Technical white paper

Implementation guide for OpenVMS-3PAR

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Executive Summary

This technical white paper documents command examples and troubleshooting processes is performed to ensure proper functioning of OpenVMS for 3PAR version 3.1.2 MU2.

Audience

This implementation 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 8.3-1H1or OpenVMS 8.4 and the HP 3PAR Operating System.

Although this guide attempts to provide the basic information that is required to establish communications between the HP 3PAR StoreServ Storage system and the OpenVMS host and to allocate the required storage for a given configuration, the appropriate HP documentation must be consulted in conjunction with the OpenVMS host and Host Bus Adapter (HBA) vendor documentation for specific details and procedures.

This guide is intended for users and administrators of storage area networks (SAN) that include HP 3PAR Storage.

Familiarity with the following topics is recommended:

- SAN
- 3PAR
- 3PAR Management Console
- 3PAR Inform Command line interface 3.1.1 or later

Disclaimer

The configurations in this document are HP recommended configurations. They are provided as a reference only, as configurations vary with specific customer needs. If mentioned - memory, processor count and speed, and I/O storage recommendations - should be considered as a minimum recommendation.

Introduction

This implementation guide provides you information about the following:

1. Information needed to configure HP 3PAR StoreServ Storage system with OpenVMS v8.3-1H1(Itanium) and v8.4(Itanium).
2. Basic steps to create Logical Units (LUN's) on the HP 3PAR StoreServ Storage system for use by an OpenVMS host.
3. Information on Virtual Volume UUID and ID limits which is important for creating LUN's recognizable by OpenVMS.
4. Multipath setup information
5. Information on Boot From SAN

The information contained in this implementation guide is the outcome of careful testing of the HP 3PAR StoreServ Storage system with as many representative hardware and software configurations as possible.

Pre-Requisite

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

Supported Configurations

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

Table 1. Supported Array Configurations

Name	Firmware	Host Mode
HP 3PAR StoreServ 10000 (10400/10800) Storage HP 3PAR StoreServ 7000 (7200/7400/7450) Storage	3.1.2 MU2	12 OpenVMS

Host OS Information

Table 2. OpenVMS versions Supported and mandatory patches

OS Versions	OS Update Level	Mandatory Patches
OpenVMS 8.4 IA64	HP I64VMS VMS84I_PCSI-V0400 HP I64VMS VMS84I_UPDATE-V0800	HP I64VMS VMS84I_FIBRE_SCSI-V0500 or Later
OpenVMS 8.3-1H1 IA64	HP I64VMS VMS831H1I_PCSI-V0300 HP I64VMS VMS831H1I_UPDATE-V1400	HP I64VMS VMS831H1I_FIBRE_SCSI-V1200 Or Later

For more details, refer to SPOCK.

http://spock.corp.hp.com/spock/Content/Default.aspx?start=Operating%20System

InForm OS Upgrade Considerations

For information about planning an online HP 3PAR Operating System (InForm OS) upgrade, see the HP 3PAR InForm Operating System Upgrade Pre-Planning Guide, which is available on the HP Business Support Center (BSC) website:

hp.com/go/3par/

For complete details on supported host configurations, consult the HP SPOCK website: hp.com/storage/spock

Terminology

LUN: Logical Unit Number.

Array: A disk array is a disk Storage system, which contains multiple disk drives.

UUID: Universal Unique Identifier

3PAR: Array name

Overview

This technical white paper documents command examples and troubleshooting processes is performed to ensure proper functioning of OpenVMS for 3PAR version 3.1.2 MU2.

It is expected that the documentation included with HP Storage Works OpenVMS for 3PAR has been referred prior to reading this document.

Related Documentation

The following documents also provide information related to the HP 3PAR StoreServ Storage system and the 3PAR OS:

Table 7

For information about	Refer
Specific platforms supported	Refer to http://SPOCK.corp.hp.com
HP 3PAR OS CLI commands and their usage	HP 3PAR OS Command Line Interface Reference
Using the HP 3PAR OS Management Console to configure and administer the HP 3PAR StoreServ Storage system	HP 3PAR Management Console Help
HP 3PAR StoreServ Storage system concepts and terminology	HP 3PAR InForm OS Concepts Guide
Identifying storage server components and detailed alert information	HP 3PAR InForm OS Messages and Operator's Guide
Using HP 3PAR Remote Copy	HP 3PAR Remote Copy Software User's Guide
Using HP 3PAR CIM	HP 3PAR CIM API Programming Reference
Updating the HP 3PAR OS	HP 3PAR InForm Operating System Upgrade Pre-Planning Guide

To get the documents you can login to hp.com/go/3par/

Advisories

To avoid injury to people or damage to data and equipment, be sure to observe the cautions and warnings in this guide. Always be careful when handling any electrical equipment.

Note:
Notes are reminders, tips, or suggestions that supplement the procedures included in this guide.

Required:
Requirements signify procedures that must be followed as directed in order to achieve a functional and supported implementation based on testing at HP.

Warning:
Warnings alert you to actions that can cause injury to people or irreversible damage to data or the operating system.

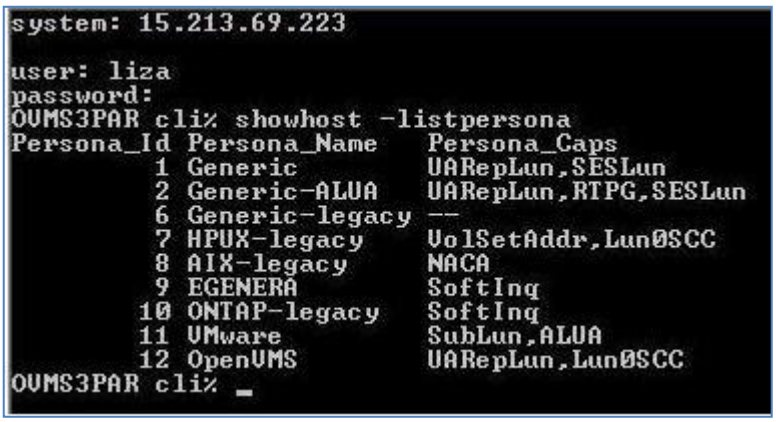
Caution:
Cautions alert you to actions that can cause damage to equipment, software, or data.

Firmware Upgrade (3.1.1 MU1/MU2 to 3.1.2 MU1/MU2)

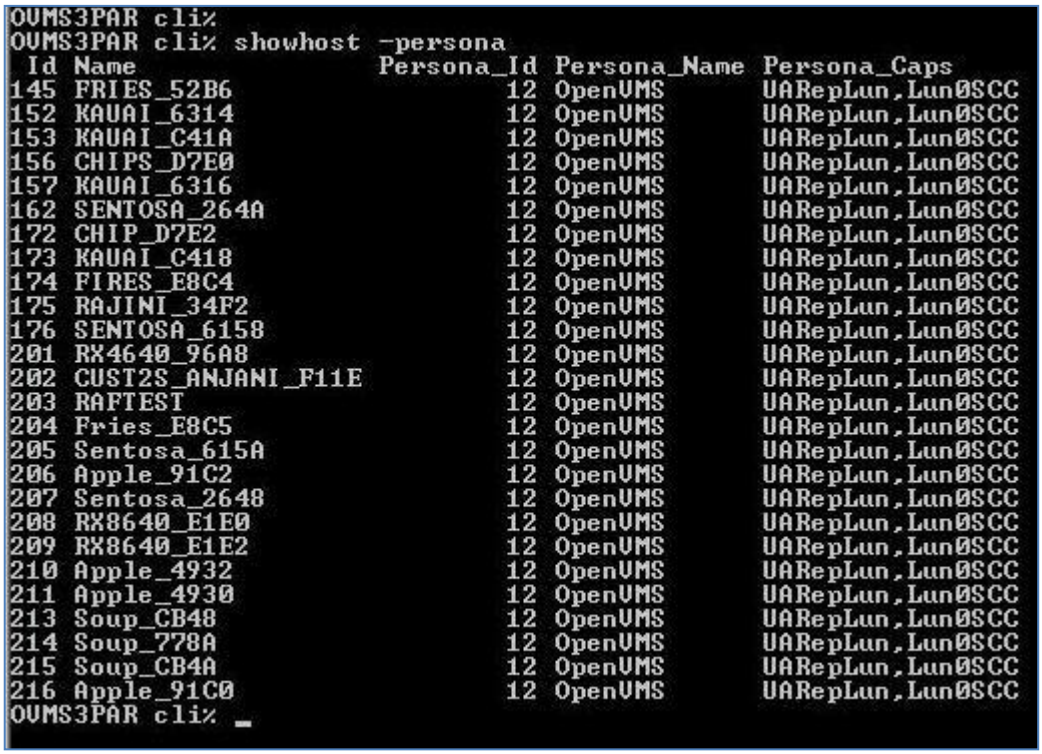
For Firmware Upgrade from **3.1.1 MU1/MU2 to 3.1.2 MU1/MU2** should follow the steps mentioned below.

STEPS:

1. Execute the CLI command "showhost –listpersona" for listing out the OpenVMS Personas available.



2. showhost –persona" will give details of your current hosts and their personas.



```
OVMS3PAR cli%
OVMS3PAR cli% showhost -persona
  Id Name                Persona_Id Persona_Name Persona_Caps
 145 FRIES_52B6                  12 OpenVMS      UARepLun,Lun0SCC
 152 KAUAI_6314                  12 OpenVMS      UARepLun,Lun0SCC
 153 KAUAI_C41A                  12 OpenVMS      UARepLun,Lun0SCC
 156 CHIPS_D7E0                  12 OpenVMS      UARepLun,Lun0SCC
 157 KAUAI_6316                  12 OpenVMS      UARepLun,Lun0SCC
 162 SENTOSA_264A                12 OpenVMS      UARepLun,Lun0SCC
 172 CHIP_D7E2                   12 OpenVMS      UARepLun,Lun0SCC
 173 KAUAI_C418                  12 OpenVMS      UARepLun,Lun0SCC
 174 FIRES_E8C4                  12 OpenVMS      UARepLun,Lun0SCC
 175 RAJINI_34F2                 12 OpenVMS      UARepLun,Lun0SCC
 176 SENTOSA_6158                12 OpenVMS      UARepLun,Lun0SCC
 201 RX4640_96A8                 12 OpenVMS      UARepLun,Lun0SCC
 202 CUST2S_ANJANI_F11E          12 OpenVMS      UARepLun,Lun0SCC
 203 RAFTEST                     12 OpenVMS      UARepLun,Lun0SCC
 204 Fries_E8C5                  12 OpenVMS      UARepLun,Lun0SCC
 205 Sentosa_615A                12 OpenVMS      UARepLun,Lun0SCC
 206 Apple_91C2                  12 OpenVMS      UARepLun,Lun0SCC
 207 Sentosa_2648                12 OpenVMS      UARepLun,Lun0SCC
 208 RX8640_E1E0                 12 OpenVMS      UARepLun,Lun0SCC
 209 RX8640_E1E2                 12 OpenVMS      UARepLun,Lun0SCC
 210 Apple_4932                  12 OpenVMS      UARepLun,Lun0SCC
 211 Apple_4930                  12 OpenVMS      UARepLun,Lun0SCC
 213 Soup_CB48                   12 OpenVMS      UARepLun,Lun0SCC
 214 Soup_778A                   12 OpenVMS      UARepLun,Lun0SCC
 215 Soup_CB4A                   12 OpenVMS      UARepLun,Lun0SCC
 216 Apple_91C0                  12 OpenVMS      UARepLun,Lun0SCC
OVMS3PAR cli% _
```

Needs to change the "2 - Generic-ALUA "to the new persona "12 OpenVMS " using
"sethost –persona 12 <hostname>" command.

Note : - Before changing the persona , disable the host port using "controlport offline <port_id>" command shown below.

3. For changing the persona type first should switch off the host port using "controlport offline <port_id>" command.

```
system: 15.213.69.223

user: liza
password:
OVMS3PAR cli% controlport offline 0:2:3

WARNING: Port 0:2:3 has active hosts that may be disrupted.

Are you sure you want to run controlport offline on port 0:2:3?
select q=quit y=yes n=no: y
OVMS3PAR cli% controlport offline 1:2:3

WARNING: Port 1:2:3 has active hosts that may be disrupted.

Are you sure you want to run controlport offline on port 1:2:3?
select q=quit y=yes n=no: y
OVMS3PAR cli% _
```

4. Use the command "sethost –persona 12 <host_name>" for changing the Persona to Persona 12.

5. After changing to the new persona the disabled ports should be re-enabled using "controlport rst <port_id>".

Note:
HP 3PAR Operating System from 3.1.1 MU1/MU2 to 3.1.2 MU1/MU2 online Firmware Upgrade is not supported.

Note:
Remove any data storage LUN 0 exported to that host, since with the new persona 12 OpenVMS the LUN 0 refers to the SCSI Controller.

Online Firmware upgrade

HP 3PAR Operating System from 3.1.2 MU1 to 3.1.2 MU2 Online Firmware Upgrade is supported.

Configuring the HP 3PAR StoreServ Storage system for Fibre Channel

The below chapter describes how to establish a connection between an HP 3PAR StoreServ Storage system and OpenVMS host using Fibre Channel and how to set up the fabric when running HP 3PAR OS.

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

Prerequisites

If you are setting up a fabric along with your installation of the HP 3PAR StoreServ Storage system, see Setting Up Fabric and Zoning before configuring or connecting your HP 3PAR StoreServ Storage system.

Configuring the HP 3PAR StoreServ Storage system Running 3PAR OS

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

The following setup must be completed before connecting the HP 3PAR StoreServ Storage system port to a device.

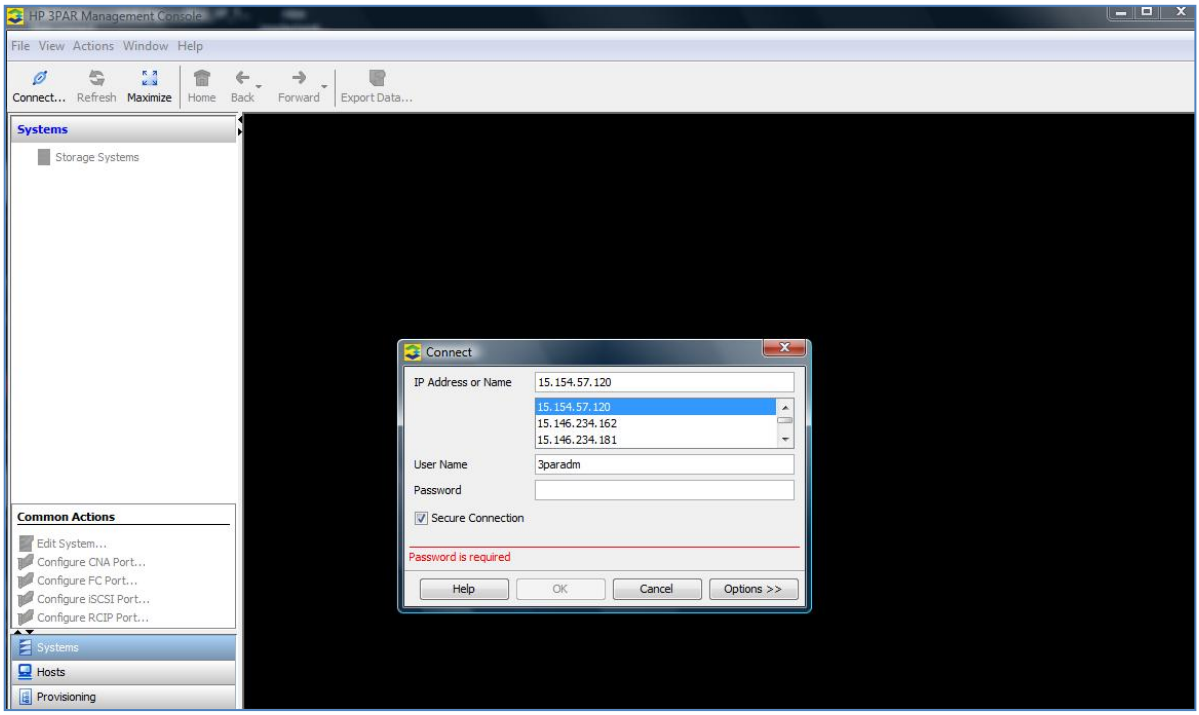
Configuring Ports for Fabric Connection

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

Caution:
Before taking a port offline in preparation for a fabric connection, you should verify that the port has not been previously defined and that it is not already connected to a host; as this would interrupt 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

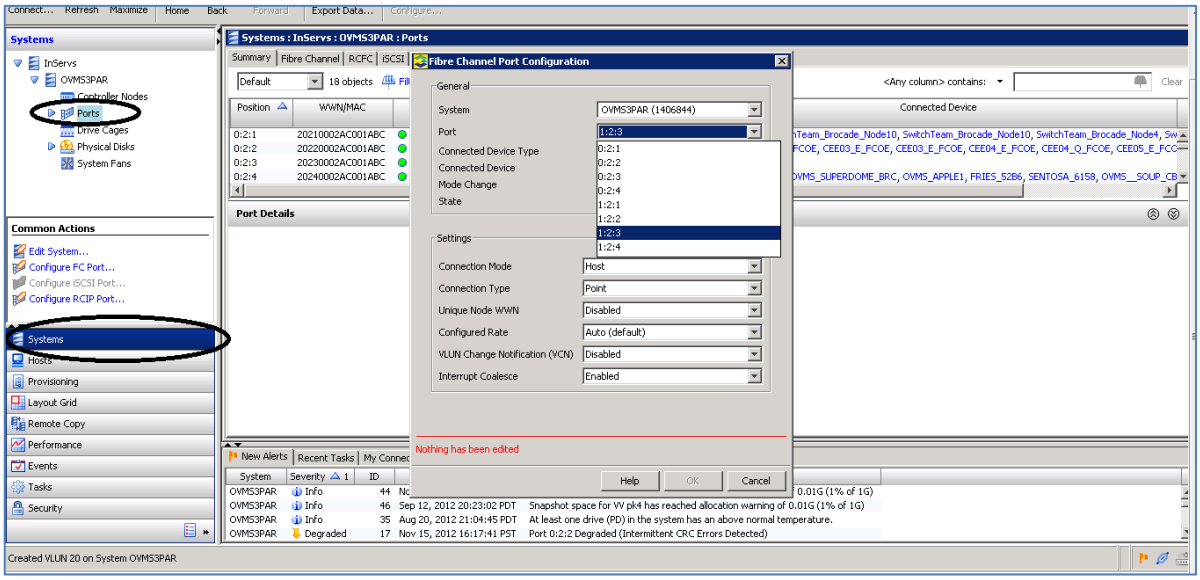
Figure 1:



2. Fill the username and password column
3. Click **OK** to proceed

Configuring the PORT using GUI

Figure 2



1. Click **Systems.**
2. Expand **In servers.**

   Top-right you can see ports.
3. Right-click **Ports.**

   The **Fibre Channel Port configuration** screens appears.
4. Fill the table for the port configuration.

Configure the PORTS using CLI

1. To determine if a port has already been configured for a host port in fabric mode, issue showport -par on the HP 3PAR Storage CLI

   ```
   # showport -par
   ```

Figure 3

```
OVMS3PAR cli% showport -par
N:S:P Connmode ConnType CfgRate MaxRate Class2   UniqNodeWwn VCN      IntCoal
0:2:1 host     point    auto    8Gbps   disabled disabled    disabled enabled
0:2:2 host     point    auto    8Gbps   disabled disabled    disabled enabled
0:2:3 host     point    auto    8Gbps   disabled disabled    disabled enabled
0:2:4 host     point    auto    8Gbps   disabled disabled    disabled enabled
0:6:1 disk     loop     auto    8Gbps   disabled disabled    disabled enabled
0:6:2 disk     loop     auto    8Gbps   disabled disabled    disabled enabled
0:6:3 disk     loop     auto    8Gbps   disabled disabled    disabled enabled
0:6:4 disk     loop     auto    8Gbps   disabled disabled    disabled enabled
1:2:1 host     point    auto    8Gbps   disabled disabled    disabled enabled
1:2:2 host     point    auto    8Gbps   disabled disabled    disabled enabled
1:2:3 host     point    auto    8Gbps   disabled disabled    disabled enabled
1:2:4 host     point    auto    8Gbps   disabled disabled    disabled enabled
1:6:1 disk     loop     auto    8Gbps   disabled disabled    disabled enabled
1:6:2 disk     loop     auto    8Gbps   disabled disabled    disabled enabled
1:6:3 disk     loop     auto    8Gbps   disabled disabled    disabled enabled
1:6:4 disk     loop     auto    8Gbps   disabled disabled    disabled enabled
-------------------------------------------------------------------------------
16
OVMS3PAR cli%
```

2. If the port has not been configured, take the port offline before configuring it for connection to a host server. To take the port offline, issue the 3PAR OS CLI command controlport offline <node:slot:port>.

   ```
   # controlport offline 1:5:1
   ```

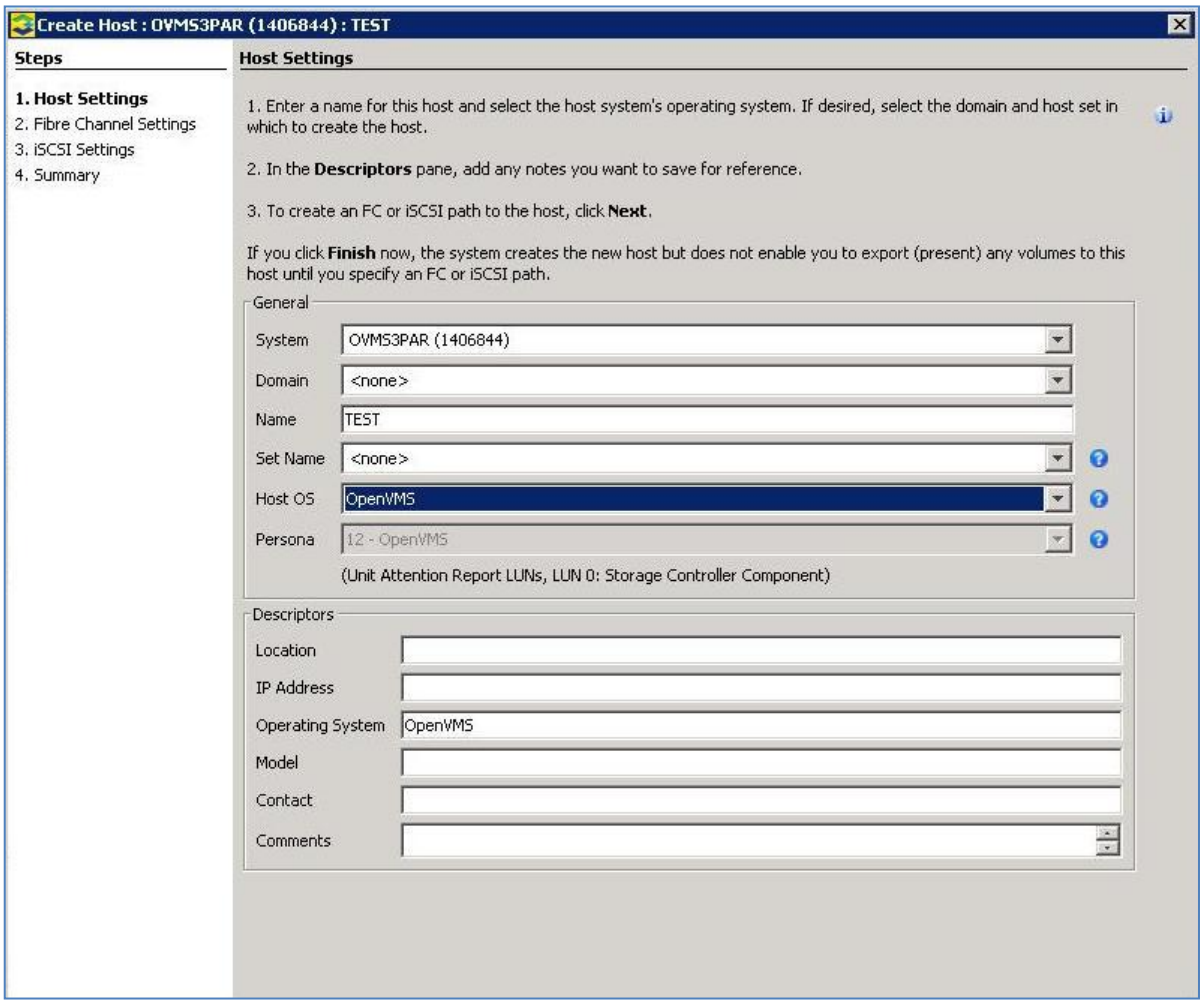
3. To configure the port to the host server, issue controlport config host –ct point <node:slot:port>, where -ct point indicates that the connection type specified is a fabric connection. For example:

```
# controlport config host –ct point 1:5:1
```

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

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

Creating a Host using HP 3PAR Management Console



- Fill up the name column
- Select **OpenVMS** in Host OS (By default Persona will change to 12 - OpenVMS)
- Click on Next

Step 3
To know HBA details, follow the steps mentioned in the screen shot

---

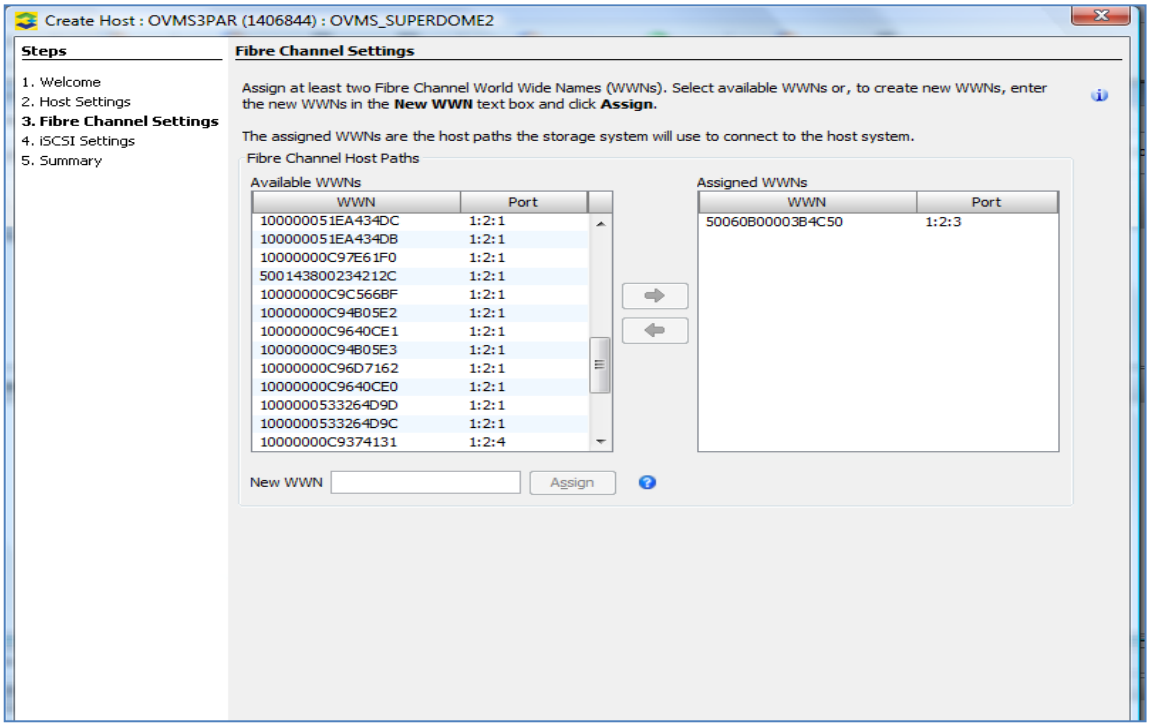
Note :
The HBA WWNs are marked in the Figure 6 screenshot.

Figure 6

```
$ show dev fg /full

Device FGA0:, device type QLogic ISP23xx FibreChannel, is online, shareable,
    error logging is enabled.

    Error count                    0    Operations completed                35
    Owner process                 ""    Owner UIC                      [SYSTEM]
    Owner process ID        00000000    Dev Prot               S:RWPL,O:RWPL,G,W
    Reference count                0    Default buffer size                 0
    Current preferred CPU Id       7    Fastpath                            1
    Current Interrupt CPU Id       7
    FC Port Name 5006-0B00-0039-67E0    FC Node Name        5006-0B00-0039-67E1

Device FGB0:, device type QLogic ISP23xx FibreChannel, is online, shareable,
    error logging is enabled.

    Error count                    0    Operations completed               120
    Owner process                 ""    Owner UIC                      [SYSTEM]
    Owner process ID        00000000    Dev Prot               S:RWPL,O:RWPL,G,W
    Reference count                0    Default buffer size                 0
    Current preferred CPU Id       0    Fastpath                            1
    Current Interrupt CPU Id       0
    FC Port Name 5006-0B00-0039-67E2    FC Node Name        5006-0B00-0039-67E3

Device FGC0:, device type QLogic ISP24xx FibreChannel, is online, shareable,
    error logging is enabled.

    Error count                    0    Operations completed                48
    Owner process                 ""    Owner UIC                      [SYSTEM]
    Owner process ID        00000000    Dev Prot               S:RWPL,O:RWPL,G,W
    Reference count                0    Default buffer size                 0
    Current preferred CPU Id       5    Fastpath                            1
    Current Interrupt CPU Id       5
    FC Port Name 5006-0B00-003B-4C50    FC Node Name        5006-0B00-003B-4C51
```

Step 4

Figure 7



1. Click the **WWN** of the HBA that needs to be added
2. Click **right-arrow** to assign the WWN of the host.
3. Click the **Finish** button

   Host is created

Creating a Host 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 is to be connected to a host HBA port through a fabric connection.

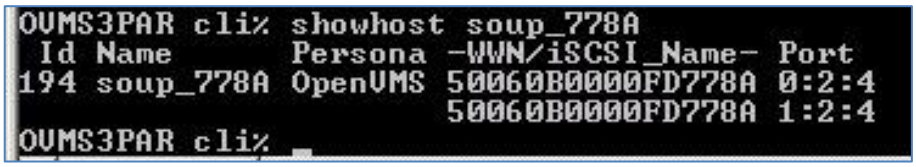
- To create host definitions, issue the createhost [options] <hostname> [<WWN>]

```
# createhost -persona 12 soup_778A 50060B0000FD778A
```

- To verify that the host has been created, issue the showhost command.

```
# showhost soup_778A
```

Figure 8



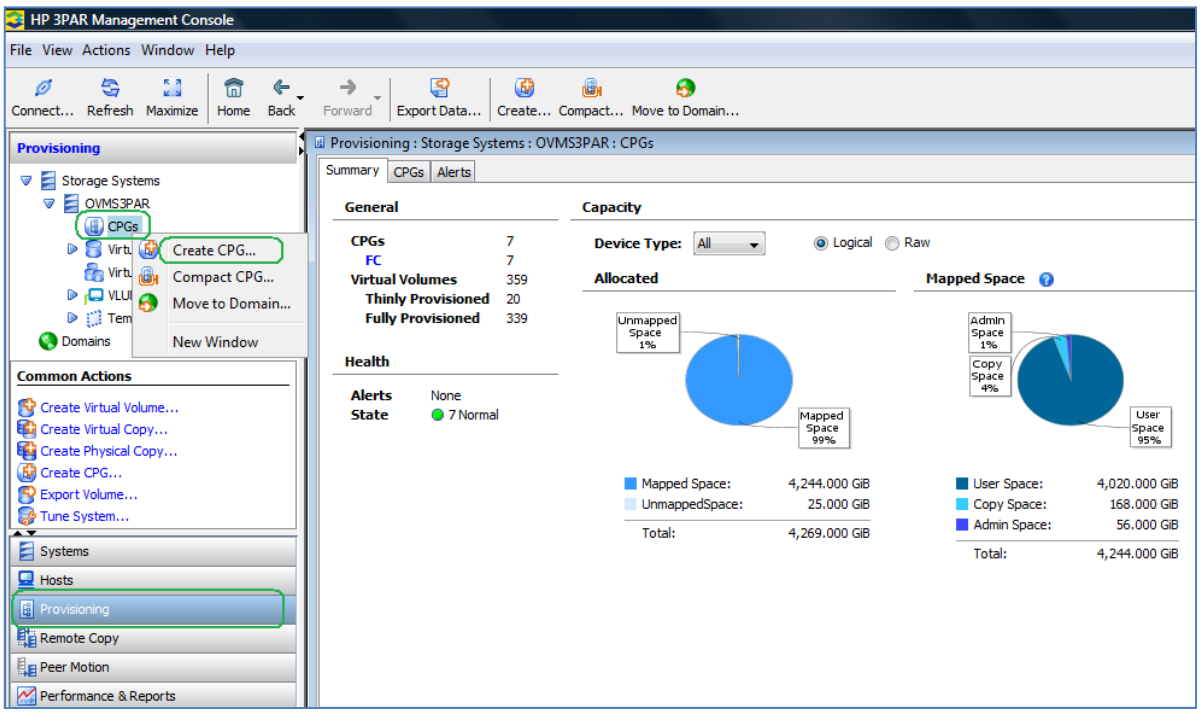
Note:
See the HP 3PAR Inform OS Command Line Interface Reference or the HP 3PAR Management Console Help for complete details on using the controlport, createhost, and showhost commands.

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

Allocating Storage for Access by the OpenVMS Host

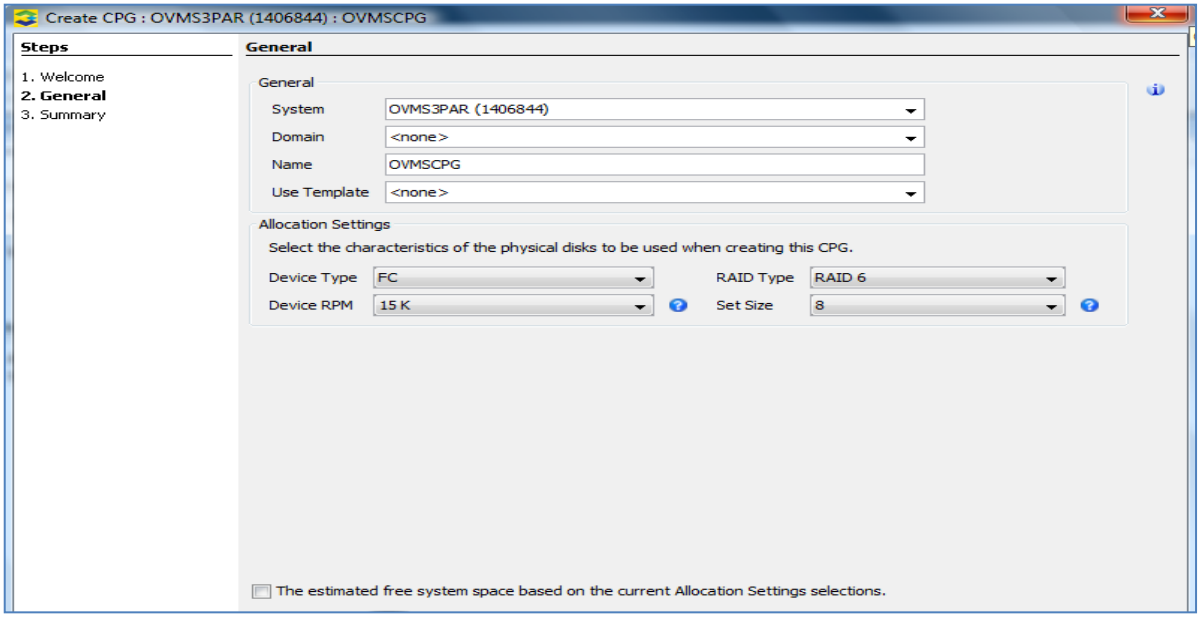
Creating a Common Provisioning Group (CPG)

Figure 9



1. Click **Provisioning** on the bottom-left of the screen
2. Expand the Storage system view, if it is not already expanded
3. Right-click **CPGs**
4. Click **Create CPG**

Figure 10



1. On the Create CPG Screen, Provide the Name of CPG

2. Select the **Device Type**
3. Select the **Device RPM**
4. Select the **Raid Type**
5. Select the **Set Size** and click **Next**
   The summary screen appears.
6. Click **Finish**.

Creating Virtual Volumes on the HP 3PAR StoreServ Storage system

This section describes the general steps and commands that are required to create the virtual volumes (VVs) that can be exported for discovery by the OpenVMS host.

For additional information, see the HP 3PAR InForm OS CLI Administrator's Manual. For a comprehensive description of InForm OS commands, see the HP 3PAR Inform 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 visible to hosts. After devising a plan for allocating space for host servers on the HP 3PAR StoreServ Storage system, create the virtual volumes.

After devising a plan for allocating space for the OpenVMS host, you need to create the required virtual volumes on the HP 3PAR StoreServ Storage system. You can create volumes that are provisioned from one or more common provisioning groups (CPGs). Volumes can be fully provisioned from a CPG or can be thinly provisioned. You can optionally specify a CPG for snapshot space for fully provisioned volumes.

Using the 3PAR Management Console:

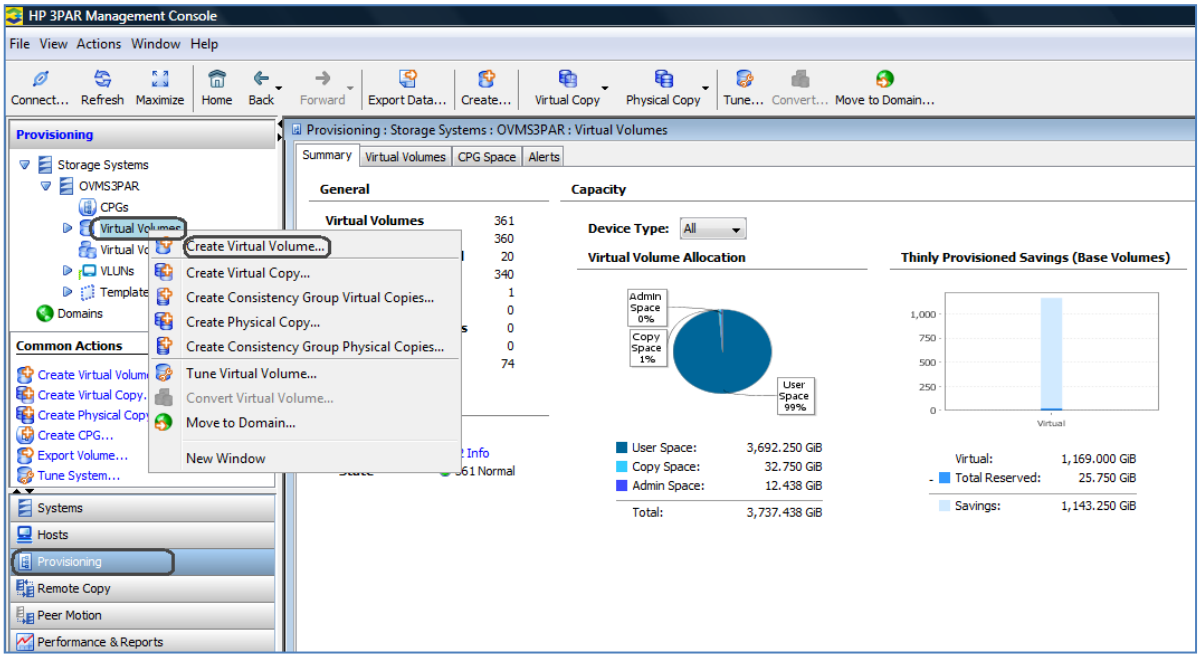
1. From the menu bar, select **Actions > Provisioning** > **Virtual Volume** > **Create Virtual Volume**
2. Use the **Create Virtual Volume** wizard to create a base volume.
3. Select one of the following options from the Provisioning list:
   - Fully Provisioned from CPG
   - Thinly Provisioned

Consult the HP 3PAR Management Console Help for complete details about the Provisioning List for the InForm OS version that is being used on the HP 3PAR StoreServ Storage system. These documents are available on the HP BSC website: hp.com/go/3par/

Creation of virtual volume in GUI

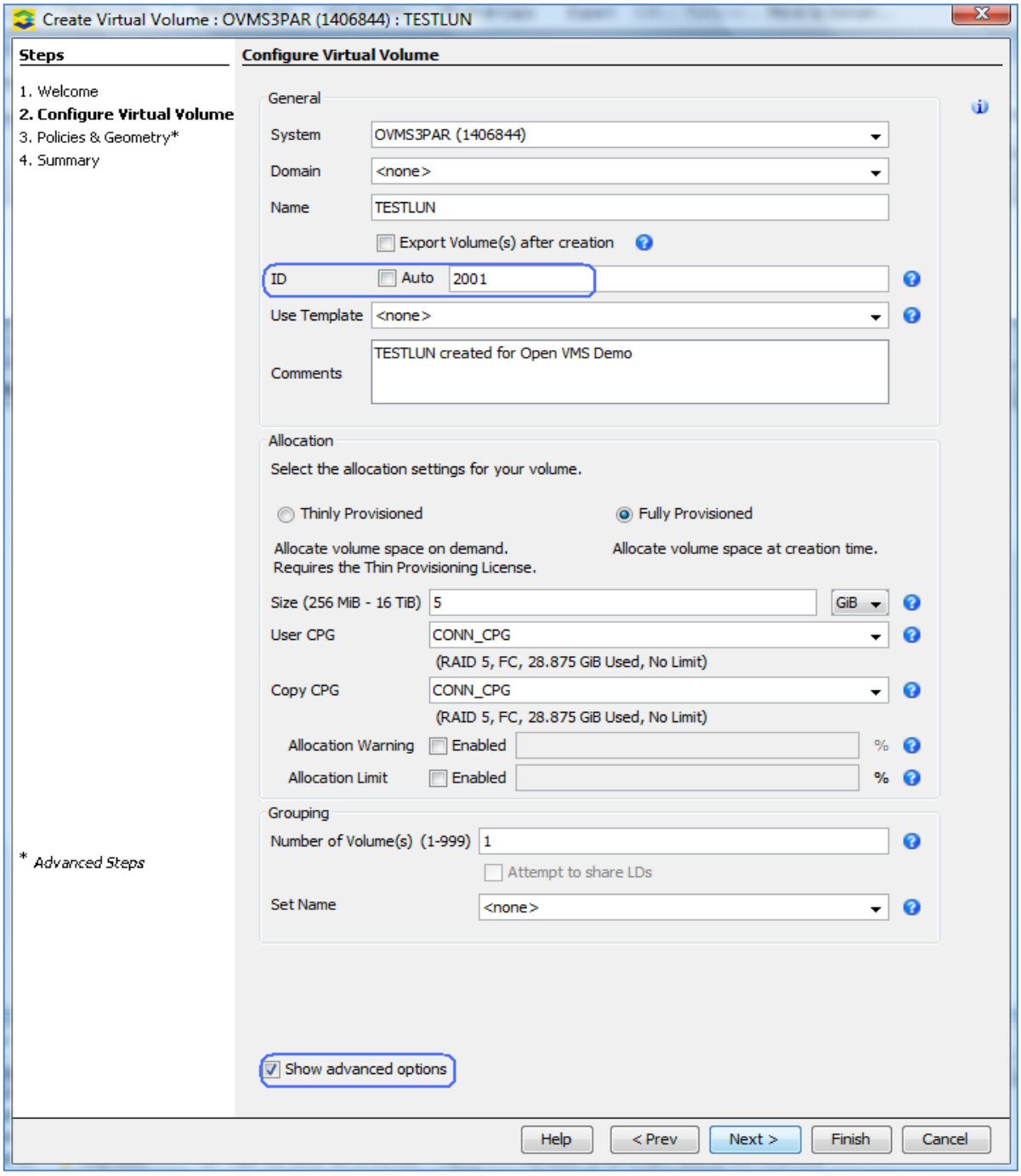
Step 1

Figure 11



1. Click **Provisioning**
2. Expand **Storage Array** view on the top left-hand
3. Click **Virtual Volume**

Step 2
Figure 12



1. Right-click **Virtual Volume**
2. Fill the name column to give the **Virtual Volume** name
3. Select the **Show Advanced** options panel(s) at the bottom (This is required for setting the UUID for the Virtual Volumes. Else the UUID will be allotted automatically by the Storage Array).
4. Uncheck **Auto** checkbox to create an ID manually.

Note:
If Auto box is checked then Array will assign the next available ID automatically.

5. Click **Finish.** A LUN is created.

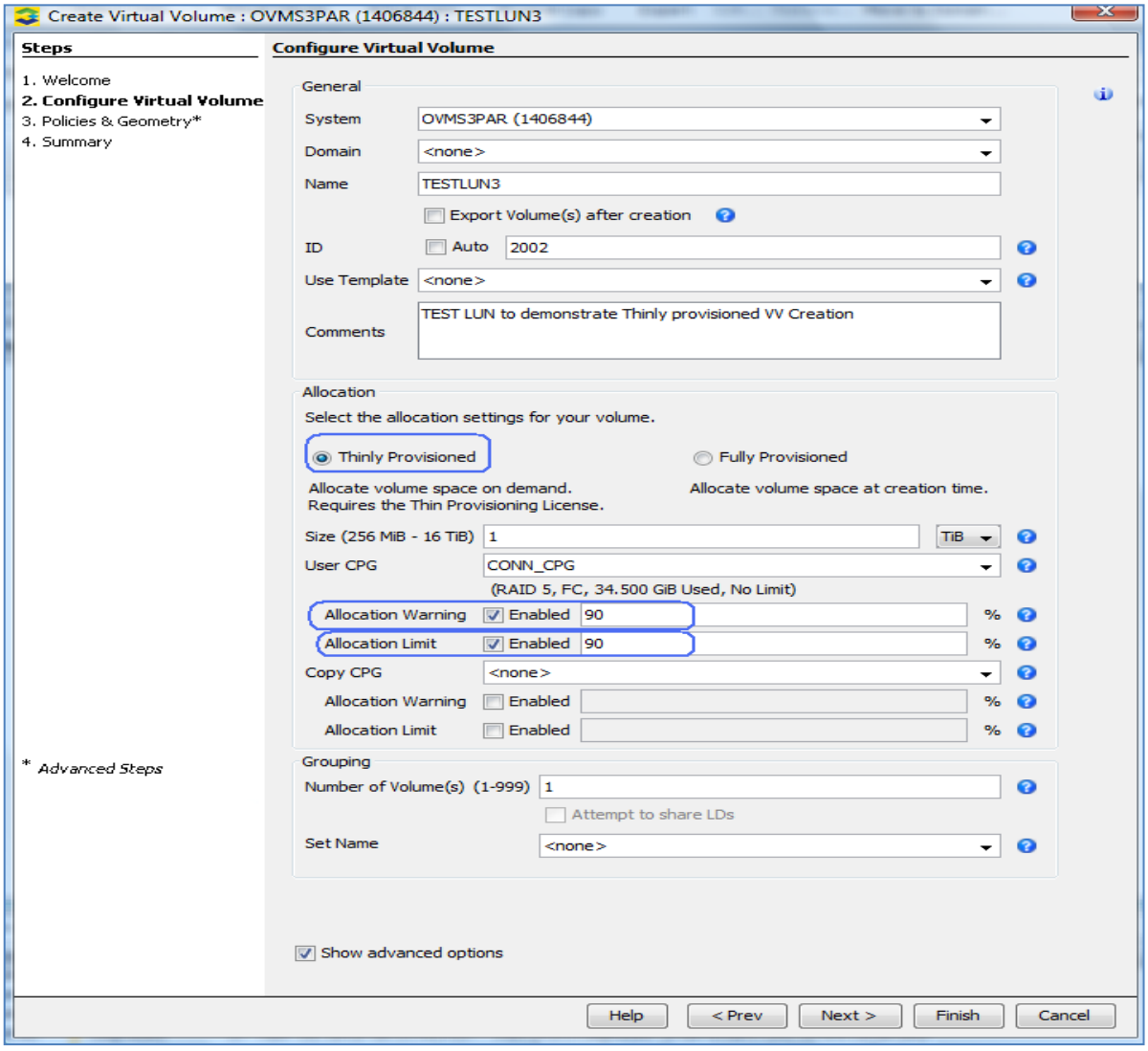
Creating Thinly-provisioned Virtual Volumes

To create thinly provisioned virtual volumes (TPVVs), see the following documents:

- HP 3PAR InForm OS Concepts Guide
- HP 3PAR InForm OS CLI Administrator's Manual
- HP 3PAR Inform OS Command Line Interface Reference

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

Figure 13



Note:
The OpenVMS OS 8.3 1H1 Itanium Supports **1023 GB** thin provisioned LUN where as OS 8.4 Itanium supports **2047 GB**.

Creating Virtual Volumes using CLI using 3.1.2 MU2

To create a fully-provisioned or thinly-provisioned virtual volume, issue the following 3PAR OS

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

The example below creates a 5 GB Virtual Volume by name TESTLUN with ID 12001

```
# createvv -i 2000 CONN_CPG TESTLUN12345 5G
```

Figure 14

```
OVMS3PAR cli%
OVMS3PAR cli%
OVMS3PAR cli%
OVMS3PAR cli% createvv -i 2000 CONN_CPG TESTLUN12345 5G
OVMS3PAR cli%
```

To create thinly provisioned virtual volumes, an HP 3PAR Thin Provisioning license is required.

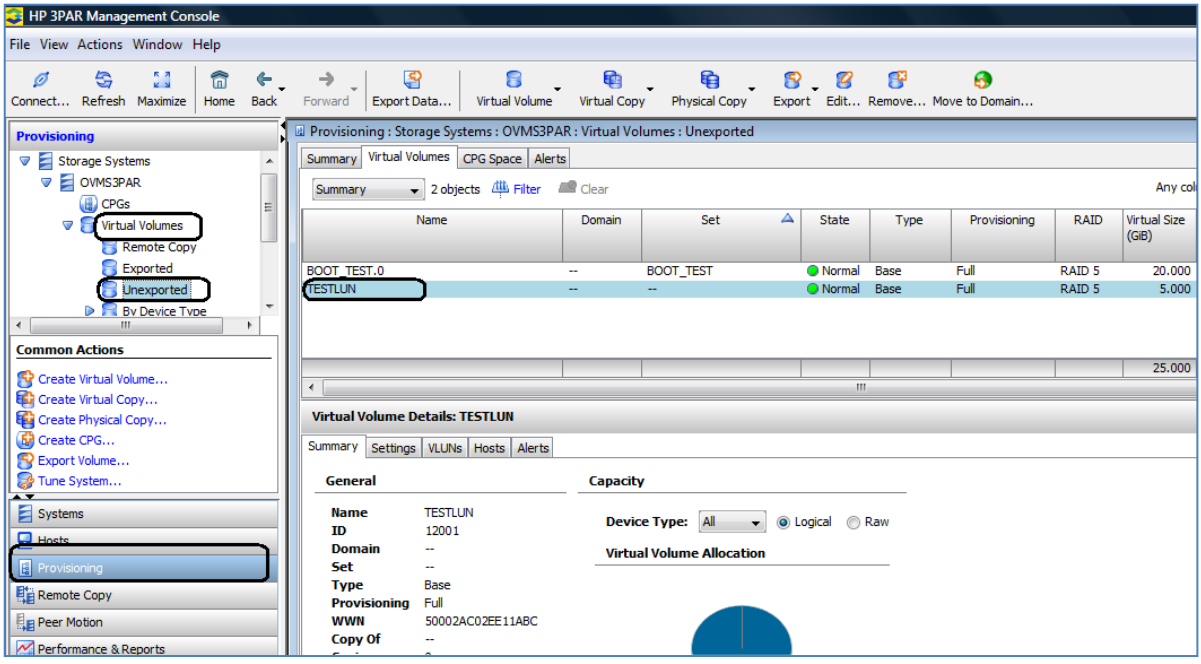
Consult the HP 3PAR Management Console Help and the HP 3PAR Inform OS Command Line Interface Reference for complete details on creating volumes for the InForm OS version that is being used on the HP 3PAR StoreServ Storage system.

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

Note:
The commands and options available for creating a virtual volume may vary for earlier versions of the 3PAR OS.

Exporting the LUNs using GUI

Figure 15



1. Click **Provisioning** on the left bottom of the **HP 3PAR Management** Screen
2. Expand the storage system view if it is not already expanded
3. Expand the **Virtual Volumes** view
4. Click **Unexported**
5. On the right-top click **Virtual Volumes** if the View is Summary
   The available Virtual Volumes are listed
6. Right-click **LUN** and click **Export**

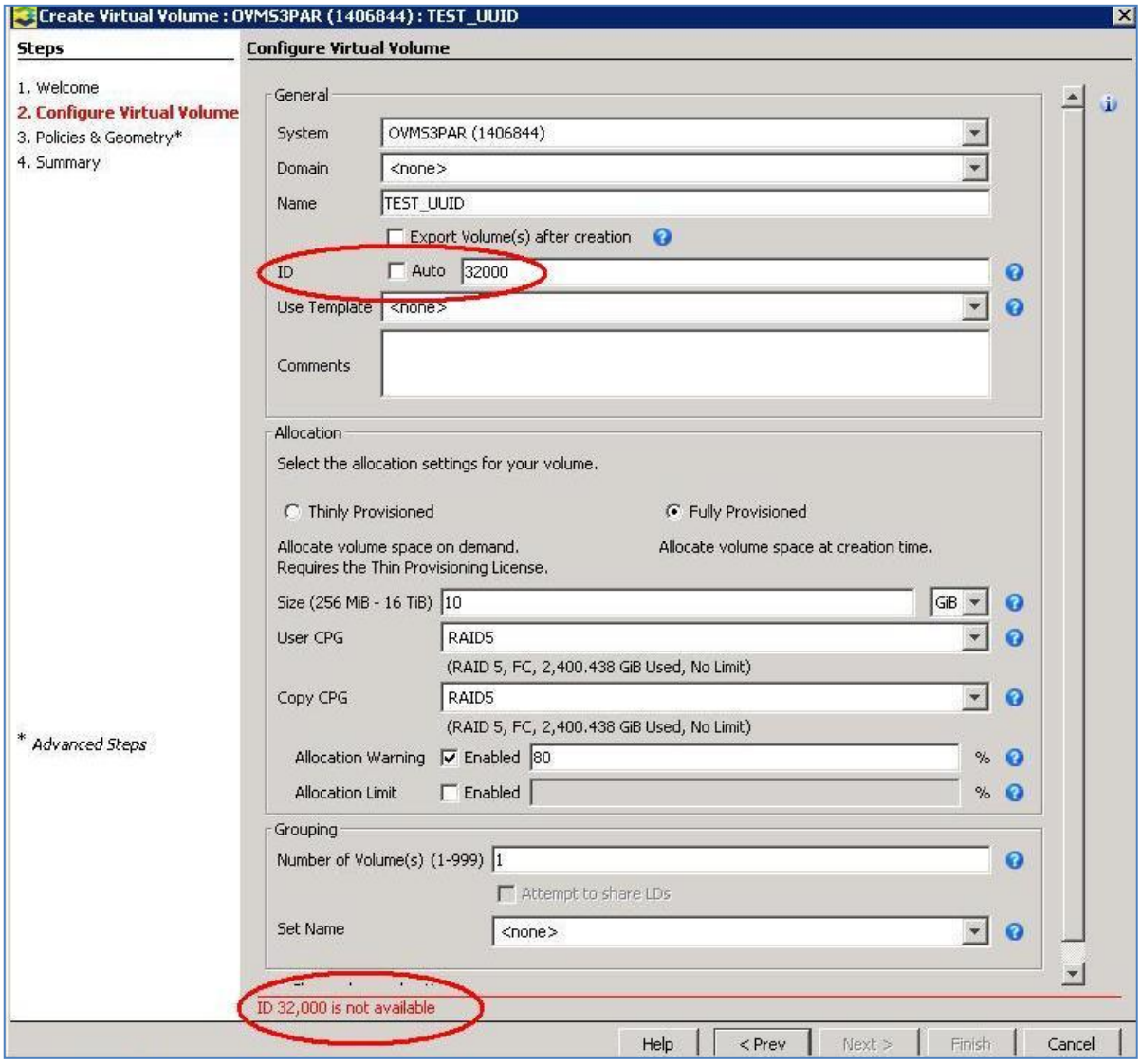
Note:
For New Persona 12 OpenVMS in 3.1.2 MU2 LUN 0 refers to the SCSI controller. Hence LUN 0 is not required.

Restrictions on Volume Size and Number

Follow the guidelines for creating virtual volumes (VV's) and Virtual LUN's (VLUN's) in the HP 3PAR InForm OS CLI Administrator's Manual while adhering to these cautions and guidelines:

- This configuration supports sparse LUNs (meaning that LUNs may be skipped). LUN's may also be exported in non-ascending order (Example. 0, 5, 7, 3).
- The HP 3PAR StoreServ Storage system supports the exportation of VLUNs with LUN's in the range from 0 to 31999.
- The maximum LUN size that can be exported to an OpenVMS 8.4 OS is 2,047 GB and for 8.3 1H1 OS is 1023 GB.

Figure 16



1. Check the **Show Advanced** options panel(s) at the bottom of the screen
2. Uncheck the **Auto** checkbox to create a Virtual Volume ID manually
3. Select the LUN to be exported, where you need to assign LUN
4. Uncheck **Auto** checkbox, in order to assign a LUN. Otherwise a UUID will be set automatically.
5. The maximum limit of assigning a UUID is **0 - 31999**.

Setting up the Fabric and Zoning

Fabric zoning controls, which Fibre Channel's end-devices have access to each other on the fabric, zoning also isolates the host server and HP 3PAR StoreServ Storage system ports from Registered State Change Notifications (RSCNs) that are irrelevant to these ports.

You can set up fabric zoning by associating the device World Wide Names (WWNs) 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 system. However, the WWN zoning method is recommended because the zone survives the changes of switch ports when cables are moved around on a fabric.

Pre-Requisite

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

The HP 3PAR arrays 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 Storage arrays.

Note:
The storage targets in the zone can be from the same HP 3PAR StoreServ Storage system, multiple HP 3PAR StoreServ Storage systems, or a mixture of HP 3PAR 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 on the HP BSC website hp.com/go/3par/

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

After configuring zoning and connecting each host server 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, to ensure that each initiator is zoned with the correct target(s).

Configuration Guidelines for Fabric Vendors

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 server HBA port or to an HP 3PAR StoreServ Storage system port should 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 and 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)

will increase 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 correctly for lower-speed HBAs, such as 4 G or 2 G HBAs.

For more information, see the Fabric OS command Reference Manual supporting FOS 6.4.3d and the FOS release notes.

- Cisco switch ports that connect to HP 3PAR StoreServ Storage system ports or host HBA ports should 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 ensure continuous I/O operations, observe the following limitations on a target port:

- Maximum of 64 host server ports per HP 3PAR StoreServ Storage system port, with a maximum of 1,024 host server ports per HP 3PAR StoreServ Storage system.
- I/O queue depth on each HP 3PAR StoreServ Storage system HBA model, as follows:
  - HP 3PAR HBA 8G: 3276 (V400/V800 systems only)
  - The I/O queues are shared among the connected host server HBA ports on a first-come, first-serve basis.

When all queues are in use and a host HBA port tries to initiate I/O, it receives a target queue **Full** response from the HP 3PAR StoreServ Storage system port. This condition can result in erratic I/O performance on each host server. If this condition occurs, each host server should be throttled so that it cannot overrun the HP 3PAR StoreServ Storage system port's queues when all host servers are delivering their maximum number of I/O requests.

Note:
When host server ports can access multiple targets on fabric zones, the assigned target number assigned by the host driver for each discovered target can change when the host server is booted and some targets are not present in the zone. This situation may change the access point of device node during a host server reboot. This issue can occur with any fabric-connected storage, and is not specific to the HP 3PAR StoreServ Storage system included in this guide.

Troubleshooting with 3.1.2 MU2

1. Medium Offline issue (**This issue is related to 3.1.2 MU2**)

   While initing a LUN, one can get medium offline message. Below is an example demonstrating how to resolve the issue

   Solution

   EXAMPLE:

   ```
   $ init $1$DGA450: $1$DGA450:
   ```

   `%INIT-F-MEDOFL`, medium is offline

   Therefore, here we see two paths from the array connected to the host, where one is primary and the other is current. By changing the path, we can set a single path as primary and current to resolve medium offline issue.

```
I/O paths to device              2
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
```

Command to set the single path as primary and as current path.

"$ set device 1DGA450: /switch/path= FGC0.2123-0002-AC00-1ABC"

Steps to Boot from SAN

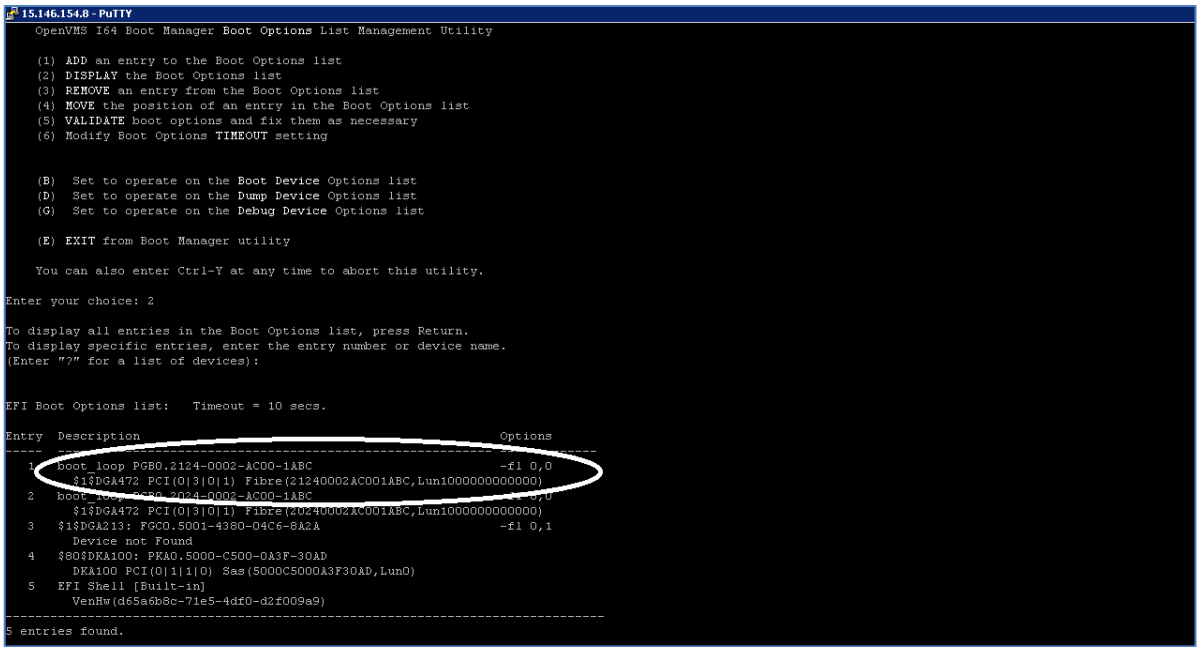
For Example

Figure 17

```
$ sho dev $1$DGA472:/full

Disk $1$DGA472: (SOUP), device type 3PARdata VV, is online, mounted, file-
    oriented device, shareable, available to cluster, device has multiple I/O
    paths, error logging is enabled.

    Error count                    0    Operations completed             12455
    Owner process                 ""    Owner UIC                     [SYSTEM]
    Owner process ID        00000000    Dev Prot            S:RWPL,O:RWPL,G:R,W
    Reference count              212    Default buffer size                512
    Current preferred CPU Id       5    Fastpath                             1
    WWID   02000008:5000-2AC0-01D8-1ABC
    Total blocks            31457280    Sectors per track                   32
    Total cylinders            30720    Tracks per cylinder                 32
    Logical Volume Size     31457280    Expansion Size Limit        2147475456
    Allocation class               1

    Volume label         "831H1BOOT"    Relative volume number               0
    Cluster size                  16    Transaction count                  274
    Free blocks             14464592    Maximum files allowed          1850428
    Extend quantity                5    Mount count                          1
    Mount status              System    Cache name        "_$1$DGA472:XQPCACHE"
    Extent cache size             64    Maximum blocks in extent cache  1446459
    File ID cache size            64    Blocks in extent cache          1445872
    Quota cache size               0    Maximum buffers in FCP cache       4150
    Volume owner UIC           [1,1]    Vol Prot    S:RWCD,O:RWCD,G:RWCD,W:RWCD

  Volume Status:  ODS-5, subject to mount verification, protected subsystems
      enabled, file high-water marking, write-through caching enabled, hard
      links enabled, special files enabled.

  I/O paths to device              2

  Path PGB0.2124-0002-AC00-1ABC    (SOUP), primary, current
    Error count                    0    Operations completed             12238
    Last switched to time:    Never                 Count                    0
    Last switched from time: Never

  Path PGB0.2024-0002-AC00-1ABC    (SOUP)
    Error count                    0    Operations completed               217
    Last switched to time:    Never                 Count                    0
    Last switched from time: Never
```

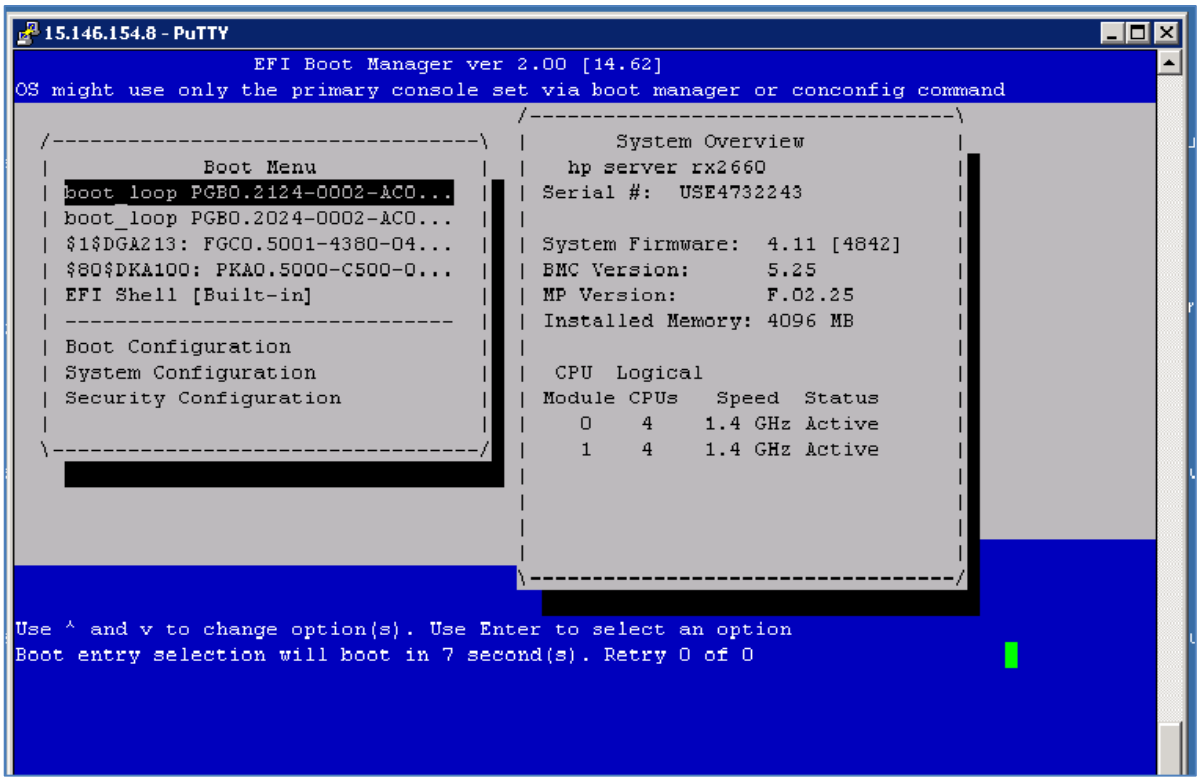
1. 1DGA472 was the LUN presented from 3PAR

Figure 18



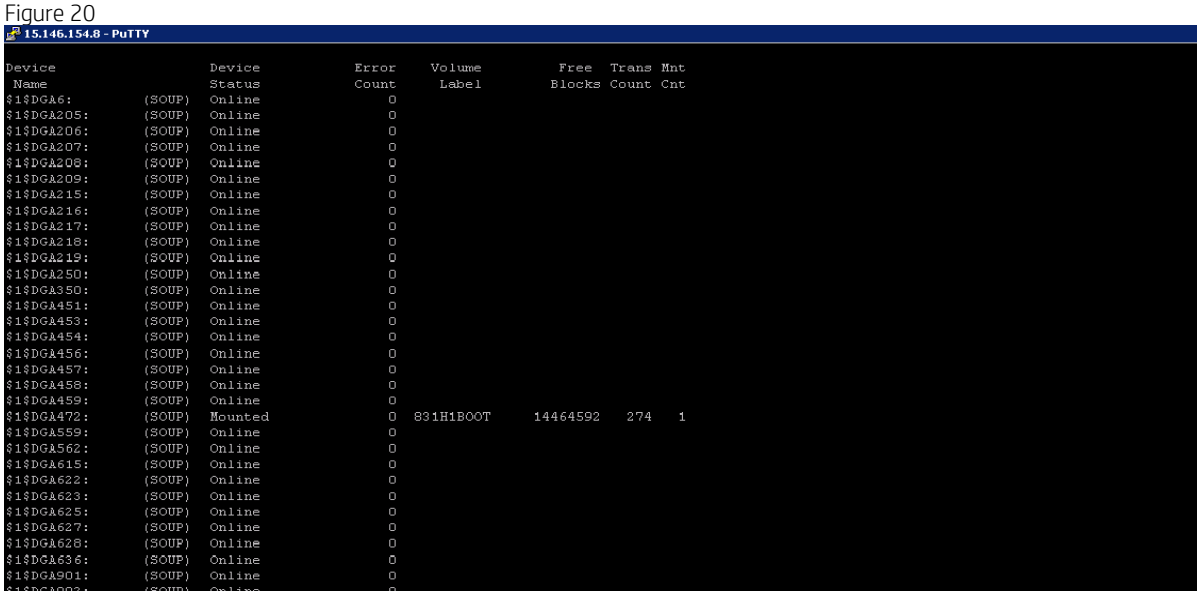
2. 1DGA472 was added in the boot_options
3. The name of the LUN was given as boot_loop

Figure 19



4. System has automatically picked up the boot LUN

Figure 20



5. System has booted with 3par LUN

Boot from San is successful

Note:
For Itanium systems, install the supported EFI firmware .The firmware is downloadable from hp.com by searching the HBA model. Those versions of firmware are essential to enable the boot over SAN feature.

OpenVMS Software List Command Output

Different servers may have different patch requirements. The lists below shows all the products installed on the test server. The following products are part of the operating system installation, as well as other specific patches mentioned in the Host Server Setup section.

8.3 1H1

$ prod sho hist

PRODUCT	KIT TYPE	OPERATION	VAL DATE
HP I64VMS VMS831H1I_UPDATE V14.0	Patch	Install	(D) 01-AUG-2013
HP I64VMS VMS831H1I_FIBRE_SCSI V12.0	Patch	Install	(D) 01-AUG-2013
HP I64VMS VMS831H1I_FIBRE_SCSI V12.0	Patch	Install	Val 20-MAY-2013
HP I64VMS VMS831H1I_UPDATE V14.0	Patch	Install	Val 20-MAY-2013
HP I64VMS VMS831H1I_FIBRE_SCSI V11.0	Patch	Install	Val 19-APR-2013
HP I64VMS VMS831H1I_UPDATE V13.0	Patch	Install	Val 19-APR-2013
HP I64VMS VMS831H1I_PCSI V3.0	Patch	Install	Val 19-APR-2013
HP I64VMS AVAIL_MAN_BASE V8.3-1H1	Full LP	Install	(U) 19-APR-2013
HP I64VMS CDSA V2.3-306	Full LP	Install	Val 19-APR-2013
HP I64VMS DECNET_PLUS V8.3-1H1	Full LP	Install	Val 19-APR-2013
HP I64VMS DWMOTIF V1.6	Full LP	Install	Val 19-APR-2013
HP I64VMS DWMOTIF_SUPPORT V8.3-1H1	Full LP	Install	(U) 19-APR-2013
HP I64VMS KERBEROS V3.1-152	Full LP	Install	Val 19-APR-2013
HP I64VMS OPENVMS V8.3-1H1	Platform	Install	Sys 19-APR-2013
HP I64VMS SSL V1.3-284	Full LP	Install	Val 19-APR-2013
HP I64VMS TCPIP V5.6-9ECO2	Full LP	Install	Val 19-APR-2013
HP I64VMS TDC_RT V2.3-1	Full LP	Install	Val 19-APR-2013
HP I64VMS VMS V8.3-1H1	Oper System	Install	Sys 19-APR-2013
HP I64VMS WBEMCIM V2.61-A070728	Full LP	Install	Val 19-APR-2013
HP I64VMS WBEMPROVIDERS V1.5-31	Full LP	Install	Val 19-APR-2013

8.4

$ prod sho hist

PRODUCT	KIT TYPE	OPERATION	VAL DATE
HP I64VMS VMS84I_FIBRE_SCSI V5.0	Patch	Install	(D) 25-AUG-2012
HP I64VMS VMS84I_FIBRE_SCSI V4.0	Patch	Install	(D) 25-AUG-2012
HP I64VMS VMS84I_FIBRE_SCSI V3.0	Patch	Install	(D) 25-AUG-2012
HP I64VMS VMS84I_UPDATE V8.0	Patch	Install	(D) 25-AUG-2012
HP I64VMS VMS84I_PCSI V4.0	Patch	Install	(D) 25-AUG-2012
HP I64VMS VMS84I_PCSI V3.0	Patch	Install	(D) 25-AUG-2012
HP I64VMS CXX V7.3-39	Full LP	Install	Val 06-OCT-2012
HP I64VMS SSL V1.3-284	Full LP	Install	Val 06-OCT-2012
HP I64VMS SSL V1.4-334	Full LP	Remove	- 06-OCT-2012
HP I64VMS PERL V5.8-6	Full LP	Install	(M) 06-OCT-2012
QTV I64VMS PYTHON X2.3-3	Full LP	Install	(U) 06-OCT-2012
HP I64VMS FORTRAN V8.2-0	Full LP	Install	(U) 06-OCT-2012
HP I64VMS C V7.3-18	Full LP	Install	Val 06-OCT-2012
JFP I64VMS LIBBZ2 V1.0-2	Full LP	Install	(U) 06-OCT-2012
JFP I64VMS ZLIB V1.2-1	Full LP	Install	(U) 06-OCT-2012
HP I64VMS VMS84I_UPDATE V7.0	Patch	Install	Val 30-JUL-2012
HP I64VMS VMS84I_PCSI V4.0	Patch	Install	Val 12-JUN-2012
HP I64VMS VMS84I_UPDATE V6.0	Patch	Install	Val 12-JUN-2012
HP I64VMS VMS84I_PCSI V3.0	Patch	Install	Val 12-JUN-2012
HP I64VMS VMS84I_FIBRE_SCSI V2.0	Patch	Install	Val 12-JUN-2012
HP I64VMS VMS84I_FIBRE_SCSI V1.0	Patch	Install	Val 06-JUL-2011
HP I64VMS VMS84I_UPDATE V5.0	Patch	Install	Val 06-JUL-2011
HP I64VMS VMS84I_PCSI V2.0	Patch	Install	Val 06-JUL-2011
HP I64VMS AVAIL_MAN_BASE V8.4	Full LP	Install	Val 12-APR-2011
HP I64VMS CDSA V2.4-322	Full LP	Install	Val 12-APR-2011
HP I64VMS DECNET_PLUS V8.4	Full LP	Install	Val 12-APR-2011
HP I64VMS DWMOTIF V1.7	Full LP	Install	Val 12-APR-2011
HP I64VMS DWMOTIF_SUPPORT V8.4	Full LP	Install	Val 12-APR-2011
HP I64VMS HPBINARYCHECKER V1.1	Full LP	Install	Val 12-APR-2011
HP I64VMS KERBEROS V3.1-152	Full LP	Install	Val 12-APR-2011
HP I64VMS OPENVMS V8.4	Platform	Install	Sys 12-APR-2011

HP I64VMS SSL V1.4-334	Full LP	Install	Val 12-APR-2011
HP I64VMS TCPIP V5.7-13	Full LP	Install	Val 12-APR-2011
HP I64VMS TDC_RT V2.3-20	Full LP	Install	Val 12-APR-2011
HP I64VMS VMS V8.4	Oper System	Install	Val 12-APR-2011
HP I64VMS WBEMCIM V2.96-A100211	Full LP	Install	Val 12-APR-2011
HP I64VMS WBEMPROVIDERS V2.0-4	Full LP	Install	Val 12-APR-2011

Learn more at

For Itanium systems, install the supported EFI firmware. go to **spock.corp.hp.com/spock**
For other documents related to 3PAR, go to **hp.com/go/3par/**

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