

OpenStack Cinder Fibre Channel Zone Manager Plugin

HIGHLIGHTS

- OpenStack is an open source cloud operating system delivering Infrastructure-as-a-Service (IaaS). OpenStack is optimized for enterprise environments to deliver interoperability, extensibility, and scalability of compute, network, and storage resources.
- Cinder, which is the OpenStack Block Storage service, creates a layer of abstraction that supports connectivity of multiple Internet Small Computer Systems Interface (iSCSI) and Fibre Channel (FC) storage devices.
- Brocade contributed to the OpenStack community with the creation of an FC Zone Manager that extended Cinder FC support to provide automated Storage Area Network (SAN) zoning.
- The Brocade[®] FC Zone Driver works with the OpenStack FC Zone Manager by updating the zone configuration for Brocade SAN devices.
- A Fibre Channel SAN Lookup service is being added to Cinder to ensure that the right volume is being attached to an initiator, based on SAN fabric information.

FC Zone Manager Enables Automated Zone Management

Brocade joined the OpenStack Foundation in 2011 and has been a corporate sponsor since 2012, actively driving networking architecture (frameworks, services, and Application Programming Interfaces [APIs]) in the OpenStack community. Brocade holds leadership positions in the OpenDaylight, OpenStack, and OpenFlow initiatives, chairing various work groups in these open source communities. Brocade spearheaded the formation of the group focused on Fibre Channel (FC) SAN extensions to OpenStack. Brocade contributed to the OpenStack community with the creation of an FC Zone Manager that supports key FC SAN functionality and use cases.

Why Add FC Zone Manager?

Zoning is a fabric-based service in SANs that groups host and storage nodes that need to communicate. Zoning creates a situation in which nodes (for example, host or initiators and storage array or targets) can communicate with each other only if they are members of the same zone. Before the plugin was developed, FC SANs were either prezoned or open-zoned when block storage was provisioned in OpenStack.

Prezoning introduces management complexity in cloud orchestration, since this involves considerable manual effort, both to determine the initiator-target pairs prior to volume operations and to configure the zones ahead of time. Also, this method is manual and may be error-prone. Using no zoning is not recommended, because this allows devices to have unrestricted access on the

fabric and may cause Registered State Change Notification (RSCN) storms, as well as other security vulnerabilities.

These operational complexities and limitations can be overcome by introducing automated SAN zoning at attach and detach entry points of volume operations. As part of the Cinder Block Storage services, the FC Zone Manager plugin interface API automates active zone management. This enables FC storage vendors to add support for pluggable implementations.

How Does It All Work?

Key Cinder components that support automated zone management are as follows:

- OpenStack FC Zone Manager
- OpenStack FC Zone Driver

- Brocade FC Zone Driver (initiated by the OpenStack FC Zone Driver)
- FC SAN Lookup Service
- Brocade FC SAN Lookup Service
- Volume Manager
- FC Volume Driver

When a volume needs to be attached to a host/initiator, Nova Compute passes the initiator World Wide Name (WWN) as part of the initialize connection call to Cinder. The Cinder Volume Manager, in turn, calls to initialize connection

(volume_id, connector data) of the FC Volume Driver. The World Wide Port Name (WWPN) of the Initiator is passed to the FC Volume Driver. The Volume Driver performs a lookup to determine that the correct target WWPN is mapped to the volume that is being attached. The FC Volume Driver makes a call to the FC SAN lookup service to perform this lookup. The vendor-specific lookup service name is read from cinder.conf ('fc_san_lookup_service'). Each instance of the FC Volume Driver can use a different lookup service instance.

After the lookup operation is completed, the FC Volume Driver returns the correlated initiator-to-target WWPN map to the Volume Manager, as part of the connection information.

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.

In the case of a Brocade SAN, the OpenStack FC Zone Manager calls the Brocade FC Zone Driver to perform zone management operations. The Brocade FC Zone Driver makes use of a lookup service to determine initiator-target connectivity and appropriate SAN context when zoning configuration changes need to be applied. The actual zone configuration is delegated to the appropriate connector plugins, which make use of Command Line Interface (CLI)-based calls to push the configuration to the FC SAN fabric.

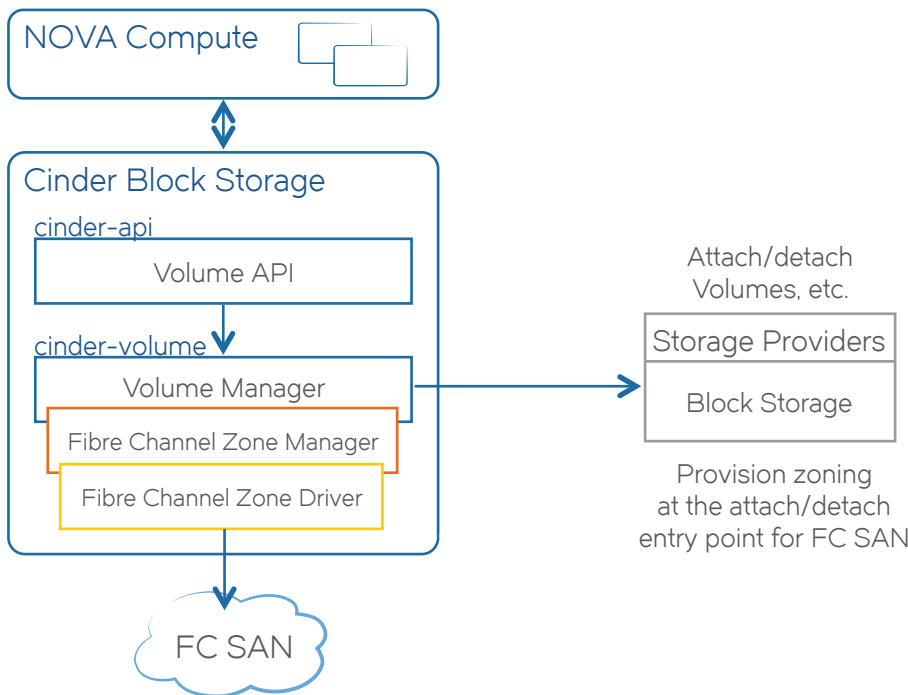


Figure 1. Volume operations: High-level component interactions with the FC Zone Manager.

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