OpenStack Liberty: Fibre Channel Zone Manager and Pure Storage

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Summary

This document looks at the configuration of the Fibre Channel Zone Manager required to enable the Pure Storage Fibre Channel driver for Cinder that was made available from the OpenStack Liberty release.

The Fibre Channel Zone Manager (FCZM) was first introduced into OpenStack in the Icehouse release, initially only supporting Brocade fabrics, but for the Juno release Cisco added a fibre channel driver, allowing the FCZM to also control SAN fabrics from this vendor as well, including their VSAN technology. At the time of writing this document there is no virtual fabric support within the Brocade driver.

The FCZM automates the zoning attachment of hosts (initiators) and storage devices (targets) such that when an OpenStack user attaches a volume to an instance (virtual machine) the FCZM driver creates the zone in the correct fabric with the necessary initiator and target addresses.

Used together with the Pure Storage block storage driver the FCZM will also remove zones from a fabric configuration when the final volume attached to instances on a Nova compute node is detached.

By utilizing the FCZM as part of your block storage environment within OpenStack deployments you can reduce the amount of manual intervention required, thereby reducing complexity, manual error and time to implement an instance.

In addition you gain better control of your fabric environment by having consistent naming conventions and dynamic cleaning of the SAN configuration files.

Intended Audience

The intended audiences for this document include the following:

- OpenStack administrators, who configure and use OpenStack Cinder

- Pure Storage system administrators, who configure and use the Purity Operating Environment

- Pure Storage partners and solutions engineers, who support the Pure Storage FlashArray Volume Driver for OpenStack Cinder

- Fibre Channel SAN Administrators who support either Brocade or Cisco SAN switches employed within OpenStack deployments.

This guide assumes familiarity with storage and fabric networking concepts, OpenStack administration, Cinder administration, Fibre Channel Zoning administration, the Purity Operating Environment, and Pure Storage's Fibre Channel best practices.

Fibre Channel Zone Manager Methodology

Whilst it is possible to retain full manual control of your fibre channel SAN fabrics within an OpenStack deployment by using pre-zoning this document specifically describes the utilization of the automated methodology utilized by the Fibre Channel Zone Manager and the advantages that brings.

The FCZM plug-in interface API allows for third-party SAN vendors to provide drivers to enable automated active zone management. At this point only Brocade and Cisco have provided these plug-in drivers.

The implementation methodology used by the FCZM uses information provided from the Nova compute services and the Cinder Volume Manager service to complete the necessary zoning changes. The key components that are used to implement the automated zoning are:

- OpenStack Fibre Channel Zone Manager

- OpenStack Fibre Channel Zone Driver

- Brocade or Cisco Fibre Channel Zone Driver (initiated by OpenStack FC Zone Driver)

- Fibre Channel SAN Lookup Service

- Brocade or Cisco Fibre Channel SAN Lookup Service

- Cinder Volume Manager

- Fibre Channel Volume Driver (in this example Pure Storage)

When a block storage volume on the Pure Storage array is required to be made available to an OpenStack
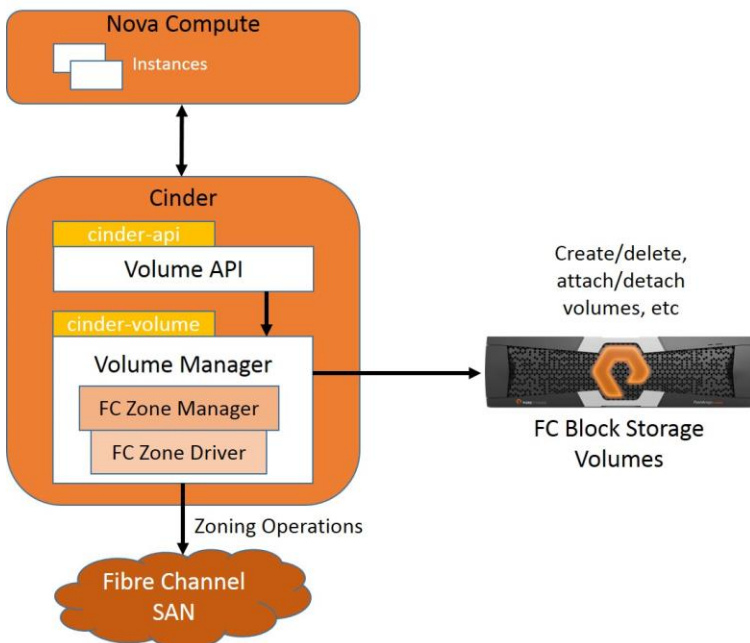
instance that resides on a Nova compute host the Nova compute service passes the Worldwide Name(s) (WWN) of the host (initiator) as part of the initialize connection call to the Cinder block storage services and the Cinder Volume Manager then calls initialize connection (volume_id, connector data) of the Pure Storage fibre channel driver. The Pure Storage fibre channel driver then queries the Worldwide Port Name(s) (WWPN) of the target storage array using a REST API call.

The Pure Storage driver next performs a lookup to determine that the correct target WWPNs are zoned to the initiator host. This is done by the Pure Storage driver making a call to the FC SAN lookup service to perform the lookup. The vendor-specific lookup service name is read from `cinder.conf`

('`fc_san_lookup_service`'). Each instance of the Pure Storage Volume Driver can use a different lookup service instance. After the lookup operation is completed, the Pure Storage driver returns the correlated initiator-to-target WWPN map to the Volume Manager, as part of the connection information.

The OpenStack Cinder FC Zone Manager is used for zone lifecycle management when FC zoning mode is enabled. The Volume Manager calls the FC Zone Manager passing the initiator-target WWPN map. The OpenStack FC Zone Manager calls the OpenStack FC Zone Driver to either add or remove connections based on the volume operations. The FC Zone Manager supplies the initiator-target WWPN map to the FC Zone Driver.

> **!** The Cisco Fibre Channel Zone Manager driver was removed in the Mitaka release

Configuration Examples

The Fibre Channel Zone Manager only requires information specific to the Brocade or Cisco SAN fabrics be added to the `/etc/cinder/cinder.conf` file so that primary fabric switch can be contacted. Creation of zones for each initiator/host to target/storage array is then handled automatically on the first request of the initiator to the target.

The following examples of are for the `/etc/cinder/cinder.conf` files in dual fabric Brocade and Cisco fibre channel OpenStack environment with a single Pure Storage array.

At a high-level the following changes need to be made:

- `zoning_mode = Fabric`, to enable FCZM, needs to be added to the `[DEFAULT]` stanza[1]

- Create a new stanza called `[fc-zone-manager]` for fabric switch vendor specific information

- Create stanzas for specific fabric, eg A and B, as defined in `[fc-zone-manager]`

- Storage backend stanzas for each Pure Storage array

Brocade Example

```
[DEFAULT]
enabled_backends = pure-fc
zoning_mode = fabric

[fc-zone-manager]
zone_driver =
cinder.zonemanager.drivers.brocade.brcd_fc_zone_driver.BrcdFCZoneDriver
brcd_sb_connector =
cinder.zonemanager.drivers.brocade.brcd_fc_zone_client_cli.BrcdFCZoneClientCLI
fc_san_lookup_service =
```

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[1] When using multi-backend configurations provide the `zoning_mode` configuration option as part of the Volume Driver configuration stanza where the `volume_driver` value is specified.

```
cinder.zonemanager.drivers.brocade.brcd_fc_san_lookup_service.BrcdFCSanLookupService
fc_fabric_names = FABRIC_A, FABRIC_B

[FABRIC_A]
fc_fabric_address = 10.209.112.34
fc_fabric_user = <username>
fc_fabric_password = <password>
principal_switch_wwn = 10:00:50:eb:1a:05:c5:5d
zoning_policy = initiator-target
zone_activate = true
zone_name_prefix = FABRIC_A_

[FABRIC_B]
fc_fabric_address = 10.209.112.35
fc_fabric_user = <username>
fc_fabric_password = <password>
principal_switch_wwn = 10:00:50:eb:1a:13:7e:ee
zoning_policy = initiator-target
zone_activate = true
zone_name_prefix = FABRIC_B_

[pure-fc]
volume_backed_name = pure-fc
volume_driver=cinder.volume.drivers.pure.PureFCDriver
san_ip=10.209.112.201
pure_api_token=12de56fa-04d5-fde4-22ed-23ed409fab65
use_multipath_for_image_xfer = True
```

 To obtain the principal switch WWN, use the **fabricShow** command on any switch in the fabric. The principal switch is denoted by the arrow (>) next to the name of the switch.

Cisco Example (Not available in Mitaka)

```
[DEFAULT]
zoning_mode=fabric
enabled_backends = pure-fc

[fc-zone-manager]
zone_driver =
cinder.zonemanager.drivers.cisco.cisco_fc_zone_driver.CiscoFCZoneDriver
fc_fabric_names = FABRIC_A, FABRIC_B
fc_san_lookup_service =
cinder.zonemanager.drivers.cisco.cisco_fc_san_lookup_service.CiscoFCSanLookupService
zone_driver =
cinder.zonemanager.drivers.cisco.cisco_fc_zone_driver.CiscoFCZoneDriver
zoning_policy = initiator-target
cisco_sb_connector =
cinder.zonemanager.drivers.cisco.cisco_fc_zone_client_cli.CiscoFCZoneClientCLI

[FABRIC_A]
cisco_fc_fabric_address = 10.209.112.36
cisco_fc_fabric_user = <username>
cisco_fc_fabric_password = <password>
cisco_fc_fabric_port = 22
```

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```
cisco_zoning_policy = initiator-target
cisco_zoning_vsan = <vsan on switch>
cisco_zone_activate = true
cisco_zone_name_prefix = FABRIC_A_

[FABRIC_B]
cisco_fc_fabric_address = 10.209.112.37
cisco_fc_fabric_user = <username>
cisco_fc_fabric_password = <password>
cisco_fc_fabric_port = 22
cisco_zoning_policy = initiator-target
cisco_zoning_vsan = <vsan on switch>
cisco_zone_activate = true
cisco_zone_name_prefix = FABRIC_B_

[pure-fc]
volume_backed_name = pure-fc
volume_driver=cinder.volume.drivers.pure.PureFCDriver
san_ip=10.209.112.201
pure_api_token=12de56fa-04d5-fde4-22ed-23ed409fab65
use_multipath_for_image_xfer = True
```

> **!** The Cisco driver supports both basic and enhanced zoning modes. The zoning VSAN must exist with an active zone set name, which is the same as the `fc_fabric_names` parameter

About the Author

As Global Solutions Architect, Simon is helping implement OpenStack technologies on Pure Storage. Core items include best practices, reference architectures and configuration guides.

With over 25 years of storage experience across all aspects of the discipline, from administration to architectural design, Simon has worked with all major storage vendors' technologies and organizations, large and small, across Europe and the USA as both customer and service provider. He also specializes in Data Migration methodologies assisting customers in their Pure Storage transition.

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