OpenSDS Aruba POC Test Plan

June 2018

Revision: 0.5

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Document Revision History

Version	Date	Comments
0.1	6/12/2018	Initial revision.
0.2	6/15/2018	Added content to sections host-based replication, array-based replication, CLI guide, Cinder compatible APIs.
0.3	6/20/2018	Modified dates after reviewing it at OSS Summit Tokyo
0.4	6/26/2018	Add Dashboard section; Modify CLI section.
0.5	6/29/2018	Update Dashboard section and Installation section.

Related Documents

Author	Documents

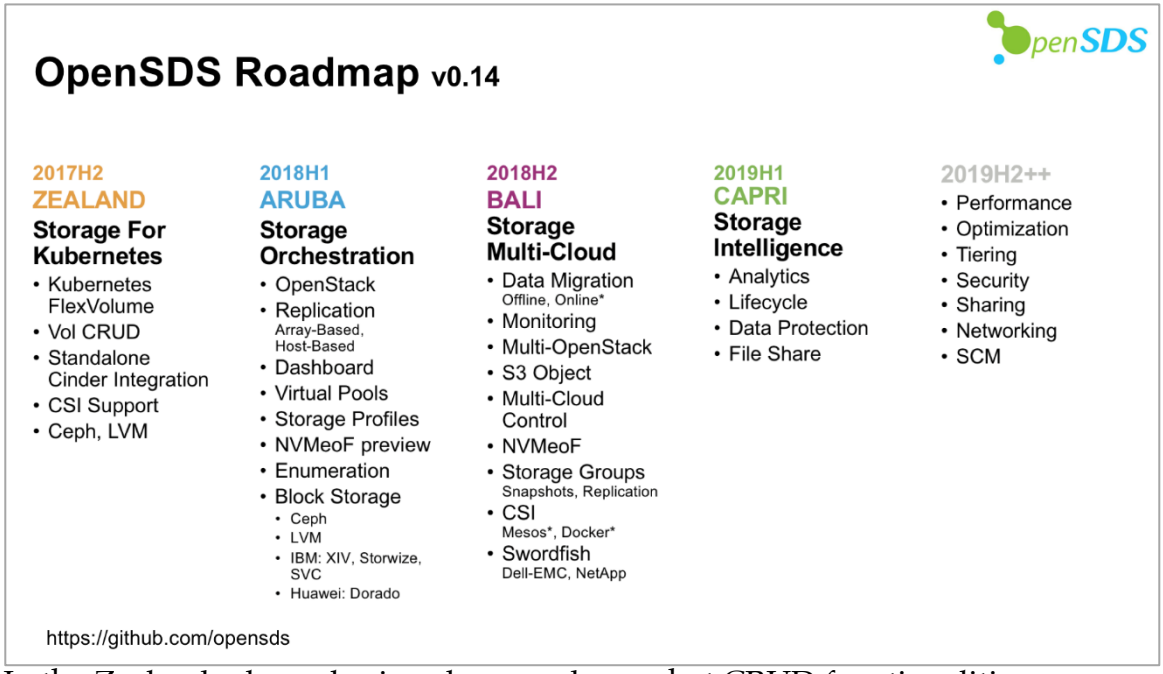
Table of Contents

1 Overview

OpenSDS Aruba will be released in the week of June 27, 2018. This document serves as the OpenSDS Aruba POC Test Plan. It covers the following topics:

1. Overall project scope and objectives
2. Test objectives and success criteria
3. Test resources required
4. Test schedule
5. Use cases
    a. OpenStack/Kubernetes/bare-metal/mixed environment provisioning
    b. Host and storage replication, and local and remote replication
    c. Test cases for each use case

1.1 Project Scope and Objectives



In the Zealand release, basic volume and snapshot CRUD functionalities were added and Kubernetes CSI/FlexVolume support was also added.

During the Aruba release, the focus has been on storage orchestration, building advanced automated storage and data services across traditional data centers, private and public clouds. Functionalities in this release include basic OpenStack integration, integrating with Keystone for identity service, array-based and host-based replication, and storage profiles design based on Swordfish. A deployment tool using Ansible is also available to install OpenSDS with Keystone and Dashboard.

1.2 POC Timeline

June 15: POC plan draft ready for EUAC review

June 29: Aruba release. POC plan approval.

July 1-31: POC testing

August 7: POC results/comments/testimonials

2 System requirements

2.1 Hardware

The hardware requirements are described in this section.

For array-based replication, two physical servers and two Dorado arrays are needed.

For host-based replication, two physical servers are needed.

For other tests described in this POC, one physical server or one VM can be used for basic testing.

2.2 Software

The software requirements are described in this section.

2.2.1 OS

Ubuntu 16.04.2 has been used during the testing and therefore should be used in this POC:

```
root@proxy:~# cat /etc/issue
Ubuntu 16.04.2 LTS \n \l
```

For host-based replication, required DRBD software is described in the relevant section later. Other required software is described in the installation section.

3 Features

Features to be tested include the following:

- Multitenancy using Keystone
- Create/delete volume
- Expand volume
- Create/delete snapshot
- Create volume from snapshot
- Create volume group
- Create/delete profile
- Array-based replication
- Host-based replication
- Use Cinder-compatible API in OpenStack

Supported storage backends include the following:

- LVM
- Ceph
- Dorado
- IBM storage via Cinder driver?
- Cinder stand alone with LVM
- Cinder in an OpenStack deployment with LVM

Supported protocols:

- iSCSI

- FC
- RBD

Testing environment includes the following:

- OpenSDS with Kubernetes
- OpenSDS with OpenStack (full OpenStack deployment or Cinder stand-alone)
- Hotpot only on bare-metal or a VM

4 Installation

In the section, how to install OpenSDS using Ansible playbook will be discussed. If you are testing OpenSDS with Kubernetes, read section *4.1 Prerequisite for the Kubernetes Environment* first. Otherwise, go to section 4.2 directly.

4.1 Prerequisite for the Kubernetes Environment

4.1.1 Packages

Install following packages:

```
apt-get install vim git curl wget make gcc zip
```

4.1.2 docker

Install docker:

```
wget
https://download.docker.com/linux/ubuntu/dists/xenial/pool/stable/amd64/docker
-ce_18.03.1~ce-0~ubuntu_amd64.deb
dpkg -i docker-ce_18.03.1~ce-0~ubuntu_amd64.deb
```

Version information:

```
root@proxy:~# docker version
Client:
 Version:      18.03.1-ce
 API version:  1.37
 Go version:   go1.9.5
 Git commit:   9ee9f40
 Built:        Thu Apr 26 07:17:20 2018
 OS/Arch:      linux/amd64
 Experimental: false
```

```
 Orchestrator: swarm

Server:
 Engine:
  Version:      18.03.1-ce
  API version:  1.37 (minimum version 1.12)
  Go version:   go1.9.5
  Git commit:   9ee9f40
  Built:        Thu Apr 26 07:15:30 2018
  OS/Arch:      linux/amd64
  Experimental: false
```

4.1.3 Golang

Check golang version information:

```
root@proxy:~# go version
go version go1.9.2 linux/amd64
```

You can install golang by executing commands blow:

```
wget https://storage.googleapis.com/golang/go1.9.2.linux-amd64.tar.gz
tar -C /usr/local -xzf go1.9.2.linux-amd64.tar.gz
echo 'export PATH=$PATH:/usr/local/go/bin' >> /etc/profile
echo 'export GOPATH=$HOME/gopath' >> /etc/profile
source /etc/profile
```

4.1.4 Etcd

You can install etcd by executing commands blow:

```
cd $HOME
wget https://github.com/coreos/etcd/releases/download/v3.3.0/etcd-v3.3.0-
linux-amd64.tar.gz
tar -xzf etcd-v3.3.0-linux-amd64.tar.gz
cd etcd-v3.3.0-linux-amd64
sudo cp -f etcd etcdctl /usr/local/bin/
```

4.1.5 kubernetes local cluster

You can start the latest k8s local cluster by executing commands blow:

```
cd $HOME
git clone https://github.com/kubernetes/kubernetes.git
cd $HOME/kubernetes
git checkout v1.10.0
make
echo alias kubectl='$HOME/kubernetes/cluster/kubectl.sh' >> /etc/profile
ALLOW_PRIVILEGED=true
FEATURE_GATES=CSIPersistentVolume=true,MountPropagation=true
RUNTIME_CONFIG="storage.k8s.io/v1alpha1=true" LOG_LEVEL=5 hack/local-up-
cluster.sh
```

4.2 OpenSDS Deployment

In this section, the steps to deploy an OpenSDS local cluster are described.

4.2.1 Pre-config (Ubuntu 16.04)

First download some system packages:

```
apt-get install -y git curl wget
```

Then config `/etc/ssh/sshd_config` file and change one line:

```
PermitRootLogin yes
```

Next generate ssh-token:

```
ssh-keygen -t rsa

ssh-copy-id -i ~/.ssh/id_rsa.pub <ip_address> # IP address of the target machine of the installation
```

4.2.2 Install docker

If using a standalone cinder as the backend, install docker to run cinder service. See the docker installation document for details.

The following command can be used to install docker:

```
wget
https://download.docker.com/linux/ubuntu/dists/xenial/pool/stable/amd64/docker-ce_18.03.1~ce-0~ubuntu_amd64.deb
dpkg -i docker-ce_18.03.1~ce-0~ubuntu_amd64.deb
```

4.2.3 Download opensds-installer code

```
git clone https://github.com/opensds/opensds-installer.git

cd opensds-installer/ansible
```

4.2.4 Install ansible tool

To install ansible, run the commands below:

```
# This step is needed to upgrade ansible to version 2.4.2 which is required for the "include_tasks" ansible command.
chmod +x ./install_ansible.sh && ./install_ansible.sh
ansible --version # Ansible version 2.4.x is required.
```

4.2.5 Configure OpenSDS cluster variables

4.2.5.1 System environment

To integrate OpenSDS with cloud platform (for example k8s), modify `nbp_plugin_type` variable in `group_vars/common.yml`:

```
nbp_plugin_type: hotpot_only # hotpot_only is the default integration method. Other
available options are 'csi' and 'flexvolume'.
```

Note: If 'csi' is the selected nbp_plugin_type, make sure section *3.1 Prerequisite for the Kubernetes Environment* is followed before proceeding.

Change opensds_endpoint to the actual IP address:

```
opensds_endpoint: http://127.0.0.1:50040 # The IP (127.0.0.1) should be replaced with
the opensds actual endpoint IP
```

4.2.5.2 LVM

If lvm is chosen as the storage backend, there is no need to modify group_vars/osdsdock.yml because it is the default choice:

```
enabled_backend: lvm # Change it according to the chosen backend. Supported backends
include 'lvm', 'ceph', and 'cinder'
```

Change tgtBindIp variable in group_vars/lvm/lvm.yaml to your real host IP address.

```
tgtBindIp: 127.0.0.1 # change tgtBindIp to your real host ip, run 'ifconfig' to check
```

4.2.5.3 Ceph

If `ceph` is chosen as storage backend, modify `group_vars/osdsdock.yml`:

```
enabled_backend: ceph # Change it according to the chosen
backend. Supported backends include 'lvm', 'ceph', and
'cinder'.
```

Configure `group_vars/ceph/all.yml` with an example below::

group_vars/ceph/all.yml:

```
ceph_origin: repository
ceph_repository: community
ceph_stable_release: luminous # Choose luminous as default version
public_network: "192.168.3.0/24" # Run 'ip -4 address' to check the ip address
cluster_network: "{{ public_network }}"
```

```
monitor_interface: eth1 # Change to the network interface on the target
machine
devices: # For ceph devices, append ONE or MULTIPLE devices like the example
below:
  - '/dev/sda' # Ensure this device exists and available if ceph is chosen
  #- '/dev/sdb'  # Ensure this device exists and available if ceph is chosen
osd_scenario: collocated
```

4.2.5.4 Cinder

If cinder is chosen as storage backend, modify group_vars/osdsdock.yml:

```
enabled_backend: cinder # Change it according to the chosen backend. Supported backends
include 'lvm', 'ceph', and 'cinder'

# Use block-box install cinder_standalone if true, see details in:

use_cinder_standalone: true
```

Configure the auth and pool options to access cinder in `group_vars/cinder/cinder.yaml`. Do not need to make additional configure changes if using cinder standalone.

4.2.6 Check if the hosts can be reached

```
sudo ansible all -m ping -i local.hosts
```

4.2.7 Run opensds-ansible playbook to start deploy

```
sudo ansible-playbook site.yml -i local.hosts
```

4.3 Test OpenSDS

4.3.1 Use OpenSDS CLI Tool

Configure OpenSDS CLI tool:

```
cd $GOPATH/src/github.com/opensds/opensds && sudo cp build/out/bin/osdsctl
/usr/local/bin

export OPENSDS_ENDPOINT=http://{your_real_host_ip}:50040

export OPENSDS_AUTH_STRATEGY=keystone

source /opt/stack/devstack/openrc admin admin
```

```
osdsctl pool list # Check if the pool resource is available
```

Create a default profile:

```
osdsctl profile create '{"name": "default", "description": "default policy"}'
```

Create a volume:

```
osdsctl volume create 1 --name=test-001
```

List all volumes:

```
osdsctl volume list
```

Delete the volume:

```
osdsctl volume delete <your_volume_id>
```

4.3.2 Test CSI Plugin

After running the ansible deployment tool in "csi" mode, three CSI plugin pods can be found by `kubectl get pods` like below:

- csi-provisioner-opensdsplugin
- csi-attacher-opensdsplugin
- csi-nodeplugin-opensdsplugin

More design details about CSI can be found from CSI Volume Plugins in Kubernetes Design Doc.

To test the OpenSDS CSI plugin, create an example nginx application:

```
kubectl create -f csi/server/examples/kubernetes/nginx.yaml
```

This will create an OpenSDS volume and mount the volume at `/var/lib/www/html`.

Use the following command to inspect the nginx container to verify it.

```
docker exec -it <nginx container id> /bin/bash
```

Clean up example nginx application by the following commands:

```
kubectl delete -f csi/server/examples/kubernetes/nginx.yaml
```

4.3.3 OpenSDS Dashboard

Log into the dashboard using the default admin credentials:
admin/opensds@123. Create tenant, user, and profiles as admin.

Log out of the dashboard as admin and log into the dashboard as a non-admin user to create volume, snapshot, expand volume, create volume from snapshot, create volume group.

4.4 Cleanup OpenSDS

4.4.1 Run opensds-ansible playbook to clean the environment

```
sudo ansible-playbook clean.yml -i local.hosts
```

This should clean up hotpot as well as nbp (including the CSI plugin).

4.4.2 Run ceph-ansible playbook to clean ceph cluster if ceph is deployed

```
cd /opt/ceph-ansible

sudo ansible-playbook infrastructure-playbooks/purge-cluster.yml -i ceph.hosts
```

In addition, clean up the logical partition on the physical block device used by ceph, using the `fdisk` tool.

4.4.3 Remove ceph-ansible source code (optional)

```
cd ..

sudo rm -rf /opt/ceph-ansible
```

4.5 Troubleshooting

4.5.1 Problem Starting CSI Plugin

If the CSI plugin cannot be started, check if OpenSDS endpoint IP is configured.

```
vi csi/server/deploy/kubernetes/csi-configmap-opensdsplugin.yaml
```

The IP (127.0.0.1) should be replaced with the opensds actual endpoint IP.

```
kind: ConfigMap

apiVersion: v1
```

```
    metadata:

  name: csi-configmap-opensdsplugin

    data:

    opensdsendpoint: http://127.0.0.1:50040

    osauthurl: http://127.0.0.1/identity
```

Manually create OpenSDS CSI pods:

```
kubectl create -f csi/server/deploy/kubernetes
```

After this, three pods can be found by `kubectl get pods` like below:

- csi-provisioner-opensdsplugin
- csi-attacher-opensdsplugin
- csi-nodeplugin-opensdsplugin

To test the OpenSDS CSI plugin, create an example nginx application:

```
kubectl create -f csi/server/examples/kubernetes/nginx.yaml
```

This will mount an OpenSDS volume into `/var/lib/www/html`.

Use the following command to inspect the nginx container to verify it.

```
docker exec -it <nginx container id> /bin/bash
```

Clean up example nginx application and opensds CSI pods by the following commands.

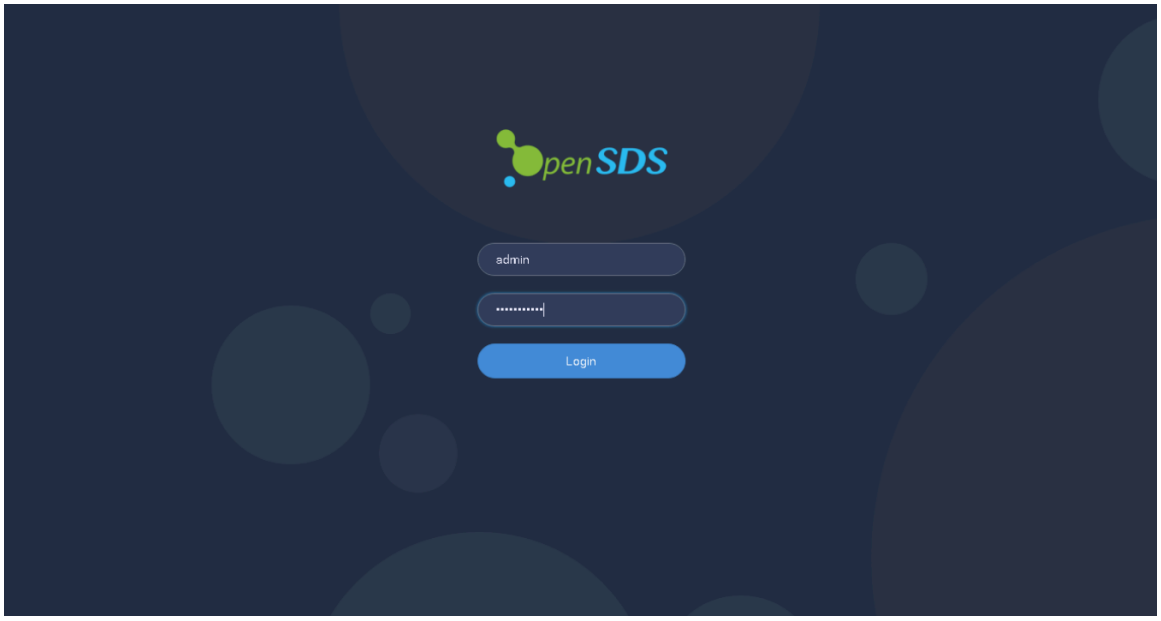
```
kubectl delete -f csi/server/examples/kubernetes/nginx.yaml

kubectl delete -f csi/server/deploy/kubernetes
```

5 Use Cases

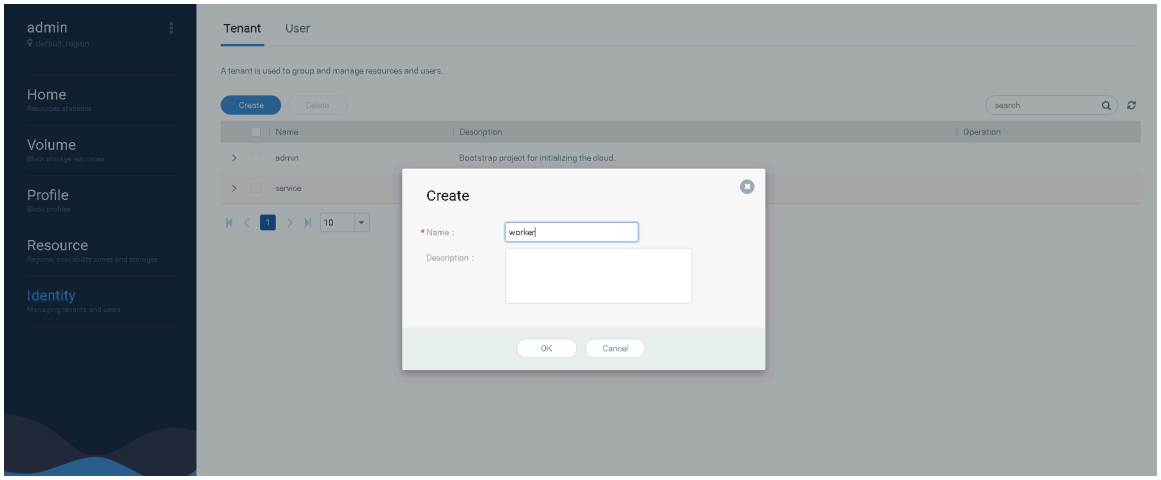
5.1 Dashboard

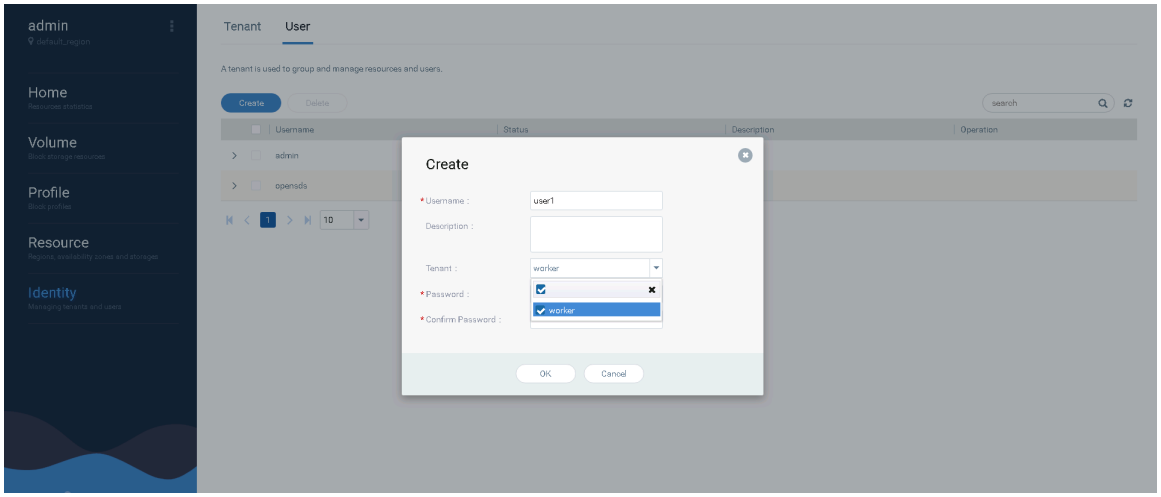
5.1.1 Administrator configuration

- Log into dashboard as admin. Password is opensds@123.

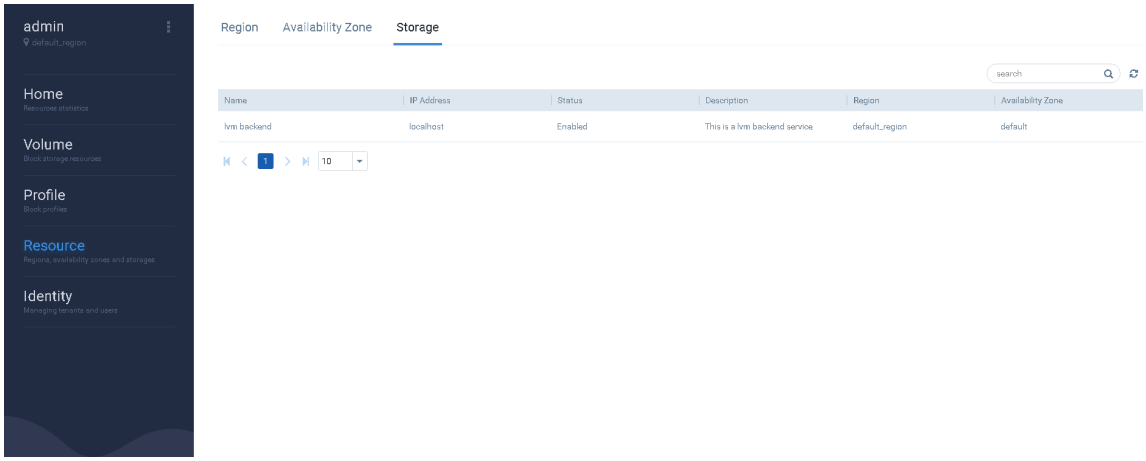


- Go to Identity tab, create a tenant and two users("user1","user2") to specify the tenant.

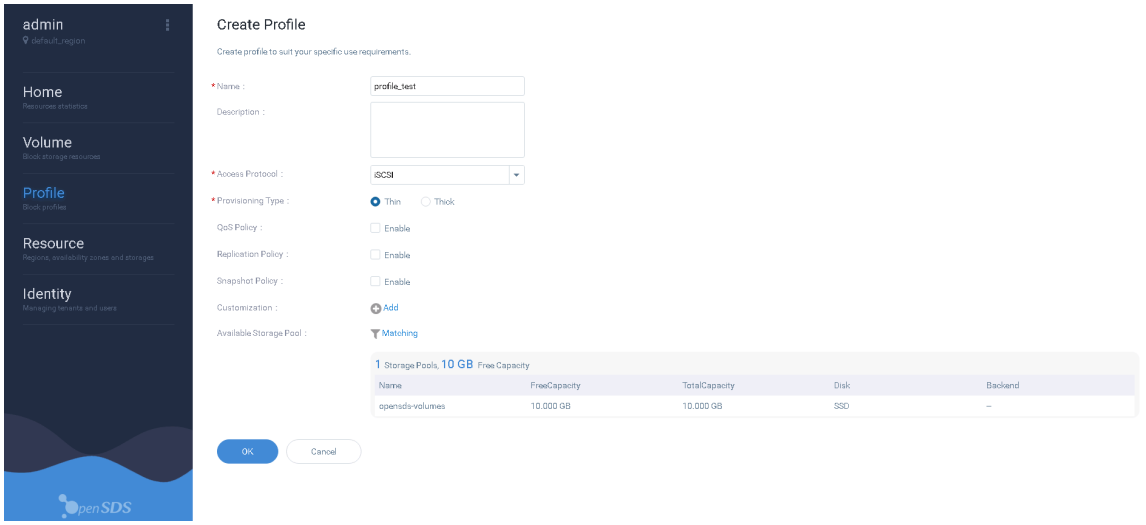




- Go to Resource tab, check Availability Zone, Region and Storage resources.

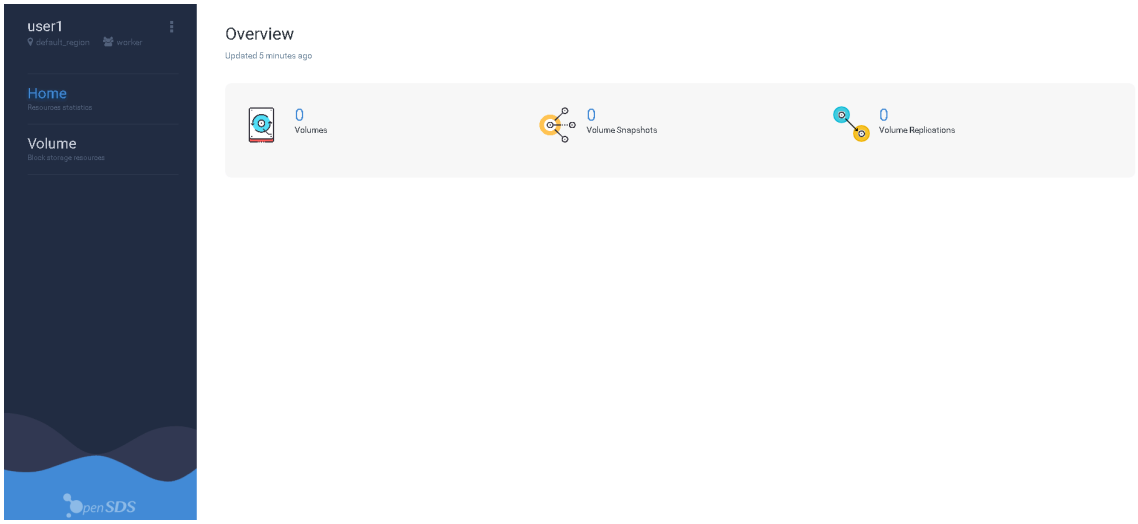


- Go to Profile tab and Create a Profile.

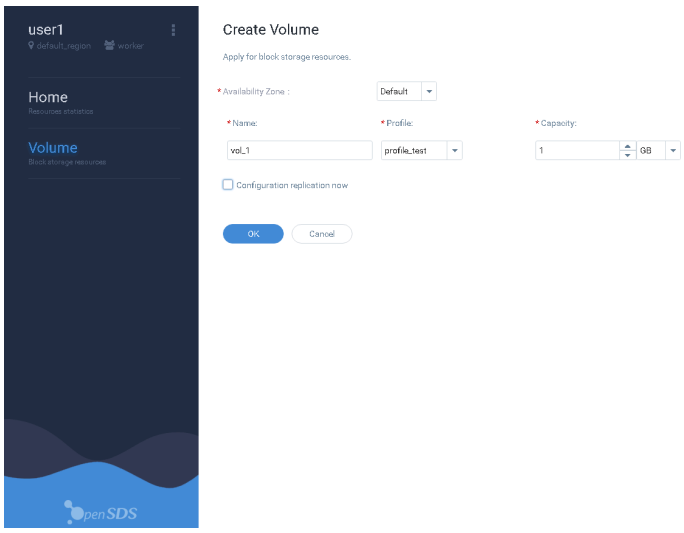


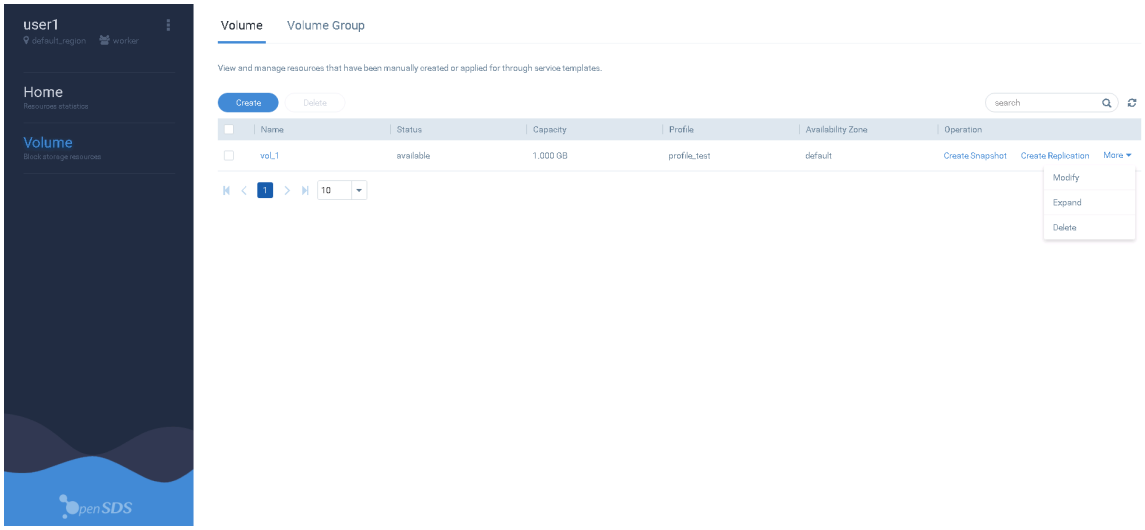
5.1.2 **Tenant provision volume**

Log into dashboard as user(user1).

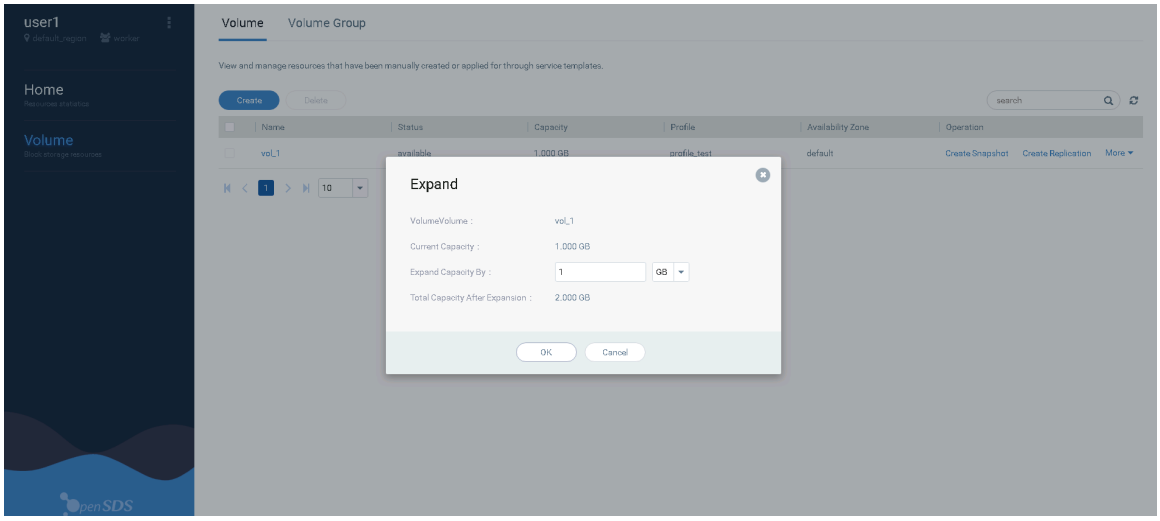


- Go to Volume tab and create a volume(vol_1). You can create snapshots, create replication, expand volume, and so on.

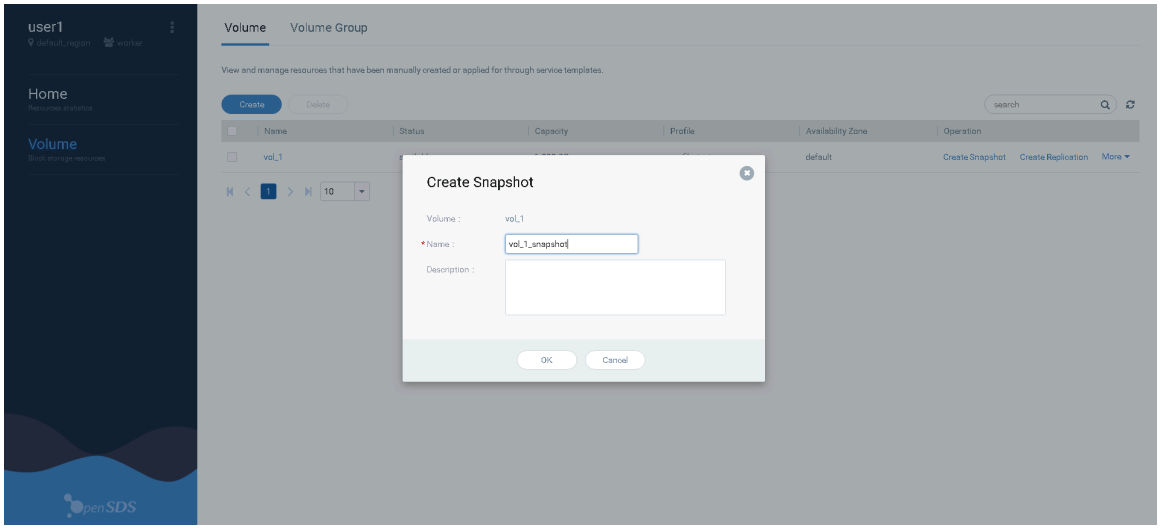




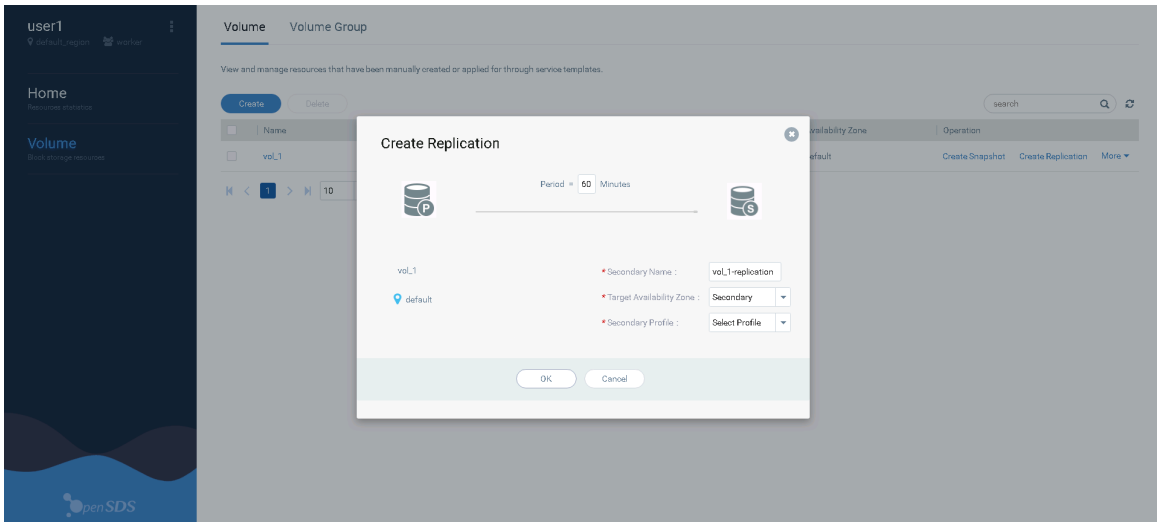
- Expand volume.



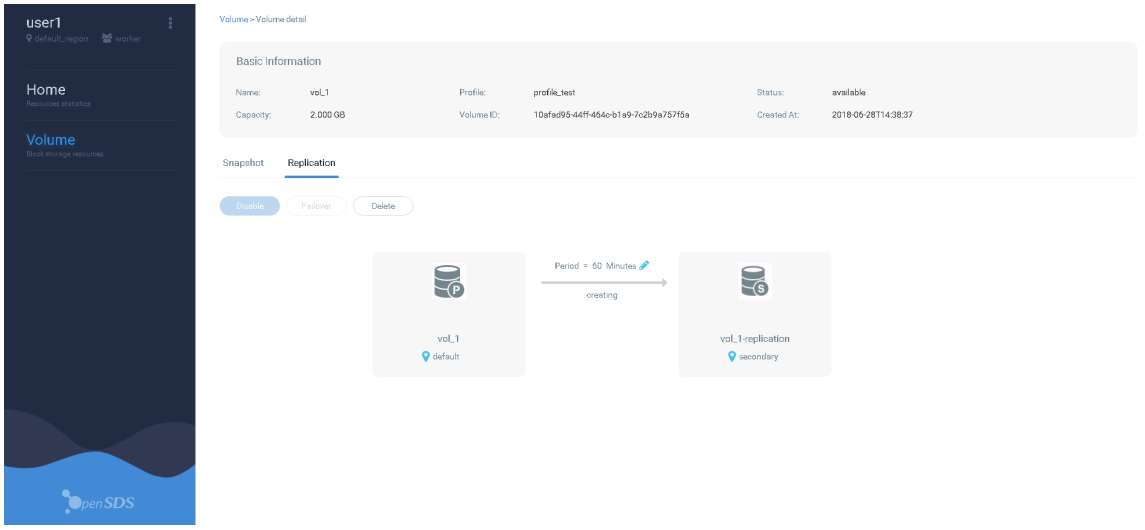
- Create a snapshot(vol_1_snapshot).

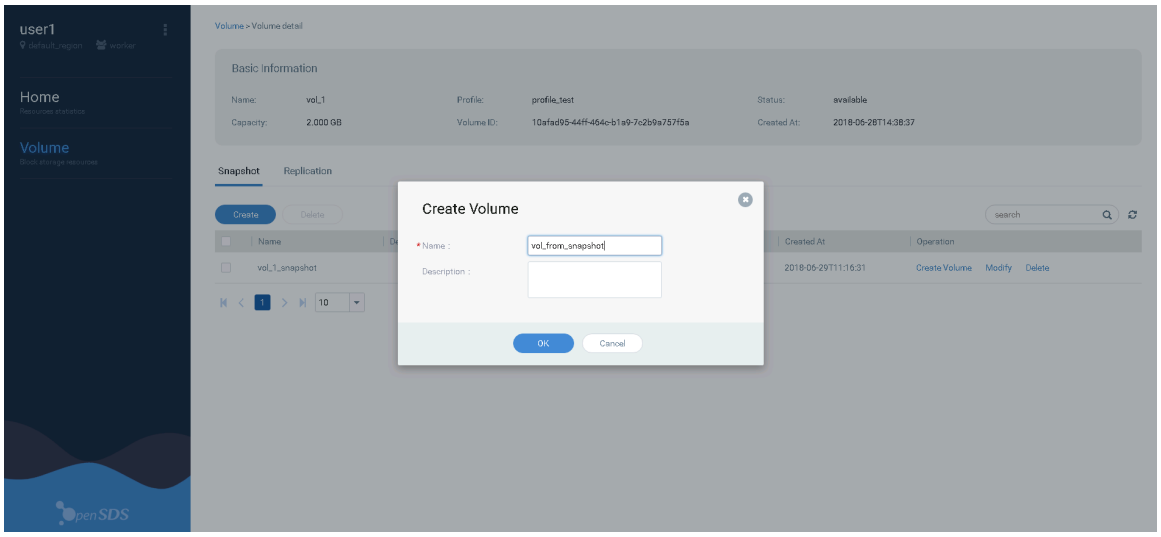


- Create replication.

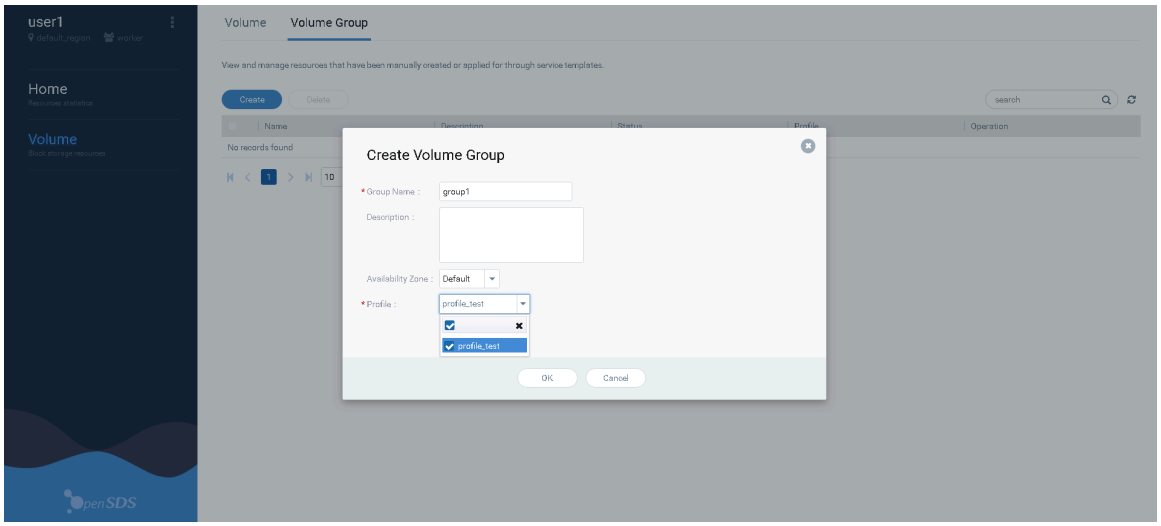


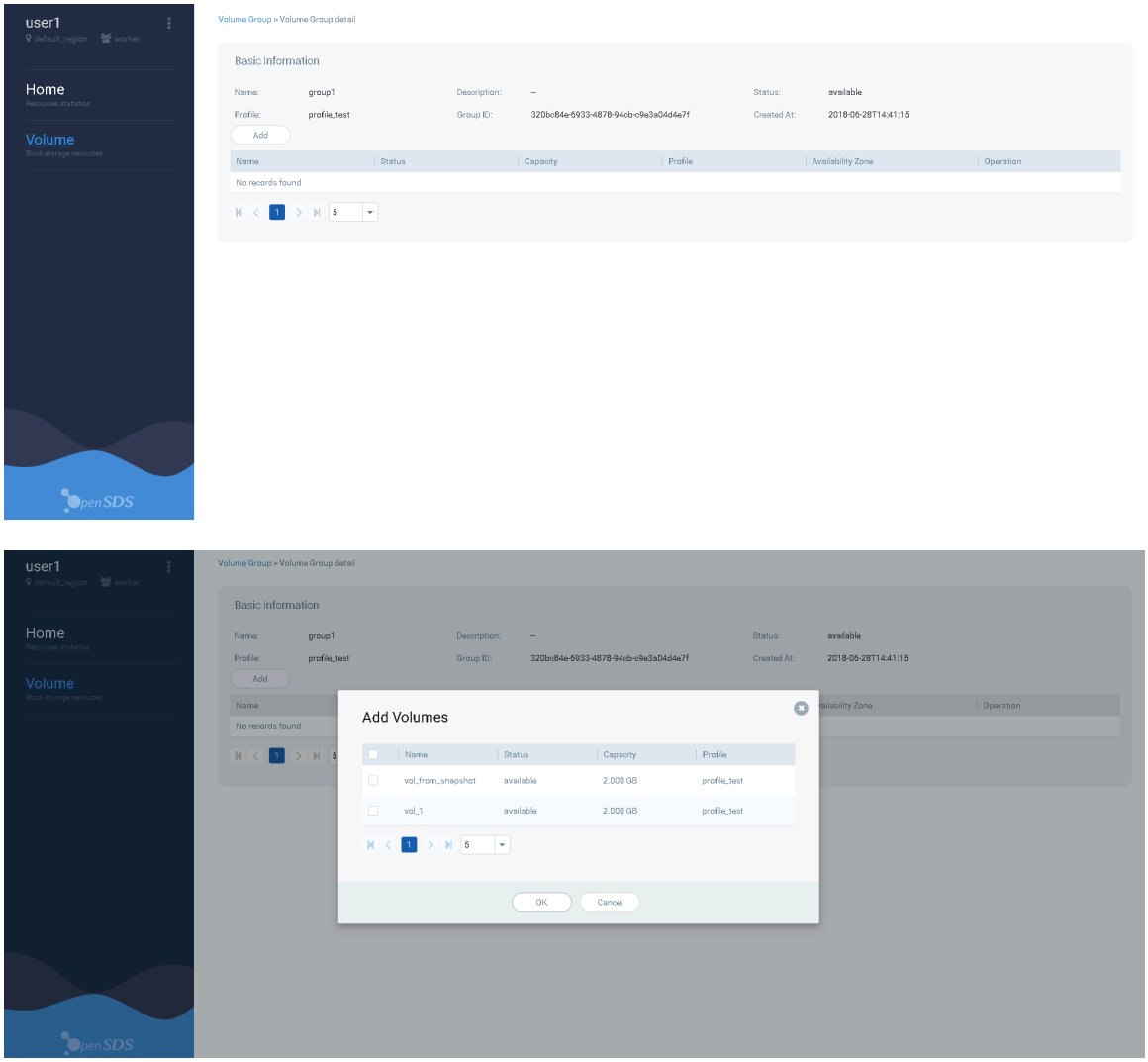
- Go to volume detail interface, view replication and snapshots, create volumes based on snapshots.



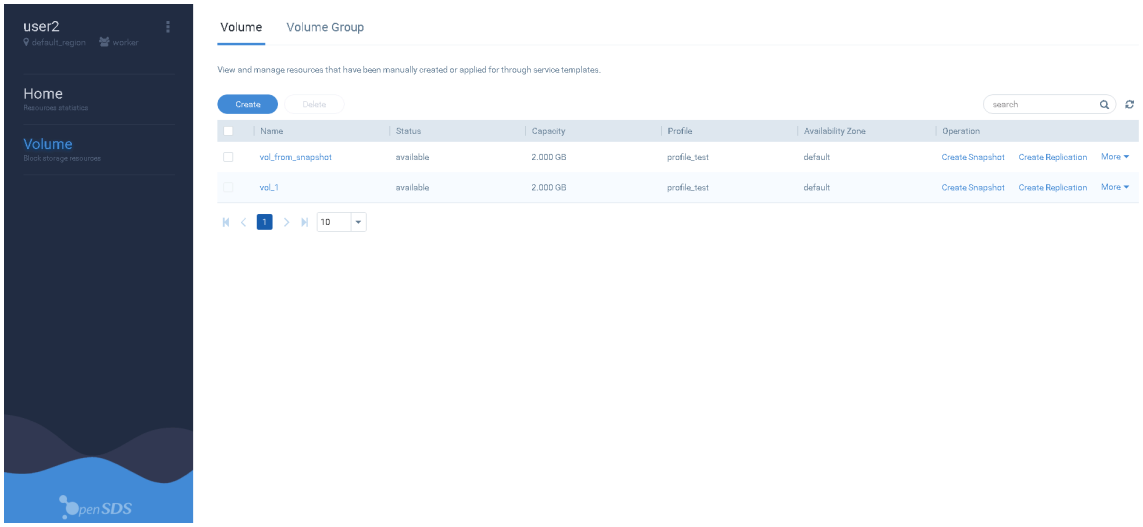


- Go to Volume Group tab and create a group for volumes.

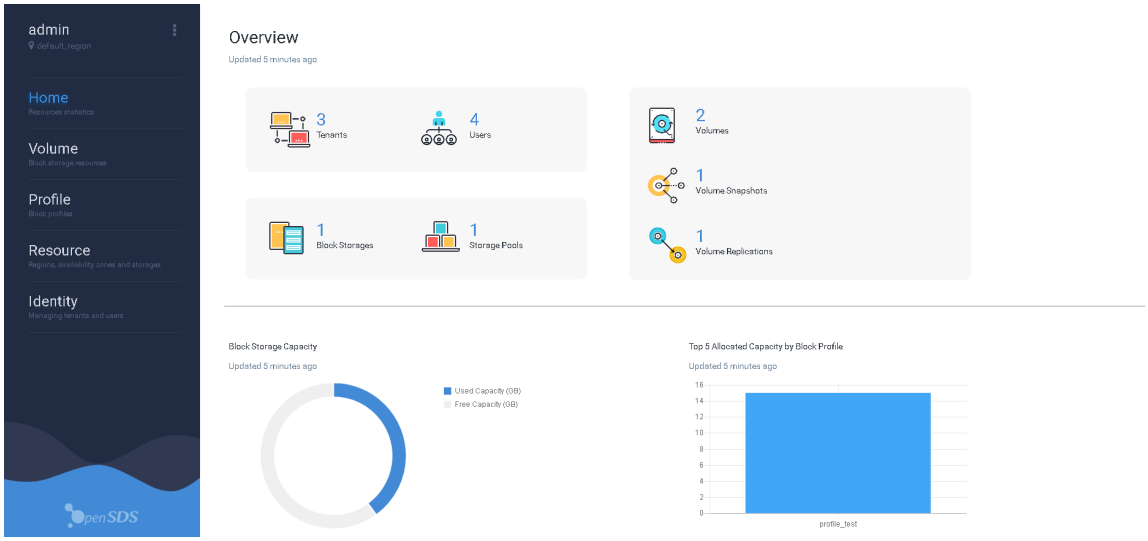


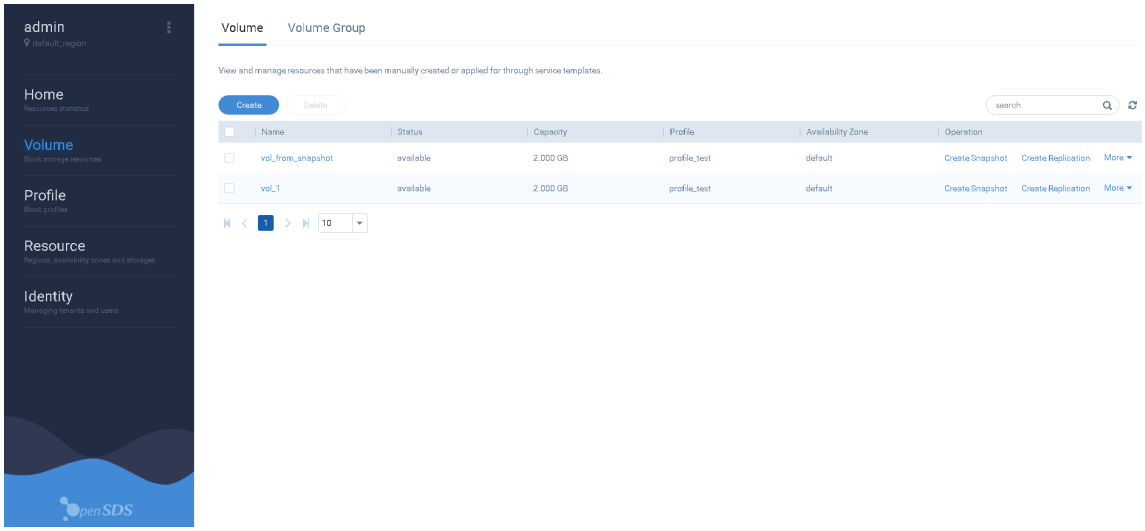


Log out and log in as user2 and verify that user2 can view volumes created by user1.



Log out and log in as administrator(admin) and can manage the volumes of all tenants.





5.2 Kubernetes

Kubernetes cluster runs on baremetal or VM using OpenSDS to provision storage, using the following drivers:

- Native LVM driver
- Native Ceph driver
- Native Dorado driver
- Cinder driver with Cinder stand-alone (LVM by default)

Refer to the *Installation* section to see how to use the OpenSDS CSI plugin to provision storage for Kubernetes.

5.3 OpenStack

There are two ways for OpenSDS to integrate with OpenStack.

- OpenSDS provisions storage through the southbound Cinder driver. Cinder can be Cinder stand-alone or part of an OpenStack deployment. See the Installation section on how to install OpenSDS to test with Cinder driver.
- OpenSDS provisions storage in an OpenStack deployment through the Cinder compatible API. It can be southbound native driver or Cinder driver below OpenSDS in this case.

5.3.1 Test Cinder Compatible API

Cinder Compatible API adapter is not built in as part of the ansible deployment tool. Follow the following instruction to install it.

5.3.1.1 Installation

1. The Cinder Compatible API only supports cinder's current Api(v3). You can use devstack to install cinder when testing, but in order to use cinder's current Api(v3), branch for devstack must be stable/queens.

2. When devstack is installed, kill all cinder processes.

3. Run the "source /opt/stack/devstack/openrc admin admin" command to execute the openstack's cli command.

4. Run the "openstack endpoint list" command to view the cinder endpoint.

5. Run the command "export CINDER_ENDPOINT=http://10.10.10.10:8776/v3". The actual value of CINDER_ENDPOINT is determined by the previous step.

6. Run the command export OPENSDS_ENDPOINT=http://127.0.0.1:50040.

7. Download the opensds source (https://github.com/opensds/opensds.git) and install opensds.

8. Run the command "go build -o ./build/out/bin/cindercompatibleapi github.com/opensds/opensds/contrib/cindercompatibleapi".

9. Execute the command "./build/out/bin/cindercompatibleapi".

10. Execute some cinder cli commands to see if the result is correct. For example, if you execute the command "cinder type-list", the results will show the profile of opensds.

5.3.1.2 Volume Types

5.3.1.2.1 List all volume types (default policy)

cinder type-list

```
root@openstack:~# cinder type-list
+--------------------------------------+---------+----------------+-----------+
| ID                                   | Name    | Description    | Is_Public |
+--------------------------------------+---------+----------------+-----------+
| 02e50100-e2b5-499e-a938-9b2a5f079c9c | default | default policy | True      |
+--------------------------------------+---------+----------------+-----------+
```

```
2018/05/07 09:31:31.659 [D] 192.168.56.104 - - [07/May/2018 09:31:31] "GET /v3/28e79796cfd84db294a756b90b8d845f/types?is_public=None HTTP/1.1 200 0" 0.003206  python-cinderclient
```

5.3.1.2.2 Delete a volume type

cinder type-delete

```
root@openstack:~# cinder type-list
+--------------------------------------+---------+---------------+-----------+
| ID                                   | Name    | Description   | Is_Public |
+--------------------------------------+---------+---------------+-----------+
| 02e50100-e2b5-499e-a938-9b2a5f079c9c | default | default policy | True      |
+--------------------------------------+---------+---------------+-----------+
root@openstack:~#
root@openstack:~# cinder type-delete 02e50100-e2b5-499e-a938-9b2a5f079c9c
Request to delete volume type 02e50100-e2b5-499e-a938-9b2a5f079c9c has been accepted.
```

```
2018/05/07 09:34:45.736 [D] 192.168.56.104 - - [07/May/2018 09:34:45] "DELETE /v3/28e79796cfd84db294a756b90b8d845f/types/02e50100-e2b5-499e-a938-9b2a5f079c9c HTTP/1.1 200 0" 0.003395 python-cinderclient
```

5.3.1.2.3 List all volume types(0)

cinder type-list

```
root@openstack:~# cinder type-list
+----+------+-------------+-----------+
| ID | Name | Description | Is_Public |
+----+------+-------------+-----------+
+----+------+-------------+-----------+
```

```
2018/05/07 09:37:28.842 [D] 192.168.56.104 - - [07/May/2018 09:37:28] "GET /v3/28e79796cfd84db294a756b90b8d845f/types?is_public=None HTTP/1.1 200 0" 0.002610 python-cinderclient
```

5.3.1.2.4 Create a volume type

cinder type-create type00 --description test_type_00

```
root@openstack:~# cinder type-create type00 --description test_type_00
+--------------------------------------+--------+--------------+-----------+
| ID                                   | Name   | Description  | Is_Public |
+--------------------------------------+--------+--------------+-----------+
| 7abff35e-0cbb-4c48-8bab-4fe7c3286792 | type00 | test_type_00 | True      |
+--------------------------------------+--------+--------------+-----------+
root@openstack:~#
```

```
2018/05/07 09:38:10.901 [D] 192.168.56.104 - - [07/May/2018 09:38:10] "POST /v3/28e79796cfd84db294a756b90b8d845f/types HTTP/1.1 200 0" 0.002892 python-cinderclient
```

5.3.1.2.5 Show volume type detail

cinder type-show Id

```
root@openstack:~# cinder type-show 7abff35e-0cbb-4c48-8bab-4fe7c3286792
+-------------+--------------------------------------+
| Property    | Value                                |
+-------------+--------------------------------------+
| description | test_type_00                         |
| extra_specs | None                                 |
| id          | 7abff35e-0cbb-4c48-8bab-4fe7c3286792 |
| is_public   | True                                 |
| name        | type00                               |
+-------------+--------------------------------------+
```

```
2018/05/07 09:39:45.513 [D] 192.168.56.104 - - [07/May/2018 09:39:45] "GET /v3/28e79796cfd84db294a756b90b8d845f/types/7abff35e-0cbb-4c48-8bab-4fe7c3286792 HTTP/1.1 200 0" 0.002401 python-cinderclient
```

5.3.1.2.6 Create a volume type（2nd）

cinder type-create type01 --description test_type_01

```
root@openstack:~# cinder type-create type01 --description test_type_01
+--------------------------------------+--------+-------------+-----------+
| ID                                   | Name   | Description | Is_Public |
+--------------------------------------+--------+-------------+-----------+
| 8ddce5f5-03a1-4397-9d82-5e002a2742cd | type01 | test_type_01 | True      |
+--------------------------------------+--------+-------------+-----------+
```

```
2018/05/07 09:41:48.712 [D] 192.168.56.104 - - [07/May/2018 09:41:48] "POST /v3/28e79796cfd84db294a756b90b8d845f/types HTTP/1.1 200 0" 0.003471 python-cinderclient
```

5.3.1.2.7 List all volume types (2)

cinder type-list

```
root@openstack:~# cinder type-list
+--------------------------------------+--------+-------------+-----------+
| ID                                   | Name   | Description | Is_Public |
+--------------------------------------+--------+-------------+-----------+
| 7abff35e-0cbb-4c48-8bab-4fe7c3286792 | type00 | test_type_00 | True      |
| 8ddce5f5-03a1-4397-9d82-5e002a2742cd | type01 | test_type_01 | True      |
+--------------------------------------+--------+-------------+-----------+
```

```
2018/05/07 09:42:42.333 [D] 192.168.56.104 - - [07/May/2018 09:42:42] "GET /v3/28e79796cfd84db294a756b90b8d845f/types?is_public=None HTTP/1.1 200 0" 0.003555 python-cinderclient
```

5.3.1.2.8 Update an encryption type

cinder type-update 7abff35e-0cbb-4c48-8bab-4fe7c3286792 --name type0 --description test_type_0 --is-public true

```
root@openstack:~# cinder type-update 7abff35e-0cbb-4c48-8bab-4fe7c3286792 --name type0 --description test_type_0 --is-public true
+--------------------------------------+-------+-------------+-----------+
| ID                                   | Name  | Description | Is_Public |
+--------------------------------------+-------+-------------+-----------+
| 7abff35e-0cbb-4c48-8bab-4fe7c3286792 | type0 | test_type_0 | True      |
+--------------------------------------+-------+-------------+-----------+
```

```
2018/05/07 09:47:33.650 [D] 192.168.56.104 - - [07/May/2018 09:47:33] "PUT /v3/28e79796cfd84db294a756b90b8d845f/types/7abff35e-0cbb-4c48-8bab-4fe7c3286792 HTTP/1.1 200 0" 0.003619 python-cinderclient
```

If is-public is not set, false is the default which is not supported by opensds：

```
root@openstack:~# cinder type-update 7abff35e-0cbb-4c48-8bab-4fe7c3286792 --name type0 --description test_type_0
ERROR: Update a volume type failed: OpenSDS does not support is_public = false (HTTP 400)
```

```
E0507 09:46:35.930152   22851 volumetype.go:64] Update a volume type failed: OpenSDS does not support is_public = false
2018/05/07 09:46:35.930 [D] 192.168.56.104 - - [07/May/2018 09:46:35] "PUT /v3/28e79796cfd84db294a756b90b8d845f/types/7abff35e-0cbb-4c48-8bab-4fe7c3286792 HTTP/1.1 400 0" 0.000870  python-cinderclient
```

5.3.1.2.9 Lists current volume types and extra specs.

cinder extra-specs-list

```
root@openstack:~# cinder type-list
+--------------------------------------+--------+--------------+-----------+
| ID                                   | Name   | Description  | Is_Public |
+--------------------------------------+--------+--------------+-----------+
| 7abff35e-0cbb-4c48-8bab-4fe7c3286792 | type0  | test_type_0  | True      |
| 8ddce5f5-03a1-4397-9d82-5e002a2742cd | type01 | test_type_01 | True      |
+--------------------------------------+--------+--------------+-----------+
root@openstack:~# cinder extra-specs-list
+--------------------------------------+--------+-------------+
| ID                                   | Name   | extra_specs |
+--------------------------------------+--------+-------------+
| 7abff35e-0cbb-4c48-8bab-4fe7c3286792 | type0  | -           |
| 8ddce5f5-03a1-4397-9d82-5e002a2742cd | type01 | -           |
+--------------------------------------+--------+-------------+
```

```
2018/05/07 09:57:14.497 [D] 192.168.56.104 - - [07/May/2018 09:57:14] "GET /v3/28e79796cfd84db294a756b90b8d845f/types?is_public=None HTTP/1.1 200 0" 0.002168  python-cinderclient
2018/05/07 09:57:40.984 [D] 192.168.56.104 - - [07/May/2018 09:57:40] "GET /v3/28e79796cfd84db294a756b90b8d845f/types?is_public=None HTTP/1.1 200 0" 0.002751  python-cinderclient
```

5.3.1.2.10 Create or update extra specs for volume type

cinder type-key 7abff35e-0cbb-4c48-8bab-4fe7c3286792 set key1=value1

```
root@openstack:~# cinder type-key 7abff35e-0cbb-4c48-8bab-4fe7c3286792 set key1=value1
root@openstack:~# cinder extra-specs-list
+--------------------------------------+--------+--------------------+
| ID                                   | Name   | extra_specs        |
+--------------------------------------+--------+--------------------+
| 7abff35e-0cbb-4c48-8bab-4fe7c3286792 | type0  | {'key1': 'value1'} |
| 8ddce5f5-03a1-4397-9d82-5e002a2742cd | type01 | -                  |
+--------------------------------------+--------+--------------------+
```

```
2018/05/07 10:09:53.361 [D] 192.168.56.104 - - [07/May/2018 10:09:53] "POST /v3/28e79796cfd84db294a756b90b8d845f/types/7abff35e-0cbb-4c48-8bab-4fe7c3286792/extra_specs HTTP/1.1 200 0" 0.003180  python-cinderclient
```

5.3.1.2.11 Delete extra specification for volume type

cinder type-key 7abff35e-0cbb-4c48-8bab-4fe7c3286792 unset key1

```
root@openstack:~# cinder extra-specs-list
+--------------------------------------+--------+--------------------+
| ID                                   | Name   | extra_specs        |
+--------------------------------------+--------+--------------------+
| 7abff35e-0cbb-4c48-8bab-4fe7c3286792 | type0  | {'key1': 'value1'} |
| 8ddce5f5-03a1-4397-9d82-5e002a2742cd | type01 | -                  |
+--------------------------------------+--------+--------------------+
root@openstack:~# cinder type-key 7abff35e-0cbb-4c48-8bab-4fe7c3286792 unset key1
root@openstack:~# cinder extra-specs-list
+--------------------------------------+--------+-------------+
| ID                                   | Name   | extra_specs |
+--------------------------------------+--------+-------------+
| 7abff35e-0cbb-4c48-8bab-4fe7c3286792 | type0  | -           |
| 8ddce5f5-03a1-4397-9d82-5e002a2742cd | type01 | -           |
+--------------------------------------+--------+-------------+
```

```
2018/05/07 10:14:44.458 [D] 192.168.56.104 - - [07/May/2018 10:14:44] "DELETE /v3/28e79796cfd84db294a756b90bb8d845f/types/7abff35e-0cbb-4c48-8bab-4fe7c3286792/extra_specs/key1 HTTP/1.1 200 0" 0.002390 python-cinderclient
```

5.3.1.3 Volumes

5.3.1.3.1 List accessible volumes with details (0)

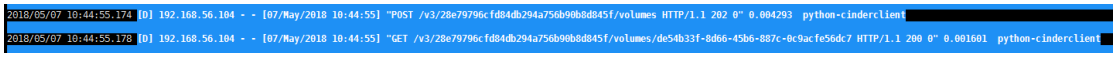
cinder list

```
root@openstack:~# cinder list
+----+--------+------+------+-------------+----------+-------------+
| ID | Status | Name | Size | Volume Type | Bootable | Attached to |
+----+--------+------+------+-------------+----------+-------------+
+----+--------+------+------+-------------+----------+-------------+
root@openstack:~#
```

5.3.1.3.2 Create a volume (1st)

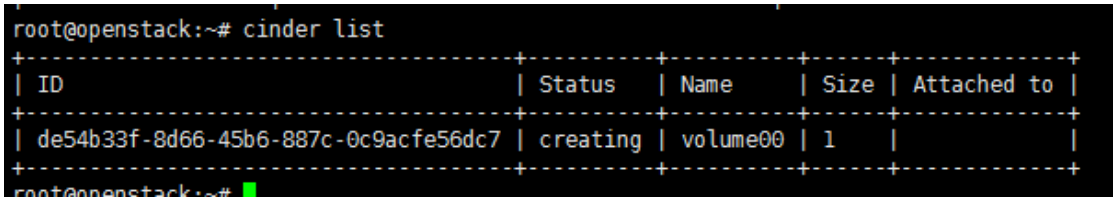
cinder create 1 --name volume00

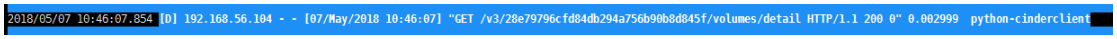
```
root@openstack:~# cinder create 1 --name volume00
+--------------------+--------------------------------------+
| Property           | Value                                |
+--------------------+--------------------------------------+
| attachments        | []                                   |
| availability_zone  | default                              |
| created_at         | 2018-05-07T10:44:55                  |
| description        |                                      |
| id                 | de54b33f-8d66-45b6-887c-0c9acfe56dc7 |
| metadata           | {}                                   |
| name               | volume00                             |
| size               | 1                                    |
| status             | creating                             |
| updated_at         |                                      |
| user_id            |                                      |
+--------------------+--------------------------------------+
```



5.3.1.3.3 List accessible volumes with details (1)

cinder list





5.3.1.3.4 Show a volume's details

cinder show <volume uuid>

5.3.1.3.5 Delete a volume

cinder delete <volume uuid>

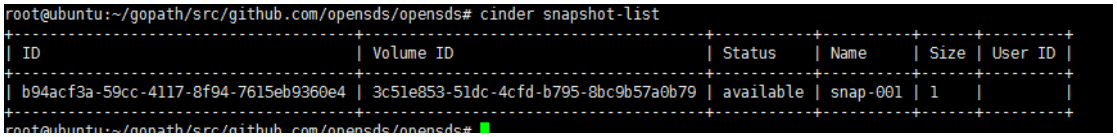
5.3.1.4 Snapshots

5.3.1.4.1 Create a snapshot

cinder snapshot-create <volume uuid>

5.3.1.4.2 List snapshots and details

cinder snapshot-list



5.3.1.4.3 Show a snapshot's details

cinder snapshot-show <snapshot uuid>

5.3.1.4.4 Delete a snapshot

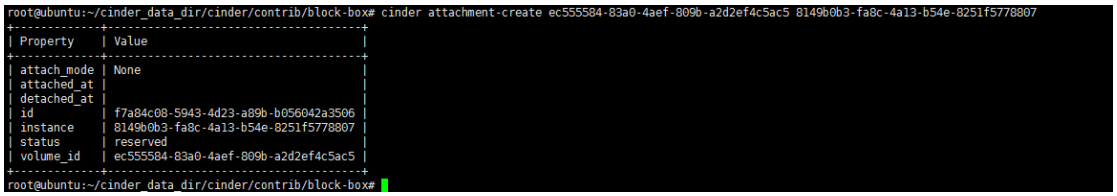
cinder snapshot-delete <snapshot uuid>

5.3.1.5 Attachments

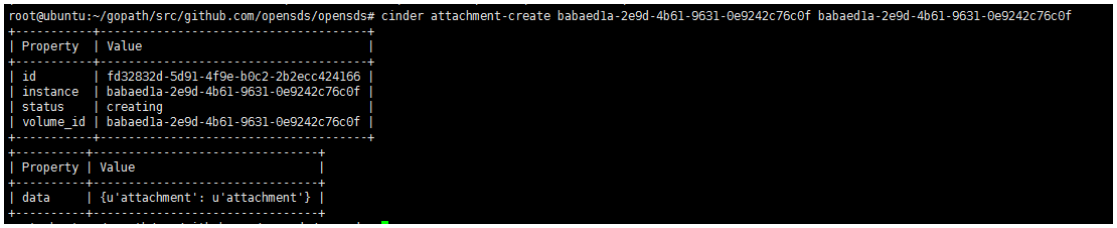
5.3.1.5.1 Create attachment

cinder attachment-create

cinder results:



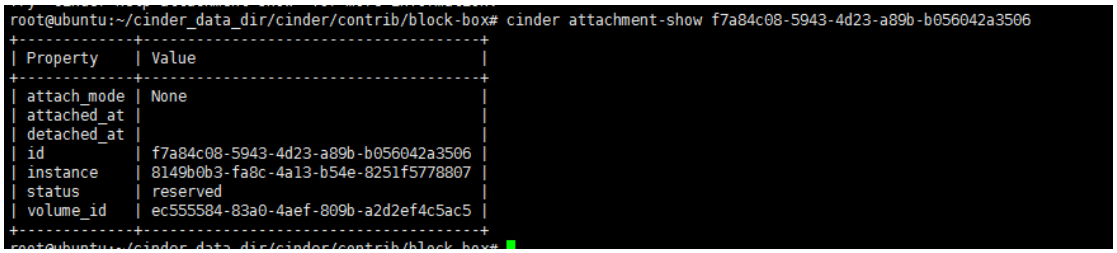
Cinder compatible API results:



5.3.1.5.2 Show attachment

Cinder attachment-show

cinder results：



Cinder compatible API results：

5.3.1.5.3 List attachment

cinder attachment-list

cinder results：

```
root@ubuntu:~/cinder_data_dir/cinder/contrib/block-box# cinder attachment-list
+--------------------------------------+--------------------------------------+----------+-----------+
| ID                                   | Volume ID                            | Status   | Server ID |
+--------------------------------------+--------------------------------------+----------+-----------+
| 8fa3413f-07dc-48f5-a7b2-fdbea19dedlc | c64a4d98-c194-4c75-a37b-05722c7ee349 | reserved |           |
| f7a84c08-5943-4d23-a89b-b056042a3506 | ec555584-83a0-4aef-809b-a2d2ef4c5ac5 | reserved |           |
+--------------------------------------+--------------------------------------+----------+-----------+
```

Cinder compatible API results：

```
root@ubuntu:~/gopath/src/github.com/opensds/opensds# cinder attachment-list
+--------------------------------------+--------------------------------------+--------+-----------+
| ID                                   | Volume ID                            | Status | Server ID |
+--------------------------------------+--------------------------------------+--------+-----------+
| 95d4e9f5-88db-4015-9467-1ed0045b6469 | 3c51e853-51dc-4cfd-b795-8bc9b57a0b79 | error  |           |
| caa2a055-a9c2-43e0-96d4-391398f7c8b4 | bb04ad9a-75bd-40a4-ac5e-3c92a7e66956 | error  |           |
+--------------------------------------+--------------------------------------+--------+-----------+
```

5.3.1.5.4 Update attachment

cinder attachment-update

Cinder compatible API results：

```
root@ubuntu:~/gopath/src/github.com/opensds/opensds# cinder attachment-update fd32832d-5d91-4f9e-b0c2-2b2ecc424166 --ip 127.0.0.1
+-----------+-----------------------------------+
| Property  | Value                             |
+-----------+-----------------------------------+
| id        | fd32832d-5d91-4f9e-b0c2-2b2ecc424166 |
| instance  | babaed1a-2e9d-4b61-9631-0e9242c76c0f |
| status    | error                             |
| volume_id | babaed1a-2e9d-4b61-9631-0e9242c76c0f |
+-----------+-----------------------------------+
+----------+------------------------------+
| Property | Value                        |
+----------+------------------------------+
| data     | {u'attachment': u'attachment'} |
+----------+------------------------------+
root@ubuntu:~/gopath/src/github.com/opensds/opensds# osdsctl volume attachment show fd32832d-5d91-4f9e-b0c2-2b2ecc424166
WARNING: Not found Env OPENSDS_AUTH_STRATEGY, use default(noauth)
+----------------+-----------------------------------+
| Property       | Value                             |
+----------------+-----------------------------------+
| Id             | fd32832d-5d91-4f9e-b0c2-2b2ecc424166 |
| CreatedAt      | 2018-04-24T10:41:28               |
| UpdatedAt      | 2018-04-24T10:54:56               |
| TenantId       | ef305038-cd12-4f3b-90bd-0612f83e14ee |
| UserId         |                                   |
| VolumeId       | babaed1a-2e9d-4b61-9631-0e9242c76c0f |
| Mountpoint     |                                   |
| Status         | error                             |
| HostInfo       | {                                 |
|                |  "platform": "x86_64",            |
|                |  "osType": "linux2",              |
|                |  "ip": "127.0.0.1"                |
|                | }                                 |
| ConnectionInfo | {                                 |
|                |  "data": {                        |
|                |   "attachment": "attachment"      |
|                |  },                               |
|                |  "additionalProperties": {        |
|                |   "attachment": "attachment"      |
|                |  }                                |
|                | }                                 |
+----------------+-----------------------------------+
```

5.3.1.5.5 Delete attachment

cinder attachment-delete

cinder results：

```
root@ubuntu:~/cinder_data_dir/cinder/contrib/block-box# cinder attachment-list
+--------------------------------------+--------------------------------------+----------+-----------+
| ID                                   | Volume ID                            | Status   | Server ID |
+--------------------------------------+--------------------------------------+----------+-----------+
| 8fa3413f-07dc-48f5-a7b2-fdbea19ded1c | c64a4d98-c194-4c75-a37b-05722c7ee349 | reserved |           |
| f7a84c08-5943-4d23-a89b-b056042a3506 | ec555584-83a0-4aef-809b-a2d2ef4c5ac5 | reserved |           |
+--------------------------------------+--------------------------------------+----------+-----------+
root@ubuntu:~/cinder_data_dir/cinder/contrib/block-box#
root@ubuntu:~/cinder_data_dir/cinder/contrib/block-box# cinder attachment-delete 8fa3413f-07dc-48f5-a7b2-fdbea19ded1c
root@ubuntu:~/cinder_data_dir/cinder/contrib/block-box# cinder attachment-list
+--------------------------------------+--------------------------------------+----------+-----------+
| ID                                   | Volume ID                            | Status   | Server ID |
+--------------------------------------+--------------------------------------+----------+-----------+
| f7a84c08-5943-4d23-a89b-b056042a3506 | ec555584-83a0-4aef-809b-a2d2ef4c5ac5 | reserved |           |
+--------------------------------------+--------------------------------------+----------+-----------+
```

Cinder compatible API results：

```
root@ubuntu:~/gopath/src/github.com/opensds/opensds# cinder attachment-list
+--------------------------------------+--------------------------------------+--------+-----------+
| ID                                   | Volume ID                            | Status | Server ID |
+--------------------------------------+--------------------------------------+--------+-----------+
| 95d4e9f5-88db-4015-9467-1ed0045b6469 | 3c51e853-51dc-4cfd-b795-8bc9b57a0b79 | error  |           |
| caa2a055-a9c2-43e0-96d4-391398f7c8b4 | bb04ad9a-75bd-40a4-ac5e-3c92a7e66956 | error  |           |
+--------------------------------------+--------------------------------------+--------+-----------+
root@ubuntu:~/gopath/src/github.com/opensds/opensds# cinder attachment-delete 95d4e9f5-88db-4015-9467-1ed0045b6469
root@ubuntu:~/gopath/src/github.com/opensds/opensds# cinder attachment-list
+--------------------------------------+--------------------------------------+--------+-----------+
| ID                                   | Volume ID                            | Status | Server ID |
+--------------------------------------+--------------------------------------+--------+-----------+
| caa2a055-a9c2-43e0-96d4-391398f7c8b4 | bb04ad9a-75bd-40a4-ac5e-3c92a7e66956 | error  |           |
+--------------------------------------+--------------------------------------+--------+-----------+
```

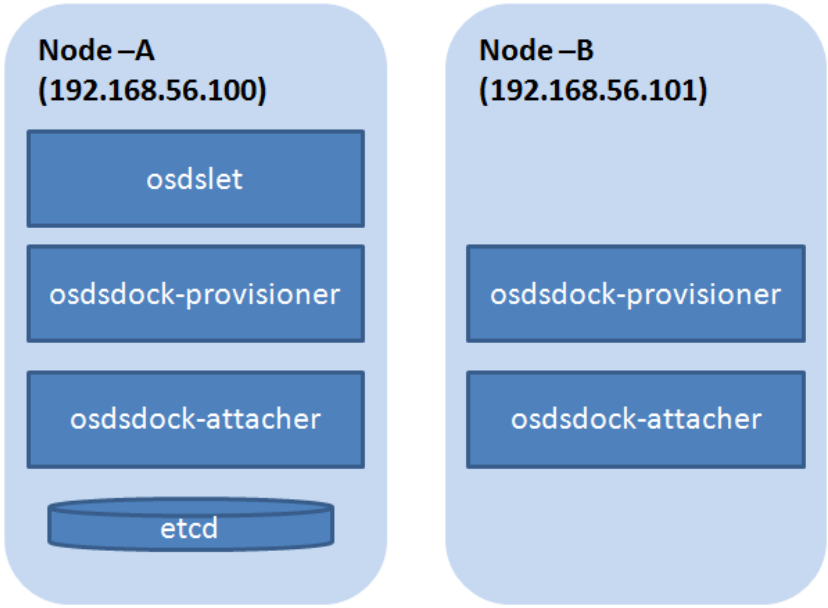
5.4 Array-based Replication using Dorado

5.4.1 Without Kubernetes

Test using Dashboard and CLI

5.4.1.1 Configuration

In host based replication scenario ,we need to depoly opensds in two nodes. Node A includes osdslet, osdsdock-provisioner, osdsdock-attacher and etcd. For simplifying the testing scenario, node B includes just only includes osdsdock-provisioner and osdsdock-attacher.



There are three configurations we need to config:

- /etc/opensds/opensds.conf
- /etc/opensds/attacher.conf
- /etc/opensds/driver/lvm.conf

An example in Node A (192.168.56.100) would be like this:

1. /etc/opensds/opensds.conf

```
[osdslet]
api_endpoint = 0.0.0.0:50040
graceful = True
log_file = /var/log/opensds/osdslet.log
socket_order = inc

[osdsdock]
api_endpoint = 192.168.56.100:50050
log_file = /var/log/opensds/osdsdock.log
# Specify which backends should be enabled, sample,ceph,cinder,lvm and so on.
enabled_backends = lvm
host_based_replication_driver=drbd

[database]
endpoint = 192.168.56.100:2379,192.168.56.101:2380
driver = etcd
[lvm]
name = lvm
description = LVM Test
driver_name = lvm
config_path = /etc/opensds/driver/lvm.yaml
```

2. /etc/opensds/attacher.conf

```
[osdsdock]
api_endpoint = localhost:50051
log_file = /var/log/opensds/osdsdock.log
bind_ip = 192.168.56.100
dock_type = attacher

[database]
endpoint = 192.168.56.100:2379,192.168.56.101:2380
driver = etcd
```

3. /etc/opensds/driver/lvm.conf

```
tgtBindIp: 192.168.56.100
pool:
  opensds-volumes-default:
    diskType: NL-SAS
    AZ: default
    extras:
      dataStorage:
        provisioningPolicy: Thin
        isSpaceEfficient: false
      ioConnectivity:
        accessProtocol: iscsi
        maxIOPS: 7000000
        maxBWS: 600
      advanced:
        diskType: SSD
        latency: 5ms
~
```

Then you can start opensds servers.

Start etcd server:

```
etcd --advertise-client-urls http://192.168.56.100:2379 --listen-client-urls http://192.168.56.100:2379 --listen-peer-urls http://127.0.0.1:2380
```

Start up osdslet:

```
osdslet --logtostderr -v 8
```

Start up osdsdock-provisioner:

```
osdsdock --logtostderr -v 8
```

Start up osdsdock-attacher:

```
osdsdock --config-file /etc/opensds/attacher.conf --logtostderr -v 8
```

In node B you just should start up osdsdock-provisioner and osdsdock-attacher.

5.4.1.2 Testing

Here is the usage of replication CLI.

1. Create replication.

Usage:

osdsctl replication create <primary volume id> <secondary volume id> [flags]

Flags:

-d, --description string the description of created replication

-h, --help help for create

-n, --name string the name of created replication

-p, --primary_driver_data string the primary replication driver data of created replication

-m, --replication_model string the replication mode of created replication, value can be sync/async

-t, --replication_period int the replication period of created replication, the value must greater than 0 (default 120)

-s, --secondary_driver_data string the secondary replication driver data of created replication

2. List replication.

Usage:

osdsctl replication list [flags]

Flags:

-h, --help help for list

Global Flags:

--debug shows debugging output.

3. Show a replication

Usage:

osdsctl replication show <replication id> [flags]

Flags:

-h, --help help for show

Global Flags:

--debug shows debugging output.

4. Enable replication.

Usage:

osdsctl replication enable <replication id> [flags]

Flags:

-h, --help help for enable

Global Flags:

--debug shows debugging output.

5.disable replication

Usage:

osdsctl replication disable <replication id> [flags]

Flags:

-h, --help help for disable

Global Flags:

--debug shows debugging output.

6. Failover replication

Usage:

osdsctl replication failover <replication id> [flags]

Flags:

-a, --allow_attached_volume whether allow attached volume when failing over replication

-h, --help help for failover

-s, --secondary_backend_id string the secondary backend id of failoverr replication

Global Flags:

--debug shows debugging output.

7. delete replication

Usage:

osdsctl replication delete <replication id> [flags]

Flags:

-h, --help help for delete

Global Flags:

--debug shows debugging output.

5.4.2 With Kubernetes

How to test CSI plugin for array-based replication will be covered later.

5.5 Host-based Replication using DRBD

5.5.1 Prepare

We need to prepare two hosts for this test, say HostA(IP: 192.168.0.131) and HostB(IP: 192.168.0.66). And before we start, please make sure the OpenSDS is already installed on both hosts. And copy *etcdctl, etcd, osdslet, osdsdock, osdsctl* to */opt/opensds/bin/*.

5.5.2 Install DRBD

Install DRBD as the following steps on both hosts:

- *sudo add-apt-repository ppa:linbit/linbit-drbd9-stack*
- *sudo apt-get update*
- *sudoapt-get install drbd-utils python-drbdmanage drbd-dkms*

5.5.3 Configuration

Before do configuration, please stop opensds service first. That is find out the process id of etcd, osdslet and osdsdock, and kill them.

Modify */etc/opensds/opensds.conf*:

- Add *host_based_replication_driver* for the *osdsdock* part on both hosts
- Change *endpoint* of *database* on hostB to the same as HostA.

Here is the example:

```
[lvm]
name = lvm
description = LVM Test
driver_name = lvm
config_path = /etc/opensds/driver/lvm.yaml

[osdslet]
api_endpoint = 0.0.0.0:50040
graceful = True
log_file = /var/log/opensds/osdslet.log
socket_order = inc
auth_strategy = noauth

[osdsdock]
api_endpoint = 192.168.0.131:50050
log_file = /var/log/opensds/osdsdock.log
# Specify which backends should be enabled, sample,ceph,cinder,lvm and so on.
enabled_backends = lvm
host_based_replication_driver = drbd

[database]
```

```
endpoint = 192.168.0.131:62379,192.168.0.131:62380
driver = etcd
```

Add a new configuration file */etc/opensds/attacher.conf* on both hosts, here is an example:

```
[osdsdock]
api_endpoint = 192.168.0.131:50051
log_file = /var/log/opensds/osdsdock.log
bind_ip = 192.168.0.131
dock_type = attacher

[database]
endpoint = 192.168.0.131:62379,192.168.0.131:62380
driver = etcd
```

Note: both hosts have the same *endpoint* of *database*, but *api_endpoint* and *bind_ip* of *osdsdock* should be the host ip respectively.

Add a new configuration file */etc/opensds/drbd.yaml* on both hosts, the content is:

```
# Minumum and Maximum TCP/IP ports used for DRBD replication
PortMin: 7000
PortMax: 8000

# Exactly two hosts between resources are replicated.
# Never ever change the Node-ID associated with a Host(name)
Hosts:
  - Hostname: ecs-37cc
    IP: 192.168.0.66
    Node-ID: 1

  - Hostname: ecs-32bc
    IP: 192.168.0.131
    Node-ID: 0
```

Note: *Hostname* and *IP* should be the real value of each hosts.

Modify */etc/opensds/driver/lvm.yaml* on hostB, change *availabilityZone* to a new value. Here is an example:

```
tgtBindIp: 192.168.0.66
tgtConfDir: /etc/tgt/conf.d
pool:
  opensds-volumes-default:
    diskType: NL-SAS
    availabilityZone: secondary
    extras:
      dataStorage:
        provisioningPolicy: Thin
        isSpaceEfficient: false
      ioConnectivity:
        accessProtocol: iscsi
        maxIOPS: 7000000
        maxBWS: 600
      advanced:
        diskType: SSD
        latency: 5ms
```

5.5.4 Create Replication

Start services on HostA:

- *cd /opt/opensds/bin*

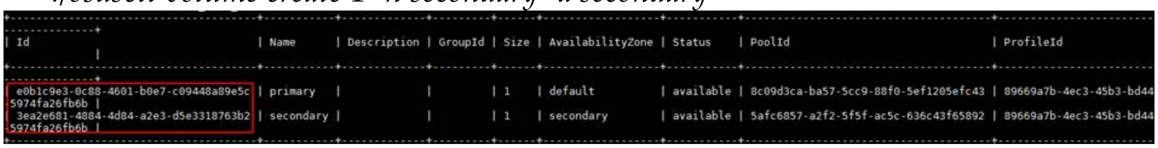
- *./etcd --advertise-client-urls http://192.168.0.131:62379 --listen-client-urls http://192.168.0.131:62379 --listen-peer-urls http://192.168.0.131:62380 --data-dir /opt/opensds/etcd/data >> /var/log/opensds/etcd.log 2>&1 &*
- *./osdslet &*
- *./osdsdock &*
- *./osdsdock --config-file /etc/opensds/attacher.conf &*

Start services on HostB:

- *./osdslet &*
- *./osdsdock &*
- *./osdsdock --config-file /etc/opensds/attacher.conf &*

Create volumes (run them on HostA or hostB):

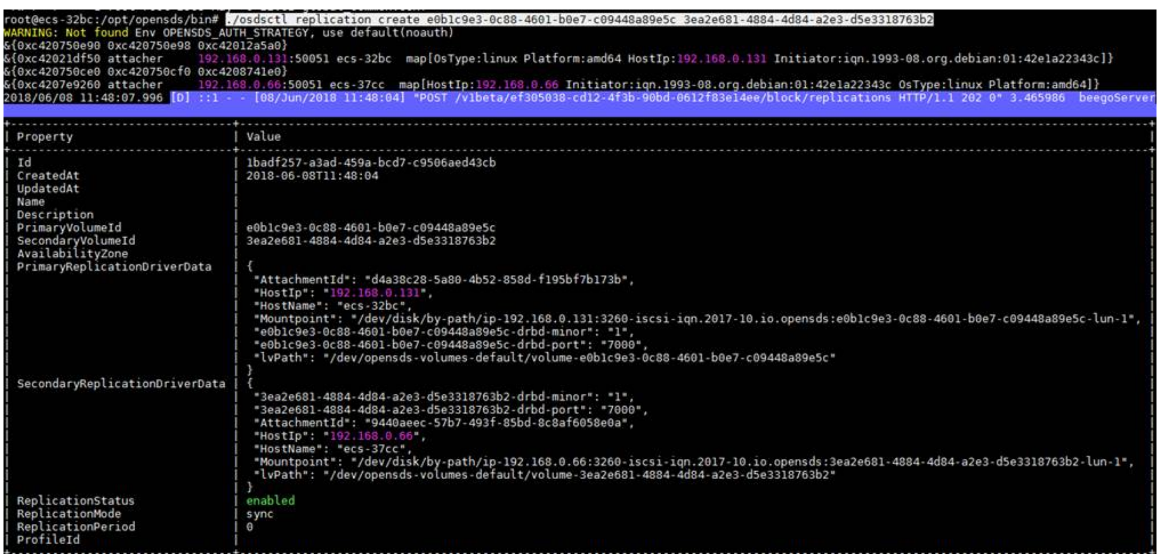
- *./osdsctl volume create 1 -n primary*
- *./osdsctl volume create 1 -n secondary -a secondary*



```
| Id                                   | Name      | Description | GroupId | Size | AvailabilityZone | Status    | PoolId                               | ProfileId
| e0b1c9e3-0c88-4601-b0e7-c09448a89e5c | primary   |             |         | 1    | default          | available | 8c09d3ca-ba57-5cc9-88f0-5ef1205efc43 | 89669a7b-4ec3-45b3-bd44
5974fa26fb6b |
| 3ea2e681-4884-4d84-a2e3-d5e3318763b2 | secondary |             |         | 1    | secondary        | available | 5afc6857-a2f2-5f5f-ac5c-636c43f65892 | 89669a7b-4ec3-45b3-bd44
5974fa26fb6b |
```

Create replication:

- *./osdsctl replication create e0b1c9e3-0c88-4601-b0e7-c09448a89e5c 3ea2e681-4884-4d84-a2e3-d5e3318763b2*



```
root@ecs-32bc:/opt/opensds/bin# ./osdsctl replication create e0b1c9e3-0c88-4601-b0e7-c09448a89e5c 3ea2e681-4884-4d84-a2e3-d5e3318763b2
WARNING: Not found Env OPENSDS_AUTH_STRATEGY, use default(noauth)
&{0xc420750e90 0xc420750e98 0xc42012a5a0}
&{0xc42021df50 attacher     192.168.0.131:50051 ecs-32bc  map[OsType:linux Platform:amd64 HostIp:192.168.0.131 Initiator:iqn.1993-08.org.debian:01:42e1a22343c]}
&{0xc420750ce0 0xc420750cf0 0xc4208741e0}
&{0xc4207e9260 attacher     192.168.0.66:50051 ecs-37cc  map[HostIp:192.168.0.66 Initiator:iqn.1993-08.org.debian:01:42e1a22343c OsType:linux Platform:amd64]}
2018/06/08 11:48:07.996 [D] ::1 - - [08/Jun/2018 11:48:04] "POST /v1beta/ef305038-cd12-4f3b-90bd-0612f83e14ee/block/replications HTTP/1.1 202 0" 3.465986  beegoServer

| Property                       | Value
| Id                             | 1badf257-a3ad-459a-bcd7-c9506aed43cb
| CreatedAt                      | 2018-06-08T11:48:04
| UpdatedAt                      |
| Name                           |
| Description                    |
| PrimaryVolumeId                | e0b1c9e3-0c88-4601-b0e7-c09448a89e5c
| SecondaryVolumeId              | 3ea2e681-4884-4d84-a2e3-d5e3318763b2
| AvailabilityZone               |
| PrimaryReplicationDriverData   | {
|                                |  "AttachmentId": "d4a38c28-5a80-4b52-858d-f195bf7b173b",
|                                |  "HostIp": "192.168.0.131",
|                                |  "HostName": "ecs-32bc",
|                                |  "Mountpoint": "/dev/disk/by-path/ip-192.168.0.131:3260-iscsi-iqn.2017-10.io.opensds:e0b1c9e3-0c88-4601-b0e7-c09448a89e5c-lun-1",
|                                |  "e0b1c9e3-0c88-4601-b0e7-c09448a89e5c-drbd-minor": "1",
|                                |  "e0b1c9e3-0c88-4601-b0e7-c09448a89e5c-drbd-port": "7000",
|                                |  "lvPath": "/dev/opensds-volumes-default/volume-e0b1c9e3-0c88-4601-b0e7-c09448a89e5c"
|                                | }
| SecondaryReplicationDriverData | {
|                                |  "3ea2e681-4884-4d84-a2e3-d5e3318763b2-drbd-minor": "1",
|                                |  "3ea2e681-4884-4d84-a2e3-d5e3318763b2-drbd-port": "7000",
|                                |  "AttachmentId": "9440aeec-57b7-493f-85bd-8c8af6058e0a",
|                                |  "HostIp": "192.168.0.66",
|                                |  "HostName": "ecs-37cc",
|                                |  "Mountpoint": "/dev/disk/by-path/ip-192.168.0.66:3260-iscsi-iqn.2017-10.io.opensds:3ea2e681-4884-4d84-a2e3-d5e3318763b2-lun-1",
|                                |  "lvPath": "/dev/opensds-volumes-default/volume-3ea2e681-4884-4d84-a2e3-d5e3318763b2"
|                                | }
| ReplicationStatus              | enabled
| ReplicationMode                | sync
| ReplicationPeriod              | 0
| ProfileId                      |
```

5.5.5 **Check result**

See the block device.

```
root@ecs-32bc:/opt/opensds/bin# lsblk
NAME                                                                  MAJ:MIN RM    SIZE RO TYPE MOUNTPOINT
sda                                                                     8:0    0      1G  0 disk
xvda                                                                  202:0    0     60G  0 disk
└─xvda1                                                               202:1    0     60G  0 part /
loop0                                                                   7:0    0     20G  0 loop
└─opensds--volumes--default-volume--e0b1c9e3--0c88--4601--b0e7--c09448a89e5c 252:0    0      1G  0 lvm
  └─drbd1                                                             147:1    0 1023.8M  1 disk
```

Create some data on HostA.

- *mkfs.ext4 /dev/drbd1*
- *mount /dev/drbd1 ./reptest/*
- *touch test*
- *dd if=/dev/zero of=./2 bs=1M count=500*
- *touch test*
- ……

Check the synchronous status on both hosts.

```
root@ecs-32bc:/opt/opensds/bin# drbdsetup status
1badf257-a3ad-459a-bcd7-c9506aed43cb role:Primary
  disk:UpToDate
  ecs-37cc role:Secondary
    peer-disk:UpToDate
```

Check if the data is updated on HostB.

- umount on HostA
- mount on HostB
- Check data on HostB, and you can see the data is updated.

```
root@ecs-37cc:/home/reptest# ll
total 512044
drwxr-xr-x 3 root root      4096 Jun  8 11:56 ./
drwxr-xr-x 4 root root      4096 Jun  8 11:54 ../
-rw-r--r-- 1 root root 524288000 Jun  8 13:39 2
-rw-r--r-- 1 root root        29 Jun  8 11:56 3
-rw-r--r-- 1 root root        29 Jun  8 11:56 4
-rw-r--r-- 1 root root        29 Jun  8 11:56 5
drwx------ 2 root root     16384 Jun  8 11:51 lost+found/
-rw-r--r-- 1 root root        29 Jun  8 11:51 test
root@ecs-37cc:/home/reptest#
```

6 OpenSDS CLI Guide

6.1 List Docks

Use the following command to display the docks information.

```
osdsctl dock list
```

Sample results are as follows:

```
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl dock list
+--------------------------------------+------+-------------+---------------------+------------+
| Id                                   | Name | Description | Endpoint            | DriverName |
+--------------------------------------+------+-------------+---------------------+------------+
| 410203b0-3bcd-5239-b9c2-3cd63d8fbdfd | lvm  | LVM Test    | 192.168.0.172:50050 | lvm        |
+--------------------------------------+------+-------------+---------------------+------------+
```

Display specific results by filter parameters. Filter parameters can be displayed by the following command.

```
osdsctl dock list -h
```

Results are as follows:

```
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl dock list -h
get all dock resources

Usage:
  osdsctl dock list [flags]

Flags:
      --description string   list docks by description
      --driverName string    list docks by driver name
      --endpoint string      list docks by endpoint
  -h, --help                 help for list
      --id string            list docks by id
      --limit string         the number of ertries displayed per page (default "50")
      --name string          list docks by name
      --offset string        all requested data offsets (default "0")
      --sortDir string       the sort direction of all requested data. supports asc or desc(default) (default "desc")
      --sortKey string       the sort key of all requested data. supports id(default), name, status, endpoint, drivername, description (default "id")
      --status string        list docks by status
      --storageType string   list docks by storage type

Global Flags:
      --debug   shows debugging output.
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds#
```

Example:

```
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl  dock list
+--------------------------------------+------+-------------+---------------------+------------+
| Id                                   | Name | Description | Endpoint            | DriverName |
+--------------------------------------+------+-------------+---------------------+------------+
| 410203b0-3bcd-5239-b9c2-3cd63d8fbdfd | lvm  | LVM Test    | 192.168.0.172:50050 | lvm        |
+--------------------------------------+------+-------------+---------------------+------------+
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl  dock list --name test
+----+------+-------------+----------+------------+------------+
| Id | Name | Description | Endpoint | DriverName | Parameters |
+----+------+-------------+----------+------------+------------+
+----+------+-------------+----------+------------+------------+
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl  dock list --name lvm
+--------------------------------------+------+-------------+---------------------+------------+
| Id                                   | Name | Description | Endpoint            | DriverName |
+--------------------------------------+------+-------------+---------------------+------------+
| 410203b0-3bcd-5239-b9c2-3cd63d8fbdfd | lvm  | LVM Test    | 192.168.0.172:50050 | lvm        |
+--------------------------------------+------+-------------+---------------------+------------+
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds#
```

6.2 List Pools

Use the following command to display the pools information.

```
osdsctl pool list
```

Sample results are as follows:

```
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl pool list
+--------------------------------------+-------------------------+-------------+--------+------------------+--------------+--------------+
| Id                                   | Name                    | Description | Status | AvailabilityZone | TotalCapacity | FreeCapacity |
+--------------------------------------+-------------------------+-------------+--------+------------------+--------------+--------------+
| 83272ab1-d97e-5706-b299-8928f8847477 | opensds-volumes-default |             |        | default          | 20           | 20           |
+--------------------------------------+-------------------------+-------------+--------+------------------+--------------+--------------+
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds#
```

Display specific results by filter parameters. Filter parameters can be displayed by the following command.

```
osdsctl pool list -h
```

Results are as follows:

```
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl pool list -h
get all pool resources

Usage:
  osdsctl pool list [flags]

Flags:
      --availabilityZone string   list pools by availability zone
      --description string        list pools by description
      --dockId string             list pools by dock id
  -h, --help                      help for list
      --id string                 list pools by id
      --limit string              the number of entries displayed per page (default "50")
      --name string               list pools by name
      --offset string             all requested data offsets (default "0")
      --sortDir string            the sort direction of all requested data. supports asc or desc(default) (default "desc")
      --sortKey string            the sort key of all requested data. supports id(default), name, status, availabilityzone, dock id, description (default "id")
      --status string             list pools by status
      --storageType string        list pools by storage type

Global Flags:
      --debug   shows debugging output.
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds#
```

Example:

```
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl pool list
+--------------------------------------+-------------------------+-------------+--------+------------------+--------------+--------------+
| Id                                   | Name                    | Description | Status | AvailabilityZone | TotalCapacity | FreeCapacity |
+--------------------------------------+-------------------------+-------------+--------+------------------+--------------+--------------+
| 83272ab1-d97e-5706-b299-8928f8847477 | opensds-volumes-default |             |        | default          | 20           | 20           |
+--------------------------------------+-------------------------+-------------+--------+------------------+--------------+--------------+
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl pool list --limit 3
+--------------------------------------+-------------------------+-------------+--------+------------------+--------------+--------------+
| Id                                   | Name                    | Description | Status | AvailabilityZone | TotalCapacity | FreeCapacity |
+--------------------------------------+-------------------------+-------------+--------+------------------+--------------+--------------+
| 83272ab1-d97e-5706-b299-8928f8847477 | opensds-volumes-default |             |        | default          | 20           | 20           |
+--------------------------------------+-------------------------+-------------+--------+------------------+--------------+--------------+
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds#
```

6.3 Create/Delete Profile

Use the following command to create profile.

```
osdsctl profile create *
```

Example:

```
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl profile create '{"name":"default","description":"default policy"}'
+-------------+--------------------------------------+
| Property    | Value                                |
+-------------+--------------------------------------+
| Id          | 879a434d-a679-44b1-8265-4ba2cff0165d |
| CreatedAt   | 2018-06-16T19:14:22                  |
| UpdatedAt   |                                      |
| Name        | default                              |
| Description | default policy                       |
| Extras      | null                                 |
+-------------+--------------------------------------+
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl profile list
+--------------------------------------+---------+----------------+
| Id                                   | Name    | Description    |
+--------------------------------------+---------+----------------+
| dde9554b-ca62-4989-9d6b-a23997883ce1 | default | default policy |
| 879a434d-a679-44b1-8265-4ba2cff0165d | default | default policy |
+--------------------------------------+---------+----------------+
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds#
```

Use the following command to delete profile.

```
osdsctl profile delete *
```

Example:

```
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl profile delete 879a434d-a679-44b1-8265-4ba2cff0165d
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl profile list
+--------------------------------------+---------+----------------+
| Id                                   | Name    | Description    |
+--------------------------------------+---------+----------------+
| dde9554b-ca62-4989-9d6b-a23997883ce1 | default | default policy |
+--------------------------------------+---------+----------------+
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds#
```

6.4 Create/Delete/Get/List Volume(s)

Use the following command to create volume.

```
osdsctl volume create 3
```

Example:

```
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl volume create 3
+------------------+--------------------------------------+
| Property         | Value                                |
+------------------+--------------------------------------+
| Id               | 2e5b76a3-8464-4fc8-9138-fda196c8d019 |
| CreatedAt        | 2018-06-16T18:24:30                  |
| UpdatedAt        |                                      |
| Name             |                                      |
| Description      |                                      |
| GroupId          |                                      |
| Size             | 3                                    |
| AvailabilityZone | default                              |
| Status           | creating                             |
| PoolId           |                                      |
| ProfileId        |                                      |
| Metadata         | map[]                                |
+------------------+--------------------------------------+
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds#
```

Use the following command to display the volume details.

```
osdsctl volume show *
```

Example:

```
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl volume show 2e5b76a3-8464-4fc8-9138-fda196c8d019
+------------------+-----------------------------------------------------------------------------------------+
| Property         | Value                                                                                   |
+------------------+-----------------------------------------------------------------------------------------+
| Id               | 2e5b76a3-8464-4fc8-9138-fda196c8d019                                                    |
| CreatedAt        | 2018-06-16T18:24:30                                                                     |
| UpdatedAt        | 2018-06-16T18:24:31                                                                     |
| Name             |                                                                                         |
| Description      |                                                                                         |
| GroupId          |                                                                                         |
| Size             | 3                                                                                       |
| AvailabilityZone | default                                                                                 |
| Status           | available                                                                               |
| PoolId           | 83272ab1-d97e-5706-b299-8928f8847477                                                    |
| ProfileId        | 65f1c4ce-cf4b-4a86-91f2-c9b40edbea4a                                                    |
| Metadata         | map[lvPath:/dev/opensds-volumes-default/volume-2e5b76a3-8464-4fc8-9138-fda196c8d019]    |
| SnapshotId       |                                                                                         |
+------------------+-----------------------------------------------------------------------------------------+
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds#
```

Use the following command to delete the volume.

```
osdsctl volume delete *
```

Example:

```
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl volume delete 2e5b76a3-8464-4fc8-9138-fda196c8d019
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl volume show 2e5b76a3-8464-4fc8-9138-fda196c8d019
ERROR: Get volume failed: specified volume(2e5b76a3-8464-4fc8-9138-fda196c8d019) can't find
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds#
```

Display specific results by filter parameters. Filter parameters can be displayed by the following command.

```
osdsctl volume list -h
```

Results are as follows:

```
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl volume list -h
list all volumes in the cluster

Usage:
  osdsctl volume list [flags]

Flags:
      --availabilityZone string   list volume by availability zone
      --description string        list volume by description
      --groupId string            list volume by volume group id
  -h, --help                      help for list
      --id string                 list volume by id
      --limit string              the number of etries displayed per page (default "50")
      --name string               list volume by name
      --offset string             all requested data offsets (default "0")
      --poolId string             list volume by poolId
      --profileId string          list volume by profile id
      --sortDir string            the sort direction of all requested data. supports asc or desc(default) (default "desc")
      --sortKey string            the sort key of all requested data. supports id(default), name, status, availabilityzone, profileid, tenantid, size, poolid, description (default "id")
      --status string             list volume by status
      --tenantId string           list volume by tenantId
      --userId string             list volume by storage userId

Global Flags:
      --debug           shows debugging output.
  -p, --profile string  the name of profile configured by admin
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds#
```

Example:

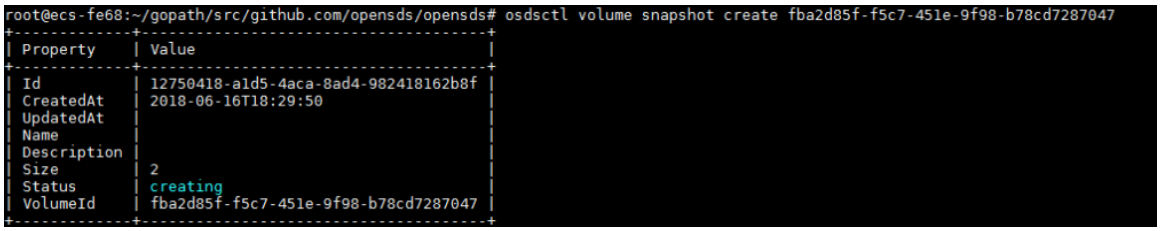
```
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl volume list
+--------------------------------------+------+-------------+---------+------+------------------+-----------+--------------------------------------+--------------------------------------+
| Id                                   | Name | Description | GroupId | Size | AvailabilityZone | Status    | PoolId                               | ProfileId                            |
+--------------------------------------+------+-------------+---------+------+------------------+-----------+--------------------------------------+--------------------------------------+
| e30867c4-8e46-4661-a119-9d9432c421e6 |      |             |         | 1    | default          | available | 273d3ce3-7728-51e1-b32d-446d33a015d6 | dde9554b-ca62-4989-9d6b-a23997883ce1 |
| 93c1cae1-7512-4d7c-81c1-60c423569f35 |      |             |         | 3    | default          | available | 273d3ce3-7728-51e1-b32d-446d33a015d6 | dde9554b-ca62-4989-9d6b-a23997883ce1 |
| 911803b4-2f47-420b-9b3a-f8062f211299 |      |             |         | 2    | default          | available | 273d3ce3-7728-51e1-b32d-446d33a015d6 | dde9554b-ca62-4989-9d6b-a23997883ce1 |
| 8bd82aab-76ee-426f-a09c-e96b4559229a |      |             |         | 4    | default          | available | 273d3ce3-7728-51e1-b32d-446d33a015d6 | dde9554b-ca62-4989-9d6b-a23997883ce1 |
| 490b9396-d020-4ac8-bc68-f93229c6a67a |      |             |         | 1    | default          | available | 273d3ce3-7728-51e1-b32d-446d33a015d6 | dde9554b-ca62-4989-9d6b-a23997883ce1 |
+--------------------------------------+------+-------------+---------+------+------------------+-----------+--------------------------------------+--------------------------------------+
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl volume list --sortKey size --sortDir asc --limit 3 --offset 1
+--------------------------------------+------+-------------+---------+------+------------------+-----------+--------------------------------------+--------------------------------------+
| Id                                   | Name | Description | GroupId | Size | AvailabilityZone | Status    | PoolId                               | ProfileId                            |
+--------------------------------------+------+-------------+---------+------+------------------+-----------+--------------------------------------+--------------------------------------+
| e30867c4-8e46-4661-a119-9d9432c421e6 |      |             |         | 1    | default          | available | 273d3ce3-7728-51e1-b32d-446d33a015d6 | dde9554b-ca62-4989-9d6b-a23997883ce1 |
| 911803b4-2f47-420b-9b3a-f8062f211299 |      |             |         | 2    | default          | available | 273d3ce3-7728-51e1-b32d-446d33a015d6 | dde9554b-ca62-4989-9d6b-a23997883ce1 |
| 93c1cae1-7512-4d7c-81c1-60c423569f35 |      |             |         | 3    | default          | available | 273d3ce3-7728-51e1-b32d-446d33a015d6 | dde9554b-ca62-4989-9d6b-a23997883ce1 |
+--------------------------------------+------+-------------+---------+------+------------------+-----------+--------------------------------------+--------------------------------------+
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds#
```

6.5 Create/Delete/Get/List Snapshot(s)

Use the following command to create snapshot.

```
osdsctl volume snapshot create *
```

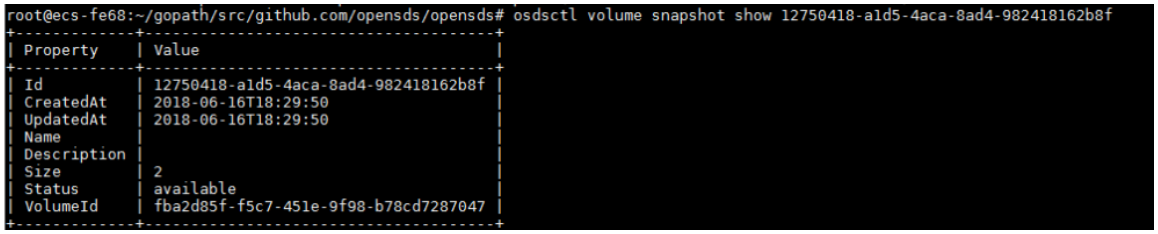
Example:



Use the following command to display snapshot details.

```
osdsctl volume snapshot show *
```

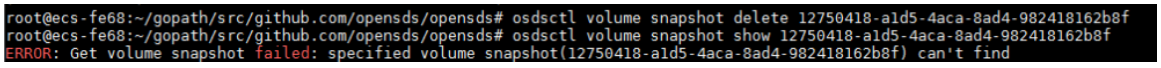
Example:



Use the following command to delete snapshot.

```
osdsctl volume snapshot delete *
```

Example:



Display specific results by filter parameters. Filter parameters can be displayed by the following command.

```
osdsctl volume snapshot list -h
```

Results are as follows:

```
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl volume snapshot list -h
list all volume snapshots in the cluster

Usage:
  osdsctl volume snapshot list [flags]

Flags:
      --description string   list volume snapshot by description
  -h, --help                 help for list
      --id string            list volume snapshot by id
      --limit string         the number of ertries displayed per page (default "50")
      --name string          list volume snapshot by Name
      --offset string        all requested data offsets (default "0")
      --sortDir string       the sort direction of all requested data. supports asc or desc(default) (default "desc")
      --sortKey string       the sort key of all requested data. supports id(default), volumeid, status, userid, tenantid, size (default "id")
      --status string        list volume snapshot by status
      --userId string        list volume snapshot by storage userId
      --volumeId string      list volume snapshot by volume id

Global Flags:
      --debug            shows debugging output.
  -p, --profile string   the name of profile configured by admin
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds#
```

6.6 Create Volume from Snapshot

Use the following command to create volume from snapshot.

```
osdsctl volume create 1 –s *
```

Example:

```
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl volume snapshot list
+--------------------------------------+------+-------------+------+-----------+--------------------------------------+
| Id                                   | Name | Description | Size | Status    | VolumeId                             |
+--------------------------------------+------+-------------+------+-----------+--------------------------------------+
| e405cf80-4679-4b12-91be-11f0282031eb |      |             | 2    | available | fba2d85f-f5c7-451e-9f98-b78cd7287047 |
+--------------------------------------+------+-------------+------+-----------+--------------------------------------+
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl volume create 2 -s e405cf80-4679-4b12-91be-11f0282031eb
+------------------+--------------------------------------+
| Property         | Value                                |
+------------------+--------------------------------------+
| Id               | 003695ae-f90a-45a6-a906-3ea6514b0ca2 |
| CreatedAt        | 2018-06-16T18:34:55                  |
| UpdatedAt        |                                      |
| Name             |                                      |
| Description      |                                      |
| GroupId          |                                      |
| Size             | 2                                    |
| AvailabilityZone | default                              |
| Status           | creating                             |
| PoolId           |                                      |
| ProfileId        |                                      |
| Metadata         | map[]                                |
+------------------+--------------------------------------+
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl volume show 003695ae-f90a-45a6-a906-3ea6514b0ca2
+------------------+-----------------------------------------------------------------------------------------+
| Property         | Value                                                                                   |
+------------------+-----------------------------------------------------------------------------------------+
| Id               | 003695ae-f90a-45a6-a906-3ea6514b0ca2                                                    |
| CreatedAt        | 2018-06-16T18:34:55                                                                     |
| UpdatedAt        | 2018-06-16T18:35:07                                                                     |
| Name             |                                                                                         |
| Description      |                                                                                         |
| GroupId          |                                                                                         |
| Size             | 2                                                                                       |
| AvailabilityZone | default                                                                                 |
| Status           | available                                                                               |
| PoolId           | 83272ab1-d97e-5706-b299-8928f8847477                                                    |
| ProfileId        | 65f1c4ce-cf4b-4a86-91f2-c9b40edbea4a                                                    |
| Metadata         | map[lvPath:/dev/opensds-volumes-default/volume-003695ae-f90a-45a6-a906-3ea6514b0ca2]    |
| SnapshotId       | e405cf80-4679-4b12-91be-11f0282031eb                                                    |
+------------------+-----------------------------------------------------------------------------------------+
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds#
```

6.7 Expand Volume

Use the following command to expand volume size.

```
osdsctl volume extend * *
```

Example:

```
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl volume extend 11a357e4-03c8-4e72-bc76-fce868ed2d10 2
+------------------+-----------------------------------------------------------------------------------------+
| Property         | Value                                                                                   |
+------------------+-----------------------------------------------------------------------------------------+
| Id               | 11a357e4-03c8-4e72-bc76-fce868ed2d10                                                    |
| CreatedAt        | 2018-06-16T18:37:18                                                                     |
| UpdatedAt        | 2018-06-16T18:37:39                                                                     |
| Name             |                                                                                         |
| Description      |                                                                                         |
| GroupId          |                                                                                         |
| Size             | 1                                                                                       |
| AvailabilityZone | default                                                                                 |
| Status           | extending                                                                               |
| PoolId           | 83272ab1-d97e-5706-b299-8928f8847477                                                    |
| ProfileId        | 65f1c4ce-cf4b-4a86-91f2-c9b40edbea4a                                                    |
| Metadata         | map[lvPath:/dev/opensds-volumes-default/volume-11a357e4-03c8-4e72-bc76-fce868ed2d10]    |
+------------------+-----------------------------------------------------------------------------------------+
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl volume show 11a357e4-03c8-4e72-bc76-fce868ed2d10
+------------------+-----------------------------------------------------------------------------------------+
| Property         | Value                                                                                   |
+------------------+-----------------------------------------------------------------------------------------+
| Id               | 11a357e4-03c8-4e72-bc76-fce868ed2d10                                                    |
| CreatedAt        | 2018-06-16T18:37:18                                                                     |
| UpdatedAt        | 2018-06-16T18:37:39                                                                     |
| Name             |                                                                                         |
| Description      |                                                                                         |
| GroupId          |                                                                                         |
| Size             | 2                                                                                       |
| AvailabilityZone | default                                                                                 |
| Status           | available                                                                               |
| PoolId           | 83272ab1-d97e-5706-b299-8928f8847477                                                    |
| ProfileId        | 65f1c4ce-cf4b-4a86-91f2-c9b40edbea4a                                                    |
| Metadata         | map[lvPath:/dev/opensds-volumes-default/volume-11a357e4-03c8-4e72-bc76-fce868ed2d10]    |
| SnapshotId       |                                                                                         |
+------------------+-----------------------------------------------------------------------------------------+
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds#
```

6.8 Create/Delete/Get/List Volume Groups

Use the following command to create volume group.

```
osdsctl volume group create --profiles *
```

Example:

```
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl volume group create --profiles dde9554b-ca62-4989-9d6b-a23997883ce1
+------------------+--------------------------------------+
| Property         | Value                                |
+------------------+--------------------------------------+
| Id               | a74480d9-9607-488b-9dd6-8b2a96d2b85c |
| CreatedAt        |                                      |
| UpdatedAt        |                                      |
| Name             |                                      |
| Status           | creating                             |
| Description      |                                      |
| Profiles         | [dde9554b-ca62-4989-9d6b-a23997883ce1] |
| AvailabilityZone | default                              |
| PoolId           |                                      |
+------------------+--------------------------------------+
```

Use the following command to show volume group.

```
osdsctl volume group show *
```

Example:

```
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl volume group show a74480d9-9607-488b-9dd6-8b2a96d2b85c
+------------------+--------------------------------------+
| Property         | Value                                |
+------------------+--------------------------------------+
| Id               | a74480d9-9607-488b-9dd6-8b2a96d2b85c |
| CreatedAt        | 2018-06-16T18:56:33                  |
| UpdatedAt        |                                      |
| Name             |                                      |
| Status           | available                            |
| Description      |                                      |
| Profiles         | [dde9554b-ca62-4989-9d6b-a23997883ce1] |
| AvailabilityZone | default                              |
| PoolId           | 273d3ce3-7728-51e1-b32d-446d33a015d6 |
+------------------+--------------------------------------+
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds#
```

Display specific results by filter parameters. Filter parameters can be displayed by the following command.

```
osdsctl volume group list -h
```

Results are as follows:

```
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl volume group list -h
List all volume groups in the cluster

Usage:
  osdsctl volume group list [flags]

Flags:
      --availabilityZone string   list volume group by availability zone
      --description string        list volume group by description
  -h, --help                      help for list
      --id string                 list volume group by id
      --limit string              the number of etries displayed per page (default "50")
      --name string               list volume group by Name
      --offset string             all requested data offsets (default "0")
      --poolId string             list volume group by pool id
      --sortDir string            the sort direction of all requested data. supports asc or desc(default) (default "desc")
      --sortKey string            the sort key of all requested data. supports id(default), name, status, availability zone, tenantid, pool id (defa
ult "id")
      --status string             list volume group by status
      --tenantId string           list volume group by tenantId
      --userId string             list volume group by storage userId

Global Flags:
      --debug           shows debugging output.
  -p, --profile string  the name of profile configured by admin
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds#
```

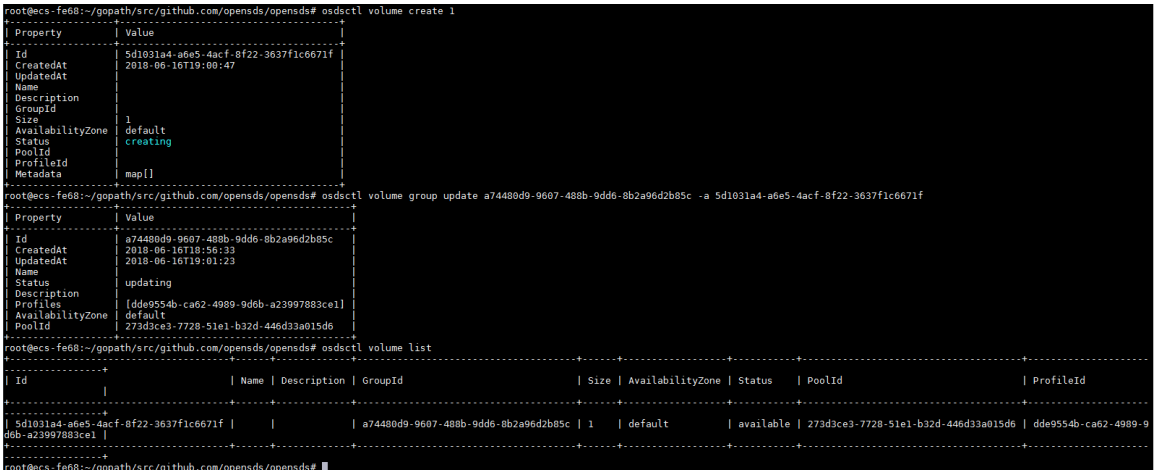
Example:

```
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl volume group list
+--------------------------------------+------+-----------+-------------+--------------------------------------+------------------+--------------------------------------+
| Id                                   | Name | Status    | Description | Profiles                             | AvailabilityZone | PoolId                               |
+--------------------------------------+------+-----------+-------------+--------------------------------------+------------------+--------------------------------------+
| a74480d9-9607-488b-9dd6-8b2a96d2b85c |      | available |             | [dde9554b-ca62-4989-9d6b-a23997883ce1] | default          | 273d3ce3-7728-51e1-b32d-446d33a015d6 |
+--------------------------------------+------+-----------+-------------+--------------------------------------+------------------+--------------------------------------+
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds# osdsctl volume group list --poolId 273d3ce3-7728-51e1-b32d-446d33a015d6
+--------------------------------------+------+-----------+-------------+--------------------------------------+------------------+--------------------------------------+
| Id                                   | Name | Status    | Description | Profiles                             | AvailabilityZone | PoolId                               |
+--------------------------------------+------+-----------+-------------+--------------------------------------+------------------+--------------------------------------+
| a74480d9-9607-488b-9dd6-8b2a96d2b85c |      | available |             | [dde9554b-ca62-4989-9d6b-a23997883ce1] | default          | 273d3ce3-7728-51e1-b32d-446d33a015d6 |
+--------------------------------------+------+-----------+-------------+--------------------------------------+------------------+--------------------------------------+
root@ecs-fe68:~/gopath/src/github.com/opensds/opensds#
```

Use the following command to update volume group.

```
osdsctl volume group update *
```

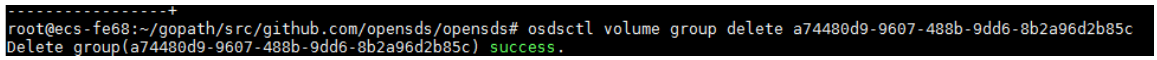
Example:



Use the following command to delete volume group.

```
osdsctl volume group delete *
```

Example:



6.9 Replication

Here is the usage of replication CLI.

1. Create replication.

Usage:

osdsctl replication create <primary volume id> <secondary volume id> [flags]

Flags:

-d, --description string the description of created replication

-h, --help help for create

-n, --name string the name of created replication

-p, --primary_driver_data string the primary replication driver data of created replication

-m, --replication_model string the replication mode of created replication, value can be sync/async

-t, --replication_period int the replication period of created replication, the value must greater than 0 (default 120)

-s, --secondary_driver_data string the secondary replication driver data of created replication

2. List replication.

Usage:

osdsctl replication list [flags]

Flags:

-h, --help help for list

Global Flags:

--debug shows debugging output.

3. Show a replication

Usage:

osdsctl replication show <replication id> [flags]

Flags:

-h, --help help for show

Global Flags:

--debug shows debugging output.

4. Enable replication.

Usage:

osdsctl replication enable <replication id> [flags]

Flags:

-h, --help help for enable

Global Flags:

--debug shows debugging output.

5.disable replication

Usage:

osdsctl replication disable <replication id> [flags]

Flags:

-h, --help help for disable

Global Flags:

--debug shows debugging output.

6. Failover replication

Usage:

osdsctl replication failover <replication id> [flags]

Flags:

-a, --allow_attached_volume whether allow attached volume when failing over replication

-h, --help help for failover

-s, --secondary_backend_id string the secondary backend id of failoverr replication

Global Flags:

--debug shows debugging output.

7. delete replication

Usage:

osdsctl replication delete <replication id> [flags]

Flags:

-h, --help help for delete

Global Flags:

--debug shows debugging output.