason |
 +-----------------+------------------------------------+------+---------+-------+--------------------------
+-----------------+
 | cinder-volume  |   redhat@fusionstorage_8_scsi    | nova | enabled |  up  |
2020-09-03T08:03:34.000000 |      -       |
 +-----------------+------------------------------------+------+---------+-------+--------------------------
+-----------------+
```

----End

4.2.2 Deploying FusionStorage Cinder Driver for the Cinder Volume Service in Non-Containerized Mode (Other Networking)

Step 1 Use a remote access tool (for example, PuTTY) to log in to an OpenStack Cinder Volume node through the management IP address, and search for the original Huawei FusionStorage Cinder Driver code in the system. For details about how to search for the code, see the following note. The default installation path is **/usr/lib/python2.7/site-packages/cinder/volume/drivers/fusionstorage**.

📖 **NOTE**

The absolute path may vary in different systems. You can search for the code directory of Huawei FusionStorage Cinder Driver as follows:

- Method 1:

  Run the following command. In the command output, **/usr/lib/python2.7/site-packages/cinder/volume/drivers/fusionstorage** is the code directory.
  ```
  # python -c "from cinder.volume.drivers import fusionstorage; print (fusionstorage.__path__)"
  ['/usr/lib/python2.7/site-packages/cinder/volume/drivers/fusionstorage']
  ```

- Method 2:

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

  ```
  # python3 -c "from cinder.volume.drivers import fusionstorage; print (fusionstorage.__path__)"
  ['/usr/lib/python3.7/site-packages/cinder/volume/drivers/fusionstorage']
  ```
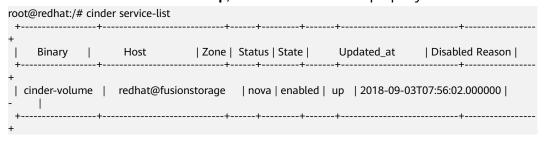
Step 2 Copy all Huawei FusionStorage Cinder Driver code files of the corresponding version to the directory returned in **Step 1**. The minimum permission required for the FusionStorage Cinder Driver code files is **644**. (**644** is a Linux system permission. **-rw-r--r--** indicates the minimum permission required.)

```
# ls -l
-rw-r--r--  1 root root  1138 May 15 08:23 constants.py
-rw-r--r--  1 root root 22174 May 15 08:23 dsware.py
-rw-r--r--  1 root root 18880 May 15 08:23 fs_client.py
-rw-r--r--  1 root root  4799 May 15 08:23 fs_conf.py
-rw-r--r--  1 root root 14419 May 15 08:23 fs_flow.py
-rw-r--r--  1 root root  2248 May 15 08:23 fs_qos.py
-rw-r--r--  1 root root  2988 May 15 08:23 fs_utils.py
-rw-r--r--  1 root root     0 May 15 08:23 __init__.py
```

Step 3 Configure service parameters. For details, see **5 Configuring Basic Properties of FusionStorage Cinder Driver**.

Step 4 After the configuration is complete, run the following command to restart the Cinder Volume service.

systemctl restart openstack-cinder-volume.service

Step 5 Run the **cinder service-list** command to view the service startup details. If **State** of the Cinder Volume service is **up**, the service is started properly.

```
root@redhat:/# cinder service-list
+------------------+---------------------------+------+---------+-------+---------------------------+-----------------+
|      Binary      |           Host            | Zone | Status  | State |        Updated_at          | Disabled Reason |
+------------------+---------------------------+------+---------+-------+---------------------------+-----------------+
|  cinder-volume   |    redhat@fusionstorage   | nova | enabled |  up   | 2018-09-03T07:56:02.000000 |        -        |
+------------------+---------------------------+------+---------+-------+---------------------------+-----------------+
```

----End

4.3 Deploying FusionStorage Cinder Driver for the Cinder Volume Service in Containerized Mode

Step 1 (Optional) Run the **docker save** command to back up the Cinder Volume container image to an image file.

> 📖 **NOTE**
>
>   To obtain the image version, run the **docker image ls** command.

Step 2 Create temporary directory **build** in any directory and go to the created directory.

mkdir ***/build;cd ***/build

Step 3 Copy the obtained Huawei FusionStorage Cinder Driver code files of the corresponding version to the **build** directory.

```
# ls -l
-rw-rw-r-- 1 root root  1138 May 15 08:23 constants.py
-rw-rw-r-- 1 root root 22174 May 15 08:23 dsware.py
-rw-rw-r-- 1 root root 18880 May 15 08:23 fs_client.py
-rw-rw-r-- 1 root root  4799 May 15 08:23 fs_conf.py
-rw-rw-r-- 1 root root 14419 May 15 08:23 fs_flow.py
-rw-r--r--. 1 root root  2248 May 15 08:23 fs_qos.py
-rw-rw-r-- 1 root root  2988 May 15 08:23 fs_utils.py
-rw-rw-r-- 1 root root     0 May 15 08:23 __init__.py
```

Step 4 Create the **Dockerfile** file in the current directory and edit the following content.

```
FROM ***:***
COPY *.py /fusionstorage/cinder/driver/path/
```

    📖 **NOTE**

- Replace ****:**** with the name and version of the original Cinder Volume container image.
- Replace **/fusionstorage/cinder/driver/path** with the path of FusionStorage Cinder Driver in the container. You can use the following command to search for the path (Python 2.7 is used as an example).

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

  The preceding command output shows the directory of all drivers. The path of FusionStorage Cinder Driver is as follows:

  /usr/lib/python2.7/site-packages/cinder/volume/drivers/fusionstorage

  If the directory does not exist, manually create the directory and modify the permission.

  mkdir -p /usr/lib/python2.7/site-packages/cinder/volume/drivers/fusionstorage
  chown root:root /usr/lib/python2.7/site-packages/cinder/volume/drivers/fusionstorage
  chmod 755 /usr/lib/python2.7/site-packages/cinder/volume/drivers/fusionstorage

Step 5 Run the following command to build an image.

docker build -t ***:*** .

    📖 **NOTE**

Replace ****:**** with the name and version of the original Cinder Volume container image.

Step 6 Configure service parameters. For details, see **5 Configuring Basic Properties of FusionStorage Cinder Driver**.

Step 7 Run the **docker restart cinder_volume** command to restart the Cinder Volume container.

----End

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5 Configuring Basic Properties of FusionStorage
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5 Configuring Basic Properties of FusionStorage Cinder Driver

This chapter describes how to configure FusionStorage Cinder Driver.

5.1 Configuring the conf File of FusionStorage Cinder Driver (SCSI Networking of the Mitaka Version)

Step 1 Configure the **/etc/cinder/cinder.conf** file.

1. Modify the **enabled_backends**, **dsware_manager**, and **fusionstorageagent** fields under **[DEFAULT]**. The following is an example:
   ```
   [DEFAULT]
   enabled_backends=fusionstorage_8_scsi
   dsware_manager = 192.168.211.99
   fusionstorageagent = 192.168.211.82,192.168.211.85,192.168.211.86
   ```

2. Add the following fields to the end of the file.
   ```
   [fusionstorage_8_scsi]
   volume_backend_name = fusionstoragescsi
   volume_driver = cinder.volume.drivers.dsware.DSWARELocalDriver
   pool_id_list = 0,1
   over_ratio = 3.0
   manager_ips=
       node1.hw.com:192.168.160.177,
       node2.hw.com:192.168.160.178
   ```

   Table 5-1 describes the parameters in the configuration file.

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Table 5-1 Parameter description

Parameter	Description
enabled_backends	Name of the storage node that needs to take effect in the system. For example, **fusionstorage_8_scsi**. If multiple storage nodes need to take effect, separate their names with commas (,).
dsware_manager	Floating IP address of FusionStorage.
fusionstorageagent	Management IP address of the OpenStack compute node (VBS) used for the communication between OpenStack and FusionStorage. If there are multiple IP addresses, separate them using commas (,).
volume_backend_name	Name of the back-end storage for the volume. For example, **fusionstoragescsi**.
volume_driver	Path of the storage system driver. The value is fixed to **cinder.volume.drivers.dsware.DSWARELocalDriver**.
pool_id_list	Storage pool list. This parameter specifies the storage pool where the volume is created. If there are multiple storage pools, you can use this parameter to create volumes in the storage pool with the specified ID.
over_ratio	Thin provisioning ratio. In thin provisioning mode, you can set the storage overcommitment rate. This parameter is optional. You can set this parameter to **1** or higher. If you do not set this parameter, default value **1** is used. **3.0** or higher is recommended.
manager_ips	Host name of OpenStack and the management IP address used for creating VBS. Multiple IP addresses are separated by commas (,) and line breaks. The information about the last VBS is not followed by a comma. In this example, **node1.hw.com** is the host name of OpenStack, and **192.168.160.177** is the management IP address displayed on VBS after VBS is created for the OpenStack node.

Step 2 Run the **fsc_cli --op getDSwareIdentifier --manage_ip** $x.x.x.x$ **--ip** $y.y.y.y$ command to test the connectivity of fsc_cli.

📖 **NOTE**

> $x.x.x.x$ indicates the floating IP address of FusionStorage, and $y.y.y.y$ indicates the IP address of the VBS node.

If no error message similar to the following is reported, the test is successful.

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```
result=51011000
[2022-03-30 15:05:03] [ERROR] [fsc_cli._send:101] ERROR - description="System socket send error"
```

----End

5.2 Configuring the conf File of FusionStorage Cinder Driver (Other Networking)

Step 1 Configure the **/etc/cinder/cinder.conf** file. Add a FusionStorage backend and configure parameters according to **Table 5-2**.

◻ NOTE

The owner and user group of **/etc/cinder/cinder.conf** are **cinder:cinder**.

```
-rw-r--r--  1 cinder cinder 2839 Aug 29 15:29 cinder.conf
```

```
[fusionstorage]
volume_driver = cinder.volume.drivers.fusionstorage.dsware.DSWAREDriver
volume_backend_name = fusionstorage
manager_ips =
    node1.hw.com:192.168.160.177,
    node2.hw.com:192.168.160.178
dsware_rest_url = https://x.x.x.x:28443
san_ip = x.x.x.x
san_port = 28443
san_login = xxx
san_password = xxx
dsware_storage_pools = xxx1;xxx2;xxx3
storage_pools = xxx1;xxx2;xxx3
target_ips = x.x.x.x,y.y.y.y
iscsi_manager_groups = x.x.x.x1;x.x.x.x2,x.x.x.x3;x.x.x.x4
use_ipv6 = False
force_delete_volume = False
full_clone = False
rest_timeout = 50
```

◻ NOTE

If iSCSI-based mounting is used, set **volume_driver** to
cinder.volume.drivers.fusionstorage.dsware.DSWAREISCSIDriver.

```
[fusionstorage]
...
volume_driver = cinder.volume.drivers.fusionstorage.dsware.DSWAREISCSIDriver
...
```

Step 2 Modify the following content in the **[DEFAULT]** section and add the FusionStorage backend

```
[DEFAULT]
 ...
enabled_backends=fusionstorage
```

Step 3 If Cinder Volume is deployed on multiple nodes, you need to configure a distributed lock in the **[coordination]** section. For details about **<user>**, **<password>**, **<host>**, and **<database>**, see the value of **connection** under **[database]** in the configuration file.

```
[coordination]
backend_url = mysql://<user>:<password>@<host>/<database>?charset=utf8
```

For example, if the configuration of **[database]** is as follows:

```
[database]
connection = mysql+pymysql://cinder:302824058e9a4f31@127.0.0.1/cinder
```

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You can configure **[coordination]** as follows:

```
[coordination]
backend_url = mysql://cinder:302824058e9a4f31@127.0.0.1/cinder
```

----End

Table 5-2 Parameter description

Default Driver Configuration File Parameter	Description	Mandatory
volume_backend_name	Back end name of the default driver.	Yes.
volume_driver	Default driver.	Yes.
dsware_rest_url	URL and port number used by a Cinder node to access FusionStorage. **NOTE** If the management IP address of FusionStorage is an IPv6 address, configure **https://**[ipv6_ip]**:28443**, where [ipv6_ip] indicates the management IPv6 address of FusionStorage.	Yes. Specify either this parameter or **san_ip** and **san_port**. If **san_ip**, **san_port**, and **dsware_rest_url** are configured at the same time ,**dsware_rest _url** has a higher priority.
san_ip	IP address used by a Cinder node to access FusionStorage. **NOTE** If the management IP address of FusionStorage is an IPv6 address, configure [ipv6_ip], where [ipv6_ip] indicates the management IPv6 address of FusionStorage.	Yes. **san_ip** and **san_port** must be configured at the same time. Specify either the parameters or **dsware_rest_url**. If **san_ip**, **san_port**, and **dsware_rest_url** are configured at the same time ,**dsware_rest _url** has a higher priority.

Default Driver Configuration File Parameter	Description	Mandatory
san_port	Port number used by a Cinder node to access FusionStorage.	Yes. **san_ip** and **san_port** must be configured at the same time. Specify either the parameters or **dsware_rest_url**. If **san_ip**, **san_port**, and **dsware_rest_url** are configured at the same time ,**dsware_rest_url** has a higher priority.
san_login	User name used by a Cinder node to access FusionStorage.	Yes.
san_password	Password used by a Cinder node to access FusionStorage.	Yes.
dsware_storage_pools	Name of an existing storage pool on a FusionStorage storage array.	Yes. Specify either this parameter or **storage_pools**. If **dsware_storage_pools** and **storage_pools** are configured at the same time ,**dsware_storage_pools** has a higher priority.

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Default Driver Configuration File Parameter	Description	Mandatory
storage_pools	Name of an existing storage pool on a FusionStorage storage array.	Yes. Specify either this parameter or **dsware_storage_pools**. If **dsware_storage_pools** and **storage_pools** are configured at the same time ,**dsware_storage_pools** has a higher priority.
manager_ips	Host name of OpenStack and the management IP address used for creating VBS. Multiple IP addresses are separated by commas (,) and line breaks. The information about the last VBS is not followed by a comma. In this example, **node1.hw.com** is the host name of OpenStack, and **192.168.160.177** is the management IP address displayed on VBS after VBS is created for the OpenStack node.	Mandatory for SCSI networking.
scan_device_timeout	Timeout interval of disk scanning for SCSI networking. The value is an integer expressed is seconds. The default value is 3.	Optional for SCSI networking.
target_ips	Management IP addresses of nodes for iSCSI networking. Separate them with commas (,).	Conditionally mandatory for iSCSI networking. Specify either this parameter or **iscsi_manager_groups**.

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Default Driver Configuration File Parameter	Description	Mandatory
iscsi_manager_groups	IP address group consisting of management IP addresses for iSCSI networking. Use semicolons (;) to separate the values in an IP address group and use commas (,) to separate IP address groups. **NOTE** Only 8.0.1.5 SPH503 and 8.1.0 and later versions support this parameter.	Conditionally mandatory for iSCSI networking. Specify either this parameter or **target_ips**. (Recommended. However, but there are version requirements. For details, see the note.)
iscsi_link_count	Number of iSCSI links for iSCSI networking. The default value is 4. When the number of iSCSI service network links on a storage array is less than 4, all the links are returned. Establish at least the following number of links: number of configured storage pools + 2. That is, if one storage pool is configured, at least 3 links are returned. **NOTE** Only 8.1.2 and later versions are supported. iSCSI links can be queried only when the iSCSI IP addresses of the entire cluster are all IPv4 or IPv6 addresses. Moreover, ensure that all iSCSI service network IP addresses can communicate with OpenStack node IP addresses.	Conditionally mandatory for iSCSI networking. This parameter takes effect when **target_ips** and **iscsi_manager_groups** are not configured. There are version requirements. For details, see the note.
use_ipv6	Whether to use IPv6 addresses as service IP addresses. The default value is **False**. **NOTE** Only 8.0.1.5 SPH502 and 8.1.0 and later versions support this parameter.	Optional for iSCSI networking.
force_delete_volume	Whether to forcibly delete a volume that has been mapped on the storage when the volume is being deleted. The value can be: ● **True**: yes ● **False**: no The default value is **False**.	No.

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Default Driver Configuration File Parameter	Description	Mandatory
full_clone	Whether to use the full clone capability. The value can be: ● **True**: yes (supported only by OceanStor Pacific 8.1.2 and later versions) ● **False**: no The default value is **False**.	No.
rest_timeout	Timeout interval for invoking a storage RESTful interface, expressed in seconds. The value can only be a number. If this parameter is not specified, the default value (**50**) is used. **NOTE** The timeout interval is the time for waiting for a response when a storage interface is invoked. The recommended value ranges from 50 to 70. If the timeout interval is too long or too short, the corresponding function may be abnormal.	No

5.3 Configuring Host Multipathing (iSCSI Networking)

Multipathing is configured to improve the link reliability of LUNs on SAN storage. If multipathing is incorrectly configured, I/O errors will occur when a single link is faulty. As a result, the file systems on a VM are read-only or faulty, affecting VM service delivery.

When configuring multipathing, install the multipathd service on the host and configure proper parameters. Then, configure multipathing parameters on OpenStack.

5.3.1 Installing the Multipathing Tool Package

This section describes how to install the multipathing tool package.

Step 1 Install the multipathing tool package based on the OS.

● CentOS:
```
yum install -y device-mapper-multipath
```

● Ubuntu:
```
apt-get install -y multipath-tools
apt-get install -y multipath-tools-boot
```

Step 2 Enable the host multipathing service.

● CentOS:
```
/sbin/mpathconf --enable
systemctl start multipathd.service
```

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```
systemctl enable multipathd.service
systemctl restart multipathd.service
```

- Ubuntu:
```
systemctl restart multipath-tools.service
```

----End

5.3.2 Configuring the Multipathing Service

Step 1 Add the following content to the **devices** field in the **/etc/multipath.conf** file. The configuration varies depending on the OS. For details, see "**Configuring Multipathing for an Application Server (Red Hat or CentOS)**" in *FusionStorage 8.0.1 Block Storage Basic Service Configuration Guide*.

```
devices {
    device {
            vendor              "Huawei"
            product             "VBS fileIO"
            path_grouping_policy      multibus
            path_checker            tur
            prio                const
            path_selector          "service-time 0"
            failback              immediate
            no_path_retry          "10"
    }
}
```

Step 2 After the configuration is complete, restart the multipathd service.
```
systemctl restart multipathd.service
```

----End

5.4 Configuring OpenStack Multipathing (iSCSI Networking)

5.4.1 Configuring Multipathing for OpenStack Nova Nodes

Step 1 Configure the **/etc/nova/nova.conf** file.

Add **volume_use_multipath = True** to **[libvirt]** in the **/etc/nova/nova.conf** file of the Nova Compute node.

> **NOTE**
>
> - If the OpenStack version is Mitaka or earlier, add **iscsi_use_multipath = True** to **[libvirt]** in the **/etc/nova/nova.conf** file of the Nova Compute node.
> - If the OpenStack version is Newton or earlier, add **volume_use_multipath = True** to **[libvirt]** in the **/etc/nova/nova.conf** file of the Nova Compute node.

Step 2 Restart the Nova-compute service.
```
systemctl restart openstack-nova-compute.service
```

----End

5.4.2 Configuring Multipathing for OpenStack Cinder Nodes

Step 1 Add the following content to the end of **BACKEND** in the **/etc/cinder/cinder.conf** file.

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```
[fusionstorage]
…
use_multipath_for_image_xfer = true
enforce_multipath_for_image_xfer = true
```

Step 2 Restart the Cinder-volume service.

```
systemctl restart openstack-cinder-volume.service
```

----End

5.5 Configuring the SmartQoS Property

The QoS feature of OpenStack depends on the front-end hypervisor and back-end storage.

For details about front-end QoS configuration, see **https://docs.openstack.org/cinder/latest/admin/blockstorage-basic-volume-qos.html**.

This section describes how to configure QoS on Huawei back-end storage.

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

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

Step 2 Enable the SmartQoS property. *<vtype>* indicates the name of the volume type created in **Step 1**.

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

Step 3 Create a QoS specification. *<name>* indicates the name of the QoS specification.

```
# cinder qos-create <name> <qos_key>=*** <qos_trigger_key>=***
```

Table 5-3 qos_key parameters

Parameter	Description	Remarks	Mandatory
maxIOPS	Maximum IOPS.	The value is an integer greater than 0. The default value is 999999999.	No. A parameter must be specified. ● The priority of **maxIOPS** is higher than that of **total_iops_sec**. ● The priority of **maxMBPS** is higher than that of **total_bytes_sec**.
maxMBPS	Maximum bandwidth.	The value is an integer greater than 0, expressed in MB/s. The default value is 999999.	
total_iops_sec	Maximum IOPS.	The value is an integer greater than 0. The default value is 999999999.	

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Parameter	Description	Remarks	Mandatory
total_bytes_sec	Maximum bandwidth.	The value is an integer greater than 0, expressed in byte/s. The default value is: 999999 x 1024 x 1024.	

☐ NOTE

- When configuring the **qos_trigger_key** parameter, ensure that the storage system version is FusionStorage V100R008C00 or later.

- When configuring the **qos_trigger_key** parameter, ensure that the user role is the super administrator.

- When configuring the **qos_trigger_key** parameter, ensure that the OpenStack environment time is the same as the storage system time.

Table 5-4 qos_trigger_key parameters

Parameter	Description	Remarks	Mandatory
scheduleType	QoS policy type.	The value can be: - **0**: always executed - **1**: one-off - **2**: daily - **3**: weekly If this parameter is not specified, the default value 0 is used.	No
startDate	Date when the QoS policy takes effect.	The value cannot be earlier than the current date. The date format is *xx-xx-xx*, for example, **2019-06-01**.	Conditionally mandatory. This parameter is mandatory when **scheduleType** is not set to **0**.
startTime	Time when the QoS policy takes effect.	The 24-hour system is used. The time format is *xx:xx*, for example, **08:00**.	Conditionally mandatory. This parameter is mandatory when **scheduleType** is not set to **0**.

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Parameter	Description	Remarks	Mandatory
durationTime	Duration of the QoS policy every day.	The value ranges from 30 minutes to 24 hours. The format is *xx:xx*, for example, **24:00** or **0:30**.	Conditionally mandatory. This parameter is mandatory when **scheduleType** is not set to **0**.
dayOfWeek	Days in a week when the QoS policy takes effect.	When **scheduleType** is set to **3**, you need to specify the days in a week when the QoS policy takes effect. The value can be: ● Mon ● Tue ● Wed ● Thur ● Fri ● Sat ● Sun The values above represent Monday to Sunday, respectively. Multiple options can be configured and are separated by spaces. For example, **Mon Tue Thur Sun** indicates that the QoS policy takes effect on Monday, Tuesday, Thursday, and Sunday.	Conditionally mandatory. This parameter is mandatory when **scheduleType** is set to **3**.

Step 4   Associate the QoS specification with the volume type. *<qos_specs>* indicates the ID of the QoS specifications created in **Step 3**, and *<volume_type_id>* indicates the ID of the volume type created in **Step 1**.

```
# cinder qos-associate <qos_specs> <volume_type_id>
```

Step 5   Use the volume type created in **Step 1** to create a volume.

----End

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5.6 Configuring the Two-Way Certificate

This section describes how to use the plug-in to configure the two-way certificate. After the configuration is complete, two-way authentication can be performed between the plug-in and storage.

> **NOTICE**
>
> Operations in this section support only non-SCSI networking. For details about the networking configuration, see **5.2 Configuring the conf File of FusionStorage Cinder Driver (Other Networking)**.

Prerequisites

You have obtained the two-way certificate file, and the client key in the file cannot be encrypted again.

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 Save the obtained certificate to a directory on the host. The requirements for the directory and file permission are as follows:

- Directory: can be accessed by Cinder, for example, **/etc/cinder/**.

- File permission: 644 or higher.

Step 3 Add the following information to the **/etc/cinder/cinder.conf** file added in **5.2 Configuring the conf File of FusionStorage Cinder Driver (Other Networking)**. **Table 5-5** describes the parameters.

```
storage_ssl_two_way_auth = True
storage_ca_filepath=*****
storage_cert_filepath=*****
storage_key_filepath=******
```

Table 5-5 Two-way authentication parameters

Parameter	Optional/ Mandatory/ Conditionally Mandatory	Description
storage_ssl_two_ way_auth	Optional	Whether two-way authentication is supported. The value can be: - **True**: Two-way authentication is used. - **False**: Two-way authentication is not used. The default value is **False**.

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Parameter	Optional/ Mandatory/ Conditionally Mandatory	Description
storage_ca_filepath	Conditionally mandatory	Absolute path of the CA certificate on the server (storage). • When the value of **storage_ssl_two_way_auth** is **True**: Enter the path of the CA certificate on the server (storage). • When the value of **storage_ssl_two_way_auth** is **False**: This parameter is optional. For example: **storage_ca_filepath=/etc/cinder/ storage_ca.crt**
storage_cert_filepath	Conditionally mandatory	Absolute path of the certificate on the client (server). • When the value of **storage_ssl_two_way_auth** is **True**: Enter the path of the certificate on the client (server). • When the value of **storage_ssl_two_way_auth** is **False**: This parameter is optional. For example: **storage_cert_filepath=/etc/cinder/ client.crt**
storage_key_filepath	Conditionally mandatory	Absolute path of the private key of the certificate on the client (server). • When the value of **storage_ssl_two_way_auth** is **True**: Enter the path of the private key of the certificate on the client (server). • When the value of **storage_ssl_two_way_auth** is **False**: This parameter is optional. For example: **storage_key_filepath=/etc/cinder/ client.key**

Step 4 Run the following command to restart the Cinder Volume service.

```
systemctl restart openstack-cinder-volume.service
```

Step 5 Run the **cinder service-list** command. If the value of **State** is **up**, the Cinder Volume service is successfully started.

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Binary	Host	Zone	Status	State	Updated_at	Cluster	Disabled Reason	Backend State
cinder-volume	openstack-wallaby-1@v6	nova	enabled	up	2021-12-03T07:56:23.000000	-	-	up

----End

6 FAQ

6.1 Failed to Create a Volume from an Image After verify_glance_signatures = enabled Is Configured

Symptom

OpenStack creates a volume from an image. After the image is copied for a period of time, the error message **Failed to copy metadata to volume: Glance metadata cannot be updated, key signature_verified exists for volume id b75f957c-0ba4-4099-8706-866c68012779** is displayed. As a result, the volume fails to be created.

Environment Configuration

- OS: CentOS 7.6
- Server model: 5288 V5
- OpenStack version: Rocky

Root Cause Analysis

Community bug link: **https://bugs.launchpad.net/cinder/+bug/1823445**

In Rocky and later versions, the **verify_glance_signatures** field is added to **cinder.image.glance.py**. The default value is **enabled**. When **CONF.verify_glance_signatures != 'disabled'** is configured and

signature_verification exists in the image, the DB API does not allow **signature_verification** to be written repeatedly. As a result, an exception is thrown.

Solution or Workaround

In the **[DEFAULT]** section of the **cinder.conf** file, set **verify_glance_signatures** to **disabled**. The following is an example:

```
[DEFAULT]
...
verify_glance_signatures = disabled
...
```

6.2 Failed to Create a VM on the Specified Host If iscsi_manager_groups Is Used When iSCSI Networking Is Used to Connect to Distributed Storage

Symptom

After **iscsi_manager_groups** is configured, OpenStack mounts volumes to a VM. At the beginning, the mounting is successful. However, volumes cannot be mounted to VMs from a certain time point, the Cinder Driver does not report any error logs, and iSCSI-based links fail to be established.

target ip returned to the Nova host from the Cinder Volume log is obtained. On the Nova host, the **ping** *target ip* command is executed to check the IP address connectivity. In addition, whether the **iscsiadm** command can be used to establish a link is checked. *target ip* failed to be pinged from the host.

Environment Configuration

- OS: CentOS 7.6
- Server model: 5288 V5
- OpenStack version: Pike or later

Root Cause Analysis

The data plane network between the Nova host and storage array is faulty.

Solution or Workaround

Rectify the data plane network fault and deliver a new VM.

6.3 When SCSI Networking Is Used to Connect to Distributed Storage, the Number of Concurrent I/Os to a Disk on a VM is Limited to Less than 64

Symptom

When SCSI networking is used to connect to distributed storage, the management plane is normal. However, on the service plane, the number of concurrent I/Os to a disk on a VM is limited to less than 64, and the VM cannot be pressed.

Environment Configuration

OpenStack networking: SCSI

Root Cause Analysis

After the disk is mapped to a host machine, **libvirt** needs to be used for virtualization and a configuration file needs to be generated. When SCSI networking is used, Nova does not have the **driver_io = "native"** configuration item. As a result, the disk I/O mode is **threads** (default), affecting the concurrent size.

Solution or Workaround

Step 1 On each Nova node, add **conf.driver_io = "native"** to the **get_config** method of **LibvirtVolumeDriver** in **nova.virt.libvirt.volume.volume.py**.

```
class LibvirtVolumeDriver(LibvirtBaseVolumeDriver):
    """Class for volumes backed by local file."""
    def __init__(self, host):
        super(LibvirtVolumeDriver,        self).__init__(host, is_block_dev=True)
    def get_config(self, connection_info, disk_info):
        """Returns xml for libvirt."""
        conf = super(LibvirtVolumeDriver,             self).get_config(connection_info, disk_info)
        conf.source_type = "block"
        conf.source_path = connection_info['data']['device_path']
        conf.driver_io = "native"
        return conf
```

Step 2 Restart the Nova-compute service.

```
systemctl restart openstack-nova-compute.service
```

----End

6.4 When the iSCSI Network Is Used to Connect to Distributed Storage, the Storage Pool Link Balancing Feature Cannot Be Used

Symptom

After the storage is upgraded, the storage pool link balancing feature does not take effect. The original method is still used to obtain iSCSI link information.

Root Cause Analysis

To reduce the load on storage, the storage pool link balancing feature does not use the periodic update policy. After the storage is upgraded, you need to manually restart the cinder-volume service for the upgrade to take effect. You can run the following command to restart the service:

```
systemctl restart openstack-nova-compute.service
```

7 Appendix

NOTICE

This appendix describes how to configure some capabilities of native OpenStack. The open-source Stein version is used as an example. For details about the configuration methods and information, see the corresponding cloud platform documentation.

7.1 Configuring a Volume-backend Image

This function is provided by the native OpenStack platform. It is used to store images in the storage backend of Cinder to accelerate the speed of creating volumes from images. Official link: **https://docs.openstack.org/cinder/stein/admin/blockstorage-volume-backed-image.html**.

For details about the configuration, see OpenStack official documentation of the desired version.

7.2 Configuring the Image-Volume Cache

This function is provided by the native OpenStack platform. Image volume cache can significantly improve the performance of creating EVS disks from images. Official link: **https://docs.openstack.org/cinder/stein/admin/blockstorage-image-volume-cache.html**.

For details about the configuration, see OpenStack official documentation of the desired version.