



**Hewlett Packard
Enterprise**

HPE 3PAR Operating System Update Planning Guide

Abstract

This guide is intended for use as a planning tool for Hewlett Packard Enterprise customers who are system and storage administrators. This guide provides an overview, prerequisites, guidelines and planning for online and offline software updates for the HPE 3PAR Operating System, including Veritas Dynamic Multipathing (DMP) prerequisites for online updates and details on remote and local methods of updating.

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HPE 3PAR OS Update Overview

This guide provides the following information on HPE 3PAR Operating System (3PAR OS) software updates:

- An overview of the online and offline update processes for the 3PAR OS
- Prerequisites for online updates
- Guidelines for online updates
- Planning information needed for online updates
- Veritas Dynamic Multipathing (DMP) prerequisites for online updates
- Remote versus local methods of updating

The 3PAR StoreServ Storage supports two different methods for updating the 3PAR OS: online and offline. The updates can be performed with a service representative on-site or remotely (from Hewlett Packard Enterprise). Remote updates require that remote operations are available.

NOTE: The 3PAR OS 3.3.x, 3.2.x, and 3.1.x are 64-bit operating systems.

See the **Single Point of Connectivity Knowledge (SPOCK)** website for 3PAR support matrices for 3PAR OS versions supported by each of the following array types:

- 3PAR StoreServ 7000 Storage system
- 3PAR StoreServ 8000 Storage system
- 3PAR StoreServ 9000 Storage system
- 3PAR StoreServ 10000 Storage system
- 3PAR StoreServ 20000 Storage system
- 3PAR StoreServ 20000 R2 Storage system

Hewlett Packard Enterprise recommends updating host drivers to a supported level of the targeted 3PAR OS update version before attempting an online update. For this information, see SPOCK.

These documents are provided to assist in setting up hosts with Hewlett Packard Enterprise-supported configuration information.

In addition to this planning document, see the 3PAR host OS implementation guides at the **Hewlett Packard Enterprise Storage Information Library**.

Hewlett Packard Enterprise recommends checking the compatibility information for HPE CloudSystem Matrix versions. See **HPE CloudSystem Matrix Compatibility**.

More information

Single Point of Connectivity Knowledge website

<http://www.hpe.com/info/storage/docs/>

Audience

This guide is intended for use as a planning tool for Hewlett Packard Enterprise customers and for system and storage administrators who monitor and direct system configurations and resource allocation for 3PAR StoreServ Storage systems. The tasks and information described in this document assume that the administrator is familiar with host operating system platforms and the 3PAR OS. The appropriate 3PAR

documentation must be consulted in conjunction with the host and host bus adapter (HBA) vendor documentation for specific details and procedures of system configuration.

NOTE:

This guide is not intended to reproduce any third-party product documentation. For details about devices such as hosts, HBAs, converged network adapters (CNAs), fabric switches, and non-3PAR software management tools, review the appropriate third-party documentation.

3PAR OS supported update types

3PAR OS updates are performed either online or offline. Online updates allow the hosts connected to the system to continue I/O activity; for offline updates, host I/O activity must be stopped.

Node-by-Node online updates are used for 3PAR OS maintenance updates (for example, 3PAR OS 3.1.1 MU1 to 3.1.1 MU2). As of 3PAR OS 3.1.1, all online updates are node-by-node. Each array node is updated one at a time. A **simple** or **auto** node-by-node update occurs with each node updated in a 3PAR OS predetermined sequence and timing. An **advanced** or **manual** node-by-node update occurs when the node sequence and timing between individual array node updates are determined by the personnel administrating the online update.

The following table lists the supported 3PAR OS-level update types. If it is not permissible to keep Remote Copy (RC) groups online for an update, the RC groups must be stopped before update.

Table 1: update Types

update from Current 3PAR OS Level	update to New 3PAR OS Level	update Permissible With RC Groups Online
3.1.1 GA ¹²³	3.1.1 MU2	No
3.1.1 MU2	3.1.2 or later	Yes ⁴
3.1.2	3.1.3	Yes
3.1.2	3.2.1 or 3.2.2	No
3.1.3	3.2.1 or 3.2.2	No
3.2.1 GA/MU1/MU2	3.2.1 MU3 or later	No
3.2.1 GA/MU1/MU2	3.2.2	No
3.2.1 MU3 or later	3.2.2	Yes
3.2.1 GA/MU1/MU2	3.3.1	No
3.2.1 MU3 or later	3.3.1	Yes
3.2.2	3.3.1	Yes
3.2.2	3.2.2	Yes
3.3.1	3.3.1	Yes

- ¹ When updating from 3PAR OS 3.1.1 x to 3PAR OS 3.1.3 MU1, a multi-step update is required. The first step is to update to 3PAR OS 3.1.2 GA, and then the second step is to update to 3PAR OS 3.1.3 MU1.
- ² When updating from 3.1.1 GA to 3.1.1 MU2, there is an issue that requires an offline update.
- ³ This table assumes all OS level required patches are installed.
- ⁴ Remote Copy groups can be kept online (in the “Started” state) when online software updates are performed. Under some conditions, one or more Remote Copy groups may stop unexpectedly during the software update. If that happens, those groups can be restarted after the update completes.

Guidelines for Online Updates

Planning information for online 3PAR OS updates

The host connectivity environment must adhere to the qualified and supported environments. For more information, see the interoperability information on the [SPOCK](#) website.

Hewlett Packard Enterprise service representatives will request this information for review before performing an online update. Relevant details include:

- Host platform
- Architecture (for example, SPARC/x86)
- Operating system (version and patch level)
- Host multipath software
- HBA and CNA (vendor, model, driver, firmware, and version. Also include FCODE and BIOS level if booting from the 3PAR StoreServ Storage)
- Switch (vendor, model and firmware)
- Information on host software provided by Hewlett Packard Enterprise is needed. Examples include: 3PAR Recovery Manager (SQL, Exchange, Oracle), 3PAR VSS Provider, 3PAR MPIO for Microsoft Windows, 3PAR ODM Definition for IBM AIX, 3PAR System Reporter, and so on
- In addition to verifying that the driver and firmware levels match the information on SPOCK, there may be host configuration settings needed as documented in the 3PAR host OS implementation guides. To prevent unpredictable behavior, verify these settings before performing an online update.

For detailed information about drivers, configurations, and interoperability, see the SPOCK website.

For the 3PAR host OS implementation guides, see the Hewlett Packard Enterprise Storage Information Library.

General guidelines for 3PAR OS updates

Observe the following general guidelines according to online 3PAR OS updates:

! **IMPORTANT:** All hosts must comply with the current applicable 3PAR host OS implementation guides for the target 3PAR OS level. Hosts that do not comply completely with the implementation guides might lose connectivity during the 3PAR OS update.

- Do not perform hardware and configuration changes on the 3PAR StoreServ Storage during the update. For example, software operations (such as `servicemag`, `createvv`, or use of the 3PAR StoreServ Storage tuner commands) and hardware operations (such as adding or removing drives and cages) are prohibited during the online update process. All logical disk growth operations for common provisioning groups continue uninterrupted as under normal operation.
- Host and environment changes are not allowed during an online update (for example, restarting, applying patches, or rezoning switches). The update software checks for the existence of hosts before and after each step, and if host connections do not reappear after each step, the update process reverts to the original level.

- Any automated processes that communicate with the 3PAR StoreServ Storage management interface (scripting) must be stopped before performing an online update.
- Online updates should be scheduled and performed during periods of low I/O activity. System resources are placed offline to be updated, system utilization must be lower than 50% for each node and I/O port.

3PAR OS host configuration guidelines

Observe the following host configuration guidelines when planning an online 3PAR OS update:

- Multipathing cabling must adhere to 3PAR configuration rules. Each defined host must have at least two operational paths attached to two adjacent nodes; an even-numbered node followed by a consecutive odd-numbered node in order for 3PAR Persistent Ports to work. Connect each node to the same HBA and port. For example, if one path is node 0 , slot 3, port 2, the other path must be node 1, slot 3, port 2.

Example of Valid pairings:

- 0 & 1
- 2 & 3
- 4 & 5
- 6 & 7

Example of Invalid pairings:

- 2 & 1
- 0 & 3
- All attached hosts must have multipathing software configured and operational for every 3PAR storage server volume exported. Hosts must connect to two adjacent nodes, an even-numbered node followed by a consecutive odd-numbered node on the 3PAR StoreServ Storage system.

NOTE:

- For supported multipathing environments, see the SPOCK website.
 - For unsupported environments, the hosts should be shut down and in some cases powered off. The VLUNs exported to such hosts must be unexported or connections must be logically disconnected before the online 3PAR OS update.
-
- A host definition must not contain initiators from multiple hosts. For example, host cluster configurations must use a separate host definition for each host in the host cluster.
 - Stop all system administration activities during a 3PAR OS online update. Complete or stop all active tasks before proceeding. This includes any provisioning activity, physical copy activity, virtual copy activity, and dynamic optimization. Stop any automated administration scripts such as Recovery Manager and VSS Provider for Microsoft Windows.
 - iSCSI hosts must have active I/O on all paths during the update. The update process restarts nodes and checks that all hosts are reconnected after each node restarts. The update will not advance until all hosts re-establish connection. An idle iSCSI host will not reconnect, it is important to have I/O on all paths during the update.
 - The recovery manager for Oracle, SQL, Exchange or VMware might require a newer version to be compatible to 3PAR OS 3.2.1 or later. For the interoperability information for 3PAR OS 3.2.x for supported levels, see the SPOCK website.

- An updated CLI client for 3PAR OS 3.2.1 or later must be installed on the recovery manager host. For information about 3PAR OS 3.2.x for supported levels and host compatibility, see the SPOCK website.
- Verify compatibility of any host third-party software to the 3PAR OS release 3.x.x.
- The 3PAR Recovery Manager software for VMware vCenter requires update to HPE StoreOnce Recovery Manager Central for VMware vCenter v1.1 to be compatible with 3PAR OS 3.2.2 or later. The update should be completed on multiple sites if the Recovery manager configuration is a Remote copy multisite configuration.
- The 3PAR StoreServ Management Console (SSMC) is generally compatible with all 3PAR OS 3.2.x and 3.3.1 versions. For the latest features and fixes, it is advisable to update to the current 3PAR Management Console release.

⚠ CAUTION: For an update to 3PAR OS 3.1.3 or later, host-based applications must be updated to the latest version in the order specified by the 3PAR OS update instructions.

NOTE: After updating from 3PAR OS 3.1.2 MU3 to 3.1.3 MU1, the passive node hangs during a restart. This occurs with Peer Persistence groups set up for Manual Transparent Failovers. To prevent this issue, BEFORE updating to 3.1.3 MU1, make sure that all Peer Persistence Groups are set for Automatic Transparent Failover by running the following command on primary Peer Persistence groups on both arrays.

Example: `setrcopygroup pol auto_failover <group_name>`

The update to 3.1.3.x includes a pre-update check that will detect this condition, display a warning message and stop the update.

After the update to both arrays is complete, the Automatic Failover policy must be reset for groups set up for Manual Transparent Failovers:

Example: `setrcopygroup pol no_auto_failover <group_name>`

After the update, check that all Peer Persistence remote copy groups have the path management policy set using the `showrcopy` command. If the path management policy is not set, run the following command to set the policy.

Example: `setrcopygroup pol path_management <group_name>`

3PAR OS Host Persona changes

Host persona capabilities and details are shown in the following tables:

Table 2: Host Persona Capabilities Defined in 3PAR OS 3.1.3 MU1

Persona ID	Persona Name	Persona Capabilities
1	Generic	UARepLun, SESLun
2	Generic - ALUA	UARepLun, SESLun, ALUA
6	Generic - legacy	
7	HP-UX - legacy	VolSetAddr, Lun0SCC
8	AIX - legacy	NACA

Table Continued

Persona ID	Persona Name	Persona Capabilities
9	EGENERA	SoftInq
10	ONTAP - legacy	SoftInq
11	VMware	SubLun, ALUA
12	OpenVMS	UARepLun, RTPG, SESLun, Lun0SCC
13	HP-UX	UARepLun, VolSetAddr, SESLun, ALUA, Lun0SCC
15	Windows Server	UARepLun, SESLun, ALUA, WSC

Table 3: Host Persona Capabilities Defined in 3PAR OS 3.1.2 MU3

Persona ID	Persona Name	Persona Capabilities
1	Generic	UARepLun, SESLun
2	Generic - ALUA	UARepLun, RTPG, SESLun
6	Generic - legacy	
7	HP-UX - legacy	VolSetAddr, Lun0SCC
8	AIX - legacy	NACA
9	EGENERA	SoftInq
10	ONTAP - legacy	SoftInq
11	VMware	SubLun, ALUA
12	OpenVMS	UARepLun, RTPG, Lun0SCC

Once the 3PAR StoreServ Storage is running 3PAR OS 3.1.1 or later, it is **recommended** that the host persona for some of the hosts be changed. See the Host Persona Details table below.

The Host Persona Capabilities Defined in 3PAR OS 3.1.3 MU1 and Host Persona Capabilities Defined in 3PAR OS 3.1.2 MU3 tables also reflect some changes in host persona for 3PAR OS 3.1.2 and 3PAR OS 3.1.3 MU1 with Windows Server, VMware ESX OS, Red Hat® and SUSE.

Table 4: Host Persona Details

Operating System	3PAR OS 3.1.1 Host Persona	3PAR OS 3.1.2 Host Persona	3PAR OS 3.1.3 MU1 and 3.2.1 Host Persona	3PAR OS 3.2.2 Host Persona	3PAR OS 3.3.1 Host Persona
AIX	8	8	8	8	8 (AIX-Legacy) 16 (AIX-ALUA)
Citrix XenServer 6	1	1	1 2	1 2	
HP-UX 11i v1 and 11i v2	7	7	7	7	7
HP-UX 11i v3	7	7	7 13	7 13	7 13
NETAPP/ONTAP	10	10	10	10	
RHEL 4 and 5	1	1	1	1	1
RHEL 5.8, 6.1 and later	1	1	1 2	1 2	1 2
RHEL 7.0 and later	n/a	n/a	2	2	2
SLES 10.4, 11.1 and later	1	1	1 2	2 2	2 2
SLES 12.0 and later	n/a	n/a	2	2	2
SLES 15.0 and later	n/a	n/a	n/a	2	2
Solaris 9, including iSCSI	1	1	1	1	1 (Generic)
Solaris 10, including iSCSI	1	1	1	1	2 (Generic-ALUA) Recommended, 1(Generic)
Solaris 11, including iSCSI	2	2	2	2	2
VMware ESX 5.5	6	11 6	11 6	11	

Table Continued

Operating System	3PAR OS 3.1.1 Host Persona	3PAR OS 3.1.2 Host Persona	3PAR OS 3.1.3 MU1 and 3.2.1 Host Persona	3PAR OS 3.2.2 Host Persona	3PAR OS 3.3.1 Host Persona
VMware ESX 6.0	n/a	11 6	11 6	11	
Windows Server 2003, including iSCSI	1	1	1	1	
Windows Server 2008 SP1 and SP2, including iSCSI	2	2	15	15	
Windows Server 2008 R2, including iSCSI	1	2	15	15	15
Windows Server 2012 Windows Server 2012 R2	n/a	2	15	15	15
Windows Server 2016	n/a	n/a	15	15	15

NOTE:

- Host persona 1 will not be supported for any version of Citrix XenServer 6 and later after 3PAR OS 3.2.2 and its MUs.
- Host persona 2 is supported only for XenServer 6.5 and later. Hewlett Packard Enterprise recommends host persona 2 for all supported versions of Citrix XenServer 6 with 3PAR OS 3.2.2 and later.
- Enabling host persona 2 will enable A/A multipath on LUNs by default. This change will require a restart. **Do not** change the host persona unless you can restart the Windows Server 2008. If you do not restart the server, the host will lose the mapping of the LUNs. See the *HPE 3PAR Windows Server 2012 and Windows Server 2008 Implementation Guide* for details.
- Microsoft enables A/A multipathing by default at Windows Server 2008 R2.
- Starting with 3PAR OS 3.1.3 MU1, host persona 2, which has asymmetric LUN unit access (ALUA), is supported. Hewlett Packard Enterprise recommends host persona 2 for RHEL 5.8, RHEL 6.1, SLES 10.4 , SLES 11.1 and later with 3PAR OS 3.1.3 MU1 and later. Changing from host persona 1 to host persona 2 is an offline process. This change applies to hosts connecting to the array through FC, FCoE, or iSCSI. For more details, see the *HPE 3PAR Red Hat Enterprise Linux, CentOS Linux, Oracle Linux, and Oracle VM Server Implementation Guide* and *HPE 3PAR SUSE Linux Enterprise Server Implementation Guide* on the Hewlett Packard Enterprise Storage Information Library.
- For Windows Server 2008 R2, configurations of persona 6 and 1 need to be changed manually to persona 2 after an update to 3PAR OS 3.1.2. The Windows Server host needs to be shut down when the persona change is performed and then brought back online in order to properly configure the ALUA paths support in persona 2. See the *HPE 3PAR Windows Server 2012 and Windows Server 2008 Implementation Guide* for details.
- Host persona 6 is not supported for any version of VMware ESX/ESXi with 3PAR OS versions after 3PAR OS 3.1.3 MU1 and its MUs. Hewlett Packard Enterprise recommends that customers migrate their VMware ESX configurations on 3PAR to host persona 11 with 3PAR OS 3.2.1 or later.
- Hewlett Packard Enterprise recommends host persona 11 for all supported VMware ESX versions with 3PAR OS 3.1.2 and later. For details, see the *HPE 3PAR VMware ESX/ESXi Implementation Guide* on the Hewlett Packard Enterprise Storage Information Library.
- Hewlett Packard Enterprise recommends host persona 13 for HP-UX 11i v3 with 3PAR OS 3.1.3 MU1 and later. Changing from host persona 7 to host persona 13 can be performed with the host online. See the *HPE 3PAR HP-UX Implementation Guide* on the Hewlett Packard Enterprise Storage Information Library for details.
- Use of generic persona allows the host to run "Host Explorer" on the host. It will automatically create LUN 254 as a SCSI enclosure device for Host Explorer use.
- SLES 12.0 and later support starts with 3PAR OS 3.2.1. Please see SPOCK for support detail.
- From 3PAR OS 3.1.3 MU1, Hewlett Packard Enterprise requires host persona 15 for Windows Server2012 R2, Windows Server 2012, and Windows Server 2008 R2 and non-R2 hosts. However, host persona 2 is automatically assigned following an online 3PAR OS update from OS version 3.1.2. After such an update, you must change host persona 2 to host persona 15. Before changing host personas, see **Windows Server OS Guidelines** for instructions to prevent loss of LUN mapping.

To change the host persona of a host:

```
cli% sethost -persona <persona_number> <host_name>
```

List of host persona's available on a 3PAR OS release:

```
cli% showhost -listpersona
```

To verify the host persona setting of a host:

```
cli% showhost persona <host_name>
```

3PAR StoreServ Storage configuration guidelines

The following guidelines must be observed when planning an online 3PAR OS update.

- The 3PAR StoreServ Storage must be in a "healthy" state (with no failed or degraded physical disks, cages, FCALs, nodes, etc.). The 3PAR OS update software performs an automated check and, if the system is not in a healthy condition, causes the update to fail.
- A VLUN for each exported volume must be exported to a defined host on at least two fully operational paths that span adjacent storage server nodes, an even-numbered node followed by a consecutive odd-numbered node, on the 3PAR StoreServ Storage. (Valid pairings are 0 & 1, 2 & 3, 4 & 5, 6 & 7.)
- 3PAR software applications running on the 3PAR StoreServ Storage must be shut down.
- Ensure that no 3PAR Virtual Copy promotes are in progress. To confirm, check that no volumes are in the `started`, `cpp` state. If any promotes are in progress, wait until the promote finishes to begin the online update.

3PAR Remote Copy guidelines

When updating the 3PAR OS of a 3PAR StoreServ Storage system that is active and actively participating in an remote copy (RC) configuration, the goal is to perform an update to one or both RC pair systems while remaining in a supported configuration.

- **Fully supported state**
 - The state of being fully supported is when the systems have been successfully updated to the final, fully supported 3PAR OS. This provides for full support from Hewlett Packard Enterprise for both the arrays and the RC relationship between the arrays.
- **Transition state**
 - The short term, interim state that occurs with the OS relationship between RC pairs as the peer's OS is migrating to a final, fully supported state. This state is supported by Hewlett Packard Enterprise for a maximum of five weeks.
- **Adjacent release**
 - An adjacent release refers to the 3PAR OS branch versions, which are the next generally-available, major-release OS version.

Hewlett Packard Enterprise Recommendations

- Complete the 3PAR OS update to a fully supported state within a five-week update period.
- With mixed 3PAR StoreServ storage hardware, update to the latest available 3PAR OS supported for each hardware type.

- With identical 3PAR StoreServ storage hardware, use the same 3PAR OS version on all of the identical hardware and update to the latest available 3PAR OS supported by the hardware type.
- In an active RC configuration, consider updating the destination array first if possible. By updating the destination first, impact to the primary system accessibility should be minimized.

For details about using 3PAR Remote Copy, see the *HPE 3PAR Remote Copy User Guide* at the Hewlett Packard Enterprise Storage Information Library.

Prerequisites for updating

Prerequisites

Procedure

1. Determine the current 3PAR OS version, hardware type, and final, fully supported update 3PAR OS for each 3PAR StoreServ Storage system participating in the RC pair relationship.
2. Determine the website to obtain the required 3PAR OS versions. See [HPE 3PAR OS update Overview](#).
3. Review the release notes for each required 3PAR OS version and apply any appropriate patches.

Updating the OS

The tables in this procedure represent a two-system RC configuration.

NOTE: With an RC configuration using more than two systems, add additional columns to the update procedure tables. The same tasks apply to any additional system or systems.

Procedure

1. For each system participating in the RC relationship, determine the current OS, hardware type, and final OS version.

Table 5: RC Pair update Information

System A Current OS	System B Current OS
System A Hardware Type	System B Hardware Type
System A Final OS	System B Final OS

2. Determine the update path or paths for each 3PAR StoreServ Storage system participating in RC. Multi-step updates must be performed within a five-week update period. Complete the RC updates to 3PAR OS table by entering the following information:
 - a. Enter the System A Current OS.
 - b. Enter the System A Hardware Type.

- c. In the update From OS column, locate the OS that matches the System A Current OS, and then mark the corresponding cell in the System A update Path column.
- d. Repeat the above steps for System B.

Table 6: RC updates to 3PAR OS

update from OS	update to OS	update Type	System A Current OS	System B Current OS
			System A Hardware Type	System B Hardware Type
			System A update Path	System B update Path
3.1.1 GA	3.1.3 MU1	Multi-step update		
3.1.1 GA /MUx	3.2.2	Multi-step update		
3.1.1	3.3.1	Multi-step update		
3.1.2 GA	3.1.3 MU1	Direct update		
3.1.2 MUx	3.1.3 MU1	Direct update		
3.1.2 MU5 3.1.2 MU3 + Patches	3.2.1	Direct update		
3.1.2 GA/MUx	3.2.2	Multi-step update		
3.1.2	3.3.1	Multi-step update		
3.1.3 MUx	3.2.1	Direct update		
3.1.3 MUx	3.2.2	Direct update		
3.1.3	3.3.1	Multi-step update		
3.2.1	3.2.2	Direct update		
3.2.1	3.3.1	Direct update		
3.2.2	3.3.1	Direct update		
3.3.1	3.3.1	Direct update		

3. Determine the order of the update or updates to remain in a supported RC configuration (3PAR OS to 3PAR OS versions).
4. Use the update Types table to verify that all update tasks are completed, review the 3PAR OS release notes, and apply any appropriate patches.

Table 7: OS and Hardware RC Configuration State

System A OS Version	System B OS Version	Hardware A	Hardware B	Transition State or Fully Supported State
3.1.1 ¹	3.1.1	<ul style="list-style-type: none"> • 3PAR T400/T800 Storage • 3PAR F200/F400 Storage • 3PAR StoreServ 10400/10800 Storage 	<ul style="list-style-type: none"> • 3PAR T400/T800 Storage • 3PAR F200/F400 Storage • 3PAR StoreServ 10400/10800 Storage 	Fully Supported
3.1.1	3.1.2 ²	<ul style="list-style-type: none"> • 3PAR T400/T800 Storage • 3PAR F200/F400 Storage • 3PAR StoreServ 10400/10800 Storage 	<ul style="list-style-type: none"> • 3PAR T400/T800 Storage • 3PAR F200/F400 Storage • 3PAR StoreServ 10400/10800 Storage • 3PAR StoreServ 7200/7400/7450 Storage 	Transition
3.1.2	3.1.2	<ul style="list-style-type: none"> • 3PAR T400/T800 Storage • 3PAR F200/F400 Storage • 3PAR StoreServ 10400/10800 Storage • 3PAR StoreServ 7200/7400/7450 Storage 	<ul style="list-style-type: none"> • 3PAR T400/T800 Storage • 3PAR F200/F400 Storage • 3PAR StoreServ 10400/10800 Storage • 3PAR StoreServ 7200/7400/7450 Storage 	Fully Supported
3.1.2	3.1.3	<ul style="list-style-type: none"> • 3PAR T400/T800 Storage • 3PAR F200/F400 Storage • 3PAR StoreServ 10400/10800 Storage • 3PAR StoreServ 7200/7400/7450 Storage 	<ul style="list-style-type: none"> • 3PAR T400/T800 Storage • 3PAR F200/F400 Storage • 3PAR StoreServ 10400/10800 Storage • 3PAR StoreServ 7200/7400/7450 Storage 	Transition

Table Continued

System A OS Version	System B OS Version	Hardware A	Hardware B	Transition State or Fully Supported State
3.1.3	3.1.3	<ul style="list-style-type: none"> • 3PAR T400/T800 Storage • 3PAR F200/F400 Storage • 3PAR StoreServ 10400/10800 Storage • 3PAR StoreServ 7200/7400/7450 Storage 	<ul style="list-style-type: none"> • 3PAR T400/T800 Storage • 3PAR F200/F400 Storage • 3PAR StoreServ 10400/10800 Storage • 3PAR StoreServ 7200/7400/7450 Storage 	Fully Supported
3.1.3	3.2.1	<ul style="list-style-type: none"> • 3PAR T400/T800 Storage • 3PAR F200/F400 Storage 	<ul style="list-style-type: none"> • 3PAR StoreServ 10400/10800 Storage • 3PAR StoreServ 7200/7400/7450 Storage 	Fully Supported
3.1.3	3.2.1	<ul style="list-style-type: none"> • 3PAR StoreServ 10400/10800 Storage • 3PAR StoreServ 7200/7400/7450 Storage 	<ul style="list-style-type: none"> • 3PAR StoreServ 10400/10800 Storage • 3PAR StoreServ 7200/7400/7450 Storage • 3PAR StoreServ 7200c/7400c/7440c/7450c Storage 	Transition
3.2.1	3.2.1	<ul style="list-style-type: none"> • 3PAR StoreServ 10400/10800 Storage • 3PAR StoreServ 7200/7400/7450 Storage • 3PAR StoreServ 7200c/7400c/7440c/7450c Storage 	<ul style="list-style-type: none"> • 3PAR StoreServ 10400/10800 Storage • 3PAR StoreServ 7200/7400/7450 Storage • 3PAR StoreServ 7200c/7400c/7440c/7450c Storage 	Fully Supported
3.1.3	3.2.2	<ul style="list-style-type: none"> • 3PAR T400/T800 Storage • 3PAR F200/F400 Storage 	<ul style="list-style-type: none"> • 3PAR StoreServ 20450/20800/20850 Storage • 3PAR StoreServ 8200/8400/8440/8450 Storage 	Fully Supported

Table Continued

System A OS Version	System B OS Version	Hardware A	Hardware B	Transition State or Fully Supported State
3.2.1	3.2.2	<ul style="list-style-type: none"> • 3PAR StoreServ 10400/10800 Storage • 3PAR StoreServ 7200/7400/7450 Storage • 3PAR StoreServ 7200c/7400c/7440c/7450c Storage 	<ul style="list-style-type: none"> • 3PAR StoreServ 10400/10800 Storage • 3PAR StoreServ 7200/7400/7450 Storage • 3PAR StoreServ 7200c/7400c/7440c/7450c Storage • 3PAR StoreServ 20450/20800/20850 Storage • 3PAR StoreServ 8200/8400/8440/8450 Storage 	Transition
3.2.2	3.2.2	<ul style="list-style-type: none"> • 3PAR StoreServ 10400/10800 Storage • 3PAR StoreServ 7200/7400/7450 Storage • 3PAR StoreServ 7200c/7400c/7440c/7450c Storage • 3PAR StoreServ 20450/20800/20850 Storage • 3PAR StoreServ 8200/8400/8440/8450 Storage 	<ul style="list-style-type: none"> • 3PAR StoreServ 10400/10800 Storage • 3PAR StoreServ 7200/7400/7450 Storage • 3PAR StoreServ 7200c/7400c/7440c/7450c Storage • 3PAR StoreServ 20450/20800/20850 Storage • 3PAR StoreServ 8200/8400/8440/8450 Storage 	Fully Supported

Table Continued

System A OS Version	System B OS Version	Hardware A	Hardware B	Transition State or Fully Supported State
3.2.1	3.3.1	<ul style="list-style-type: none"> • 3PAR StoreServ 10400/10800 Storage • 3PAR StoreServ 7200/7400/7450 Storage • 3PAR StoreServ 7200c/7400c/7440c/7450c Storage 	<ul style="list-style-type: none"> • 3PAR StoreServ 10400/10800 Storage • 3PAR StoreServ 7200/7400/7450 Storage • 3PAR StoreServ 7200c/7400c/7440c/7450c Storage • 3PAR StoreServ 20450/20800/20850 Storage • 3PAR StoreServ 20xx0_R2 Storage • 3PAR StoreServ 8200/8400/8440/8450 Storage • 3PAR StoreServ 9450 Storage 	Transition

Table Continued

System A OS Version	System B OS Version	Hardware A	Hardware B	Transition State or Fully Supported State
3.2.2	3.3.1	<ul style="list-style-type: none"> • 3PAR StoreServ 10400/10800 Storage • 3PAR StoreServ 7200/7400/7450 Storage • 3PAR StoreServ 7200c/7400c/7440c/7450c Storage • 3PAR StoreServ 20450/20800/20850 Storage • 3PAR StoreServ 8200/8400/8440/8450 Storage 	<ul style="list-style-type: none"> • 3PAR StoreServ 10400/10800 Storage • 3PAR StoreServ 7200/7400/7450 Storage • 3PAR StoreServ 7200c/7400c/7440c/7450c Storage • 3PAR StoreServ 20450/20800/20850 Storage • 3PAR StoreServ 20xx0_R2 Storage • 3PAR StoreServ 8200/8400/8440/8450 Storage • 3PAR StoreServ 9450 Storage 	Fully Supported
3.3.1	3.3.1	<ul style="list-style-type: none"> • 3PAR StoreServ 10400/10800 Storage • 3PAR StoreServ 7200/7400/7450 Storage • 3PAR StoreServ 7200c/7400c/7440c/7450c Storage • 3PAR StoreServ 20450/20800/20850 Storage • 3PAR StoreServ 20xx0_R2 Storage • 3PAR StoreServ 8200/8400/8440/8450 Storage • 3PAR StoreServ 9450 Storage 	<ul style="list-style-type: none"> • 3PAR StoreServ 10400/10800 Storage • 3PAR StoreServ 7200/7400/7450 Storage • 3PAR StoreServ 7200c/7400c/7440c/7450c Storage • 3PAR StoreServ 20450/20800/20850 Storage • 3PAR StoreServ 20xx0_R2 Storage • 3PAR StoreServ 8200/8400/8440/8450 Storage • 3PAR StoreServ 9450 Storage 	Fully Supported

¹ OS version currently at SW EOL (End-of-Life).

² OS version approaching SW EOL (End-of-Life).

Table 8: Unsupported OS to OS and Hardware RC Configuration

System A OS Version	System B OS Version	Hardware A	Hardware B	Transition State or Fully Supported State
3.1.1	3.1.3	<ul style="list-style-type: none">• 3PAR T400/T800 Storage• 3PAR F200/F400 Storage• 3PAR StoreServ 10400/10800 Storage	<ul style="list-style-type: none">• 3PAR T400/T800 Storage• 3PAR F200/F400 Storage• 3PAR StoreServ 10400/10800 Storage• 3PAR StoreServ 7200/7400/7450 Storage	Not supported
3.1.1	3.2.1	<ul style="list-style-type: none">• 3PAR T400/T800 Storage• 3PAR F200/F400 Storage• 3PAR StoreServ 10400/10800 Storage	<ul style="list-style-type: none">• 3PAR StoreServ 10400/10800 Storage• 3PAR StoreServ 7200/7400/7450 Storage• 3PAR StoreServ 7200c/7400c/7440c/7450c Storage	Not supported

Table Continued

System A OS Version	System B OS Version	Hardware A	Hardware B	Transition State or Fully Supported State
3.1.2	3.2.1	<ul style="list-style-type: none"> 3PAR T400/T800 Storage 3PAR F200/F400 Storage 3PAR StoreServ 10400/10800 Storage 3PAR StoreServ 7200/7400/7450 Storage 	<ul style="list-style-type: none"> 3PAR StoreServ 10400/10800 Storage 3PAR StoreServ 7200/7400/7450 Storage 3PAR StoreServ 7200c/7400c/7440c/7450c Storage 	Not supported
3.1.3	3.3.1	<ul style="list-style-type: none"> 3PAR T400/T800 Storage 3PAR F200/F400 Storage 3PAR StoreServ 10400/10800 Storage 3PAR StoreServ 7200/7400/7450 Storage 	<ul style="list-style-type: none"> 3PAR StoreServ 10400/10800 Storage 3PAR StoreServ 7200/7400/7450 Storage 3PAR StoreServ 7200c/7400c/7440c/7450c Storage 3PAR StoreServ 20450/20800/20850 Storage 3PAR StoreServ 20xx0_R2 Storage 3PAR StoreServ 8200/8400/8440/8450 Storage 3PAR StoreServ 9450 Storage 	Not Supported

NOTE: 3PAR OS SW EOL (End-of-Life) information for 3PAR OS 3.1.1 and 3.1.2, go to the Hewlett Packard Enterprise Support Center website.

5. Plan the update procedure. Use the update Types table when a multi-step update is required. Verify that all update tasks are completed, review the 3PAR OS release notes, and apply any appropriate patches.
6. Complete the Plan the update Procedure table by entering the following information:
 - a. Enter the Current OS for systems A and B.
 - b. Enter the Final OS for systems A and B.
 - c. Based on the update path or paths for each system, determine each update's OS by performing only one update per update step and keeping the RC pair systems in a Transition State or Fully Supported State using OS and Hardware RC Configuration State table. See the Example update Procedure.

Table 9: Plan the update Procedure

	[System A Hardware Type]	[System B Hardware Type]	Transition State or Fully Supported State
	System A update Steps	System B update Steps	
Current OS			
update Step 1			
update Step 2			
update Step 3			
update Step 4			
update Step 5			
Final OS			

7. Perform the planned updates. Prior to any 3PAR OS update, ensure the updating system, pair system, and RC links are stable. Ensure RC data has completed a full synchronization. Repeat until all update steps are completed.
 - a. Perform the first update step per the Plan the update Procedure table.
 - b. At the end of each update, check the conditions before proceeding onto the next update.

Example Update Procedure

The following is an example of the update procedure involving a 3PAR F400 storage currently running 3.1.2 MU2 (System A) in an RC relationship with a 3PAR StoreServ 7400 storage currently running 3.1.2 MU2 (System B).

1. For each system participating in the RC relationship, determine the current OS, hardware type, and final OS version.

Table 10: Example -- RC Pair Update Information

System A Current OS	System B Current OS
3.1.2 MU2	3.1.2 MU2
System A Hardware Type	System B Hardware Type
3PAR F400	3PAR StoreServ 7400

Table Continued

System A Final OS	System B Final OS
3.1.3 MU1	3.2.1 GA

- Determine the update path or paths for each 3PAR StoreServ Storage system participating in RC, and complete the RC Updates to 3PAR OS table.

Table 11: Example -- RC Updates to 3PAR OS

Update from OS	Update to OS	Update Type	System A	System B
			Current OS	Current OS
			System A	System B
			Hardware Type	Hardware Type
Update from OS	Update to OS	Update Type	System A Update Path	System B Update Path
3.1.1 GA	3.1.3 MU1	Multi-step update ¹		
3.1.1 GA /MUx	3.2.2	Multi-step update		
3.1.2 GA	3.1.3 MU1	Direct update		
3.1.2 MUx	3.1.3 MU1	Direct update	X	X
3.1.2 MU5 3.1.2 MU3 + Patches	3.2.1	Direct update		
3.1.2 GA/MUx	3.2.2	Multi-step update		
3.1.3 MUx	3.2.1	Direct update		
3.1.3 MUx	3.2.2	Direct update		X
3.2.1	3.2.2	Direct update		

¹ Multi-step updates must be performed within a five-week update period.

- Determine the order of the update/updates to remain in a supported RC configuration (3PAR OS to 3PAR OS versions) using the OS and Hardware RC Configuration State table. Use the Update Types table to verify that all update tasks are completed, review the 3PAR OS release notes, and apply any appropriate patches.
- Plan the update procedure. In an active RC configuration, consider updating the destination array first, if possible. Complete the Plan the Update Procedure table.

Table 12: Example -- Plan the Update Procedure

	3PAR F400	3PAR StoreServ 7400	Transition State or Fully Supported State
	System A Update Steps	System B Update Steps	
Current OS	3.1.2 MU2	3.1.2 MU2	Fully Supported
Update Step 1	3.1.3 MU1		Transition
Update Step 2		3.1.3 MU1	Fully Supported
Update Step 3		3.2.1	Fully Supported
Update Step 4			
Update Step 5			
Final OS	3.1.3 MU1	3.2.1	Fully Supported

5. Perform the planned updates. Prior to any 3PAR OS update, ensure the updating system, pair system, and RC links are stable. Ensure RC data has completed a full synchronization. Repeat until all update steps are completed.
 - Perform the first update step per the Plan the Update Procedure table.
 - At the end of each update, check the conditions before proceeding onto the next update.

Remote versus local methods for a 3PAR OS update

Remote 3PAR OS updates

Remote 3PAR OS updates are achieved by utilizing Hewlett Packard Enterprise's Remote Operations Service Tools (RemOps) (for example, via Ethernet or modem). The process used for remote 3PAR OS updates depends on the connectivity model allowed for remote updates. There are two connectivity models:

Ethernet RemOps

Service processor software updates can be downloaded, staged, and performed remotely through a secure channel.

Temporary RemOps

In some cases, customers will temporarily open up connectivity to the service processor for remote operations for software updates. If temporary remote operations access can be granted, we can perform the update remotely.

Local 3PAR OS updates

Local 3PAR OS updates are achieved by utilizing an on-site service representative to perform the update. Typically, local 3PAR OS updates are performed when there is no remote connection to the service processor. Additionally, a local 3PAR OS update may be combined with other on-site activities, such as hardware updates or maintenance.

Stopping and starting 3PAR Quorum Witness

Before performing an online update to 3PAR OS 3.1.3 MU1 or later, stop 3PAR Quorum Witness, and restart it upon completion of the update.

To stop and start Quorum Witness, follow these steps:

Procedure

1. Check the status of the quorum with the `showrcopy -qw` command.

For example:

```
# showrcopy -qw targets
Remote Copy System Information
Status: Started, Normal

Target Information

Name ID Type Status Policy          QW-IP          Q-Status Q-Status-Qual
s210 3 IP   ready mirror_config 10.112.135.205 Started
```

2. Before updating to 3PAR OS 3.1.3 MU1, stop the quorum witness on both arrays with the `setrcopytarget witness stop` command.

For example:

```
# setrcopytarget witness stop s210
# setrcopytarget witness stop -remote s210
```

3. Verify that the quorum witness is in the `Not-started` state with the `showrcopy -qw` command.

For example:

```
# showrcopy -qw targets
Remote Copy System Information
Status: Started, Normal

Target Information

Name ID Type Status Policy          QW-IP          Q-Status Q-Status-Qual
s210 3 IP   ready mirror_config 10.112.135.205 Not-started
```

4. If the 3PAR Quorum Witness was updated to the latest version and a new virtual machine installed, remove the old 3PAR Quorum Witness IP address, and add the new IP address to your configuration. See [Updating and migrating Quorum Witness](#) .
5. After the update to 3PAR OS 3.1.3, restart the quorum witness on both arrays with the `setrcopytarget witness start` command.

For example:

```
# setrcopytarget witness start s210
# setrcopytarget witness start -remote s210
```

6. Verify that the quorum witness started with the `showrcopy -qw` command.

For example:

```
# showrcopy -qw targets
Remote Copy System Information
Status: Started, Normal

Target Information

Name ID Type Status Policy QW-IP Q-Status Q-Status-Qual
s210 3 IP ready mirror_config 10.112.135.205 Started
```

Updating and migrating Quorum Witness

Procedure

1. Stop the quorum witness on both arrays:

```
# setrcopytarget witness stop s210
# setrcopytarget witness stop -remote s210
```

2. Remove the old quorum witness on both arrays:

```
# setrcopytarget witness remove s210
# setrcopytarget witness remove -remote s210
```

3. Create the new quorum witness on both arrays:

```
# setrcopytarget witness create <new_witness_ip> s210
# setrcopytarget witness create -remote <new_witness_ip> s210
```

4. Wait for the quorum state to stabilize, changing from `Initializing` to the `Not-started` state. This may take up to 30 seconds. To view the quorum state, run the following command:

```
# showrcopy -qw targets
```

Red Hat, Oracle Linux, and SUSE Guidelines

Observe the following host configuration guidelines when planning an online 3PAR OS update for Red Hat (RHEL), Oracle Linux, or SUSE (SLES) OS:

- The SCSI timeout value for RHEL 4 must be changed from the default of 30 seconds to 60 seconds. To change the timeout value, see the 3PAR host OS implementation guide specific to the OS. This needs to be performed for both FC- and iSCSI-connected hosts.
- QLogic drivers for SLES 10 and RHEL 4 and 5 should be running with driver parameter PORT-DOWN retry count (`qlport_down_retry`) set to 1. To set the value, see the 3PAR host OS implementation guide specific to the OS.

NOTE: If the 3PAR StoreServ Storage array is running 3PAR OS 3.1.1 or later you must modify the HBA parameter by setting `qlport_down_retry` to 14.

If the 3PAR StoreServ Storage array is running a 3PAR OS version earlier than 3.1.1, set `qlport_down_retry` to 1.

- For Brocade HBA Adapters for both Red Hat and SUSE, set the Path TOV value to 14 using BCU command. Refer to the Host OS implementation Guide
- For hosts using Oracle Clusterware, make the following required changes or adjustments before performing an update:

- For 10gR1 10.1.0.x and 10gR2 10.2.0.1 (without bug 4896338 patched), set `css miscount` to 195:

```
#set css miscount=195
```

- For 10gR2 10.2.0.1 (with bug 4896338 patched) and later, 11gR1, and 11gR2, `css disktimeout` must not be lowered from its default value of 200.
- For all Linux hosts with Oracle Clusterware, install and adjust Linux Hangcheck tick parameters to 30 seconds.

Sun/Solaris Configuration Guidelines

As of 3PAR OS 3.1.1 GA, online updates can be successfully performed by means of a node-by-node (aka "Advanced") update and pausing between 3PAR StoreServ Storage node updates. Wait for all I/O paths for all Sun Cluster nodes to recover during each pause between 3PAR StoreServ Storage node updates. See [Monitoring Solaris I/O paths](#).

NOTE: Solaris 10 MU3 with an iSCSI configuration is not supported for online updates.

Monitoring Solaris I/O paths

The recovery of the I/O paths must be monitored at each individual Sun Cluster node. Status of the Sun Cluster I/O paths cannot be assessed from the 3PAR StoreServ Storage.

Using the Solaris `format` command, establish the device IDs for the device I/O paths that will need to be monitored.

```
# format
Searching for disks...done

AVAILABLE DISK SELECTIONS:
 0. c0t1d0 <SUN72G cyl 14087 alt 2 hd 24 sec 424> sol9u9
    /pci@1e,600000/pci@0/pci@a/pci@0/pci@8/scsi@1/sd@1,0
 1. c3t50002AC000A50172d0 <3PARdata-VV-3120 cyl 8621 alt 2 hd 8 sec 304>
    /scsi_vhci/ssd@g50002ac000a50172
 2. c3t50002AC000A60172d0 <3PARdata-VV-3120 cyl 8621 alt 2 hd 8 sec 304>
    /scsi_vhci/ssd@g50002ac000a60172
```

In the sample output shown above, it can be established that the 3PAR data volumes whose I/O paths are to be monitored are on controller c3 (c3t50002AC000A50172d0 <3PARdata-VV-3120>). With this information, use the Solaris `luxadm display` command to check the State of the I/O paths.

The `luxadm display` output yields significant data about the volumes and their associated connection to the storage array. For the purpose of monitoring the I/O paths during array online update, only the listing of the State of the Controller is relevant.

In the sample output below, two of the four I/O paths on each of the two volumes are `ONLINE`, and two are `OFFLINE`.

```

# luxadm display /dev/rdisk/c3*s2
DEVICE PROPERTIES for disk: /dev/rdisk/c3t50002AC000A50172d0s2
Vendor:          3PARdata
Product ID:     VV
Revision:       3111
Serial Num:     01400370
Unformatted capacity: 10240.000 MBytes
Write Cache:    Enabled
Read Cache:     Enabled
  Minimum prefetch: 0x0
  Maximum prefetch: 0xffff
Device Type:    Disk device
Path(s):

/dev/rdisk/c3t50002AC000A50172d0s2
/devices/scsi_vhci/ssd@g50002ac000a50172:c,raw
Controller      /devices/pci@1f,700000/pci@0/SUNW,qlc@2,1/fp@0,0
Device Address  20340002ac000172,1e
Host controller port WWN  210100e08bafelb5
Class           primary
State          OFFLINE
Controller      /devices/pci@1f,700000/pci@0/SUNW,qlc@2,1/fp@0,0
Device Address  21340002ac000172,1e
Host controller port WWN  210100e08bafelb5
Class           primary
State          ONLINE
Controller      /devices/pci@1f,700000/pci@0/SUNW,qlc@2/fp@0,0
Device Address  20340002ac000172,1e
Host controller port WWN  210000e08b8fe1b5
Class           primary
State          OFFLINE
Controller      /devices/pci@1f,700000/pci@0/SUNW,qlc@2/fp@0,0
Device Address  21340002ac000172,1e
Host controller port WWN  210000e08b8fe1b5
Class           primary
State          ONLINE

DEVICE PROPERTIES for disk: /dev/rdisk/c3t50002AC000A60172d0s2
Vendor:          3PARdata
Product ID:     VV
Revision:       3111
Serial Num:     01400370
Unformatted capacity: 10240.000 MBytes
Write Cache:    Enabled
Read Cache:     Enabled
  Minimum prefetch: 0x0
  Maximum prefetch: 0xffff
Device Type:    Disk device
Path(s):

/dev/rdisk/c3t50002AC000A60172d0s2
/devices/scsi_vhci/ssd@g50002ac000a60172:c,raw
Controller      /devices/pci@1f,700000/pci@0/SUNW,qlc@2,1/fp@0,0
Device Address  20340002ac000172,1f
Host controller port WWN  210100e08bafelb5
Class           primary
State          OFFLINE
Controller      /devices/pci@1f,700000/pci@0/SUNW,qlc@2,1/fp@0,0
Device Address  21340002ac000172,1f

```



```

Host controller port WWN    210100e08bafefb5
Class                       primary
State                       ONLINE
Controller                  /devices/pci@1f,700000/pci@0/SUNW,qlc@2/fp@0,0
Device Address              20340002ac000172,1f
Host controller port WWN    210000e08b8fefb5
Class                       primary
State                       OFFLINE
Controller                  /devices/pci@1f,700000/pci@0/SUNW,qlc@2/fp@0,0
Device Address              21340002ac000172,1f
Host controller port WWN    210000e08b8fefb5
Class                       primary
State                       ONLINE

```

It is sufficient to simply monitor the `State` of the I/O paths during the array online update.

```

# luxadm display /dev/rdisk/c3*s2 | grep State
State                       OFFLINE
State                       ONLINE
State                       OFFLINE
State                       ONLINE
State                       OFFLINE
State                       ONLINE
State                       OFFLINE
State                       ONLINE

```

When the `State` of all paths is `ONLINE`, the node-by-node update sequence may proceed to the next array node.

On each Solaris Cluster node, issue the following command:

```

# luxadm display /dev/rdisk/c3*s2 | grep State
State                       ONLINE
State                       ONLINE
State                       ONLINE
State                       ONLINE
State                       ONLINE
State                       ONLINE
State                       ONLINE
State                       ONLINE

```

NOTE: The `luxadm display`

reports the I/O path

State

at a point in time and may have to be run through several iterations on each Solaris Cluster node before all I/O paths are shown as

ONLINE

.

The time for I/O path recovery varies widely between Solaris Cluster configurations and is dependent on the number of LUNs presented, total I/O paths, FC fabric configuration, and I/O load.

Symantec Veritas Storage Foundation DMP (VxDMP) and Online Update

NOTE: 3PAR OS online updates with attached hosts using Symantec Veritas Storage Foundation VxDMP multipath software require a pause to be implemented between updates of the array nodes within the system. The pause is to be implemented in order to allow sufficient time for I/O path recovery to maintain host connectivity to all presented volumes. 3PAR testing indicates that a pause of 5 minutes between array node updates is sufficient to allow VxDMP I/O path recovery during the update.

Pauses exceeding 30 minutes are not recommended.

A pause between array node updates can only be implemented while performing node-by-node online updates with the Advanced/manual procedures for 3PAR OS 3.1.1 and later. Failure to utilize the node-by-node online updates procedures and implement a pause between array node updates may result in loss of host connectivity and data availability of Veritas disks or disk groups during the array update.

The default value of the VxDMP link restore (`dmp_restore_interval` tunable) interval must temporarily be changed to a value of 1 second before performing an online update of the 3PAR OS for the following VxDMP versions:

- All Linux/Solaris/AIX VxDMP versions older than 5.0MP1
- All NETAPP VxDMP versions older than 5.0MP3

Changing the link restore interval causes the VxDMP software to react to the return of missing paths more quickly than it normally would with default settings. Failure to perform the change to the shorter restore interval for the noted VxDMP versions above, may cause a loss of host connectivity to 3PAR volumes during the update. For instructions, see [Changing the Veritas DMP link restore interval](#). After the online update, reset the link restore interval to the previously configured value. For instructions, see [Restoring the Veritas DMP link restore interval](#). As of VxDMP 5.0MP1 for Linux/Solaris/AIX and 5.0MP3 NETAPP, Veritas software was modified to circumvent the path loss issue related to the link restore interval during a 3PAR OS update and no changes to the restore interval are necessary.

Changing the Veritas DMP link restore interval

The following procedure may be required if you are performing an online update to the 3PAR OS and Veritas DMP is being used for the multipathing solution on the host. The procedure must be repeated for each host that is connected to the 3PAR StoreServ Storage and using Veritas DMP.

Use the following procedure to gather the current settings and change the link restore interval:

Procedure

1. Display the current setting of the link restore interval as follows. Record the interval so that it can be restored later.

```
# vxdmpadm stat restored          (note the current setting)
```

2. Stop the daemon.

```
# vxdmpadm stop restore
```

3. Restart the daemon with the interval set to 1.

```
# vxdmpadm start restore interval=1
```

4. Verify that the daemon is running with the interval set to 1.

```
# vxdmpadm stat restored
```

NOTE: The restore daemon reverts to the default value of 300 if or when a host restart occurs.

Restoring the Veritas DMP link restore interval

If the Veritas DMP link restore interval has been changed to 1 second for 3PAR OS online update, use the following commands to change the link restore interval to the previous setting on storage server hosts after completing an online update. The following procedure must be repeated for each host that is connected to 3PAR Storage and using Veritas DMP.

Use the following procedure to restore the link restore interval to its original setting:

Procedure

1. Stop the daemon.

```
# vxdmpadm stop restore
```

2. Restart the daemon with the interval set to what it was previously.

```
# vxdmpadm start restore interval=<prior setting>
```

3. Verify the daemon is running with the interval set to the prior setting.

```
# vxdmpadm stat restored
```

VMware ESX/ESXi Host Guidelines

NOTE: Hewlett Packard Enterprise recommends host persona 11 for all supported versions of VMware ESX/ESXi with 3PAR OS 3.1.2 and later. Starting with 3PAR OS 3.2.1 host persona 6 will not be supported for any VMware ESX/ESXi version with 3PAR storage systems.

For information regarding 3PAR host persona support for all supported VMware ESX versions.

VMware ESX/ESXi host - Active/Active, with a path policy of `Most Recently Used (MRU)`, does not maintain or re-instate balancing of I/O load after a failover/failback multipath event. This could leave I/O in an unbalanced state, which may yield significant I/O performance issues. Implementation of an MRU path policy is not recommended by Hewlett Packard Enterprise. As of ESX 4.0, an alternate path policy choice of `Round Robin` is available. This is the recommended path selection policy on ESX systems where it is available.

The VMware vCenter Site Recovery Manager and the 3PAR Adapter for VMware Site Replicator require newer versions to be compatible with 3PAR OS 3.1.1 or later. For details, see VMware's *Site Recovery Manager Storage Partner Compatibility Matrix*:

http://www.vmware.com/pdf/srm_storage_partners.pdf

NOTE: This link will take you outside the Hewlett Packard Enterprise website. Hewlett Packard Enterprise does not control and is not responsible for information outside of the Hewlett Packard Enterprise website.

3PAR StoreServ array operations

3PAR StoreServ array operations that include reboot/reset of the array master node, including 3PAR OS update, may disrupt VM operations initiated by vSphere. For this reason, Hewlett Packard Enterprise recommends not performing VM operations on VMs using VVols during an array master node reboot/reset or 3PAR OS update.

VM operations that might fail during an array master node reboot/reset or 3PAR OS update include:

- Creating a VM in a VVol Datastore
- Powering up or shutting down a VM that is in a VVol Datastore, or has VVol disks
- Adding or removing a VVol to/from a VM
- Snapshotting a VM or promoting a VM snapshot on a VM that has VVol disks
- Migrating a VM to/from a VVol Datastore
- Cloning a VM from/to a VVol Datastore
- Browsing a VVol Datastore
- Attempting to register a VM in a VVol Datastore

VVol-based VMs that are currently running will continue to operate normally.

Windows Server OS Guidelines

Restarting Windows Server OS after an update

On the first Windows Server 2008, 2008 R2, 2012, or 2012 R2 restart following a 3PAR array firmware update (whether a major update or an MU update within the same release family) the Windows server will mark the 3PAR LUNs as offline, but the data remains intact.

This behavior is seen only in the following cases:

- 3PAR LUNs are seen by non-clustered Windows servers.
- 3PAR LUNs are used in Microsoft Failover Clustering, but are not configured as shared storage in the Failover Cluster.

The behavior of LUNs being marked offline is not seen if 3PAR LUNs are configured as shared storage in a Microsoft Failover Cluster.

! **IMPORTANT:** When the 3PAR LUNs are marked offline, the Windows server administrator must follow these steps so that the applications can access the 3PAR LUNs:

1. Click **Computer Management > Disk Management**.
2. Right-click each of the 3PAR LUNs.
3. Set the LUNs as **online**.

After an update to 3PAR OS 3.1.3 MU1 or a later version, Hewlett Packard Enterprise requires that host persona 15 be used for Windows Server 2012 R2 and non-R2 and Windows Server 2008 R2 and non-R2 to prevent this issue from occurring. The host persona must be changed to 15 before the first restart of the Windows Server host following the update. Changing to host persona 15 is an online procedure. Use the 3PAR OS CLI `sethost` command to change the persona, and verify by using the `showhost` command following the update.

```
# sethost -persona 15 windowshost
showhost
Id Name          Persona          -WWN/iSCSI_Name- Port
0 windowshost WindowsServer 10000000C9606724 0:5:1
                                     10000000C9606724 1:5:1
```

Microsoft Hotfixes

Hotfixes might be required for the support of specific Windows functionality. For more information about required hotfixes, see the Windows Server SPOCK configurations on the SPOCK website:

<http://www.hpe.com/storage/spock>

For Windows Server 2008 and Windows Server 2008 R2 using MS MPIO, Microsoft hotfixes must be applied before updating the 3PAR StoreServ Storage. For more information about the required hotfixes, see the Windows Server 2008 and Windows Server 2008 R2 SPOCK configurations on the SPOCK website:

<http://www.hpe.com/storage/spock>

A hotfix, available from Microsoft, is required to support live storage migrations with Windows Server 2012 using Cluster Shared Volumes on 3PAR OS 3.1.2 and later. The hotfix must be applied before updating the

3PAR StoreServ Storage. For more information about the required hotfix, see the Windows Server 2012 SPOCK configuration on the SPOCK website:

<http://www.hpe.com/storage/spock>

AIX Guidelines

3PAR OS online automatic updates with AIX Direct Connect attached hosts are not supported by Hewlett Packard Enterprise for any 3PAR OS updates. Online maintenance updates can be successfully performed by means of a node-by-node (or advanced) update method. Using this method will cause the system to wait for user input between each node restart needed during an online 3PAR OS update.

This pause time in the update process is used to allow all of the I/O paths to the AIX direct-connect hosts, for all of the presented LUNs, to recover (fail back). To display the paths that must be monitored for recovery, use the AIX `lspath -s failed` command on the attached host:

```
# lspath -s failed
Failed hdisk4 fscsi0
Failed hdisk5 fscsi0
...
#
```

After all the paths have recovered, continue with the next node of the 3PAR OS.

```
# lspath -s failed
#
```

HP-UX Guidelines

Restart Issues with HP-UX Integrity servers

Cause

After updating the 3PAR OS on the array, you can restart your Integrity servers. Should you encounter any restart issues with Integrity servers, follow this procedure:

1. From the boot menu, select EFI shell (command line interface).
2. From the Device mapping table, select the FS device that has the boot LUN on the array.

Example:

- At the shell prompt type

```
fs0
```

and then press enter.

- Show the directory contents by typing:

```
dir
```

and press enter.

- Restart the server by typing:

```
hpux boot
```

and press enter.

3. Run the following commands after the server has restarted:

a. `insf -e`: Running this command on 11.23 ensures that the DSFs (device special files) are created.

b. `ioscan`: Verifies that the BFS boot LUN is shown

c. `lvlnboot -v`

d. `setboot -v|head -5`

e. `setboot -p <primary-path> [-h HA alternate-path] [-a alternate-path]`

f. Restart the server if needed to reboot to the BFS LUN.

Example with 11i v3 (11.31)

Using the `lvlnboot -v` command and the `setboot -v | head -5` command on the HP-UX server:

```
# lvlnboot -v
Boot Definitions for Volume Group /dev/vg00:
Physical Volumes belonging in Root Volume Group:
    /dev/disk/disk7_p2 -- Boot Disk
Boot: lvoll      on:  /dev/disk/disk7_p2
Root:  lvoll3    on:  /dev/disk/disk7_p2
Swap: lvoll2     on:  /dev/disk/disk7_p2
Dump:  lvoll2    on:  /dev/disk/disk7_p2, 0

# setboot -v | head -5
Primary bootpath : 41/0/0/2/0/0/2.0x21210002ac000e2c.0x4001000000000000 (/dev/rdisk/disk7)
HA Alternate bootpath : 41/0/2/0/0/0/0/4/0/0/0.0x217000c0ffd0000b.0x4002000000000000 (/dev/rdisk/
disk8)
Alternate bootpath : 41/0/2/0/0/0/0/4/0/0/0.0x217000c0ffd0000b.0x4002000000000000 (/dev/rdisk/disk8)
```

For this example, the `setboot` command would be:

```
# setboot -p /dev/rdisk/disk7 -h /dev/rdisk/disk8 -a /dev/rdisk/disk8
```

Example with 11i v2 (11.23)

Using the `lvlnboot -v` command and the `setboot -v | head -5` command on the HP-UX server:

```
# lvlnboot -v
Boot Definitions for Volume Group /dev/vg00:
Physical Volumes belonging in Root Volume Group:
    /dev/dsk/c6t2d1s2 (0/0/14/0/0/0/0.2.11.0.0.2.1) -- Boot Disk
Boot: lvoll      on:  /dev/dsk/c6t2d1s2
Root:  lvoll3    on:  /dev/dsk/c6t2d1s2
Swap: lvoll2     on:  /dev/dsk/c6t2d1s2
Dump:  lvoll2    on:  /dev/dsk/c6t2d1s2, 0

# setboot -v ...
Primary bootpath : 0/0/14/0/0/0/0.2.11.0.0.2.1
HA Alternate bootpath : 0/0/1/1/0/4/1.5.0
Alternate bootpath : 0/0/4/0/0/0/0.100.76.0.0.0.1
```

For this example, the `setboot` command would be:

```
# setboot -p 0/0/14/0/0/0/0.2.11.0.0.2.1 -h 0/0/1/1/0/4/1.5.0 -a 0/0/4/0/0/0/0.100.76.0.0.0.1
```

Setting up the HP-UX PA-RISC server

- ❗ **IMPORTANT:** To preserve the boot from SAN (BFS) setup for HP-UX PA-RISC servers running any supported OS version, the following steps **must** be completed before restarting the server and after the 3PAR OS on the arrays is updated.

After the 3PAR OS on the array is updated, run the following commands before restarting the server:

Procedure

1. Run the `insf -e` command.
2. Run the `ioscan` command.

3. Use the `setboot` command to reset the primary and alternate boot paths as well as HA if it is available.

Example with 11i v3 (11.31)

Using the `lvlboot -v` command and the `setboot -v | head -5` command on the HP-UX server:

```
#lvlboot -v
Boot Definitions for Volume Group / dev/vg00:
Physical Volumes belonging in Root Volume Group: /dev/disk/disk8 -- Boot Disk
Boot:  lv011   on:   /dev/disk/disk8
Root:   lv013   on:   /dev/disk/disk8
Swap:   lv012   on:   /dev/disk/disk8
Dump:   lv012   on:   /dev/disk/disk8, 0

#setboot -v
Primary bootpath: 1/0/14/1/0.0x21120002ac0010e6.0x4001000000000000 (/dev/rdisk/disk8) <= BFS Boot
LUN
HA Alternate bootpath: 1/0/4/1/0/4/0.0x21110002ac0010e6.0x4001000000000000
Alternate bootpath: 1/0/0/2/0.0x6.0x0 (/dev/rdisk/disk5) <= Internal Boot LUN
```

In this example, the `setboot` command would be:

```
# setboot -p /dev/rdisk/disk8 -a /dev/rdisk/disk5 -h /dev/rdisk/disk8
```

Example with 11i v2 (11.23)

Using the `lvlboot -v` command and the `setboot -v | head -5` command on the HP-UX server:

```
#lvlboot -v
Current path "/dev/dsk/c10t0d2" is an alternate link, skip.
Boot Definitions for Volume Group /dev/vg00:
Physical Volumes belonging in Root Volume Group: /dev/dsk/c8t0d2
(0/5/1/0/4/0.8.0.0.0.0.2) -- Boot Disk /dev/dsk/c10t0d2 (0/5/2/0.8.0.0.0.0.2)
Boot:   lv011   on:   /dev/dsk/c8t0d2/dev/dsk/c10t0d2
Root:   lv013   on:   /dev/dsk/c8t0d2/dev/dsk/c10t0d2
Swap:   lv012   on:   /dev/dsk/c8t0d2/dev/dsk/c10t0d2
Dump:   lv012   on:   /dev/dsk/c8t0d2, 0

#setboot -v
Primary bootpath: 0/5/1/0/4/0.8.0.0.0.0.2 <= BFS Boot LUN
Alternate bootpath: 0/1/1/0.1.0 <= Internal Boot LUN
```

In this example, the `setboot` command would be:

```
# setboot -p 0/5/1/0/4/0.8.0.0.0.0.2 -a 0/1/1/0.1.0
```

HP-UX troubleshooting

Cause

NOTE: The following 3PAR OS online updates have been determined to cause HP-UX servers to report device discovery problems until the update is complete:

- 3PAR OS 3.1.1 (including all MUs) to 3.1.2 MU1, 3.1.2 MU2, or 3.1.2 MU3
- 3PAR OS 3.1.2 GA to 3.1.2 MU1, 3.1.2 MU2, or 3.1.2 MU3

ioscan reports device paths with a Software State of NO_HW

Cause

If a rescan of the HP-UX I/O system hardware is run during the 3PAR OS online update process, `ioscan` might report device paths with a Software State of `NO_HW`. This is due to a defect that causes an unexpected SCSI inquiry response to LUN 0 for HP-UX hosts during the 3PAR OS online update. It was verified that I/O is not affected and paths remain accessible as long as the server is not restarted during the online update process. When the entire online update process is complete, the SCSI inquiry response to LUN 0 is normal and a rescan reports device paths with a Software State of `CLAIMED`.

```
#ioscan -fnC disk
Class | H/W Path | Driver | S/W State
H/W Type | Description
=====
==
disk 67 0/0/0/5/0/0/0.20.131.97.0.0.1 sdisk NO_HW
DEVICE 3PARdataVV
/dev/dsk/c15t0d1 /dev/rdisk/c15t0d1
disk 69 0/0/0/5/0/0/0.20.131.97.0.0.2 sdisk NO_HW
DEVICE 3PARdataVV
/dev/dsk/c15t0d2 /dev/rdisk/c15t0d2
```

If an HP-UX server is restarted during a 3PAR OS online update, 1 or more previous known LUN paths might not be discovered by the HP-UX server. The HP-UX operating systems will not continue device discovery when a LUN 0 SCSI Inquiry response returns an unexpected value. Once the update is complete, manual intervention by a system administrator is required for the restarted HP-UX server to rediscover 3PAR devices as described in the next section.

NOTE: Resolution

This issue was resolved with 3PAR OS 3.1.3.GA. If you are updating to any of the affected 3PAR OS versions listed above, follow the steps listed below.

During the 3PAR OS Online Update process, a rescan of the HP-UX.31 I/O system hardware reports device paths with a Software State of `NO_HW`. Perform the following steps to check the health of the data LUN paths and confirm they are reported as **online**.

1. Ensure that the HP-UX 11.31 server was not restarted.
2. Scan the HP-UX system hardware and identify the hardware paths for any devices that report a Software State as `NO_HW`.

```
#ioscan -fnC disk
Class   |   H/W Path           Driver   S/W
State   H/W Type      Description
=====
=
disk    67    0/0/0/5/0/0/0.20.131.97.0.0.1   sdisk
NO_HW   DEVICE      3PARdataVV
        /dev/dsk/c15t0d1   /dev/rdisk/c15t0d1
disk    69    0/0/0/5/0/0/0.20.131.97.0.0.2   sdisk
NO_HW   DEVICE      3PARdataVV
        /dev/dsk/c15t0d2   /dev/rdisk/c15t0d2
```

3. Verify the health of the data LUN path using the hardware paths from the previous step.

```
#ioscan -P health -H <hardware_path>
#ioscan -P health -H 0/0/0/5/0/0/0

Class   |   H/W
Path
health
=====
lunpath 9    0/0/0/5/0/0/0.0x23240002ac000e2c.
0x0      offline
lunpath 68   0/0/0/5/0/0/0.0x23240002ac000e2c.0x4001000000000000
online
lunpath 77   0/0/0/5/0/0/0.0x23240002ac000e2c.0x4002000000000000
online
```

4. If the LUN paths display as **online**, I/O is not affected and paths remain accessible as long as the server is not restarted during the online update process.

NOTE: HP-UX OS version 11i v2 (11.23) and earlier do not provide the health check utility, however it has been verified that even though the devices are in the NO_HW state, the online update will resume without I/O interruption.

If an HP-UX host is restarted during the online update operation, the following steps must be performed to re-discover 3PAR devices:

1. Ensure all InServ nodes successfully completed the online update and show the correct 3PAR OS version as follows:

```
# cli updatesys -status
System is not currently undergoing an online update.
First node to be rebooted is node 3
  Which will be followed by node 0
  Which will be followed by node 2
  Which will be followed by node 1
```

```
# showversion -b
Release version 3.1.2.322 (MU1)
Patches: P05, P13

Component Name      Version
CLI Server           3.1.2.322 (MU1)
CLI Client           3.1.2.322 (MU1)
System Manager       3.1.2.428 (P05)
Kernel               3.1.2.322 (MU1)
TPD Kernel Code      3.1.2.322 (MU1)
TPD Kernel Patch     3.1.2.466 (MU1)
```

-
2. Scan the HP-UX system hardware for usable I/O system devices:

```
#ioscan -fn
```

3. If you are using LVM/PVLinks, scan the physical volumes for LVM volume groups and activate them:

```
#vgscan -v -a
```

Run the following command for each volume group using 3PAR LUNs:

```
#vgchange -a y <VG Name>
```

4. If you are using VxVM, rebuild the volume device nodes and start the volumes:

```
#vxdctl enable
```

```
#vxvol -g <Disk Group> start &lt;Volume Name>
```

Verify that the volumes are online: `#vxprint -ht -g <Disk Group>`

Support and other resources

Websites

Website	Link
Hewlett Packard Enterprise Information Library	www.hpe.com/info/enterprise/docs
Hewlett Packard Enterprise Support Center	www.hpe.com/support/hpesc
Contact Hewlett Packard Enterprise Worldwide	www.hpe.com/assistance
Subscription Service/Support Alerts	www.hpe.com/support/e-updates
Software Depot	www.hpe.com/support/softwaredepot
Customer Self Repair	www.hpe.com/support/selfrepair
Insight Remote Support	www.hpe.com/info/insightremotesupport/docs
Serviceguard Solutions for HP-UX	www.hpe.com/info/hpux-serviceguard-docs
Single Point of Connectivity Knowledge (SPOCK) Storage compatibility matrix	www.hpe.com/storage/spock
Storage white papers and analyst reports	www.hpe.com/storage/whitepapers
Hewlett Packard Enterprise Storage Information Library	www.hpe.com/info/storage/docs

Support and other resources

Accessing Hewlett Packard Enterprise Support

- For live assistance, go to the Contact Hewlett Packard Enterprise Worldwide website:
<http://www.hpe.com/assistance>
- To access documentation and support services, go to the Hewlett Packard Enterprise Support Center website:
<http://www.hpe.com/support/hpesc>

Information to collect

- Technical support registration number (if applicable)
- Product name, model or version, and serial number
- Operating system name and version
- Firmware version

- Error messages
- Product-specific reports and logs
- Add-on products or components
- Third-party products or components

Accessing updates

- Some software products provide a mechanism for accessing software updates through the product interface. Review your product documentation to identify the recommended software update method.
- To download product updates:

Hewlett Packard Enterprise Support Center

www.hpe.com/support/hpesc

Hewlett Packard Enterprise Support Center: Software downloads

www.hpe.com/support/downloads

Software Depot

www.hpe.com/support/softwaredepot

- To subscribe to eNewsletters and alerts:
www.hpe.com/support/e-updates
- To view and update your entitlements, and to link your contracts and warranties with your profile, go to the Hewlett Packard Enterprise Support Center **More Information on Access to Support Materials** page:
www.hpe.com/support/AccessToSupportMaterials

❗ **IMPORTANT:** Access to some updates might require product entitlement when accessed through the Hewlett Packard Enterprise Support Center. You must have an HPE Passport set up with relevant entitlements.

Customer self repair

Hewlett Packard Enterprise customer self repair (CSR) programs allow you to repair your product. If a CSR part needs to be replaced, it will be shipped directly to you so that you can install it at your convenience. Some parts do not qualify for CSR. Your Hewlett Packard Enterprise authorized service provider will determine whether a repair can be accomplished by CSR.

For more information about CSR, contact your local service provider or go to the CSR website:

<http://www.hpe.com/support/selfrepair>

Remote support

Remote support is available with supported devices as part of your warranty or contractual support agreement. It provides intelligent event diagnosis, and automatic, secure submission of hardware event notifications to Hewlett Packard Enterprise, which will initiate a fast and accurate resolution based on your product's service level. Hewlett Packard Enterprise strongly recommends that you register your device for remote support.

If your product includes additional remote support details, use search to locate that information.

Remote support and Proactive Care information

HPE Get Connected

www.hpe.com/services/getconnected

HPE Proactive Care services

www.hpe.com/services/proactivecare

HPE Proactive Care service: Supported products list

www.hpe.com/services/proactivecaresupportedproducts

HPE Proactive Care advanced service: Supported products list

www.hpe.com/services/proactivecareadvancedsupportedproducts

Proactive Care customer information

Proactive Care central

www.hpe.com/services/proactivecarecentral

Proactive Care service activation

www.hpe.com/services/proactivecarecentralgetstarted

Warranty information

To view the warranty information for your product, see the links provided below:

HPE ProLiant and IA-32 Servers and Options

www.hpe.com/support/ProLiantServers-Warranties

HPE Enterprise and Cloudline Servers

www.hpe.com/support/EnterpriseServers-Warranties

HPE Storage Products

www.hpe.com/support/Storage-Warranties

HPE Networking Products

www.hpe.com/support/Networking-Warranties

Regulatory information

To view the regulatory information for your product, view the *Safety and Compliance Information for Server, Storage, Power, Networking, and Rack Products*, available at the Hewlett Packard Enterprise Support Center:

www.hpe.com/support/Safety-Compliance-EnterpriseProducts

Additional regulatory information

Hewlett Packard Enterprise is committed to providing our customers with information about the chemical substances in our products as needed to comply with legal requirements such as REACH (Regulation EC No 1907/2006 of the European Parliament and the Council). A chemical information report for this product can be found at:

www.hpe.com/info/reach

For Hewlett Packard Enterprise product environmental and safety information and compliance data, including RoHS and REACH, see:

www.hpe.com/info/ecodata

For Hewlett Packard Enterprise environmental information, including company programs, product recycling, and energy efficiency, see:

www.hpe.com/info/environment

Documentation feedback

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