Abstract

This document defines the commands and the troubleshooting processes to ensure proper functioning of OpenVMS for HP 3PAR StoreServ storage versions 3.1.2 MU2/MU3, 3.1.3, and 3.2.1. HP recommends that you read the documentation included with HP Storage Works OpenVMS for HP 3PAR before you read this document.
Acknowledgments

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1 Overview

The HP 3PAR Open VMS Implementation Guide provides a set of commands and troubleshooting processes to ensure proper functioning of OpenVMS for HP 3PAR versions 3.1.2 MU2/MU3, 3.1.3, and 3.2.1.

Intended audience

This guide is intended for system and storage administrators who monitor and direct system configurations and resource allocation for the HP 3PAR StoreServ Storage system.

The tasks described in this manual assume that the administrator is familiar with OpenVMS 8.3-1H1 or OpenVMS 8.4 and the HP 3PAR OS (HP 3PAR Operating System).

This guide attempts to provide the basic information required to establish communication between HP 3PAR StoreServ Storage and the OpenVMS host operating system and to allocate the required storage for a given configuration. HP recommends that you read the appropriate HP documentation in conjunction with the OpenVMS host operating system and HBA (Host Bus Adapter) vendor documentation for specific details and procedures.

Familiarity with the following is recommended:

- SAN (Storage Area Network)
- HP 3PAR
- HP 3PAR Management Console
- HP 3PAR Inform Command line interface 3.1.2 or later

NOTE: The configurations mentioned in this document are HP recommended configurations and are provided as a reference. The configurations might vary based on your needs.

Introduction

This guide provides the following information:

- Configuring HP 3PAR StoreServ Storage system with OpenVMS v8.3-1H1 (Itanium) and v8.4 (Itanium).
- Procedure to create LUNs (Logical Units) on the HP 3PAR StoreServ Storage system for use by an OpenVMS host.
- Virtual Volume UDID and ID limits for creating Virtual Volumes that can be recognized by OpenVMS.
- Multipath setup.
- OpenVMS Boot from SAN with HP 3PAR StoreServ.
- Online HP 3PAR OS update from 3.1.1 MU2 to 3.1.2 MU3.
- Online HP 3PAR OS update from 3.1.2 MU3 to 3.1.3.
- Online HP 3PAR OS update from 3.1.3 to 3.2.1.
- Support for snapshot devices on HP 3PAR OS 3.2.1.
- Changing Virtual Volume UDIDs using CLI.

The information provided in this guide is the result of careful testing of HP 3PAR StoreServ Storage with many representative hardware and software configurations.
Prerequisite

For predictable performance and results with your HP 3PAR StoreServ Storage system, use the information in this guide in concert with the documentation set provided for HP 3PAR StoreServ Storage system and the documentation provided by the vendors for their respective products.

Supported configurations

Fibre channel connections are supported between the HP 3PAR StoreServ Storage system and the OpenVMS host OS.

Table 1 Supported array configurations

<table>
<thead>
<tr>
<th>Name</th>
<th>HP 3PAR OS</th>
<th>Host mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP 3PAR StoreServ 10000 (10400/10800) Storage</td>
<td>• HP 3PAR 3.1.2 MU2 and MU3</td>
<td>12 OpenVMS</td>
</tr>
<tr>
<td></td>
<td>• HP 3PAR 3.1.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• HP 3PAR 3.2.1</td>
<td></td>
</tr>
<tr>
<td>HP 3PAR StoreServ 7000 (7200/7400/7450) Storage</td>
<td>• HP 3PAR 3.1.2 MU2 and MU3</td>
<td>12 OpenVMS</td>
</tr>
<tr>
<td></td>
<td>• HP 3PAR 3.1.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• HP 3PAR 3.2.1</td>
<td></td>
</tr>
</tbody>
</table>

Host OS information

Table 2 Supported OpenVMS versions and mandatory patches

<table>
<thead>
<tr>
<th>OS versions</th>
<th>OS update level</th>
<th>Mandatory patches</th>
</tr>
</thead>
<tbody>
<tr>
<td>OpenVMS 8.4 i64</td>
<td>• HP I64VMS VMS84I_PCSI-V0400</td>
<td>HP I64VMS VMS84I_FIBRE_SCSI-V0600 or later</td>
</tr>
<tr>
<td></td>
<td>• HP I64VMS VMS84I_UPDATE-V0900</td>
<td></td>
</tr>
<tr>
<td>OpenVMS 8.3.1H1 i64</td>
<td>• HP I64VMS VMS831H1I_PCSI-V0300</td>
<td>HP I64VMS VMS831H1I_FIBRE_SCSI-V1200 or later</td>
</tr>
<tr>
<td></td>
<td>• HP I64VMS VMS831H1I_UPDATE-V1500</td>
<td></td>
</tr>
</tbody>
</table>

For more information on the host operating system, see the HP SPOCK website http://h20272.www2.hp.com/.

HP 3PAR OS upgrade considerations

For information about planning an online HP 3PAR OS upgrade, see the HP 3PAR Operating System Upgrade Pre-Planning Guide available on the HP Business Support Center website hp.com/go/3par/.

For information on the supported host configurations, see the HP SPOCK website http://h20272.www2.hp.com/.
2 Upgrading HP 3PAR OS

Online HP 3PAR OS upgrade (3.1.1 MU1 to 3.1.2 MU3)
Upgrade HP 3PAR OS from 3.1.1 MU1 to 3.1.1 MU2, and then perform the steps mentioned in the following section to upgrade the HP 3PAR OS from 3.1.1 MU2 to 3.1.2 MU3.

Online HP 3PAR OS upgrade (3.1.1 MU2 to 3.1.2 MU3)

Prerequisite
1. The following HP 3PAR OS components must be ready and accessible before you update the HP 3PAR array:
   • HP 3PAR OS Patch 3.1.1.P18
   • HP 3PAR OS Patch 3.1.1.P33
   • HP 3PAR OS 3.1.2.484 (MU3) or later
2. HP recommends you to back up all the data from HP 3PAR StoreServ Storage system.
3. HP 3PAR StoreServ Storage is loaded with HP 3PAR OS -3.1.1.410 (MU2).
4. All OpenVMS host persona set to 2-Generic-ALUA.
5. Knowledge of HP 3PAR CLI 3.1.2 and HP 3PAR Service Processor Onsite Customer Care - SPOCC or SP.

NOTE: HP recommends that you choose a non peak IO window with a minimum IO load from the hosts before upgrading HP 3PAR array to new HP 3PAR OS version.

To upgrade from 3.1.1 MU2 to 3.1.2 MU3 perform the following:
1. Load HP 3PAR OS Patch 3.1.1.P18.
2. Load HP 3PAR OS Patch 3.1.1.P33.
   a. Open a CLI session. Run Sethost -ovrd -persona 12 <Host Name> command to change the host persona.
3. Load HP 3PAR OS 3.1.2.484 (MU3) or later.

NOTE:
- Use **SPOCC Update Menu**→**Load Update** to load HP 3PAR OS.
- Use **SPOCC Update Menu**→**Install HP 3PAR OS Update** to install HP 3PAR OS.

Online HP 3PAR OS upgrade (3.1.2 MU1/MU2 to 3.1.2 MU3)
HP 3PAR OS online upgrade from 3.1.2 MU1 to 3.1.2 MU2/MU3 is supported.

Online HP 3PAR OS upgrade (3.1.2 MU3 to 3.1.3)
HP 3PAR OS online upgrade from 3.1.2 MU3 to 3.1.3 is supported.

Online HP 3PAR OS upgrade (3.1.3 to 3.2.1)
HP 3PAR OS online upgrade from 3.1.3 to 3.2.1 is supported.

IMPORTANT: Before you do an upgrade, install the mandatory HP 3PAR OS 3.1.3-P02 patch. For information on installing the HP 3PAR OS 3.1.3-P02 patch, see the **HP 3PAR documentation**.
3 Configuring the HP 3PAR StoreServ Storage system for fibre channel

This chapter describes how to establish a connection between an HP 3PAR StoreServ Storage system and OpenVMS host using fibre channel and to set up the fabric while running HP 3PAR OS.

For information on setting up a physical connection for a particular HP 3PAR StoreServ Storage system, see the appropriate HP 3PAR StoreServ installation manual.

Prerequisites

If you are setting up a fabric along with the installation of HP 3PAR StoreServ Storage system, see “Setting up the Fabric and Zoning” (page 22) before you configure or connect your HP 3PAR StoreServ Storage system.
4 Configuring HP 3PAR StoreServ Storage systems running HP 3PAR OS

This section describes how to configure the HP 3PAR StoreServ Storage system running HP 3PAR OS.

Ensure that you complete the following setups before connecting the HP 3PAR StoreServ Storage system port to a device.

Configuring ports for fabric connection

To configure HP 3PAR StoreServ Storage system ports for a fabric connection, complete the following procedure for each port connected to the fabric.

⚠️ CAUTION: Before taking a port offline in preparation for a fabric connection, ensure that the port has not been previously defined and it is not already connected to a host. This interrupts the existing host connection. If the HP 3PAR StoreServ Storage system port is already configured for a fabric connection, you can ignore step 2, since you do not have to take the port offline.

1. Click **HP 3PAR Management Console** and select the IP.

![Figure 1 HP 3PAR Management Console](image)

2. Enter the username and password.
3. Click **OK**.

Configuring ports using GUI

1. Click **Systems**.

2. Enter the username and password.
3. Click **OK**.
2. Expand the Storage system.
3. Right click Ports.
   The Fibre Channel Port configuration screen appears.
4. Enter the port configuration.

Configuring HP 3PAR array host ports using CLI

1. To determine if a port has already been configured for a host port in fabric mode, run the following command on the HP 3PAR Storage CLI:
   
   ```
   # showport -par
   ```

2. If the port is not configured, take the port offline before you configure it for connection to a host OS. To take the port offline, run the HP 3PAR OS CLI command `controlport offline <node:slot:port>`.
   
   ```
   # controlport offline 1:5:1
   ```
3. To configure the port to the host OS, run `controlport config host -ct point <node:slot:port>`, where `-ct point` indicates that the connection type specified is a fabric connection.

   ```bash
   # controlport config host -ct point 1:5:1
   ```

4. Reset the port by entering the `controlport rst <node:slot:port>` command.

   ```bash
   # controlport rst 1:5:1
   ```

**NOTE:** If the array host port is already in point mode, you can skip the steps.

**Creating hosts using HP 3PAR Management Console**

Use the **Create Host** window to create a host.

**Figure 4 Create host**

1. Enter the **Name**.
2. Select **OpenVMS** from **Host OS**.
   
   By default, **Persona** changes to **12 - OpenVMS**.
3. Click **Next**.

**Step 1**

To view the HBA details, run the commands as shown in **Figure 5 (page 11)**.
Step 2

NOTE: The HBA WWNs are highlighted in Figure 5 (page 11).

Figure 6 Create host

1. Click WWN of the HBA that you need to be add.
2. Click the right arrow key to assign the WWN of the host.
3. Click Finish.

The host is created.
Creating hosts using CLI

Before connecting the OpenVMS host to the HP 3PAR StoreServ Storage system, create a host definition that specifies a valid host persona for each HP 3PAR StoreServ Storage system that must be connected to a host HBA port through a fabric connection.

- To create host definitions, run the `createhost [options] <hostname> [<WWN>]` command.
  
  # createhost -persona 12 soup_778A 50060B000FD778A

- To verify that the host is created, run the `showhost` command.
  
  # showhost soup_778A

Figure 7

NOTE: For information on using the `controlport`, `createhost`, and `showhost` commands, see the HP 3PAR OS Command Line Interface Reference or the HP 3PAR Management Console Help. These documents are available at the HP website [hp.com/go/3par/](http://hp.com/go/3par/).

Allocating storage for access by the OpenVMS host

Creating Common Provisioning Groups

Figure 8

To create a CPG (Common Provisioning Group), perform the following:
1. Click **Provisioning** at the lower left corner of the screen.
2. Expand the Storage system view.
3. Right-click **CPGs**, and then click **Create CPG**.
   The **Create CPG** window appears.

**Figure 9 Create CPG**

4. On the **Create CPG** window, enter the CPG Name.
5. Select the **Device Type**.
6. Select the **Device RPM**.
7. Select the **Raid Type**.
8. Select the **Set Size** and click **Next**.
   The summary screen appears.
9. Click **Finish**.
Creating Virtual Volumes on HP 3PAR StoreServ Storage systems

This chapter describes the steps and commands required to create a Virtual Volume that can be exported for discovery by the OpenVMS host. For more information on creating Virtual Volumes on an HP 3PAR StoreServ Storage system, see the HP 3PAR OS CLI Administrator’s Manual.

For a comprehensive description of HP 3PAR OS commands, see the HP 3PAR OS Command Line Interface Reference. To obtain a copy of this documentation, go to hp.com/go/3par/, navigate to your product page, click HP Support & Drivers, and then click Manuals.

Creating Virtual Volumes

Virtual volumes are the only data layer that are visible to the hosts. After allocating space for the host OS on the HP 3PAR StoreServ Storage system, create virtual volumes.

After allocating space for the OpenVMS host, you must create the required virtual volumes on the HP 3PAR StoreServ Storage system. You can create volumes that are provisioned from one or more CPGs. Volumes can be fully provisioned from a CPG or can be thinly provisioned. You can also specify a CPG for snapshot space for fully provisioned volumes.

OpenVMS OS 8.3 1H1 Itanium supports 1023

1. From the menu bar, select Actions→Provisioning→Virtual Volume, and then click Create Virtual Volume.

   The Create Virtual Volume wizard appears.

2. Use the Create Virtual Volume wizard to create a base volume.

3. Select one of the following options from the Provisioning List:
   - Fully Provisioned from CPG
   - Thinline Provisioned

For more information on the Provisioning List for the HP 3PAR OS version that is used on the HP 3PAR StoreServ Storage system, see the HP 3PAR Management Console Help. This document is available at the HP BSC website hp.com/go/3par/.
Creating Virtual Volumes using GUI

Step 1

Figure 10 HP 3PAR Management Console

1. Click **Provisioning**.
2. Expand the **Storage Systems** view on the upper left corner of the window.
3. Click **Virtual Volume**.
Step 2

Figure 11 Create Virtual Volume

1. Right-click **Virtual Volume**.
2. Specify the name of the virtual volume in **Name**.
3. Select **Show Advanced options** panel(s).
   This is required for setting the UDID for the Virtual Volumes. Otherwise, the UDID will be allotted automatically by the HP 3PAR StoreServ Storage system.
4. Clear **Auto** to manually create an ID.
   **NOTE:** If **Auto** is selected, then the array automatically assigns the next available ID.
5. Click **Finish**.
Creating thinly-provisioned Virtual Volumes

For information on creating TPVVs (thinly provisioned virtual volumes), see the following documents:

- HP 3PAR OS Concepts Guide
- HP 3PAR OS CLI Administrator’s Manual
- HP 3PAR OS Command Line Interface Reference

These documents are available at the HP BSC website hp.com/go/3par/.

Figure 12 Create Virtual Volumes

NOTE: The maximum size of the Virtual Volume supported by OpenVMS is:

- OpenVMS OS 8.3 1H1 Itanium supports 1023 GB thin provisioned Virtual Volumes.
- OpenVMS OS 8.4 Itanium supports 2047 GB thin provisioned Virtual Volumes.

Creating Virtual Volumes using CLI

To create a fully-provisioned or thinly-provisioned Virtual Volume, run the following HP 3PAR OS CLI command:

```
# createvv [options] <usr_CPG> <VV_name> <size>[g|G|t|T]
```

Example for creating a 5 GB virtual volume by name TESTVIRTUAL VOLUME with ID 12001 is as follows:

```
# createvv -i 2000 CONN_CPG TESTLUN12345 5G
```
NOTE: To create thinly provisioned Virtual Volumes, an HP 3PAR Thin Provisioning license is required.

For more information on creating volumes for the HP 3PAR OS version that is used on the HP 3PAR StoreServ Storage system, see the HP 3PAR Management Console Help and the HP 3PAR OS Command Line Interface Reference. These documents are available at the HP BSC website hp.com/go/3par/.

NOTE: The commands and options for creating a virtual volume might differ for the previous versions of HP 3PAR OS.

Exporting virtual volumes using GUI

1. Click **Provisioning** on the lower left corner of the HP 3PAR Management Console screen.
2. Expand the storage system view.
3. Expand the virtual volumes view.
4. Click **Unexported**.
5. On the top corner of the screen, click **Virtual Volumes** in the summary view.
   The available VVs are listed.
6. Right-click **Virtual Volume** and click **Export**.

NOTE: For the New Persona 12 OpenVMS in HP 3PAR OS 3.1.2 MU2/MU3, 3.1.3, and 3.2.1, **VIRTUAL VOLUME 0** refers to SCSI controller. Therefore, **VIRTUAL VOLUME 0** is not required.
Restrictions on volume size and number

While creating Virtual Volumes and VLUNs (Virtual LUNs), adhere to the guidelines listed in the HP 3PAR OS CLI Administrator’s Manual in addition to the following cautions and guidelines:

- This configuration supports sparse Virtual Volumes (implying that LUNs may be skipped). Virtual Volumes can also be exported in a non-ascending order (for example 0, 5, 7, 3).
- The HP 3PAR StoreServ Storage system supports exportation of VLUNs with Virtual Volumes in the range 0 to 32727.

**NOTE:** HP 3PAR 3.1.3 supports UDIDs in the range 0 to 63999. However, the OVMS OS recognizes UDIDs only up to 32727.

- The maximum virtual volume size that can be exported to an OpenVMS 8.4 OS is 2,047 GB and 1023 GB for OpenVMS 8.3 1H1 OS.

**Figure 15 Create Virtual Volume**

1. Select the Show Advanced options panel(s) at the bottom of the screen.
2. Clear Auto to manually create a Virtual Volume ID.
3. Select the Virtual Volume to be exported, where you need to assign VIRTUAL VOLUME.
4. Clear Auto to assign a Virtual Volume. Otherwise, a UDID is set automatically.
5. The limit for assigning a UDID for OVMS OS is 0 – 32727.
Changing Virtual Volume UDID

Before you change the Virtual Volume UDID:

- unmount the LUN from host.
- unexport the LUN from HP 3PAR StoreServ Storage system.

To change Virtual Volume UDID using CLI:

1. Run the `showvv -d` command to view the Virtual Volumes details.

   ![Figure 16](image)

   2. Run the `setvv` command to change the UDID.

      The syntax for this command is `setvv -udid <new UDID> <LUN Name>`. Figure 17 (page 20) shows how to change the UDID of an existing Virtual Volume.

   ![Figure 17](image)

   3. Export the Virtual Volume to the host.
   4. Run the `mc sysman io auto/log` command from the OpenVMS host to check the Virtual Volume.
5. Run the `sho dev dg` command to view the Virtual Volumes in the host.
   Run the `mount` command to mount the Virtual Volume.

Figure 19

```
$ mount /over-id $1$DGA3133: $1$DGA3133:
$MOUNT-I-MOUNTED, $1$DGA3133: mounted on _$1$DGA3133: (SEN84)
$ sho dev dg

<table>
<thead>
<tr>
<th>Device</th>
<th>Device</th>
<th>Error</th>
<th>Volume</th>
<th>Free</th>
<th>Trans</th>
<th>Mnt</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Status</td>
<td>Count</td>
<td>Label</td>
<td>Blocks</td>
<td>Count</td>
<td>Cnt</td>
</tr>
<tr>
<td>$1$DGA488:</td>
<td>(SEN84) Online 0</td>
<td>I6484</td>
<td>3728880</td>
<td>331</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>$1$DGA490:</td>
<td>(SEN84) Mounted 0</td>
<td>I6484</td>
<td>3728880</td>
<td>331</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>$1$DGA494:</td>
<td>(SEN84) Online 0</td>
<td>I6484</td>
<td>3728880</td>
<td>331</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>$1$DGA503:</td>
<td>(SEN84) Online 0</td>
<td>I6484</td>
<td>3728880</td>
<td>331</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>$1$DGA506:</td>
<td>(SEN84) Online 0</td>
<td>I6484</td>
<td>3728880</td>
<td>331</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>$1$DGA513:</td>
<td>(SEN84) Mounted alloc 0</td>
<td>$1$DGA3132:</td>
<td>2096864</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>$1$DGA524:</td>
<td>(SEN84) Online 0</td>
<td>I6484</td>
<td>3728880</td>
<td>331</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
```
6 Setting up the Fabric and Zoning

Fabric zoning controls which fibre channel’s end-devices have access to each other on the fabric. Fabric zoning also isolates the host OS and the HP 3PAR StoreServ Storage system ports from RSCNs (Registered State Change Notifications) that are not relevant to these ports.

You can set up fabric zoning by associating the device WWNs (World Wide Names) or the switch ports with specified zones in the fabric. You can use either the WWN method or the port zoning method with the HP 3PAR StoreServ Storage systems. However, the WWN zoning method is recommended, because the zone survives the changes of switch ports when the cables are moved around on a fabric.

Prerequisite

Employ fabric zoning using the methods provided by the switch vendor to create relationships between the host OS HBA ports and the storage server ports before connecting the host OS HBA ports or the HP 3PAR StoreServ Storage system ports to the fabric(s). Fibre channel switch vendors support zoning of the fabric end-devices in different zoning configurations. There are both advantages and disadvantages with each zoning configuration. Select a zoning configuration based on your needs.

The HP 3PAR StoreServ Storage systems support the following zoning configurations:

- One initiator to one target per zone.
- One initiator to multiple targets per zone (zoning by HBA). This zoning configuration is recommended for the HP 3PAR StoreServ Storage system. Zoning by HBA is required for coexistence with other HP 3PAR StoreServ Storage systems.

NOTE: The storage targets in a zone can be from the same HP 3PAR StoreServ Storage system, multiple HP 3PAR StoreServ Storage systems, or a mixture of HP 3PAR StoreServ Storage systems and other HP Storage systems.

For more information about using one initiator to multiple targets per zone, see Zoning by HBA in the Best Practices chapter of the HP SAN Design Reference Guide. This document is available at the HP BSC website hp.com/go/3par/.

If you use an unsupported zoning configuration and a failure occurs, then HP requires that you implement one of the supported zoning configurations as part of the troubleshooting or corrective actions.

After configuring zoning and connecting each host OS HBA port and HP 3PAR StoreServ Storage system port to the fabric(s), verify the switch and zone configurations using the HP 3PAR OS CLI showhost command. This is to ensure that each initiator is zoned with the correct target(s).

Guidelines for configuring fabric

Use the following fabric vendor guidelines before configuring ports on fabric(s) to which the HP 3PAR StoreServ Storage system connects.

- Brocade switch ports that connect to a host OS HBA port or to an HP 3PAR StoreServ Storage system port must be set to their default mode.
  The following fill-word modes are supported on a Brocade 8 G/s switch running FOS firmware 6.4.3b or later:
  admin>portcfgfillword
  Usage: portCfgFillWord PortNumber Mode [Passive]
  Mode: 0/-idle-idle - IDLE in Link Init, IDLE as fill word (default)
  1/-arbff-arbff - ARBFF in Link Init, ARBFF as fill word
2/-idle-arbff - IDLE in Link Init, ARBFF as fill word (SW)
3/-aa-then-ia - If ARBFF/ARBFF failed, then do IDLE/ARBFF

HP recommends that you set the fill word to Mode 3 (aa-then-ia), which is the preferred mode using the portcfgfillword command. If the fill word is not correctly set, er_bad_os counters (invalid ordered set) increases when you use the portstatsshow command while connected to 8 G HBA ports, as they need the ARBFF-ARBFF fill word. Mode 3 will also work for low-speed HBAs.
For more information, see the Fabric OS command Reference Manual and the FOS Release Notes.

- The Cisco switch ports that connect to HP 3PAR StoreServ Storage system ports or host HBA ports must be set to AdminMode = FX and AdminSpeed = auto port, with the speed set to auto negotiate.

Target port limits and specifications
To avoid overwhelming a target port and to ensure continuous I/O operations, observe the following limitations on a target port:

- Maximum of 64 host OS ports per HP 3PAR StoreServ Storage system port, with a maximum of 1,024 host OS ports per HP 3PAR StoreServ Storage system.
- I/O queue depth on each HP 3PAR StoreServ Storage system HBA model must be:
  - HP 3PAR host port 8G: 3276 (V400/V800 systems only)
  - The I/O queues are shared among the connected host OS HBA ports on a first-come, first-serve basis.
  - When all the queues are in use and a host HBA port tries to initiate an I/O request, it receives target queue full response from the HP 3PAR StoreServ Storage system port. This condition can result in erratic I/O performance on each host OS. If this condition occurs, each host OS must be throttled so that it cannot overrun the HP 3PAR StoreServ Storage system port’s queues when all the host OS are delivering their maximum number of I/O requests.

NOTE: When host OS ports can access multiple targets on fabric zones, the target number assigned by the host driver for each discovered target can change when the host OS is booted and some targets are not available in the zone. This situation may change the access point of the device node during a host OS reboot. This occurs with any fabric-connected storage, and is not specific to the HP 3PAR StoreServ Storage system mentioned in this guide.
This section describes the procedure to configure Boot from SAN in OpenVMS with HP 3PAR StoreServ Storage.

1. Create a host and present the virtual volume from HP 3PAR StoreServ Storage to the host. The virtual volume $1$DGA517 is presented from HP 3PAR StoreServ Storage to the host.

2. Mount the virtual volume on the host.

3. Take an image backup of the OpenVMS OS using the backup command. For example, see the backup /image/ignore=inter/list DEEPAK$DKAO: $1$DGA517: command shown in the previous figure.

4. Set the boot option in the host by using the sys$manager:boot_options command.
   a. Enter option 1 to add an entry to the boot option list.
   b. Enter ? to view the list of all the devices that are available.
   c. Enter the device name.
Follow the instructions on the screen and enter appropriate details when you are prompted for, as shown in the following figures:
5. Enter 3 to display the boot options list.
Follow the instructions on the screen and enter appropriate details when you are prompted for, as shown in the following figure:
6. Run the Reboot command to reboot the host.

7. Run the show device dg command to view the device name from which the host is booted.
The host is now booted from the virtual volume $1DGA517$.

**NOTE:** To Boot from a SAN disk, ensure that you have the pre-requisite patch level for the OpenVMS OS as described in “Host OS information” (page 5). For Itanium systems, you must install the supported EFI firmware to enable the Boot from SAN feature. To download the firmware, go to [http://www.hp.com](http://www.hp.com), search for the HBA model, and then download it.
8 Support for Virtual Copy on HP 3PAR OS 3.2.1

This section describes the procedure to create and mount Virtual Copies of HP 3PAR Virtual Volumes on HP OpenVMS hosts. This feature is supported on HP 3PAR OS 3.2.1 or later.

1. Right-click a Virtual Volume and select Create Virtual Copy.

Figure 20

2. The Create Virtual Copy window appears. Select Show advanced options.
3. Click **OK** to complete the Virtual Copy creation task.

**NOTE:** To change the UDID, click **Show advanced options** on the GUI. However, this option is not functional in this release.

4. A Virtual Volume is created with a new UDID.
   You can change the UDID using the CLI command and then export it to an OpenVMS host.

5. Export the Virtual Volume.
6. Mount the Virtual Volume to the host using the `mount` command.

**NOTE:** Change the UDID of the new Virtual Volume before you present it to the OpenVMS host.
This section describes the procedure to create and mount physical copies of HP 3PAR virtual volumes on HP OpenVMS hosts. This feature is supported on HP 3PAR OS 3.2.1 or later.

1. Create a source and destination Virtual Volume.
   In the example, Physical_Copy is the source Virtual Volume and Physical_Copy_Destination the destination Virtual Volume.

2. Export the source Virtual Volume to the OpenVMS host.

3. Right-click the source Virtual Volume and select **Create Physical Copy**.

4. The **Create Physical Copy** window appears.
5. Select a destination volume and click OK. The physical copy creation task is completed.

6. Change the Virtual Type of the destination volume from physical copy to base before you export the destination volume. Right-click the destination volume and select Promote Physical Copy.

Figure 25

7. The Promote Physical Copy window opens. Click Yes to confirm.

8. Right-click and export the destination volume to the host.

9. Run the mount /over=id command to mount the LUN.
Different servers might have different patch requirements. The following table displays all the products installed on a test server. The listed products are part of the operating system installation, as well as other specific patches mentioned in the Host Server setup section.

OpenVMS 8.3 1H1
$ prod sho hist

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OpenVMS 8.4

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11 Troubleshooting

1. Disk device medium offline issue
   This issue is related to HP 3PAR OS 3.1.2 MU2/MU3, 3.1.3, and 3.2.1.
   The first initialization of HP 3PAR LUN after it is presented to OpenVMS host might result in
   the following medium offline error message:
   %INIT-F-MEDOFL, medium is offline

   Solution
   The following example shows how to resolve this issue:
   $ init $1$DGA450: $1$DGA450:
   %INIT-F-MEDOFL, medium is offline
   There are two paths (primary and current) from the HP 3PAR StoreServ Storage system that
   are connected to the host. Change the path to set a single path as both primary and current.
   This will resolve the medium offline issue.
   I/O paths to device
   Path FGC0.2023-0002-AC00-1ABC (PVSAND), primary
   Error count 0 Operations completed 164
   Last switched to time: Never Count 0
   Last switched from time: 13-JUL-2012 14:21:20.47
   Path FGC0.2123-0002-AC00-1ABC (PVSAND), current
   Error count 0 Operations completed 166
   Last switched to time: 13-JUL-2012 14:21:20.47 Count 1
   Last switched from time: Never
   To set the single path as primary and current path, run the following command:
   $ set device $1$DGA450: /switch/path= FGC0.2123-0002-AC00-1ABC

2. When OpenVMS Volume Shadowing is used between HP 3PAR StoreServ and other HP arrays
   (for example, HP P6000 or EVA arrays that support SCSI READL/WRITEL), the shadowing
   driver might remove the HP 3PAR LUN from the shadow set when a bad block is reported
   and the Operator log displays an error message similar to:
   "%SHADOW_SERVER-E-SSRVTERMCPY, terminating copy operation on device _DSA191: at LBN: 34404414, ID number: 1D1A3F96" and
   "%SHADOW_SERVER-E-SSRVTRMSTS, reason for termination of operation on device _DSA191: ABORT, abort.

   Details
   OpenVMS uses SCSI READL/WRITEL to signal a forced error on a particular disk block or
   LUN. During the OpenVMS volume shadow copy operation, if the source disk supports SCSI
   READL/WRITEL (for example, HP P6000 or EVA arrays), and if Forced Error is detected in
   the source disk, then the HP 3PAR StoreServ disk array LUN is removed from the shadow set.

   Solution
   For the shadow copy to proceed towards completion, do the following:
a. Identify the file corresponding to the blocks with Forced Error enabled. The block numbers are displayed in the error message by volume shadowing copy operation. Run the following OpenVMS command to identify all the blocks with Forced Error bit enabled:

$ANALYZE /DISK_STRUCTURE /READ_CHECK

b. Recreate the file to correct it.

c. If you are unable to correct the file, then restore it from a valid backup.

d. If a valid backup is not available, then do one of the following to make the shadow copy operation proceed:

- Run the $ DELETE/ERASE command to delete the original file.
- Run the BACKUP utility so that the Forced Error flags are not carried forward.

⚠ **CAUTION:** This data must be considered as degraded data as it has error block.


12 Support and other resources

Related information

Documentation

For Itanium systems, install the supported EFI firmware, see http://h20272.www2.hp.com/.
The following documents also provide information related to the HP 3PAR StoreServ Storage system and the HP 3PAR OS:

Table 3 Related information

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<td>Using HP 3PAR Remote Copy</td>
<td>HP 3PAR Remote Copy Software User’s Guide</td>
</tr>
<tr>
<td>Using HP 3PAR CIM</td>
<td>HP 3PAR CIM API Programming Reference</td>
</tr>
<tr>
<td>Updating the HP 3PAR OS</td>
<td>HP 3PAR Operating System Upgrade Pre-Planning Guide</td>
</tr>
</tbody>
</table>

You can get these documents and other documents related to HP 3PAR at hp.com/go/3par/.

⚠️ WARNING! Indicates that failure to follow directions could result in bodily harm or death.

⚠️ CAUTION: Indicates that failure to follow directions could result in damage to equipment or data.

⚠️ IMPORTANT: Provides clarifying information or specific instructions.

NOTE: Provides additional information.

🌟 TIP: Provides helpful hints and shortcuts.
13 Documentation feedback

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# Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
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<tbody>
<tr>
<td>Array</td>
<td>A disk array is a disk storage system that contains multiple disk drives.</td>
</tr>
<tr>
<td>HP 3PAR</td>
<td>Array name</td>
</tr>
<tr>
<td>LUN</td>
<td>Logical Unit Number</td>
</tr>
<tr>
<td>SAN</td>
<td>Storage Area Network</td>
</tr>
<tr>
<td>SPOCC</td>
<td>HP 3PAR Service Processor Onsite Customer Care Application</td>
</tr>
<tr>
<td>UDID</td>
<td>Unique Device Identifier</td>
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