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Configuration of FC Client

This section includes the following topics:

- About this Document
- Prerequisites
- Setting Up RedHat FC Initiator
- Setting Up SUSE Linux 11 SP4
- Setting Up XenServer 6.1.0
- Configuring Windows
- VMware ESX

About this Document

This document covers the details to configure different supported FC initiators. The FC initiator /client operating system does not recognize NexentaStor natively nor detect the ALUA-nature of the FC LUNs presented. So the steps discussed here must be executed on the client OS (FC initiator) so that when a LUN is associated with a specific initiator group it will be visible to initiators in the group. Properly configuring an FC initiator in an ALUA environment requires initiator-specific tuning.

This documentation also covers the following details:

- NexentaStor configuration used for the different supported FC initiators
- Settings for each of the FC initiators enabling them to recognize Nexenta FC LUNs correctly
Prerequisites

When setting up FC ensure that you use the following:

- Supported client operating systems and versions that have been tested by Nexenta and qualified with FC
- Supported hardware components (including firmware revisions)

**Note:**
NexentaStor Fibre Channel services are not supported in open Fibre Channel fabric. When running NexentaStor FC services, you should always implement appropriate FC fabric zoning between the NexentaStor and fibre channel client ports.

List of Supported FC Initiators

- Red Hat
- SUSE Linux 11 SP4
- Xen 6.1.0
- Windows
- VMware ESX
  
  No special configuration required.
Setting Up RedHat FC Initiator

You must set up client multipathing as shown here for a CentOS 7 system to consume FC exclusively from NexentaStor.

Edit RedHat /etc/multipath.conf File

Edit /etc/multipath.conf to add the blacklist and devices entries:

```conf
defaults {
    user_friendly_names no
    find_multipaths yes
    verbosity 2
}
blacklist {
    devnode "^(ram|raw|loop|fd|md|dm-|sr|scd|st) [0-9]*"
    devnode "^hd[a-z]"
}
blacklist_exceptions {
    device {
        vendor  "NEXENTA"
        product "COMSTAR"
    }
}
devices {
    device {
        vendor "NEXENTA"
        product "COMSTAR"
        hardware_handler "1 alua"
        path_selector "round-robin 0"
    }
}
```

**Note:**

If NexentaStor is added to a system that sees other storage that results in multipathing being already configured, do the following:

- add a device description to the devices section,
- add NexentaStor into a blacklist exception,
- set "find_multipaths" to "yes" in the defaults.

For further details on the directives used, see the multipath.conf man page for the initiator distribution.
After reconfiguring the Linux client, start the multipath daemon.

**Start Multipath Daemon**

Start the multipath daemon by running the following commands:

```bash
# modprobe dm-multipath
# service multipathd start
```

**Ensure Multipath Daemon Starts at Bootup**

Ensure the multipath daemon starts at bootup, run the following command:

```bash
# chkconfig multipathd on
```

**Verify Multipathed Devices**

Finally, to list multipathed devices, run the command:

```bash
# multipath -ll
```

Following is an output example for a deployment with redundant connectivity to two NS heads running with ALUA.

```
root@lrtsrh01]# multipath -ll
3652c261cb6ae22c23473764266f4db2c dm-15 NEXENTA ,COMSTAR
size=512G features='1 queue_if_no_path' hwhandler='1 alua' wp=rw
|--- policy='round-robin 0' prio=50 status=active
  | | - 0:0:0:0 sdg  8:96  active ready running
  | `-- 8:0:0:0 sdm  8:192 active ready running
|`-- policy='round-robin 0' prio=1 status=enabled
  |- 8:0:1:0 sds  65:32 active ready running
  `-- 0:0:1:0 sdy  65:128 active ready running
```
3652c261cb6ae22c2b8666b4ddf6c1540 dm-14 NEXENTA ,COMSTAR
size=512G features='1 queue_if_no_path' hwhandler='1 alua' wp=rw
|+- policy='round-robin 0' prio=50 status=active
|  | 0:0:0:1 sdh 8:112 active ready running
| `-- policy='round-robin 0' prio=1 status=enabled
|    `- 8:0:0:1 sdn 8:208 active ready running
`-+- policy='round-robin 0' prio=1 status=enabled
    `- 0:0:1:1 sdz 65:144 active ready running

36283879fcb8be32f4c9bb9ac7a2c024 dm-13 NEXENTA ,COMSTAR
size=512G features='1 queue_if_no_path' hwhandler='1 alua' wp=rw
|+- policy='round-robin 0' prio=50 status=active
|  `- 8:0:1:5 sdx 65:112 active ready running
`-- policy='round-robin 0' prio=1 status=enabled
     `- 0:0:1:5 sdad 65:208 active ready running

36283879fcb8be32d2ceb5f60e10b93a dm-11 NEXENTA ,COMSTAR
size=512G features='1 queue_if_no_path' hwhandler='1 alua' wp=rw
|+- policy='round-robin 0' prio=50 status=active
|  `- 8:0:1:3 sdv 65:80 active ready running
`-- policy='round-robin 0' prio=1 status=enabled
     `- 8:0:1:3 sdab 65:176 active ready running

36283879fcb8be325f41080d948601f4 dm-12 NEXENTA ,COMSTAR
size=512G features='1 queue_if_no_path' hwhandler='1 alua' wp=rw
|+- policy='round-robin 0' prio=50 status=active
|  `- 8:0:1:4 sdw 65:96 active ready running
`-- policy='round-robin 0' prio=1 status=enabled
     `- 0:0:1:4 sdac 65:192 active ready running

3652c261cb6ae22c215ed0dccb3739d62 dm-10 NEXENTA ,COMSTAR
size=512G features='1 queue_if_no_path' hwhandler='1 alua' wp=rw
|+- policy='round-robin 0' prio=50 status=active
List Devices

In the above example, you will see two sets of ports, one active (that’s the node that owns the LUN), one standby), with all ports in an "active ready running" state. This results in the device mapper creating the following nodes in /dev/disk/by-id (note that their IDs line up clearly with those used in the multipath output):

```
[root@lrtsrh01]# ls /dev/disk/by-id/dm-uuid-mpath-*
/dev/disk/by-id/dm-uuid-mpath-36283879fcbd8be32f41080d948601f4 /dev/disk/by-id/dm-uuid-mpath-36283879fcbd8be32f4c9bb9ac7a2c024 /dev/disk/by-id/dm-uuid-mpath-3652c261c6ae22c23473764266f4db2c
/dev/disk/by-id/dm-uuid-mpath-36283879fcbd8be32d2ceb5f60e10b93a /dev/disk/by-id/dm-uuid-mpath-3652c261c6ae22c215ed0dcbb3739d62 /dev/disk/by-id/dm-uuid-mpath-3652c261c6ae22c2b8666b4ddf6c1540
```

If each of these LUNs is then given a single partition, you can use these devices to reference them for filesystem or raw device consumers.

```
[root@lrtsrh01]# ls /dev/disk/by-id/dm-uuid-part1-mpath-*
/dev/disk/by-id/dm-uuid-part1-mpath-36283879fcbd8be32f41080d948601f4 /dev/disk/by-id/dm-uuid-part1-mpath-36283879fcbd8be32f4c9bb9ac7a2c024 /dev/disk/by-id/dm-uuid-part1-mpath-3652c261c6ae22c23473764266f4db2c
/dev/disk/by-id/dm-uuid-part1-mpath-36283879fcbd8be32d2ceb5f60e10b93a /dev/disk/by-id/dm-uuid-part1-mpath-3652c261c6ae22c215ed0dcbb3739d62 /dev/disk/by-id/dm-uuid-part1-mpath-3652c261c6ae22c2b8666b4ddf6c1540
```

The device identifiers are the same as the GUIDs used by COMSTAR with a protocol prefix of "3" for FC.

```bash
CLI@nexenta> for LU in $(logicalunit list -O basic | awk '{print $1}')
do
logicalunit get guid -O basic $LU
done
tank/esx/vol05 guid 62AA25D4F509A14B15EBA5E64A47D736
tank/esx/vol04 guid 62AA25D4F509A14B39A8663D9A996F60
```
tank/esx/vol02     guid  62AA25D4F509A14B472C24E4E5BB9A35
tank/esx/vol00     guid  62AA25D4F509A14B50E30343224A0E2A
tank/esx/vol01     guid  62AA25D4F509A14B74575CF4B14D5B0
tank/myvolumegroup/ubuntu70  guid  62AA25D4F509A14BB369395D6AF40387
tank/myvolumegroup/newlun     guid  62AA25D4F509A14BCB0CAB07401A4E92

In case of any issues, set verbosity to 5, restart multipathd, run "multipath -ll", and attach output to the bug report.

VMware ESX

No special configuration required. VMware recognizes NexentaStor natively and the LUNs are visible to initiators in the group.
Setting Up SUSE Linux 11 SP4

**Edit SuSe/etc/multipath.conf File**

Edit SuSe/etc/multipath.conf to add the blacklist and devices entries.

```plaintext
blacklist {
    devnode "^(ram|raw|loop|fd|md-|sr|scd|st)\[0-9\\]*"
    devnode "^hd[a-z]\[0-9\\]*"
    devnode "^cciss.c\[0-9\]d\[0-9\\].\\*"
}
devices {
    device {
        vendor "NEXENTA"
        product "COMSTAR"
        path_grouping_policy "group_by_prio"
        path_selector "round-robin 0"
        path_checker tur
        features "1 queue_if_no_path"
        hardware_handler "1 alua"
        prio "alua"
        failback immediate
        rr_weight "priorities"
        no_path_retry "queue"
        rr_min_io 100
    }
}
```

**Edit /etc/lvm/lvm.conf**

Edit /etc/lvm/lvm.conf to ensure that lvm ignores the direct paths since we are ALUA and handles the multipath devices correctly.

1. Add the following:

   ```plaintext
   multipath_component_detection = 1
   ```

2. Change the filter line to:

   ```plaintext
   /etc/lvm/lvm.conf filter
   filter = [ "r|/dev/\*\" ]
   ```
Setting Up XenServer 6.1.0

Check Version of XenServer

[root@xenserver-zhplilev ~]# cat /etc/redhat-release
XenServer release 6.1.0-59235p (xenenterprise)

Edit /etc/multipath.conf

Add the following to /etc/multipath.conf

device {
    vendor "NEXENTA"
    product "COMSTAR"
    getuid_callout "/sbin/scsi_id -g -u -s /block/%n"
    prio_callout "/sbin/mpath_prio_alua /dev/%n"
    hardware_handler "0"
    path_grouping_policy group_by_prio
    failback immediate
    no_path_retry queue
    rr_min_io 100
    path_checker tur
    rr_weight uniform
}
Configuring Windows

Prior to enabling Multipath I/O on Windows Server 2008, any COMSTAR Fibre Channel target accessible through the SAN fabric by more than one physical path is displayed as multiple disks in the Storage section of Computer Management. Each disk represents a different physical path to the same Fibre Channel target; therefore the total number of disks represents the total number of physical paths through the SAN fabric to the Fibre Channel target.

In the example below there are two physical paths to the same disc shown:
Install MPIO

To install MPIO on Windows Server 2008, start Server Manager and select Multipath I/O from the Add Features wizard. Once Multipath I/O is installed, the MPIO applet will then be added to the Control Panel.

Add Support for COMSTAR

To add support for COMSTAR Fibre Channel targets on Windows Server 2008, start the MPIO applet from the Control Panel:
View NEXENTA COMSTAR as Supported Device

The Discover Multi-Paths tab should list NEXENTA COMSTAR as an SPC-3 compliant device, click Add and then reboot the server if prompted, the Devices list under the MPIO-ed Devices tab will now show NEXENTA COMSTAR as a supported device.
Troubleshoot

If COMSTAR does not appear in the above list, do the following:

- On the Nexenta heads ensure all cards are set to target mode.
- Check all cabling to ensure there are physical paths to the COMSTAR fibre channel targets.
- If cables are not keyed (i.e. a cable can be plugged into either of the A/B ports on the GBIC) try swapping over the A/B ports.
- Ensure any fibre switches are not blocking the path due to zoning.

After enabling Multipath I/O on Windows Server 2008, any COMSTAR Fibre Channel target accessible through the SAN fabric by more than one physical path is now displayed as a single disk in the Storage section of Computer Management, irrespective of the total number of physical paths through the SAN fabric to the Fibre Channel target.
Configure MPIO Load Balancing

Finally configure MPIO load balancing policy from the disc properties (in this example we choose fail over only, however, the other available policies will also work):

Note: “Round Robin With Subset” is now preferred as failover only will use a single active path.