IBM Storage Driver for OpenStack
Version 1.3.1

Installation Guide

IBM

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About this guide

This guide describes how to install the IBM® Storage Driver for OpenStack.

Who should use this guide

This guide is intended for system administrators who are familiar with the OpenStack cloud environment and the supported IBM storage systems that are in use.

Conventions used in this guide

These notices are used in this guide to highlight key information.

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- IBM DS8000® Information Center (publib.boulder.ibm.com/infocenter/dsichelp/ds8000ic)
- IBM XIV® Storage System Information Center (publib.boulder.ibm.com/infocenter/ibmxiv/r2)
- OpenStack Block Storage (Cinder) reference page (wiki.openstack.org/Cinder)
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Procedure

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Chapter 1. Introduction

The IBM Storage Driver for OpenStack is a software component that integrates with the OpenStack cloud environment and enables utilization of storage resources provided by supported IBM storage systems.

After the driver is installed on the OpenStack Cinder (OpenStack Block Storage) nodes, storage volumes can be allocated by the Cinder nodes to the Nova-compute nodes. Virtual machines on the Nova-compute nodes can then utilize these storage resources.

Concept diagram

The following figure illustrates how an IBM storage system (DS8000 or XIV) is connected to the OpenStack cloud environment and provides storage resources when the IBM Storage Driver for OpenStack is installed on the OpenStack Cinder nodes.

The OpenStack cloud is connected to the IBM storage system over Fibre Channel or iSCSI (iSCSI is supported only with XIV systems).

Remote cloud users can issue requests for storage resources from the OpenStack cloud. These requests are transparently handled by the IBM Storage Driver, which communicates with the IBM storage system and controls the storage volumes on it. The IBM storage resources are then provided to the Nova-compute nodes in the OpenStack cloud.
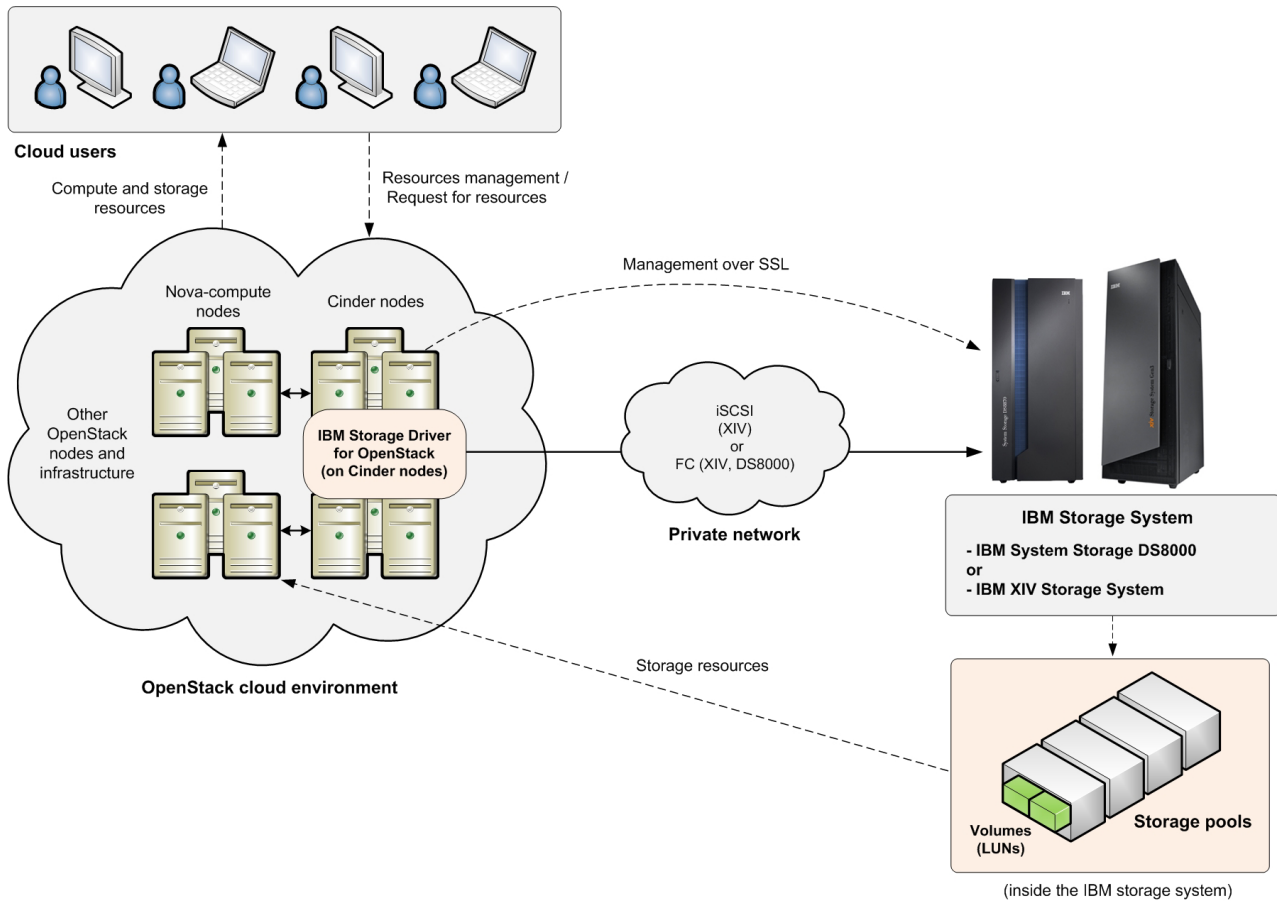
Figure 1. IBM storage systems integrated with an OpenStack cloud

> **Attention:** Using both XIV and DS8000 systems together with the IBM Storage Driver for OpenStack is not supported.

Compatibility and requirements

For the complete and up-to-date information about the compatibility and requirements of the IBM Storage Driver for OpenStack, refer to the latest release notes.

You can find the latest release notes on the IBM Storage Host Software Solutions Information Center (publib.boulder.ibm.com/infocenter/strhosts/ic) or on the IBM Fix Central (www.ibm.com/support/fixcentral).

> **Note:** Refer to the relevant OpenStack documentation for information about how to deploy the compatible release of the OpenStack platform on your cloud nodes.

Chapter 2. Installation

The IBM Storage Driver for OpenStack should be installed on each OpenStack Cinder node.

During the installation, you can connect the Cinder node to one or more IBM storage systems and storage pools, using different connectivity types and user credentials. Each individual connection between the Cinder node and a storage system is referred to as a volume backend.

For XIV systems that use iSCSI connectivity, an option for increased security with CHAP authentication is available.

Connecting and attaching OpenStack nodes to the IBM storage system

Before installing the IBM Storage Driver, the OpenStack nodes must be physically connected and logically attached to the IBM storage system.

To ensure proper connection and attachment, refer to the following information sources depending on the IBM storage system that is used:

- If you are using a DS8000 storage system, refer to the DS8000 Host Systems Attachment Guide, and to the 'Attaching Hosts' section on the DS8000 Information Center.
- If you are using an XIV storage system and a Red Hat Enterprise Linux (RHEL) node, refer to the IBM XIV Host Attachment Kit documentation.
- If you are using Fibre Channel (FC) connectivity and an XIV storage system, ensure that proper zoning is configured between the relevant OpenStack nodes and the XIV storage system. For more information about FC zoning, refer to the 'Overview of Fibre Channel zoning' section in the IBM XIV Host Attachment Kit documentation.

Running the installation wizard on the Cinder node

Run the installation wizard on each individual Cinder node as explained in the following procedure.

Before you begin

Prior to installing the IBM Storage Driver, a predefined storage pool must be ready for your use on the IBM storage system. For information about how to define a storage pool, refer to the IBM storage system documentation, or contact your storage administrator.

Important: You must have root user privileges on the Cinder node in order to run the installation.

About this task

You can run the installation script in two ways:

- Regular mode – in this mode you are prompted to provide connection parameters and other information in separate interactive steps.

- Unattended mode – in this mode you can avoid prompts in separate steps. For more information, see "Installing in unattended (silent) mode" on page 6.

Procedure

To run the installation in regular mode:

1. Extract the driver installation package on the Cinder node ([build] represents a build number; [os] represents the Linux operating system type):

```
# tar xzvf IBM_Storage_Driver_for_OpenStack_1.3.1-[build]_[os].tar.gz
```

2. From the extracted folder, run the following script:

```
install.sh
```

The following prompt is displayed:

```
Welcome to the IBM Storage Driver for OpenStack (v1.3.1) installation.
Press [ENTER] to proceed.
```

3. Press Enter. The following message is displayed:

```
Enter the storage array type.
x/xiv for XIV or d/ds8k for DS8000 [Default: x]:
```

4. Specify whether you are using an XIV or a DS8000 storage system. Enter x for XIV or d for DS8000. The following message is displayed:

```
Enter the IBM storage system IP address or hostname:
```

5. Enter the IP address or hostname of the storage system. For example:
   106.9.220.221

6. Enter the credentials for accessing the specified storage system:

```
Enter the username and password for accessing the IBM storage system:
Username: john-1x2
Password: *************
```

Important: You must use storage admin credentials.

7. If you previously chose XIV, specify the connectivity type that the node uses to connect to the XIV storage system: enter f for Fibre Channel or i for iSCSI.

```
Please choose the connectivity type:
f/fc/fibre for Fibre Channel or i/iscsi for iSCSI: [Default: [i]: i
```

Note: For DS8000 systems, only Fibre Channel (FC) is supported.

8. If you previously chose DS8000, enter the identifier name of the relevant DS8000 storage unit:

```
Enter the IBM DS8000 storage unit identifier: unit1
```

9. If you previously chose DS8000, enter the directory path of the Java™ executable:

```
Enter the full path of the Java executable: [Default: /usr/bin/java]: /usr/bin/java
```

10. Enter the name of the storage pool that was predefined for your OpenStack environment:

```
Enter the storage pool name: Nova_Pool_1
```

11. Choose whether you want to connect to another storage system or storage pool (another volume backend):

```
Would you like to add another IBM storage system? [Default: No]: n
```

    If you enter y (yes), repeat steps 3–9 for the additional storage system (of the same type) or storage pool (you can press CTRL+C to abort the addition after you entered y). Otherwise, enter n (no).

12. If you have chosen iSCSI connectivity for XIV, specify whether you want to use CHAP authentication over the iSCSI connection. If you enter y (yes), CHAP names and secrets are generated automatically for each host that uses the storage system, and are not shown.

```
Would you like to use CHAP authentication (relevant only for iSCSI connections)?
[Default: No]: y
```

Attention: If hosts were manually predefined on the XIV storage system prior to the IBM Storage Driver the installation, iSCSI connectivity for these hosts will be affected depending on your choice on the CHAP authentication step:

- If you choose y to enable CHAP authentication, iSCSI connectivity will not work with any host that was manually predefined on the XIV side.
- If you choose n to disable CHAP authentication, iSCSI connectivity will not work with hosts for which CHAP parameters were specified on the XIV side. iSCSI connectivity will work only with hosts for which CHAP parameters were not specified on the XIV side.

To avoid this problem, check for and remove any previous host definition that was made on XIV storage system the prior to the IBM Storage Driver installation.

    After the interactive steps, the following prompt is displayed (varies depending on the storage system to which you connect) :

```
Verifying installation...
Installation verified successfully.
Installing IBM Storage Driver for OpenStack Python eggs...
Patching open source driver...
Stopping OpenStack volume service...
Configuring OpenStack with IBM XIV Storage System information...
Starting OpenStack volume service...
Installation of the IBM Storage Driver for OpenStack (v1.3.1-b193) is complete.
Press [ENTER] to exit.
```

13. Press Enter. The IBM Storage Driver for OpenStack is now installed.

Note: If you encounter any error during the installation, see Chapter 3, "Troubleshooting," on page 11.

What to do next

After the driver installation, you can run the **create_volume_types.sh** script to automatically define volume types that you can later choose when creating new volumes.

```
# create_volume_types.sh
Welcome to the IBM Storage Volume Type Creator.
Press [ENTER] to proceed.

Creating xiv backend for: IBM-XIV_host.domain.com_cinder1_iscsi
Creating xiv backend for: IBM-XIV_host.domain.com_cinder2_iscsi
Done
Press [ENTER] to exit.
```

As shown in the example above, the type format convention comprises the IBM storage system type (XIV or DS8000), storage system hostname, storage pool name, and connectivity type.

Installing in unattended (silent) mode

Installation of the IBM Storage Driver in unattended mode (referred to as 'silent' in the CLI) allows you to avoid prompts in separate steps during the installation. In addition, you can use a configuration file that contains the required connection parameters.

Before you begin

As in the regular installation, you must first extract the driver installation package on the Cinder node:

```
# tar xzvf IBM_Storage_Driver_for_OpenStack_1.3.1-[build]_[os].tar.gz
```

About this task

Unattended installation can be performed in two methods:

* By typing the unattended installation command along with required parameters on the command line. This method allows connection to a single IBM storage system (volume backend). If at a later stage you will want to connect to additional volume backends, you will need to uninstall the IBM Storage Driver and then use the regular (interactive) installation, or use the unattended installation with a configuration file.
* By using a configuration file that contains the required connection parameters, saving the need to type-in the parameters on the command line. This method allows connection to multiple IBM storage systems (volume backends).

Procedure

* To install in unattended mode by entering the connection parameters on the command line, type the installation command in the following format:

```
install.sh -s -a [storage array IP or hostname] -u [username] -p [password]
  -o [storage pool name] -t [XIV connection type (iscsi or fibre_channel)]
   -c [CHAP authentication for iSCSI (enabled or disabled)]
  -d [storage array type (ds8k for DS8000 if used)] -l [DS8000 storage unit]
   -j [DS8000 Java path]
```

Note:

- The **-t** parameter (connectivity type) is required only if XIV is used.
- The **-c** parameter (CHAP authentication) is required only if iSCSI connectivity is used.
- The **-d**, **-l**, and **-j** parameters are required only if DS8000 is used.

The following example shows how an XIV storage system (array) is added:

```
# install.sh -s -a 100.150.200.250 -u john-1x2 -p ************* -o Nova_Pool_1 -t iscsi
Verifying installation...
Installation verified successfully.
Installing IBM Storage Driver for OpenStack Python eggs...
Patching open source driver...
Stopping OpenStack volume service...
Configuring OpenStack with IBM storage system information...
Starting OpenStack volume service...
Installation of the IBM Storage Driver for OpenStack (v1.3.1) is complete.
```

The following example shows how a DS8000 storage system (array) is added:

```
# install.sh -s -a 100.150.100.200 -u john-1x2 -p ************* -o Nova_Pool_1
-d ds8k -l unit1 -j /usr/bin/java
Verifying installation...
Installation verified successfully.
Installing IBM Storage Driver for OpenStack Python eggs...
Patching open source driver...
Stopping OpenStack volume service...
Configuring OpenStack with IBM storage system information...
Starting OpenStack volume service...
Installation of the IBM Storage Driver for OpenStack (v1.3.1) is complete.
```

- To install in unattended mode by using a configuration file, type the installation command in the following format, where [file name] represents the directory location and name of the file:

  ```
  install.sh -s -i [file name]
  ```

  For example:

  ```
  # install.sh -s -i path/filename.conf
  ```

Note: The configuration file must be a text file that contains the required parameters for each backend, as shown in the following examples.

  - For an XIV backend, the file must contain the following information:

    ```
    [backend1 name]
    xiv_ds8k_address = xiv1.domain.com or IP address
    xiv_ds8k_user = storage_admin_user
    xiv_ds8k_password = password
    xiv_ds8k_vol_pool = poolname
    xiv_ds8k_connection_type = iscsi
    xiv_chap = disabled
    ```

    The file can contain additional sections with connection parameters for additional storage systems (additional volume backends). The details of each additional system should be specified in a separate section using a different name.

    For example, [backend2] is the section name for the additional XIV system:

```
                      [backend2 name]
                      xiv_ds8k_address = xiv2.domain.com or IP address
                      xiv_ds8k_user = storage_admin_user
                      xiv_ds8k_password = password
                      xiv_ds8k_vol_pool = poolname
                      xiv_ds8k_connection_type = fibre_channel
```

– For a DS8000 backend, the file must contain the following information:

```
                      [backend1 name]
                      xiv_ds8k_address = ds80001.domain.com or IP address
                      xiv_ds8k_user = storage_admin_user
                      xiv_ds8k_password = password
                      xiv_ds8k_vol_pool = poolname
                      xiv_ds8k_storage_array_type = ds8k
                      ds8k_storage_unit = unit1
                      ds8k_java_path = /usr/bin/java
```

Additional similar sections can be used in the file for connecting additional DS8000 systems.

Attention: If you are using a configuration file, retain the file in a secure folder and do not distribute the file over non-secure media. Use any required precaution to avoid unauthorized remote access to your IBM storage systems.

Uninstalling the IBM Storage Driver

You can uninstall the IBM Storage Driver from each individual Cinder node at any time, as described in the following procedure.

Before you begin

Ensure that the IBM storage resources are not currently in use.

Important: You must have root user privileges on the Cinder node in order uninstall the IBM Storage Driver.

Attention: Removal of the IBM Storage Driver disables the ability to control IBM storage volumes that may currently be in use by the OpenStack cloud environment. However, attached volumes remain fully functional even without the IBM Storage Driver. To restore control over such volumes after the uninstallation, reinstall the IBM Storage Driver and specify the same storage array details.

About this task

You can uninstall in two ways:
* Regular mode – in this mode you are prompted to confirm the uninstallation.
* Unattended mode – in this mode you are not required to confirm the uninstallation.

Procedure

To uninstall in **regular mode**:
1. Run the following script:

   ```
   uninstall.sh
   ```

The following prompt is displayed:

```
IBM Storage Driver for OpenStack (v1.3.0) - Uninstallation

Are you sure you want to uninstall the IBM Storage Driver for OpenStack (v1.3.0)?
[Default: No]
```

2. Enter y to confirm the removal of the IBM Storage Driver. If there are storage volumes that are still in use by the OpenStack cloud, a confirmation message specifies the amount and location of these volumes:

```
30 volumes on storage pool 'pool name' have remained attached to the host 'hostname'
for OpenStack use.
Are you sure you want to continue? [Default: No]:
```

3. Enter y to confirm that you want to continue. The following prompt is displayed:

```
Stopping OpenStack volume service...
Press [ENTER] to proceed.
```

4. Press Enter. The following prompt is displayed:

```
Removing IBM Storage information from OpenStack...
Removing IBM Storage Driver for OpenStack Python eggs...
Starting OpenStack volume service...
The IBM Storage Driver for OpenStack (v1.3.0)has been removed successfully.
Press [ENTER] to exit.
```

5. Press Enter. The IBM Storage Driver is now uninstalled.

Note: If you encounter any error during the uninstallation, see Chapter 3, "Troubleshooting," on page 11.

Alternatively, to uninstall the IBM Storage Driver in **unattended mode** (without confirmation prompts), type the **uninstall** command with the **-s** argument:

uninstall.sh -s

For example:

```
#./uninstall.sh -s
30 volumes on storage pool 'pool name' have remained attached to the host 'hostname'
for OpenStack use.
Stopping OpenStack Volume service...
Removing IBM Storage information from OpenStack...
Removing IBM Storage Driver for OpenStack Python eggs...
Starting OpenStack Volume service...
The IBM Storage Driver for OpenStack (v1.3.0) has been removed successfully.
```

Chapter 3. Troubleshooting

Refer to this information to troubleshoot technical problems that you might encounter when using the IBM Storage Driver for OpenStack.

- "Resolving patch installation problems"
- "Checking the OpenStack node log files" on page 12
- "Displaying on-screen help" on page 12

Note: For up-to-date information about known issues and possible workarounds, refer to the latest release notes.

Resolving patch installation problems

If you encounter error messages or failures during the 'Patching open source driver' installation stage, refer to the following procedure.

Before you begin

Make sure that your Linux system includes the **patch** command. If not, install the command support on your Linux host.

About this task

In the following procedure you first back up the required source code file and then manually perform the required patching.

Procedure

1. Depending on the Linux version that you are using, go to the IBM open source directory.
   - On Red Hat Enterprise Linux (RHEL), go to:

     `/usr/lib/python2.6/site-packages/cinder/volume/drivers/`
   - On Ubuntu Server, go to:

     `/usr/lib/python2.7/dist-packages/cinder/volume/drivers/`

2. Create a backup copy of the `xiv_ds8k.py` source file by entering the following command:

   ```
   cp xiv_ds8k.py xiv_ds8k.py.orig
   ```

3. Enter the following **patch** command by specifying the IBM Storage Driver installation directory (referred to as `/INSTALLATION-DIRECTORY` in this example) on the command line:

   ```
   patch xiv_ds8k.py -i /INSTALLATION-DIRECTORY/runtime/xiv_ds8k_havana_chap.patch
   ```

Note: If the manual patching procedure does not resolve the encountered problem, contact IBM Support.

Checking the OpenStack node log files

The Nova-compute and Cinder log files record operation information that might be useful for troubleshooting.

Before you begin

To achieve optimal and clear logging of events, activate the verbose logging level in the `cinder.conf` file, located in the `/etc/cinder` folder. Add the following line in the file, save the file, and then restart the cinder-volume service:

`verbose = True`

To turn off the verbose logging level, change `True` to `False`, save the file, and then restart the cinder-volume service.

About this task

You can check the log files on a periodic basis to ensure that the IBM Storage Driver is functioning properly. If you encounter issues with the driver functionality, you can send the contents of the files to IBM Support if needed.

Procedure

* To check the log file on a Cinder node:
  - Go to the `/var/log/cinder` folder and then open the log file named **cinder-volume.log** or **volume.log**. The IBM Storage Driver writes to this log file using the `[IBM DS8K STORAGE]` or `[IBM XIV STORAGE]` prefix (depending on the relevant storage system) for each event that it records in the file.
* To check the log file on a Nova-compute node:
  - Go to the `/var/log/nova` folder and then open the log file named **nova-compute.log** or **compute.log**.

Displaying on-screen help

When needed, you can display on-screen help information that summarizes usage format, syntax, and other options that are available for the installation and uninstallation commands.

About this task

You can type the **--help** or **-h** argument after each of following commands:
* **install.sh** (regular installation; see "Running the installation wizard on the Cinder node" on page 3)
* **install.sh -s** (unattended installation; see "Running the installation wizard on the Cinder node" on page 3)
* **uninstall.sh** (uninstallation; see "Uninstalling the IBM Storage Driver" on page 8)

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