# Hitachi Block Storage Driver for Red Hat OpenStack Platform

## Driver Migration Guide

This guide provides information about migration from Hitachi Block Storage Driver version 9.0 to Red Hat OpenStack Platform 16.2 in-tree driver.

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# Preface

## About this document

This document provides technical information and procedures for migration from Red Hat OpenStack Platform("RHOSP") 16.1 with Hitachi Block Storage Driver("HBSD") to RHOSP 16.2 in-tree driver.

## Document conventions

This document uses the following typographic convention:

| Convention | Description |
|---|---|
| **Bold** | • Indicates text in a window, including window titles, menus, menu options, buttons, fields, and labels. Example: **Click OK**.<br>• Indicates emphasized words in list items. |
| *Italic* | Indicates a document title or emphasized words in text. |
| `Monospace` | Indicates text that is displayed on screen or entered by the user.<br>Example: `pairdisplay -g oradb` |

## Intended audience

This document is intended for operators and administrators who configure and operate cloud systems using Red Hat OpenStack Platform.
This document assumes basic knowledge of Linux operating systems.

# Scope of this document

As customers upgrade/update from RHOSP16.1 to RHOSP16.2, they will have to move from using Hitachi out of tree driver to RHOSP in-tree driver to continue to use VSP storage services under support. This document shows settings and operations for making the transition between those Cinder drivers when migrating from RHOSP16.1 to RHOSP16.2. In summary, the steps involve backing up configuration files, update to 16.2 (or later) and restore config files from backup.
For information on updating RHOSP, refer the document Keeping Red Hat OpenStack Platform Updated, which is provided by Red Hat.

# Summary of migration steps

Migration needs following steps:

1. Preparation for migration
   Know differences between out of tree driver and in-tree driver

2. Backing up configuration files
   Back up configuration files, because configuration files will be initialized while updating RHOSP

3. Updating RHOSP
   Update RHOSP referring to RedHat documents

4. Installing Driver, if needed
   Install patched in-tree driver, if needed

5. Fixing configuration files
   Fix configuration files referring to the backed up files

6. Migrating Data

# Preparation for migration

## Overview of differences in Cinder driver types

### Type of Cinder driver

Two types of Cinder drivers exist for RHOSP , out of tree driver and in-tree driver. Previously, Hitachi provided an out of tree driver but now, only in-tree driver can get Red Hat driver certification. For Hitachi block storages, only in-tree driver will be provided for RHOSP 16.2 or later. Hitachi has received Red Hat driver certification for RHOSP16.2 in-tree driver.
A patched in-tree driver is a driver that can be provided with new features before RedHat releases an OpenStack release with those features. Used only in exceptional circumstances.

| Items | RHOSP16.1 | RHOSP 16.2 or later |
|---|---|---|
| **Provided driver type** | Out of tree driver (HBSD) | In-tree driver (HBSD) |
| **Developed** | Hitachi | Hitachi, submitted to community |
| **Provided by** | Hitachi | Red Hat |
| **How to get the driver** | Download from the vender site | Including in RHOSP package |
| **Customer support** | Hitachi | Red Hat |

## Supported features

Supported features are different among the out of tree driver, the in-tree driver and the patched in-tree driver. See the following table:

| | Feature | RHOSP16.1<br>Out of tree<br>(v9.0) | RHOSP16.2<br>in-tree | RHOSP17.1.3<br>in-tree [2] |
|---|---|---|---|---|
| 1 | Required features:<br>• Create, delete, attach, and detach volumes.<br>• Create, list, and delete volume snapshots.<br>• Create a volume from a snapshot.<br>• Create, list, update, and delete consistency groups.<br>• Create, list, and delete consistency group snapshots<br>• Copy a volume to an image<br>• Copy an image to a volume<br>• Clone a volume<br>• Extend a volume<br>• Migrate a volume(host assisted)<br>• Get volume statistics.<br>• Efficient non-disruptive volume backup<br>• Manage and unmanage a volume<br>• Attach a volume to multiple instances at once (multi-attach)<br>• Revert a volume to a snapshot | Y | Y | Y |
| 2 | Multipath | Y | Y | Y |
| 3 | Live migration | Y | Y | Y |
| 4 | Consistency groups | Y | N/A | Y |
| 5 | Global-active device | Y | N/A | Y |
| 6 | Remote replication | Y [1] | N/A | N/A |
| 7 | QoS | Y | N/A | N/A |
| 8 | Multi pools | Y | N/A | Y |
| 9 | Deduplication and compression | Y | N/A | Y |

| | | | | |
|---|---|---|---|---|
| 10 | Storage assisted migration | N/A | N/A | Y |
| 11 | Port assignment using extra spec | Y | N/A | Y |
| 12 | Port scheduler | Y | N/A | Y |
| 13 | REST API server on the management server | Y | Y | Y |
| 14 | REST API server on the storage | N/A | Y | Y |
| 15 | REST API server on Hitachi Storage Advisor Embedded | Y | N/A | N/A |
| 16 | Copy method for old storage model | Y | N/A | N/A |
| 17 | hbsdgetinfo command | Y | N/A | N/A |
| 18 | High Availability(Active-Standby) | Y | Y | Y |
| 19 | High Availability(Active-Active) | N/A | N/A | N/A |

Legend:

- Y: Supported
- N/A: Not Available

Note:

1. Supported as "tech-preview" because RedHat supports this feature as tech-preview.
2. It is just a reference. Migration to RHOSP17.1 is out of the scope of this document.

## Driver name

Driver name is different between out of tree driver and in-tree driver. Fix cinder.conf along the following table, when migration.

| Driver type | Driver name [1] | |
|---|---|---|
| | RHOSP16.1 Out of tree(v9.0) | RHOSP16.2 in-tree |
| Fibre Channel | `cinder.volume.drivers.hitachi.`**`hbsd.hbsd_fc`**`.HBSDFCDriver` | `cinder.volume.drivers.hitachi.`**`hbsd_fc`**`.HBSDFCDriver` |
| iSCSI | `cinder.volume.drivers.hitachi.`**`hbsd.hbsd_iscsi`**`.HBSDISCSIDriver` | `cinder.volume.drivers.hitachi.`**`hbsd_iscsi`**`.HBSDISCSIDriver` |

Note:

1. Driver name is set as a value of the parameter "`volume_driver`" in cinder.conf)

## Parameters and default values

Support parameter, parameter names and default value of parameters are different between the out of tree driver and in-tree driver. Use this table in the section "Fixing configuration files".

| Parameter name | | Default value | |
|---|---|---|---|
| RHOSP16.1 Out of tree(v9.0) | RHOSP16.2 in-tree | Out of tree | In-tree |
| hitachi_storage_id | | None | None |
| hitachi_storage_cli | - | REST | N/A (Work as REST) |
| hitachi_ldev_range | | None | None |
| hitachi_pool | | None | None |
| hitachi_target_port | | [] | [] |
| hitachi_compute_target_port | | [] | [] |
| hitachi_thin_pool | hitathi_snap_pool | None | None |
| hitachi_rest_number | hitachi_replication_number | 0 | N/A |
| hitachi_rest_user | san_login | None | None |
| hitachi_rest_password | san_password | None | None |
| hitachi_rest_password_path | - | None | N/A |
| hitachi_rest_tcp_keepalive | | True | True |
| hitachi_rest_name_only_discovery | - | False | N/A |
| hitachi_rest_pair_target_ports | | [] | [] |
| hitachi_group_request | hitachi_group_create | False | False |
| hitachi_use_chap_auth | - | False | N/A |
| hitachi_auth_user | chap_username | None | None |
| hitachi_auth_password | chap_password | None | None |
| hitachi_auth_password_path | - | None | N/A |
| hitachi_copy_version | - | 2.0 | N/A (Work as 2.0) |
| hitachi_default_copy_method | - | FULL | N/A (Work as FULL for copy, THIN for snapshot ) |
| hitachi_copy_speed | | 3 | N/A |
| hitachi_copy_check_interval | | 3 | N/A |
| hitachi_async_copy_check_interval | | 10 | N/A |
| hitachi_rest_disable_io_wait | | False | N/A |
| hitachi_rest_api_ip | san_ip | "" | "" |
| hitachi_rest_api_port | san_api_port | 23451 | 443 |
| hitachi_over_subscription | - | False | N/A |

| | | | |
|---|---|---|---|
| | | | (Work as `True`) |
| `hitachi_server_auto_create` | - | `True` | N/A |
| `hitachi_server_auto_delete` | - | `False` | N/A |
| `hitachi_pair_target_number` | | `0` | 0 |
| `hitachi_discard_zero_page` | | `True` | `True` |
| `hitachi_host_mode_options` | | `None` | `[]` |
| `hitachi_gad_auth_password` | - | `None` | N/A |
| `hitachi_gad_auth_password_path` | - | `None` | N/A |
| `hitachi_gad_auth_user` | - | `None` | N/A |
| `hitachi_gad_compute_target_ports` | - | [] | N/A |
| `hitachi_gad_ldev_range` | - | `None` | N/A |
| `hitachi_gad_path_group_id` | - | `0` | N/A |
| `hitachi_gad_pool` | - | `None` | N/A |
| `hitachi_gad_rest_api_ip` | - | "" | N/A |
| `hitachi_gad_rest_api_port` | - | `23451` | N/A |
| `hitachi_gad_rest_pair_target_ports` | - | [] | N/A |
| `hitachi_gad_rest_password` | - | `None` | N/A |
| `hitachi_gad_rest_password_path` | - | `None` | N/A |
| `hitachi_gad_rest_user` | - | `None` | N/A |
| `hitachi_gad_thin_pool` | - | `None` | N/A |
| `hitachi_gad_ssl_cert_path` | - | `None` | N/A |
| `hitachi_gad_ssl_cert_verify` | - | `False` | N/A |
| `hitachi_gad_status_check_long_interval` | - | `5` | N/A |
| `hitachi_gad_status_check_short_interval` | - | `600` | N/A |
| `hitachi_gad_status_check_timeout` | - | `86400` | N/A |
| `hitachi_gad_storage_id` | - | `None` | `None` |
| `hitachi_gad_target_ports` | - | [] | N/A |
| `hitachi_gad_use_chap_auth` | - | `False` | N/A |
| `hitachi_gad_quorum_disk_id` | - | `None` | N/A |

| | | | |
|---|---|---|---|
| hitachi_gad_copy_speed | - | 3 | N/A |
| hitachi_replication_journal_creation_speed | - | L | N/A |
| hitachi_replication_journal_overflow_tolerance | - | 60 | N/A |
| hitachi_replication_journal_path_failure_tolerance | - | 5 | N/A |
| hitachi_replication_journal_size | - | None | N/A |
| hitachi_replication_journal_transfer_speed | - | 256 | N/A |
| hitachi_replication_journal_use_cache | - | True | N/A |
| hitachi_replication_mun | - | 1 | N/A |
| hitachi_replication_path_group_id | - | 0 | N/A |
| hitachi_replication_status_check_long_interval | - | 5 | N/A |
| hitachi_replication_status_check_short_interval | - | 600 | N/A |
| hitachi_replication_status_check_timeout | - | 86400 | N/A |
| hitachi_gad_set_gad_reserve_attribute | - | True | N/A |
| hitachi_shared_targets | - | True | N/A |
| hitachi_debug_level | - | info | N/A |
| | | | |

Legend:

- - : the feature is not supported
- N/A : the parameter is not supported and the value is not used

# Known issue in migrating

## Hitachi Storage Advisor Embedded API is not support

If the parameter `hitachi_storage_cli=SIMPLE_REST` is set in your cinder.conf, your system uses Hitachi Storage Advisor Embedded as REST API server. This is not common.

In-tree driver does not support Hitachi Storage Advisor Embedded as REST API server. Use Configuration Manager REST API server or Platform REST API server.

Note:

- Keep using IP address which set to the parameter "hitachi_rest_api_ip" in cinder.conf. REST API server on the storage will be used, instead of Hitachi Storage Advisor Embedded.

To migrate volumes, detach volumes and remove servers on your storage as following steps before updating your system to RHOSP16.2, if your system uses Hitachi Storage Advisor Embedded.

1. Add the parameter `hitachi_server_delete=True` to the section for the target backend in cinder.conf
2. Restart the cinder driver service by the following command:

```
# pcs resource restart openstack-cinder-volume
```

3. Run the following command for all volumes in all servers to detach volumes and remove servers.

```
# nova volume-detach <ID of instance> <ID of volume>
```

4. Verify all servers are removed.

   Confirm the IP address and WWN of the Compute Node and Controller Node, respectively.

```
# ip address
# systool -v -c fc_host
```

   Verify any servers with the following names in the server list are not existed:

   - `HBSD-<WWN>`
   - `HBSD-<IP address>`

   The following command is a sample for getting server list on raidcom:

```
# raidcom get server
```

   The following command is a sample for removing the server on raidcom:

```
# raidcom delete server -server_id <ID of server> -request_id auto
```

# Operation for migration

## Backing up configuration files

Configuration files for Cinder, Nova and other OpenStack components will be initialized when updating RHOSP. Before updating, back up `/var/lib/config-data/puppet-generated/cinder/etc/cinder/cinder.conf` and the following files which you customized after over-cloud deploy:

- On Controller Node
  - `/var/lib/config-data/puppet-generated/cinder/*`
  - `/var/lib/config-data/puppet-generated/nova/*`
  - `/var/lib/config-data/puppet-generated/glance_api/*`
- On Compute Node
  - `/var/lib/config-data/puppet-generated/nova_libvirt/*`

## Updating RHOSP

Update your RHOSP environment along Keeping Red Hat OpenStack Platform Updated, which is provided by Red Hat.

## Installing Driver

### Installing in-tree driver

When updating your system to RHOSP 16.2, RHOSP 16.2 in-tree driver will be also installed.

### Installing patched in-tree driver

If required, install manually patched in-tree driver, which is not a container, after updating to RHOSP16.2. See the following procedure:

1. On the controller node, create a new directory.
2. Transfer the HBSD media file to the newly created directory.
3. Extract the HBSD media.

```
# tar zxvf RHOSP16_2_HBSD_patch.tar.gz
__init__.py
hbsd_common.py
hbsd_fc.py
hbsd_iscsi.py
```

```
hbsd_replication.py
hbsd_rest.py
hbsd_rest_api.py
hbsd_rest_fc.py
hbsd_rest_iscsi.py
hbsd_utils.py
```

4. Created the following directory and copy the extracted files to the directory.

```
/var/lib/config-data/puppet-generated/cinder/usr/lib/python3.6/site-
packages/cinder/volume/drivers/hitachi
```

5. Check the attributes of the files.

```
owner: root
group: root
permission: -rw-r--r--
```

6. Restart the Cinder Volume Container.

7. Check if the status of the Cinder Volume Container is "started".

```
# pcs resource status
```

8. Check if the State of the Cinder Volume backend is "up" and the Backend State of the Cinder Volume backend is "up".

```
# cinder service-list
```

# Fixing configuration files

Restore each configuration files with the parameters and values which you customized for your environment refer to the backed up files in the section "Backing up configuration files".

> Note:
> - Do not replace configuration files with whole backed up files, because some new parameters are added and some values would be changed while updating RHOSP.

Fix `/var/lib/config-data/puppet-generated/cinder/etc/cinder/cinder.conf` as follows.
Details of differences are in the description of the section "Overview of differences in Cinder driver".

- Required fields to replace in cinder.conf :
  - Driver name

        - For Fibre Channel, from "`cinder.volume.drivers.hitachi.hbsd.hbsd_fc.HBSDFCDriver`" to "`cinder.volume.drivers.hitachi.hbsd_fc.HBSDFCDriver`"
        - For iSCSI, from "`cinder.volume.drivers.hitachi.hbsd.hbsd_iscsi.HBSDISCSIDriver`" to "`cinder.volume.drivers.hitachi.hbsd_iscsi.HBSDISCSIDriver`"
    - Parameter names
        - from "`hitachi_rest_user`" to "`san_login`"
        - from "`hitachi_rest_password`" to "`san_password`"
        - from "`hitachi_rest_api_ip`" to "`san_ip`"

Note:

- Add the parameter "`san_api_port=23451`" to sections for each backends, if you use Configuration Manager REST API server.
- Recommend to add `debug=True`. The parameter will help

## Migrating Data

No operation is needed for data migration. Volumes and other data are migrated automatically when updating RHOSP.

# Operation differences after migration

- LDEV number assigned to cinder volume
  In out of tree driver, LDEV number which is assigned to cinder volume is saved as volume metadata. On in-tree driver, the way to get LDEV number is changed. Run the following command on the Controller node.

```
# podman exec galera-bundle-podman-0 mysql -c cinder -e "select provider_location from volumes where id=\"<VOLUME_ID>\";"
```

  Note:

  - Although volume metadata in migrated volume still has LDEV number, the LDEV number is not guaranteed.

- In-tree driver records all messages to `/var/log/containers/cinder/cinder-volume.log`. `/var/log/containers/cinder/hbsd_debug.log` is not used.

# Restrictions

Not applicable

# Known Issues

1. GAD volume, which may have been created by out of tree driver before updating RHOSP, will fail removing, extending, migrating or failover. To solve the problem, update with later version of in-tree or patched in-tree driver. Schedule for providing updated driver is TBD. Contact PM for more information.

2. If Remote Replication volume, which may have been created by out of tree driver before updating RHOSP, does exist, replication volume can not be created on updated RHOSP environment. To avoid this case, remove all Remote Replication volumes before updating. To solve the problem, update with later version of in-tree or patched in-tree driver. Schedule for providing updated driver is TBD. Contact PM for more information.

3. When the Cinder volume backend is down, Cinder scheduler is also down unexpectedly. When backend is down, restart the cinder scheduler service.

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