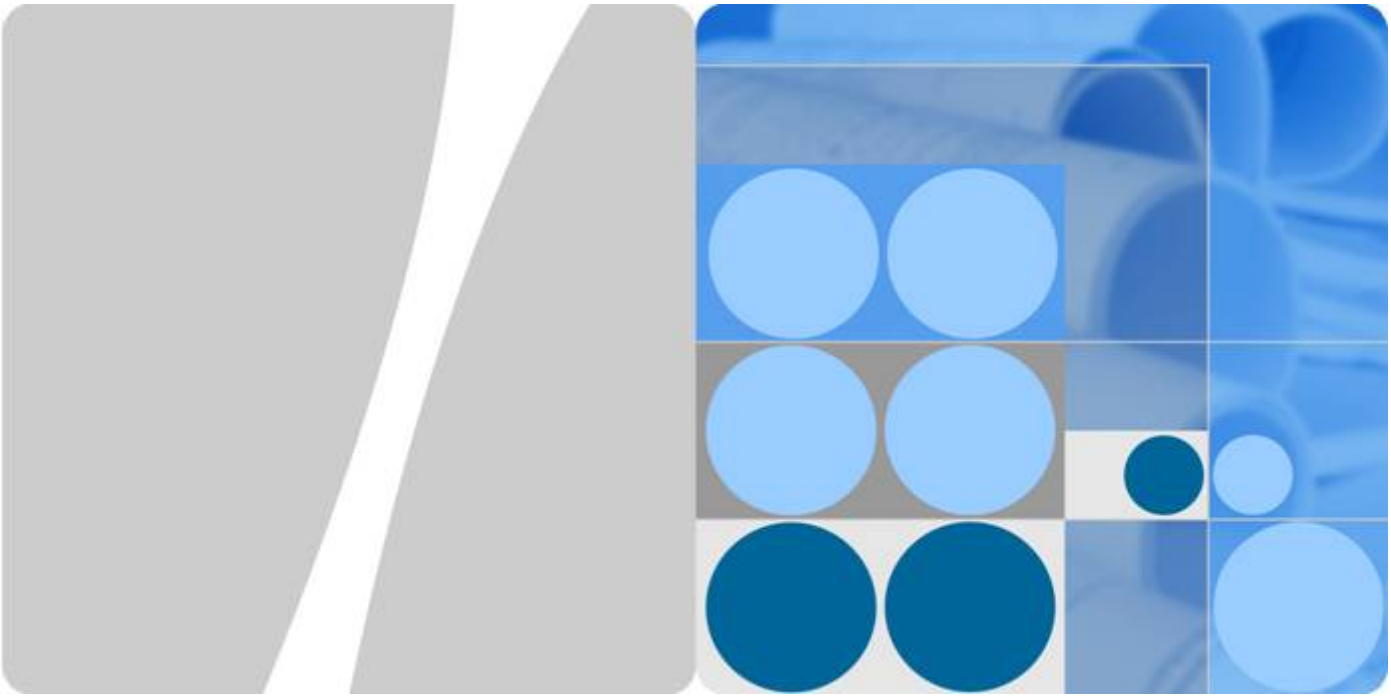

OceanStor UltraPath for vSphere

21.3.0

User Guide

Issue 01

Date 2018-11-30

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About This Document

Purpose

This document covers the functions, features, installation, configuration, upgrade, uninstallation, maintenance, troubleshooting, and FAQs of OceanStor UltraPath for vSphere (UltraPath for vSphere). UltraPath for vSphere is the multipathing software developed by Huawei Technologies Co., Ltd (Huawei for short). The document aims at helping users to be fully familiar with UltraPath for vSphere and its use.

Intended Audience

This document is intended for:

- Technical support engineers
- Maintenance engineers

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
NOTICE	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.

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Symbol	Description
NOTE	Calls attention to important information, best practices and tips. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Conventions

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If a product does not function as described in this document, contact Huawei technical support engineers.

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Change History

Changes between document issues are cumulative. The latest document issue contains all the changes made in earlier issues.

Issue 01 (2018-11-30)

This issue is the first official release.

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1 Overview

About This Chapter

OceanStor UltraPath is the multipathing software developed by Huawei. Its functions include masking of redundant LUNs, optimum path selection, I/O load balancing, and failover and failback. These functions enable your storage network to be intelligent, stable, and fast.

1.1 Overview
UltraPath can meet the requirements on high reliability and superb performance of storage networks. This section introduces the background, purpose, and benefits of UltraPath.

1.2 Principles and Functions
UltraPath provides powerful functions and features, ensuring secure, stable, and fast service operation. This section introduces the basic principles and functions of UltraPath.

1.3 Typical UltraPath Applications
Installed on an application server, UltraPath supports different networks and helps ensure fast and smooth data transfer.

1.4 UltraPath Security Feature
This chapter describes UltraPath security feature.

1.1 Overview

UltraPath can meet the requirements on high reliability and superb performance of storage networks. This section introduces the background, purpose, and benefits of UltraPath.

As modern technology develops, the requirements laid upon the security and stability of storage networks increase during the implementation of IT infrastructure. A fault in the storage network may cause the entire network to break down. Such a fault is called a single point of failure in the storage network. To avoid this, a highly reliable storage network not only includes redundant devices and components, but also adopts the interconnection of redundant links, as shown in **Figure 1-1**. The redundancy design can improve the reliability as well as the performance of the entire storage network. The multipathing technology helps achieve this goal.

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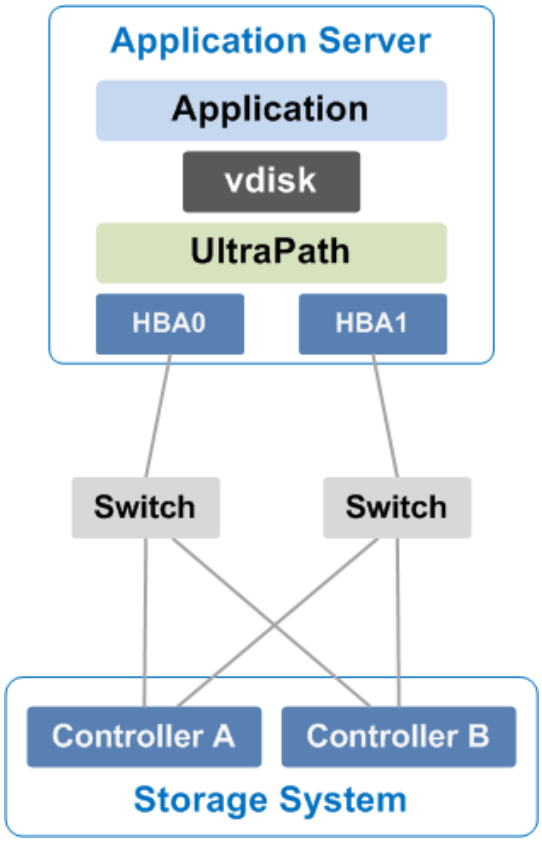
Figure 1-1 Multi-path networking



The multipathing technology is realized through multipathing software. If a path fails or cannot meet the performance requirement, multipathing software automatically and transparently transfers I/Os to other available paths to ensure that I/Os are transmitted effectively and reliably. As shown in **Figure 1-2**, multipathing software can handle many faults such as HBA faults, link faults, and controller faults.

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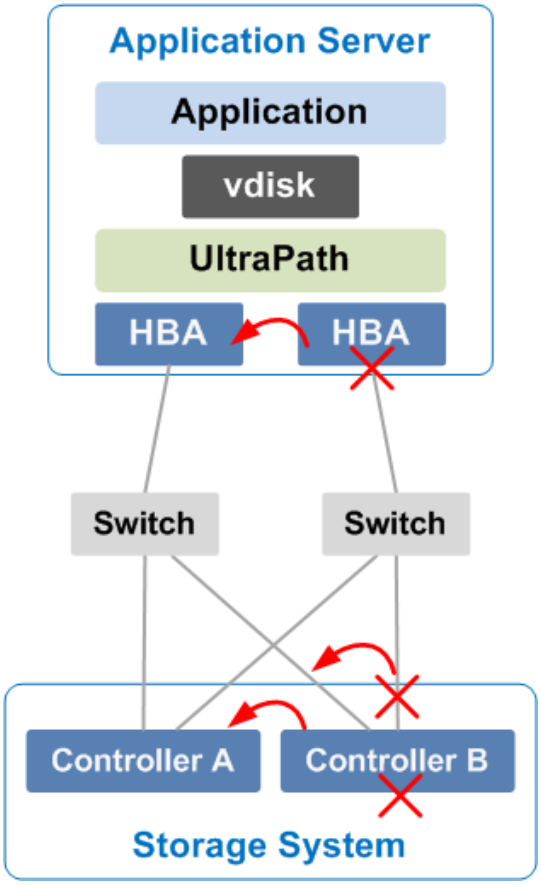
Figure 1-2 UltraPath handling path faults



The multipathing software (normally called Multi-Path I/O, MPIO) built-in host operating systems only provides basic failover and load balancing functions, failing to meet the high reliability requirements. Huawei UltraPath cannot only provide these basic functions, but also meet the systems' demands on reliability, performance, maintainability, and adaptation with many advanced functions such as path test, all paths down protection, path isolation, path alarm pushing, and path performance monitoring. Furthermore, UltraPath has better compatibility with Huawei storage. You are advised to use UltraPath for Huawei storage if you do not have any special requirements.

UltraPath is compatible with different host operating systems. For details,click **OceanStor Interoperability Navigator**.

1.2 Principles and Functions

UltraPath provides powerful functions and features, ensuring secure, stable, and fast service operation. This section introduces the basic principles and functions of UltraPath.

Integrating UltraPath with Operating Systems

UltraPath is a type of filter driver software running in host kernels. It can manage and process disk creation/deletion and I/O delivery of operating systems.

- **Figure 1-3** shows the layer where the UltraPath driver resides in Windows, Linux, and Solaris.

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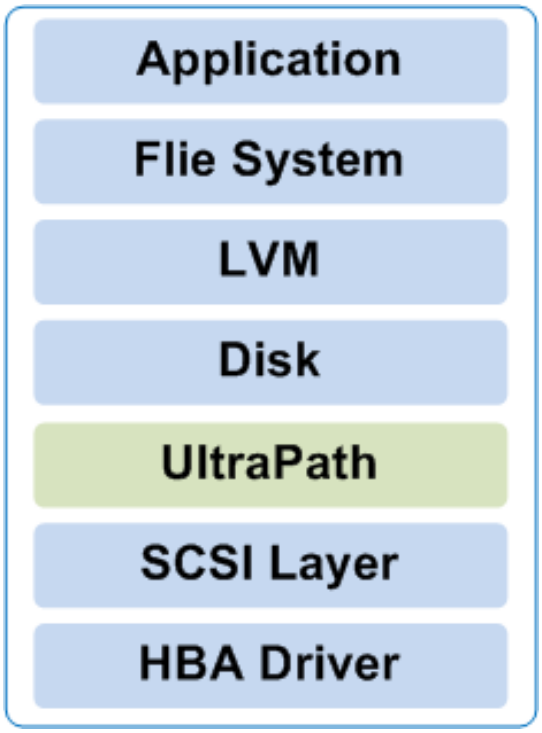
Figure 1-3 Layers where UltraPath resides in different operating systems



- On the AIX and VMware ESXi platform, UltraPath is implemented based on the multipath framework of operating systems.
  - UltraPath for AIX is a kernel driver developed based on the MPIO of AIX operating systems.

    MPIO is introduced to AIX 5.2 TL04 and 5.3, as well as later versions. With MPIO, a storage system can connect to a host through multiple paths and is present as one device on the host. MPIO employs Path-Control Modules (PCMs) to implement multipath management, such as path adding or deleting, I/O path selection, path detection, and failover.
  - UltraPath for vSphere is a Multipath Plug-in adaptable to the pluggable storage architecture (PSA) of VMware vShpere/ESXi platforms.

UltraPath Functions

- **Masking of Redundant LUNs**

  In a redundant storage network, an application server with no multipathing software detects a LUN on each path. Therefore, a LUN mapped through multiple paths is mistaken for two or more different LUNs. Redundant LUNs exist because each path reports a LUN directly to the application server.

  The dual-link direct-connection network shown in the left side of **Figure 1-4** is an example. As shown in the figure, the storage system maps one LUN to the application server. Since two paths exist between the application server and the storage system and no multipathing software is installed, the application server simultaneously detects two LUNs, LUN0 and LUN1, indicating that a redundant LUN exists. The two detected LUNs actually are the same LUN from the storage system. Due to the identification errors of the application server, different applications on the application server repeatedly write different data to the same location of the LUN, resulting in data corruption. To

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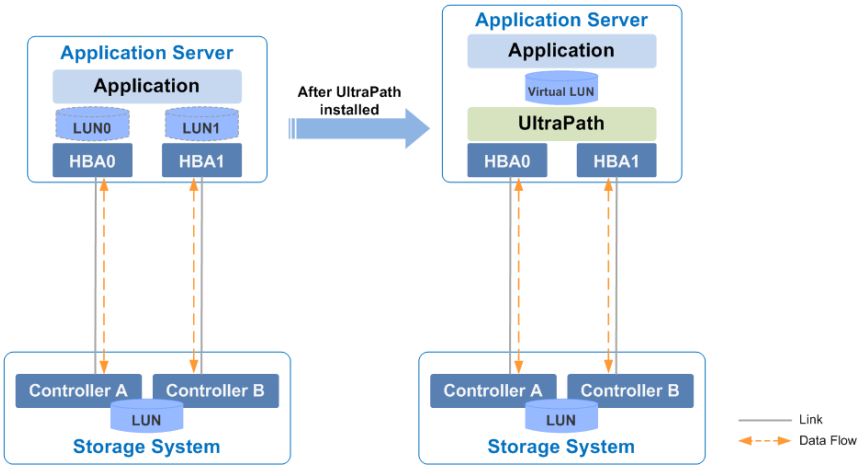
resolve this problem, the application server must identify which is the real and available LUN.

Figure 1-4 Masking the redundant LUN



As UltraPath is able to acquire configuration information of the storage system, it clearly knows which LUN has been mapped to the application server. As shown in the right side of **Figure 1-4**, UltraPath installed on the application server masks redundant LUNs on the operating system driver layer to provide the application server with only one available LUN, the virtual LUN. In this case, the application server only needs to deliver data read and write operations to UltraPath that masks the redundant LUNs, and properly writes data into LUNs without damaging other data.

- **Optimum Path Selection**

  To ensure service continuity and stability, a storage system is generally equipped with two or more controllers to implement redundancy parts. Each LUN in a storage system has its owning controller, and no other controllers can operate on the LUN, preventing data corruption due to possible controller conflicts. If an application server wants to access a LUN through non-owning controllers, this access request is still redirected to the owning controller. Therefore, the highest I/O speed occurs when application servers access the target LUN directly through the owning controller.

  In a multipath environment, the owning controller of a LUN on the application server that corresponds to the LUN on the storage array is called the prior controller of the LUN on the application server. Therefore, the highest I/O speed occurs when an application server with UltraPath inside accesses the LUN on the storage system through the prior controller (owning controller). The path to the prior controller is the optimum path.

  As UltraPath is able to acquire owning controller information, it can automatically select one or more optimum paths for data streams to achieve the highest I/O speed.

  As shown in **Figure 1-5**, the owning controller (prior controller) is controller A, and UltraPath selects the path to controller A as the optimum path.

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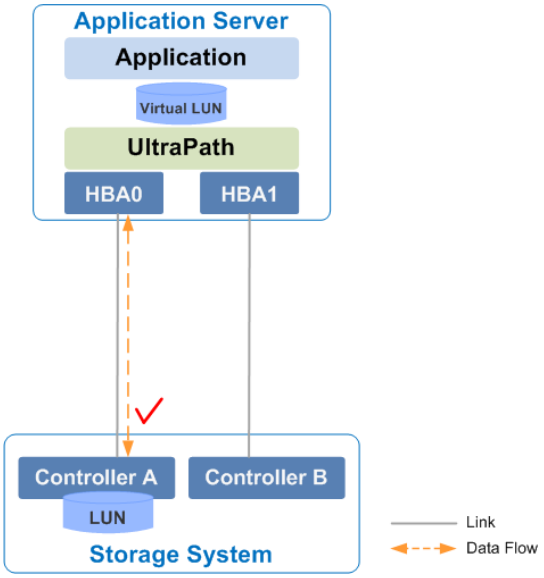
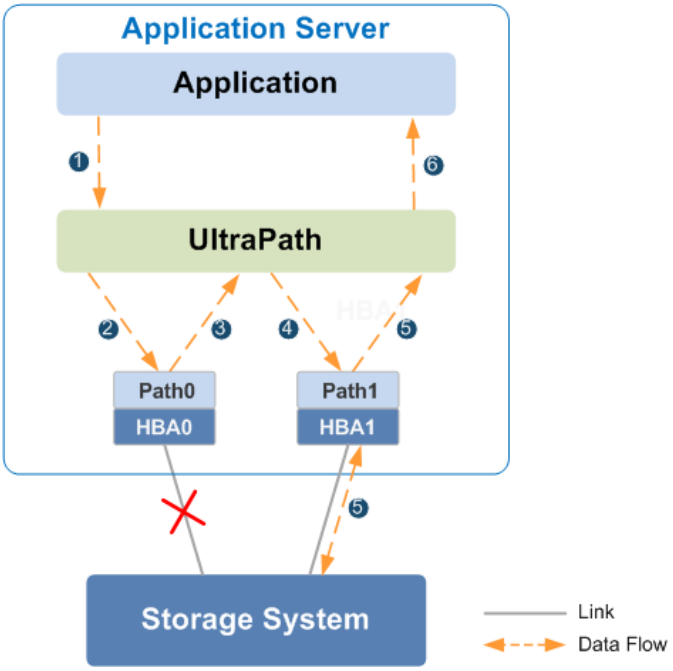
Figure 1-5 Optimum path selection by UltraPath



- **Failover and Failback**
  - Failover

    When a path fails, UltraPath fails over its services to another functional path. **Figure 1-6** shows the failover process.

    Figure 1-6 UltraPath failover



    i. An application on the the application server sends an I/O request to the virtual LUNs displayed on UltraPath.

    ii. UltraPath designate **Path0** to transfer this I/O request.

    iii. A fault on **Path0** prevents this I/O from being sent to the storage system. The I/O is returned to UltraPath.

iv. UltraPath designate **Path1** to transfer this I/O request.

v. **Path1** is normal. The I/O request is sent to the storage system successfully. A message indicating the I/O request is sent successfully is sent to UltraPath.

vi. UltraPath sends the message to the application server.

NOTE

In the process displayed in **iii**, the HBA tries reconnection for a period of time after a path is faulty. During the period of time, I/Os remain in the HBA instead of returning back to UltraPath. For this reason, I/Os are blocked for a period of time during the failover.

- Failback

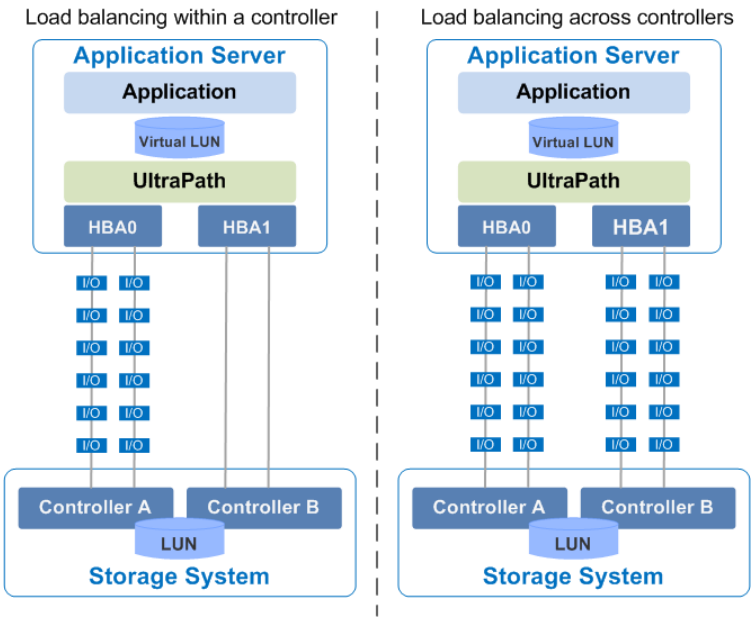
  UltraPath automatically delivers I/Os to the first path again after the path recovers from the fault. There are two methods to recover a path:

  - For a hot-swappable system (for example, Windows), the SCSI device will be deleted if the link between an application and a storage array is down. After the link is recovered, a SCSI device will be created. UltraPath can immediately sense the path recovery.
  - For a non-hot-swappable system (for example, AIX or earlier versions of Linux), UltraPath periodically tests and detects the path recovery.

- **I/O Load Balancing**

  UltraPath provides load balancing within a controller and across controllers, as shown in **Figure 1-7**.

Figure 1-7 Two I/O load balance modes



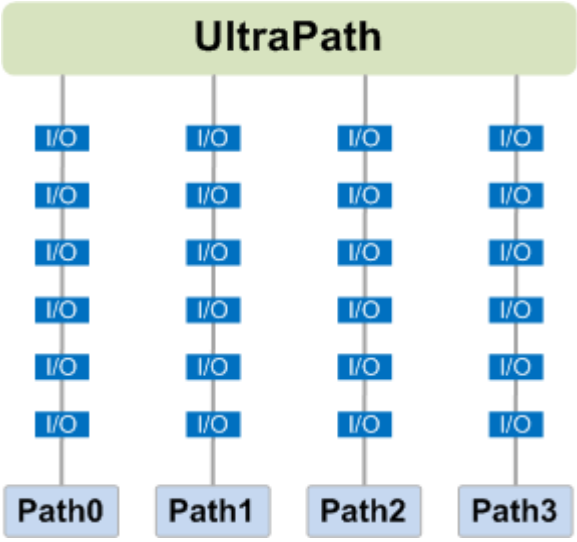
- For load balancing within a controller, I/Os poll among all the paths of the controller.
- For load balancing across controllers, I/Os poll among the paths of all these controllers.

  The path selection algorithm provided by UltraPath is as follows:

  - **Round robin**: As is shown in **Figure 1-8**, when an application server delivers I/Os to a storage system, UltraPath sends the first set of I/Os through **path0**

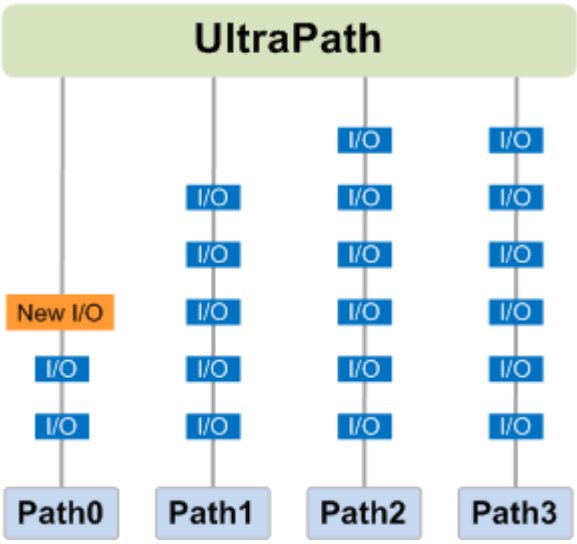
and the second set of I/Os through **path1**, and so on. Paths are used in turn to ensure that each path is fully utilized.

Figure 1-8 Round robin algorithm



- **Minimum queue depth**: As shown in **Figure 1-9**, UltraPath calculates the number of I/Os queuing in each path and delivers new I/Os to the path with minimum number of I/Os. The path with shortest I/O queue has the priority to send new I/Os.

Figure 1-9 Minimum queue depth algorithm



- **Minimum task**: On the basis of minimum queue depth algorithm, UltraPath uses the block size to calculate the overall load of each path and delivers new I/Os to the path with the minimum data load. The path with minimum I/O load has the priority to send new I/Os.

  According to the test, the minimum queue depth algorithm is superior than other algorithms in both performance and reliability. You are advised to use the minimum queue depth algorithm.

- **Path test**

  UltraPath tests the following paths:

  - Faulty paths.

    UltraPath tests faulty paths with a high frequency to detect the path recover as soon as possible.

  - Idle, available paths.

    UltraPath tests idle paths to identify faulty paths in advance, preventing unnecessary I/O retires. The test frequency is kept low to minimize impact on service I/Os.

SAN Boot Functions

SANBOOT is a network storage management system that stores data (including servers' operating systems) totally on storage systems. Specifically, operating systems are installed on and booted from SAN storage devices. Therefore, SANBOOT is also called REMOTE BOOT or boot from SAN.

SAN Boot is beneficial to system integration and central management. Its advantages are as follows:

- Server integration: Blade servers are used to integrate a large number of servers within a small space. There is no need to configure local disks.
- Centralized management: Boot disks of servers are centrally managed on a storage device. All advanced management functions of the storage device can be fully utilized. For example, the volume replication function can be used for backup. Devices of the same model can be quickly deployed using the volume replication function. In addition, the remote mirroring function can be used for disaster recovery.
- Quick recovery: Once a server that is booted from SAN fails, its boot volume can be quickly mapped to another server, achieving quick recovery.

Boot modes supported by UltraPath:

- Boot from Local: Install the operating systems on the local disks of an application server and start the application server from local disks.
- Boot from SAN: Install the operating systems on the SAN storage devices and start the application server from the SAN storage devices.

1.3 Typical UltraPath Applications

Installed on an application server, UltraPath supports different networks and helps ensure fast and smooth data transfer.

UltraPath is applicable to the following scenarios:

- Dual-link direct connection
- Dual-link single-switch interconnection
- Dual-link dual-switch interconnection
- Dual-link dual-switch interconnection in a cluster environment
- Dual-link dual-switch interconnection in a HyperMetro cluster environment

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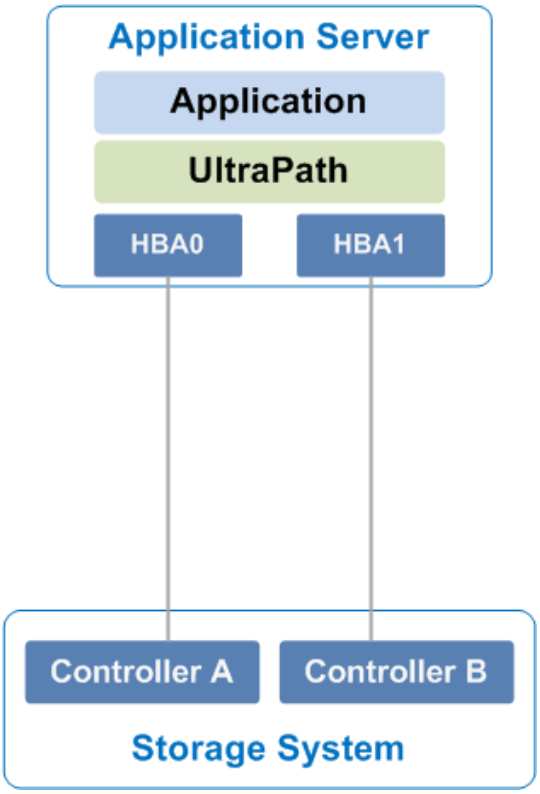
Dual-Link Direct Connection

Dual-link direct connection is the simplest and most inexpensive storage network connection, as shown in **Figure 1-10**.

Figure 1-10 UltraPath in dual-link direct connection



The application server uses optical fibers to connect different storage controllers for redundancy. In this networking mode, the path between the application server and the LUN's owning controller is the optimum one while other paths stand by.

In normal cases, UltraPath selects the optimum path for data transfer. If the optimum path is down, another standby path is used. After the optimum path recovers, it takes over data transfer again.

Dual-Link Single-Switch Interconnection

The dual-link single-switch interconnection adds one switch on the basis of dual-link direct connection, improving data access and forwarding capabilities, as shown in **Figure 1-11**.

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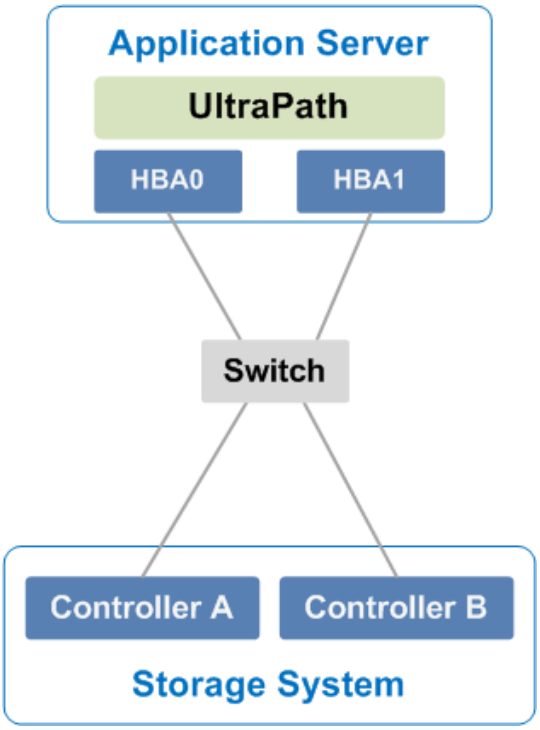
Figure 1-11 UltraPath in dual-link single-switch interconnection



In **Figure 1-11**, there are four paths between the application server and the storage system. In this networking mode, the two paths between the application server and the LUN's owning controller are optimum while other two paths stand by.

A switch expands host ports to improve access capability of the storage system. Besides, a switch extends the supported distance of transfer so that a remote application server can connect to the storage system through the switch. As only one switch is available in this networking mode, it may encounter a single point of failure. To prevent the failure, you can adopt **Dual-Link Dual-Switch Interconnection**, as shown in **Figure 1-12**.

Dual-Link Dual-Switch Interconnection

Dual-link dual-switch interconnection adds one switch on the basis of dual-link single-switch interconnection to provide dual-switch forwarding, as shown in **Figure 1-12**.

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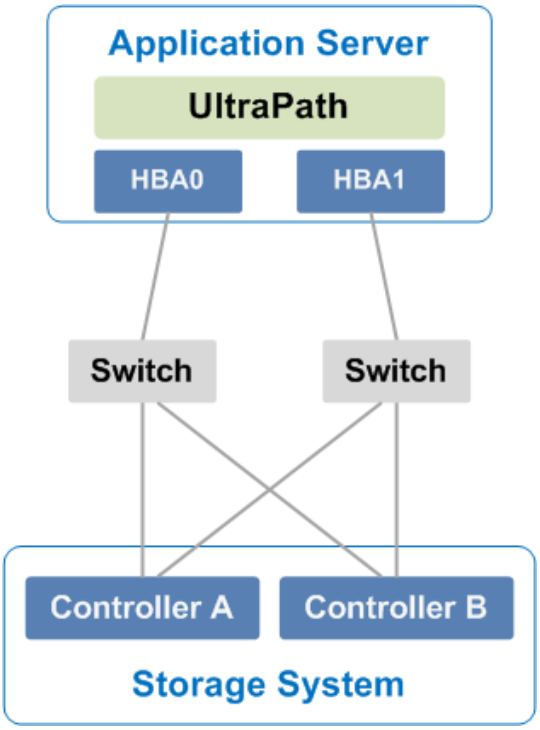
Figure 1-12 UltraPath in dual-link dual-switch interconnection



With two switches, the network prevents switch single points of failure to boost the network stabilization.

Dual-Link Dual-Switch Interconnection in a Cluster Environment

On the basis of dual-link dual-switch interconnection, one or more application servers are added to form a cluster environment, which enhances the reliability and processing capability of the application services, as shown in **Figure 1-13**.

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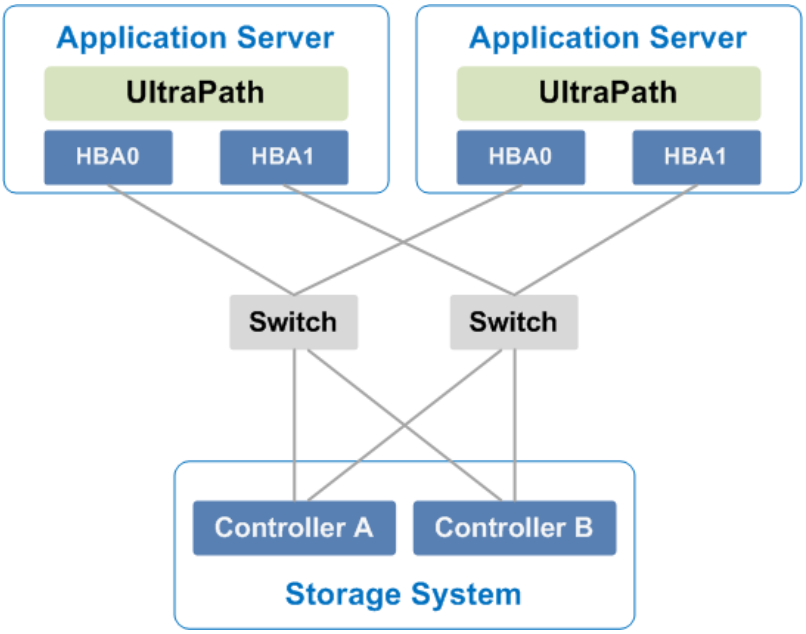
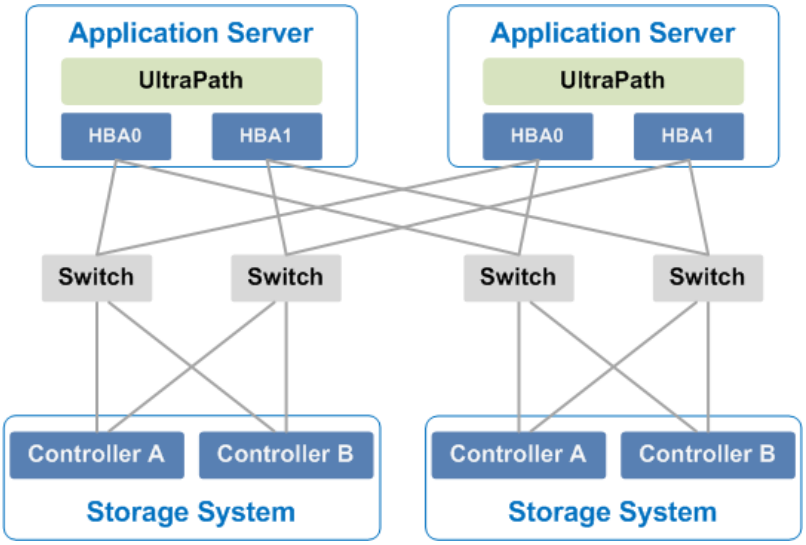
Figure 1-13 Dual-link dual-switch interconnection in a cluster environment



Dual-Link Dual-Switch Interconnection in a HyperMetro Cluster Environment

The dual-link dual-switch interconnection in a HyperMetro cluster environment improves the reliability and processing capability of the application servers. However, a single storage system is a hidden danger to cause a single point of failure in the entire storage network. Two storage systems back up each other in this scenario, greatly improving system reliability, as shown in **Figure 1-14**.

Figure 1-14 Dual-link dual-switch interconnection in a HyperMetro cluster environment



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1.4 UltraPath Security Feature

This chapter describes UltraPath security feature.

- Only user **root** can operate UltraPath.
- All non-query operations are recorded in logs. These logs can be accessed by user **root** only.
- The inputs of all users are verified to prevent unauthorized inputs.
- Interaction data of arrays are verified to prevent attacks.
- Ports are not listened and personnel data and sensitive data are not accessed.
- The UltraPath vCenter plug-in is based on web applications. All accesses to pages and data transfer employ the HTTPS protocol.
- Filter interception is configured for all accessed pages and Servlet. The authentication mechanism of vSphere vCenter can be used to determine whether users have permissions to access pages.
- Automatic logout is enabled upon a session timeout.

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2 Installation

About This Chapter

Selecting and managing paths between an application server and the storage system can be realized after the UltraPath is installed. This chapter describes installation environment requirements, pre-installation preparations, and the installation procedure of UltraPath for ESXi and UltraPath for vCenter.

2.1 Environment Requirements
This section describes the data, hardware, and software that are required ready before installing UltraPath.

2.2 Pre-Installation Check

2.3 Installing UltraPath for ESXi
This chapter explains how to install UltraPath for ESXi.

2.4 Installing UltraPath for vCenter
Installation methods for UltraPath for vCenter are different based on vCenter versions. This section describes how to install UltraPath for vCenter for different versions of vCenter.

2.1 Environment Requirements

This section describes the data, hardware, and software that are required ready before installing UltraPath.

2.1.1 Preparing Software Packages and Data

To smoothly install UltraPath, prepare required software packages or data in advance or based on actual conditions.

Software Package

Check whether you have prepared the required software packages. **Table 2-1** lists the software packages.

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Table 2-1 Required software packages

Software Name	Content	Description
UltraPath for ESXi installation package	**Docs** and **Packages**	Software package directory: **/VMware_ESXi**
UltraPath for ESXi installation file	**UltraPath-XX.XX.XXX-ESXi5.0-offline-bundle.zip**, **UltraPath-XX.XX.XXX-ESXi5.5-offline-bundle.zip**, **UltraPath-XX.XX.XXX-ESXi6.x-offline-bundle.zip**, **install.sh** and **unattend_install.conf**. **NOTE** Choose the software package based on the version of the VMware ESXi operating system. ● For VMware ESXi 5.0 and VMware ESXi 5.1, use **UltraPath-XX.XX.XXX-ESXi5.0-offline-bundle.zip**. ● For VMware ESXi 5.5, use **UltraPath-XX.XX.XXX-ESXi5.5-offline-bundle.zip**. ● For VMware ESXi 6.0, VMware ESXi 6.5 and VMware ESXi 6.7, use **UltraPath-XX.XX.XXX-ESXi6.x-offline-bundle.zip**.	Software package directory: **/VMware_ESXi/Packages**
UltraPath for vCenter installation package	**Docs** and **Packages**	Software package directory: **/VMware_vCenter**
UltraPath for vCenter installation file (for vCenter 5.0, vCenter 5.1, and vCenter 5.5)	**UltraPath-XX.XX.XXX-vCenter.exe** and **Config**	Software package directory: **/VMware_vCenter/Packages/VMware_vSphere_5.X**
UltraPath for vCenter installation file (for vCenter 6.0, vCenter 6.5 and vCenter 6.7)	**Windows** and **VCSA6.x** **NOTE** For vCenter 6.0/6.5/6.7 running on Windows operating system, use **Windows**. For vCenter 6.0/6.5/6.7 running on Linux operating system (VCSA 6.0/6.5/6.7), use **VCSA6.x**.	Software package directory: **/VMware_vCenter/Packages/VMware_vSphere_6.X**

NOTE

Due to constant software upgrades, the actual version and file name of the UltraPath software may differ from that in the document. In this case, use the actual name.

Download the digital signature verification tool from **http://support.huawei.com/enterprise/** to verify integrity of the software package. If the verification fails, contact technical support engineers to obtain the correct software package.

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Application Server Data

Table 2-2 describes the data that you need prepare for installing UltraPath.

Table 2-2 Data preparations

Parameter	Description	Example
Management IP address	Used to manage application servers. Log in to the application server using this IP address to make necessary configurations for UltraPath.	Example: 192.168.100.100
User name	User name for the application server **NOTE** To install UltraPath, you must log in as user **root**.	**root**
Password	Password of the application server. **NOTE** The password must: ● Contain at least one upper-case letter, one lower-case letter, one digit, and one special character among spaces or ~!@#$%^&*()-_=+\\\|{};:'",<.>/? ● Contain 8 to 32 characters. ● Not contain the user name or the reverse spelling of the user name.	Huawei@123

2.1.2 Preparing the Installation Environment

Check the application server and hardware and software of the storage system to ensure that UltraPath can be smoothly installed.

Application Servers

UltraPath for ESXi supports the following VMware ESXi operating systems:

- VMware ESXi5.0
- VMware ESXi5.1
- VMware ESXi5.5
- VMware ESXi6.0
- VMware ESXi6.5

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- VMware ESXi6.7

NOTE

After UltraPath is upgraded, its requirements on the operating system may change. For details about operating systems supported by UltraPath, log in to Huawei technical support website (**http://support.huawei.com/enterprise/**). In the search field, enter **UltraPath**, and select a path from the paths that are automatically displayed to go to the document page of the UltraPath. Search, browse, and download the *Release Notes* of the corresponding version.

Storage System

For details about storage systems supported by UltraPath, log in to Huawei technical support website (**http://support.huawei.com/enterprise/**). In the search field, enter **UltraPath**, and select a path from the paths that are automatically displayed to go to the document page of the UltraPath. Search, browse, and download the *Release Notes* of the corresponding version.

2.1.3 (Optional) SAN Boot Environment Requirements

This chapter introduces the environment requirements for installing UltraPath when SAN Boot is configured.

If SAN Boot is configured for the host, in addition to doing the above-mentioned work before installing UltraPath, the following requirements must also be met:

- An operating system (OS) has been installed on the virtual LUN mapped to the host by the Huawei storage system.
- The virtual LUN running the host operating system must be a common virtual LUN.

NOTICE

In SAN Boot scenarios, do not map the LUN that houses the host's operating system to two or more hosts. Otherwise, operating system data may be inconsistent. Besides, the virtual LUN running the host operating system must be a common virtual LUN.

The procedure for configuring HyperMetro in the SAN Boot scenario is as follows:

Step 1 Install the operating system on the SAN storage device.

Step 2 Install UltraPath on the operating system. For details, see **2.3 Installing UltraPath for ESXi**.

Step 3 Configure the HyperMetro feature by referring to related product documentation.

NOTE

- Log in to Huawei technical support website (**http://support.huawei.com/enterprise/**) and enter **BC&DR Solution Product Documentation (Active-Active DCs)** in the search box to search for, browse, and download corresponding product documents.
- For UltraPath V100R008C50 and later versions, use the product documentation of V200R001C20.

----End

2.2 Pre-Installation Check

This section describes the check before the installation of UltraPath for ESXi.

Procedure

Step 1 Log in to the ESXi host.

Step 2 Run **/etc/init.d/sfcbd-watchdog status** to check whether the CIM Agent has been started.

```
~ # /etc/init.d/sfcbd-watchdog status
```

- If **sfcbd is not running** is displayed, the CIM Agent is not started. In this case, run **/etc/init.d/sfcbd-watchdog start** to start the CIM Agent. Then view the **/var/log/syslog.log** file to check whether the CIM Agent has been completely started.

  If the following information is displayed, the CIM Agent has been completely started.

  ```
  2013-11-29T23:51:30Z sfcbd-watchdog: starting sfcbd
  2013-11-29T23:51:30Z sfcbd: Starting sfcbd
  2013-11-29T23:51:33Z sfcb-sfcb[20560]: --- Log syslog level: 3
  2013-11-29T23:51:37Z cimslp: --- Using /etc/sfcb/sfcb.cfg
  ```

- If the command output displays **sfcbd is running**, the CIM Agent has been started.

Step 3 Run **esxcli storage core device list**. If the **Display Name** of each device contains **HUAWEI**, Huawei storage devices have been mapped to the ESXi hosts.

- If no Huawei storage devices have been mapped to an ESXi host, install UltraPath for ESXi on the host directly and you do not need to restart the host afterwards.
- If Huawei storage devices have been mapped to an ESXi host, remove them from the host before installing UltraPath for ESXi. If you do not remove them in advance, restart the host after installing UltraPath for ESXi on it.

NOTE

In SAN boot scenarios, if Huawei storage devices do not need to be removed, install UltraPath for ESXi and restart the host.

For details about how to safely remove the storage devices, refer to **VMware Knowledge Base**. After the installation, map the removed storage devices again.

Step 4 Run **esxcli storage core claimrule list** to view the claim rule numbers that have been used in the current system.

```
~ # esxcli storage core claimrule list
Rule Class Rule  Class    Type       Plugin
Matches
----------  -----  -------  ---------  ---------
-----------------------------------
MP              0  runtime  transport  NMP
transport=usb
MP              1  runtime  transport  NMP
transport=sata
MP              2  runtime  transport  NMP
transport=ide
MP              3  runtime  transport  NMP
transport=block
MP              4  runtime  transport  NMP
transport=unknown
MP            101  runtime  vendor     MASK_PATH  vendor=DELL model=Universal
Xport
MP            101  file     vendor     MASK_PATH  vendor=DELL model=Universal
Xport
MP            200  runtime  vendor     VxDMP      vendor=DGC
model=*
MP            200  file     vendor     VxDMP      vendor=DGC
model=*
MP            201  runtime  vendor     VxDMP      vendor=EMC
model=*
MP            201  file     vendor     VxDMP      vendor=EMC
model=*
MP            202  runtime  vendor     VxDMP      vendor=HITACHI
```

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```
model=*
MP            202  file     vendor     VxDMP      vendor=HITACHI
model=*
MP            204  runtime  vendor     VxDMP      vendor=HP
model=*
MP            204  file     vendor     VxDMP      vendor=HP
model=*
MP            205  runtime  vendor     VxDMP      vendor=COMPAQ
model=*
MP            205  file     vendor     VxDMP      vendor=COMPAQ
model=*
MP            206  runtime  vendor     VxDMP      vendor=IBM
model=*
MP            206  file     vendor     VxDMP      vendor=IBM
model=*
MP            208  runtime  vendor     VxDMP      vendor=NETAPP
model=*
MP            208  file     vendor     VxDMP      vendor=NETAPP
model=*
MP            209  runtime  vendor     VxDMP      vendor=XIV
model=*
MP            209  file     vendor     VxDMP      vendor=XIV model=*
MP            210  runtime  vendor     VxDMP      vendor=HUAWEI
model=*
MP            210  file     vendor     VxDMP      vendor=HUAWEI
model=*
MP            260  runtime  vendor     PowerPath  vendor=EMC
model=SYMMETRIX
MP            260  file     vendor     PowerPath  vendor=EMC
model=SYMMETRIX
MP            270  runtime  vendor     PowerPath  vendor=EMC
model=Invista
MP            270  file     vendor     PowerPath  vendor=EMC
model=Invista
MP            300  runtime  vendor     PowerPath  vendor=COMPAQ model=HSV111
(C)COMPAQ
MP            300  file     vendor     PowerPath  vendor=COMPAQ model=HSV111
(C)COMPAQ
MP            310  runtime  vendor     PowerPath  vendor=EMC
model=Celerra
MP            310  file     vendor     PowerPath  vendor=EMC
model=Celerra
MP            400  runtime  vendor     PowerPath  vendor=IBM
model=2107900
MP            400  file     vendor     PowerPath  vendor=IBM
model=2107900
MP          65535  runtime  vendor     NMP        vendor=* model=*
```

- If claim rules contain **HUAWEI** devices, run the following command to delete the claim rule numbers that correspond to the **HUAWEI** devices before installing UltraPath for ESXi:

```
~ # esxcli storage core claimrule remove --rule 210
~ # esxcli storage core claimrule load
~ # esxcli storage core claimrule run
```

- For UltraPath for ESXi, the claim rule number ranges from 400 to 477. Therefore, check whether claim rule numbers that range from 400 to 477 exist in the **Rule** column. If claim rule numbers that range from 400 to 475 exist in the **Rule** column, run the following commands to change the claim rule numbers and then install the UltraPath for ESXi. If claim rule number **400** has been used, run the following command to change **400** to another value, for example **320**:

```
~ # esxcli storage core claimrule move --claimrule-class=MP --new-rule=320 --
rule=400
~ # esxcli storage core claimrule load
~ # esxcli storage core claimrule run
~ # esxcli storage core claimrule list
Rule Class Rule  Class    Type       Plugin
Matches
```

```
----------  -----  -------  ---------  ---------
-----------------------------------
MP              0  runtime  transport  NMP
transport=usb
MP              1  runtime  transport  NMP
transport=sata
MP              2  runtime  transport  NMP
transport=ide
MP              3  runtime  transport  NMP
transport=block
MP              4  runtime  transport  NMP
transport=unknown
MP            101  runtime  vendor     MASK_PATH  vendor=DELL model=Universal
Xport
MP            101  file     vendor     MASK_PATH  vendor=DELL model=Universal
Xport
MP            200  runtime  vendor     VxDMP      vendor=DGC
model=*
MP            200  file     vendor     VxDMP      vendor=DGC
model=*
MP            201  runtime  vendor     VxDMP      vendor=EMC
model=*
MP            201  file     vendor     VxDMP      vendor=EMC
model=*
MP            202  runtime  vendor     VxDMP      vendor=HITACHI
model=*
MP            202  file     vendor     VxDMP      vendor=HITACHI
model=*
MP            204  runtime  vendor     VxDMP      vendor=HP
model=*
MP            204  file     vendor     VxDMP      vendor=HP
model=*
MP            205  runtime  vendor     VxDMP      vendor=COMPAQ
model=*
MP            205  file     vendor     VxDMP      vendor=COMPAQ
model=*
MP            206  runtime  vendor     VxDMP      vendor=IBM
model=*
MP            206  file     vendor     VxDMP      vendor=IBM
model=*
MP            208  runtime  vendor     VxDMP      vendor=NETAPP
model=*
MP            208  file     vendor     VxDMP      vendor=NETAPP
model=*
MP            209  runtime  vendor     VxDMP      vendor=XIV
model=*
MP            209  file     vendor     VxDMP      vendor=XIV model=*
MP            260  runtime  vendor     PowerPath  vendor=EMC
model=SYMMETRIX
MP            260  file     vendor     PowerPath  vendor=EMC
model=SYMMETRIX
MP            270  runtime  vendor     PowerPath  vendor=EMC
model=Invista
MP            270  file     vendor     PowerPath  vendor=EMC
model=Invista
MP            300  runtime  vendor     PowerPath  vendor=COMPAQ model=HSV111
(C)COMPAQ
MP            300  file     vendor     PowerPath  vendor=COMPAQ model=HSV111
(C)COMPAQ
MP            310  runtime  vendor     PowerPath  vendor=EMC
model=Celerra
MP            310  file     vendor     PowerPath  vendor=EMC
model=Celerra
MP            320  runtime  vendor     PowerPath  vendor=IBM
model=2107900
MP            320  file     vendor     PowerPath  vendor=IBM
model=2107900
MP          65535  runtime  vendor     NMP        vendor=* model=*
```

Step 5 Use a digital signature verification tool to verify integrity of the software package.

NOTE

Download the digital signature verification tool from **http://support.huawei.com/enterprise/** to verify integrity of the software package. If the verification fails, contact technical support engineers to obtain the correct and secure software package.

Step 6 Check HBAs of the host. The UltraPath supports Fiber Channel over Ethernet (FCoE) HBAs, Fiber Channel HBAs and iSCSI initiators. A LUN cannot be mapped to a host using HBAs and iSCSI initiators of different firware versions or models or from different vendors.

Step 7 You have completed the pre-installation check.

----End

2.3 Installing UltraPath for ESXi

This chapter explains how to install UltraPath for ESXi.

Precautions

- For VMware ESXi 5.5, if patch software **VMware ESXi 5.5, Patch Release ESXi550-201312001 (2063795)** is not installed and the hostd service is restarted, the vCenter VM console may fail to be accessed due to inherent defects in ESXi. Before installing UltraPath, you are advised to install patch software **VMware ESXi 5.5, Patch Release ESXi550-201312001 (2063795)**.
- After UltraPath takes effect, you cannot manually configure SSD identifies for disks.
- For a cluster, ensure that all the hosts in the cluster are installed with UltraPath. If this condition cannot be met, shared LUNs may be taken over by UltraPath on some hosts and NMP on other hosts.

2.3.1 Installing UltraPath for ESXi By Executing a Script (Recommended)

This section describes how to execute a script to install UltraPath for ESXi. Script-based UltraPath for ESXi installation includes two modes: silent installation and non-silent installation.

2.3.1.1 Silent Installation

This section describes how to install UltraPath for ESXi in silent installation mode. Before installing UltraPath, you must configure the parameters of the configuration file used for silent installation. The UltraPath installation process does not involve user interactions, enabling one-click installation.

Precautions

In a VMware HA cluster, to ensure VM service continuity, you must enable a host to enter the maintenance mode and ensure that the VMs on the host are migrated before installing UltraPath for ESXi on the host.

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Procedure

Step 1 Save the UltraPath for ESXi installation package to any directory on the ESXi host.

You are advised to create a new directory to save all files in the UltraPath for ESXi installation package. In the following example, the **UltraPath-XX.XX.XXX-ESXi6.x-offline-bundle.zip** installation package and the **install.sh** and **unattend_install.conf** files are saved in the **/opt** directory.

Step 2 Log in to the ESXi host.

Step 3 Determine whether the LUNs of the storage device that will be taken over by UltraPath have been mapped to the host.

On the application server, run the **esxcli storage core device list** command to check the mapped virtual disks. The following uses the S5500T as an example.

```
[root@local22:~] esxcli storage core device list
naa.60022a11000beb2a03707dd900000009
  Display Name: HUAWEI iSCSI Disk (naa.60022a11000beb2a03707dd900000009)
    Has Settable Display Name: true
 Size: 2048
 Device Type: Direct-Access
 Multipath Plugin: NMP
 Devfs Path: /vmfs/devices/disks/naa.60022a11000beb2a03707dd900000009
 Vendor: HUAWEI
 Model: S5500T
 Revision: 2105
 SCSI Level: 4
 Is Pseudo: false
  Status: on
```

- In the command output, if the information about the storage device that will be taken over exists in the **Vendor** and **Model** items, go to **Step 4**.
- In the command output, if the information about the storage device that will be taken over does not exist in the **Vendor** and **Model** items, go to **Step 5**.

Step 4 Set the items of the unattend_install.conf file used for silent installation. For details about the parameters, see **Table 2-3**.

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Table 2-3 Parameters of the configuration item

Parameter	Description	Value
lun_exist_continue	This parameter is used to determine whether UltraPath installation continues or exits after the LUNs of the storage device that is taken over by UltraPath are mapped to the host. If the system boot disk is a Huawei storage device, you are advised to set the parameter to **y**. **NOTE** If disks of a storage system already exist on the host before you install UltraPath, the disks are not taken over by UltraPath after you set the parameter to **y**.	[Value range] ● y: The LUN exists and UltraPath installation continues. ● n: The LUN exists and UltraPath installation exits. [Default value] n
restart	This parameter is used to determine whether the host is restarted after UltraPath is installed.	[Value range] ● y: The host is restarted after the installation. ● n: The host is not restarted after the installation. [Default value] n

Step 5 In the **/opt** directory, run the **sh install.sh -f unattend_install.conf** command to start installation.

In the following example, **lun_exist_continue** is set to **y**.

```
sh install.sh -f unattend_install.conf
WARNING: Some LUNs which should be managed by UltraPath are already managed by
NMP or other third-party MPP.
Please delete these LUNs before installing UltraPath, or reboot system after
UltraPath is installed.
* Are you sure that you want to continue the UltraPath installation? [y,n,?] : y
Unattend install configuration item 'lun_exist_continue' set to 'y'. Unattend
installation will continue.
Installation Result
 Message: Operation finished successfully.
 Reboot Required: false
 VIBs Installed: HUAWEI_bootbank_ultrapath.cim_XX.XX.XXX-00,
HUAWEI_bootbank_ultrapath.cli_XX.XX.XXX-00,
HUAWEI_bootbank_ultrapath.mpp_XX.XX.XXX-00
 VIBs Removed:
 VIBs Skipped:
Please make sure your host name is uniqueness in data center.
WARNING: Some LUNs which should be managed by UltraPath are already managed by
NMP or other third-party MPP.
Please reboot system to make these LUNs managed by UltraPath, otherwise these
```

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```
LUNs may work abnormally.
Reboot system now? (n|y) [n] : n
Unattend install configuration item 'restart' set to 'n'. The system will not be
restarted after the unattend installation.
Please reboot system later.
Please restart the /etc/init.d/hostd manually.
```

NOTE

VMware stops providing signature authentication for the software packages of ESXi 5.0 and 5.1 operating systems, so the software packages are not authenticated with signatures. Therefore, when the ESXi version is 5.0 or 5.1, the following prompt information will be displayed at the beginning of command output after command execution:

Because VMware stops providing signature authentication for the software package of the ESXi 5.0/ESXi 5.1 system, the software package is not certified and signed by VMware. An alarm will be reported in vCenter if an unsigned package is used.

Step 6 Run the **esxcli software vib list |grep ultrapath** command to check whether UltraPath for ESXi is installed successfully. If the **ultrapath.cim**, **ultrapath.cli**, and **ultrapath.mpp** files are displayed, UltraPath for ESXi is installed successfully. The command output is as follows:

```
esxcli software vib list |grep ultrapath
ultrapath.cim                  XX.XX.XXX-00                            HUAWEI
VMwareAccepted    2016-03-14
ultrapath.cli                  XX.XX.XXX-00                            HUAWEI
VMwareAccepted    2016-03-14
ultrapath.mpp                  XX.XX.XXX-00                            HUAWEI
VMwareAccepted    2016-03-14
```

----End

Follow-up Procedure

- After the installation is complete, perform the following steps to check whether UltraPath is successfully installed:

  a. Run the **esxcli upadm show version** command to check whether the current UltraPath version is consistent with the driver version.

  ```
  ~ # esxcli upadm show version
   Software Version   : XX.XX.XXX
   Driver   Version   : XX.XX.XXX
  ```

  b. Run the **esxcli upadm show upconfig** command to check the UltraPath configuration. If the configuration information is displayed, UltraPath is successfully installed.

  NOTE

  - For details about how to configure the command output, see **A.2.2 Querying Configuration File Information**.
  - If the check fails, UltraPath does not take effect. Contact Huawei technical support.

- In SAN boot scenarios, restart the EXSi host immediately after UltraPath for ESXi is installed.
- In non-SAN boot scenarios, if you do not restart the ESXi host after UltraPath for ESXi is installed, perform the following steps:

  Run **/etc/init.d/hostd restart** to restart the **/etc/init.d/hostd** service.

  ```
  ~ # /etc/init.d/hostd restart
  ```

- After the UltraPath is installed, change the system log size to provide sufficient storage space for system logs, facilitating subsequent analysis and maintenance of the UltraPath. You are advised to set the sizes of both **syslog.log** and **vmkernel.log** to **30M** and keep

the default value **8** of rotations. For details about how to set these parameters, see **4.1 How to Set System Logs?** Select one method.

2.3.1.2 Non-Silent Installation

This section describes how to install UltraPath for ESXi in non-silent installation mode. In the UltraPath installation process, you must perform operations according to the prompt information.

Precautions

To ensure uninterrupted virtual machine (VM) services in a VMware HA cluster, you must enter the maintenance node on a host and wail until all VMs on the host have been migrated before installing UltraPath for ESXi on the host.

Procedure

Step 1 Save the UltraPath for ESXi installation package to any directory on the ESXi host.

You are advised to create a new directory to save the installation package. This section uses the **/opt** directory to save the **UltraPath-XX.XX.XXX-ESXi6.x-offline-bundle.zip** installation package and **install.sh** file as an example.

Step 2 Log in to the ESXi host.

Step 3 In the **/opt** directory, run **sh install.sh** to start the installation.

```
~ # sh install.sh
Installation Result
 Message: Operation finished successfully.
 Reboot Required: false
 VIBs Installed: HUAWEI_bootbank_ultrapath.cim_XX.XX.XXX-00,
HUAWEI_bootbank_ultrapath.cli_XX.XX.XXX-00,
HUAWEI_bootbank_ultrapath.mpp_XX.XX.XXX-00
 VIBs Removed:
 VIBs Skipped:
Please make sure your host name is uniqueness in data center.
Please restart the /etc/init.d/hostd manually.
```

NOTE

VMware stops providing signature authentication for the software packages of ESXi 5.0 and 5.1 operating systems, so the software packages are not authenticated with signatures. Therefore, when the ESXi version is 5.0 or 5.1, the following prompt information will be displayed at the beginning of command output after command execution:

Because VMware stops providing signature authentication for the software package of the ESXi 5.0/ESXi 5.1 system, the software package is not certified and signed by VMware. An alarm will be reported in vCenter if an unsigned package is used.

Step 4 Run **esxcli software vib list |grep ultrapath** to check whether the installation is successful. If the **ultrapath.cim**, **ultrapath.cli**, and **ultrapath.mpp** files are all displayed, the installation is successful. The following figures show possible outputs:

```
~ # esxcli software vib list |grep ultrapath
ultrapath.cim         XX.XX.XXX-00                        HUAWEI
VMwareAccepted    2016-04-22
ultrapath.cli         XX.XX.XXX-00                        HUAWEI
VMwareAccepted    2016-04-22
ultrapath.mpp         XX.XX.XXX-00                        HUAWEI
VMwareAccepted    2016-04-22
```

----End

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Follow-up Procedure

- After the installation is complete, perform the following steps to check whether UltraPath is successfully installed:

  a. Run the **esxcli upadm show version** command to check whether the current UltraPath version is consistent with the driver version.

  ```
  ~ # esxcli upadm show version
   Software Version   : XX.XX.XXX
   Driver   Version   : XX.XX.XXX
  ```

  b. Run the **esxcli upadm show upconfig** command to check the UltraPath configuration. If the configuration information is displayed, UltraPath is successfully installed.

  NOTE

  - For details about how to configure the command output, see **A.2.2 Querying Configuration File Information**.
  - If the check fails, UltraPath does not take effect. Contact Huawei technical support.

- In SAN boot scenarios, restart the EXSi host immediately after UltraPath for ESXi is installed.
- In non-SAN boot scenarios, if you do not restart the ESXi host after UltraPath for ESXi is installed, perform the following steps:

  Run **/etc/init.d/hostd restart** to restart the **/etc/init.d/hostd** service.

  ```
  ~ # /etc/init.d/hostd restart
  ```

- After the UltraPath is installed, change the system log size to provide sufficient storage space for system logs, facilitating subsequent analysis and maintenance of the UltraPath. You are advised to set the sizes of both **syslog.log** and **vmkernel.log** to **30M** and keep the default value **8** of rotations. For details about how to set these parameters, see **4.1 How to Set System Logs?** Select one method.

2.3.2 Installing UltraPath for ESXi on the ESXCLI

This section describes how to install UltraPath for ESXi on the ESXCLI.

Precautions

To ensure uninterrupted virtual machine (VM) services in a VMware HA cluster, you must enter the maintenance node on a host and wail until all VMs on the host have been migrated before installing UltraPath for ESXi on the host.

Procedure

Step 1 Save the UltraPath for ESXi installation package to any directory on the ESXi host.

You are advised to create a new directory to save the installation package. This section uses the **/opt** directory to save the **UltraPath-XX.XX.XXX-ESXi6.x-offline-bundle.zip** installation package as an example.

Step 2 Log in to the ESXi host.

Step 3 Run **esxcli software vib install -d** */opt/UltraPath-XX.XX.XXX-ESXi6.x-offlinebundle.zip* to start the installation.

```
~ # esxcli software vib install -d /opt/UltraPath-XX.XX.XXX-ESXi6.x-offline-
bundle.zip
Installation Result
```

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```
 Message: Operation finished successfully.
 Reboot Required: false
 VIBs Installed: HUAWEI_bootbank_ultrapath.cim_XX.XX.XXX-00,
HUAWEI_bootbank_ultrapath.cli_XX.XX.XXX-00,
HUAWEI_bootbank_ultrapath.mpp_XX.XX.XXX-00
 VIBs Removed:
 VIBs Skipped:
```

NOTE

VMware stops providing signature authentication for the software packages of ESXi 5.0 and 5.1 operating systems, so the software packages are not authenticated with signatures. Therefore, run the **esxcli software vib install -d** */opt/UltraPath-XX.XX.XXX-ESXi5.0-offline-bundle.zip* **--no-sig-check** command when the ESXi version is 5.0 or 5.1.

Step 4 Run **esxcli software vib list |grep ultrapath** to check whether the installation is successful. If the **ultrapath.cim**, **ultrapath.cli**, and **ultrapath.mpp** files are all displayed, the installation is successful. The following figures show possible outputs:

```
~ # esxcli software vib list |grep ultrapath
ultrapath.cim         XX.XX.XXX-00                        HUAWEI
VMwareAccepted    2016-04-22
ultrapath.cli         XX.XX.XXX-00                        HUAWEI
VMwareAccepted    2016-04-22
ultrapath.mpp         XX.XX.XXX-00                        HUAWEI
VMwareAccepted    2016-04-22
```

NOTE

If **2.2 Pre-Installation Check** is not properly completed, restart the ESXi host.

----End

Follow-up Procedure

- After the installation is complete, perform the following steps to check whether UltraPath is successfully installed:
  a. Run the **esxcli upadm show version** command to check whether the current UltraPath version is consistent with the driver version.
  ```
  ~ # esxcli upadm show version
   Software Version   : XX.XX.XXX
   Driver   Version   : XX.XX.XXX
  ```
  b. Run the **esxcli upadm show upconfig** command to check the UltraPath configuration. If the configuration information is displayed, UltraPath is successfully installed.

  NOTE

  - For details about how to configure the command output, see **A.2.2 Querying Configuration File Information**.
  - If the check fails, UltraPath does not take effect. Contact Huawei technical support.
- In SAN boot scenarios, restart the EXSi host immediately after UltraPath for ESXi is installed.
- In non-SAN boot scenarios, if you do not restart the ESXi host after UltraPath for ESXi is installed, perform the following steps:
  a. Run **/etc/init.d/hostd restart** to restart the **/etc/init.d/hostd** service.
  ```
  ~ # /etc/init.d/hostd restart
  ```
  b. Restart the CIM Agent service.
     i. If the CIM Agent service is disabled, or the ESXi 6.0 system is installed on the host before you install UltraPath for ESXi, enable the CIM Agent service after the installation.

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```
~ # /sbin/esxcfg-advcfg -A CIMvmw_ultrapath-providerProviderEnabled -
T int -E "Enable or Disable the CIMvmw_ultrapath-
providerProviderEnabled" -F 1 -N 0 -M 1
~ # esxcfg-advcfg --set 1 /UserVars/CIMvmw_ultrapath-
providerProviderEnabled
~ # /etc/init.d/sfcbd-watchdog restart
~ # /etc/init.d/sfcbd-watchdog status
sfcbd is running.
```

ii. For the ESXi 6.5 and ESXi 6.7 system, perform the following command to restart the CIM Agent service.

```
/etc/init.d/sfcbd-watchdog restart
/etc/init.d/sfcbd-watchdog status
```

- After the UltraPath is installed, change the system log size to provide sufficient storage space for system logs, facilitating subsequent analysis and maintenance of the UltraPath. You are advised to set the sizes of both **syslog.log** and **vmkernel.log** to **30M** and keep the default value **8** of rotations. For details about how to set these parameters, see **4.1 How to Set System Logs?** Select one method.

2.3.3 Installing UltraPath for ESXi Using VUM

This section describes how to install UltraPath for ESXi using VMware Update Manager (VUM).

Prerequisites

- The ESXi hosts are being managed by vCenter.
- VUM has been installed on vCenter.

Precautions

- To ensure service continuity and avoid data loss, migrate all virtual machines to other hosts or power them off before installing UltraPath for ESXi Using VUM.
- VMware stops providing signature authentication for the software packages of ESXi 5.0 and 5.1 operating systems, so the software packages are not authenticated with signatures. Therefore, it is not supported to install UltraPath for ESXi using VUM when the ESXi version is 5.0 or 5.1.

Procedure

Step 1 Log in to vCenter.

Step 2 Proceed to **Update Manager**.

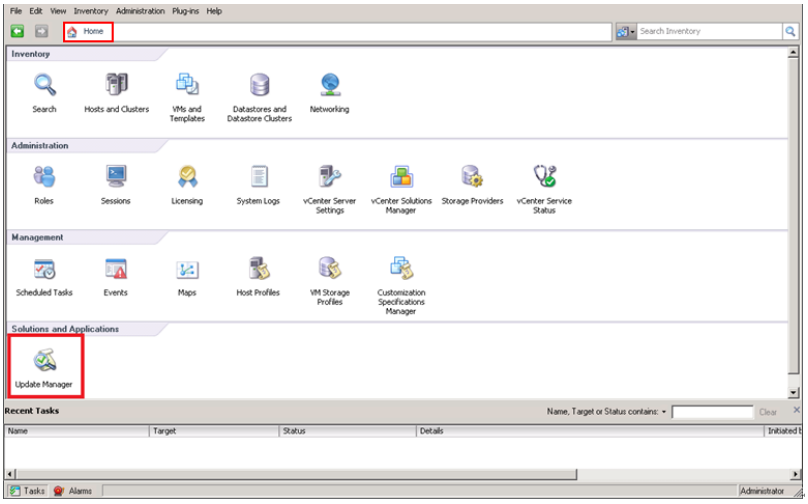
1. On the menu bar of the ***— **vSphere Client** page, click **Home**.

   NOTE

   The *** of ***— **vSphere Client** is the host name.

2. In the **Solutions and Application** area, click **Update Manager**, as shown in **Figure 2-1**.

Figure 2-1 Clicking **Update Manager**

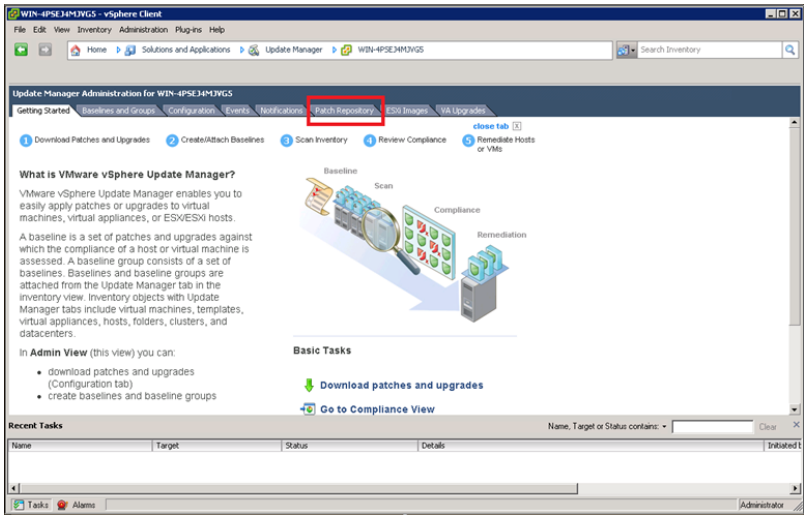


The **Update Manager Administration for ***** page is displayed.

Step 3 Import the patch program.

1. On the **Update Manager Administration for ***** page, click **Patch Repository**, as shown in **Figure 2-2**.

Figure 2-2 Clicking **Patch Repository**



2. On the upper right, click **Import Patches**.

   The **Import Patches** dialog box is displayed.

3. In the **Import Patches** dialog box, click **Browse**.

   The **Select a.zip file,containing the patches** dialog box is displayed.

4. Select a **.zip** file containing a patch and click **Open**, as shown in **Figure 2-3**.

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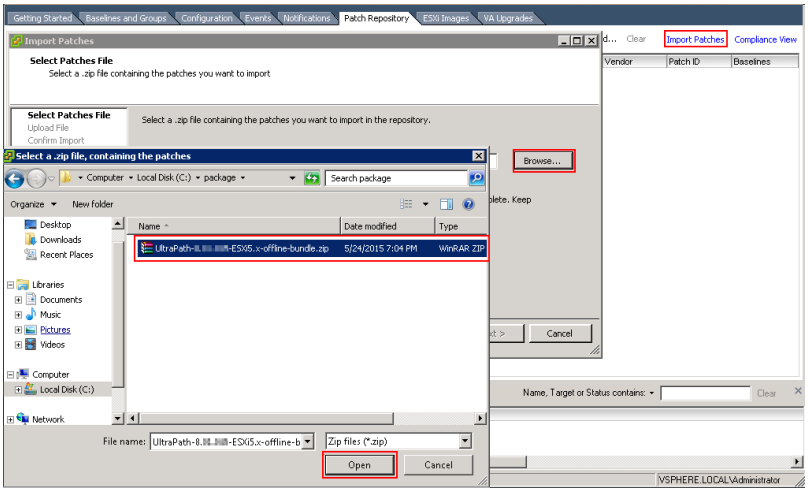
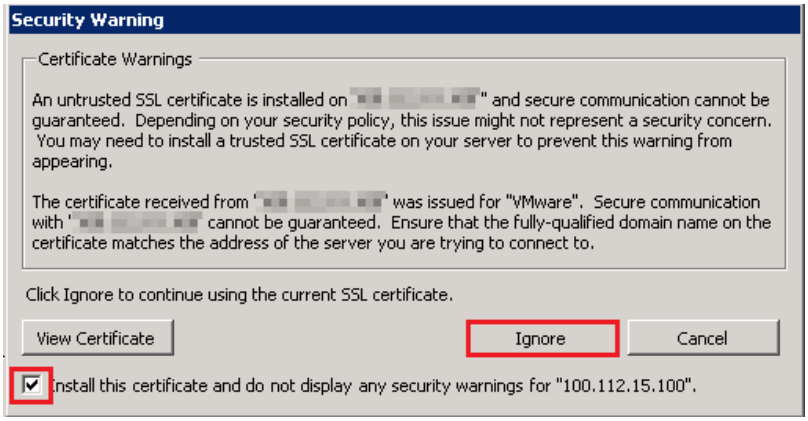
Figure 2-3 Select .zip file



The **Security Warning** dialog box is displayed.

5. In the **Security Warning** dialog box, select **Install this certificate and do not display any security warnings for "100.112.15.100"** and click **Ignore**, as shown in **Figure 2-4**.

Figure 2-4 Security warning



The **Import Patches** dialog box is displayed.

6. Select the programs you want to repair and click **Finish**, as shown in **Figure 2-5**.

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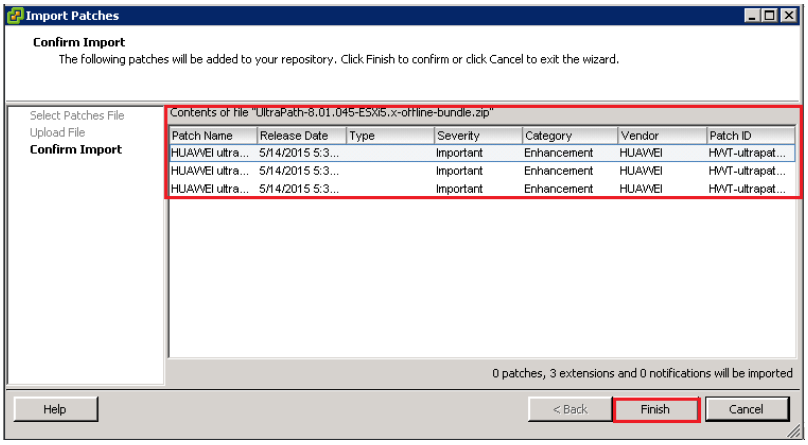
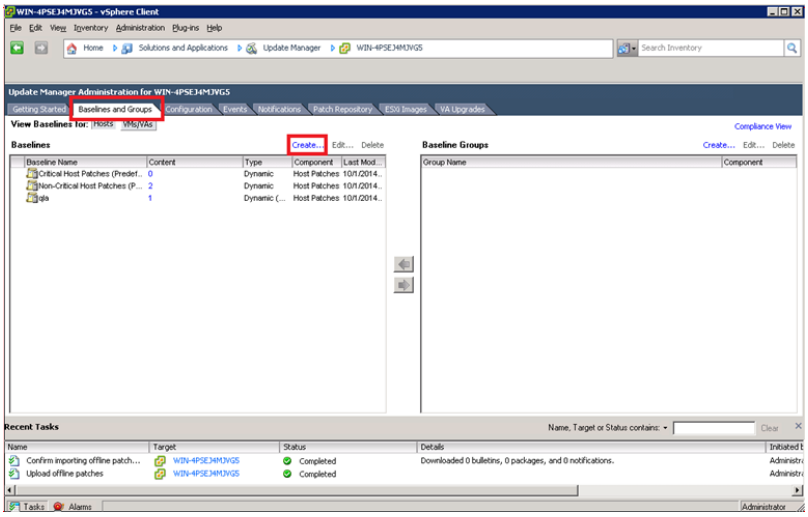
Figure 2-5 Importing the patch program



Step 4 Create **Baselines and Groups**.

1. On the **Update Manager Administration for ***** page, click **Baselines and Groups**.
2. Click **Create**, as shown in **Figure 2-6**.

Figure 2-6 Creating baseline and group



The **New Baseline** dialog box is displayed.

3. Enter the baseline name and type and click **Next**, as shown in **Figure 2-7**.

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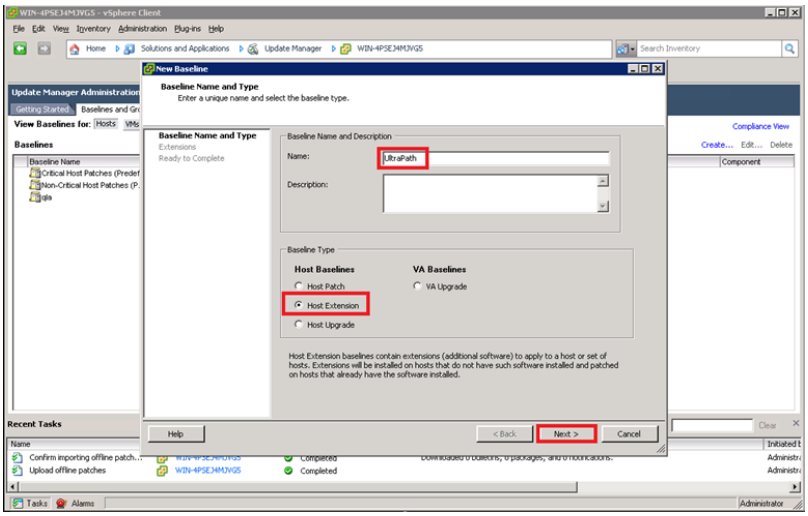
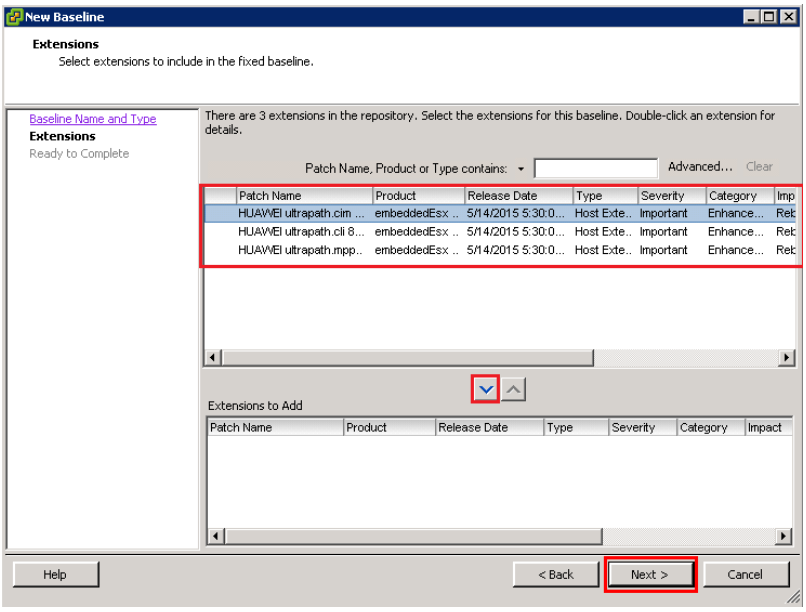
Figure 2-7 Baseline



4. On the right function page, select the baselines that need to be extended and click to add the baselines to the **Extensions to Add** pane, as shown in **Figure 2-8**.

Figure 2-8 Creating a new baseline

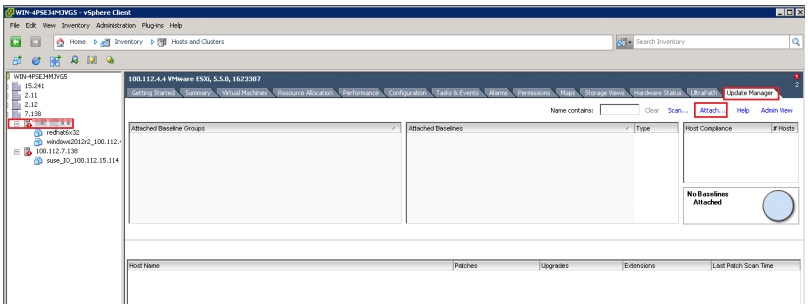


5. Click **Next**.
6. Click **Finish**.

Step 5 Attach baselines and groups.

1. On the **Home** page, click **Hosts and Clusters**.
2. In the left function pane, select hosts, and then select **Update Manager**.
3. Click **Attach** as shown in **Figure 2-9**.

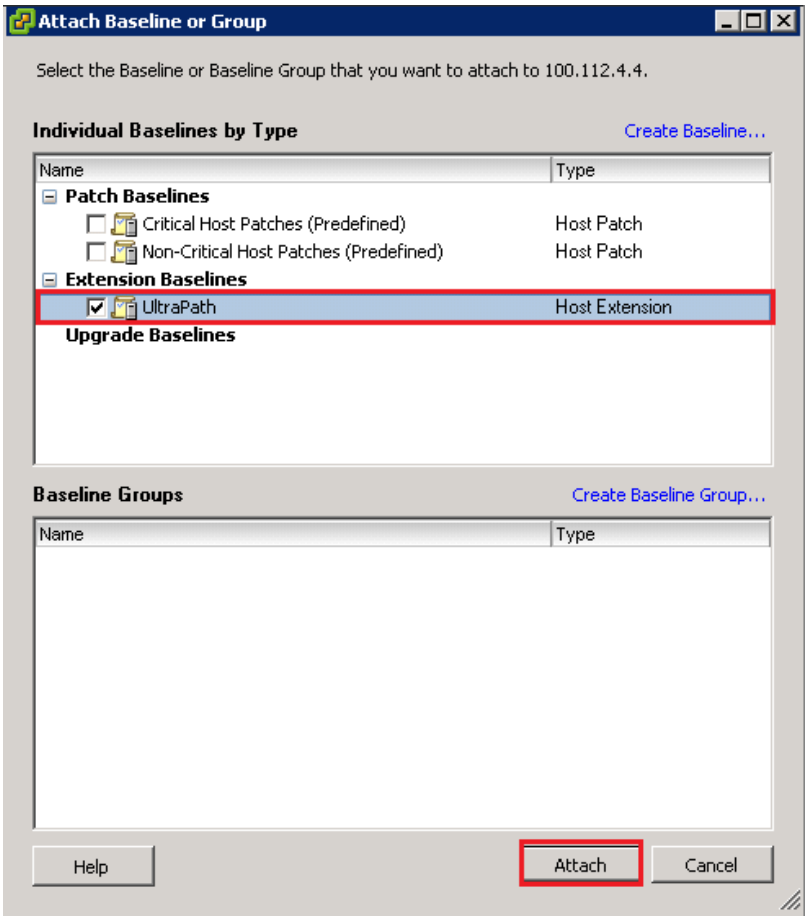
Figure 2-9 Hosts and clusters



The **Attach Baselines or Group** dialog box is displayed.

4. Select the baseline you have created in **Step 4** and click **Attach**, as shown in **Figure 2-10**.

Figure 2-10 Attaching baselines and groups



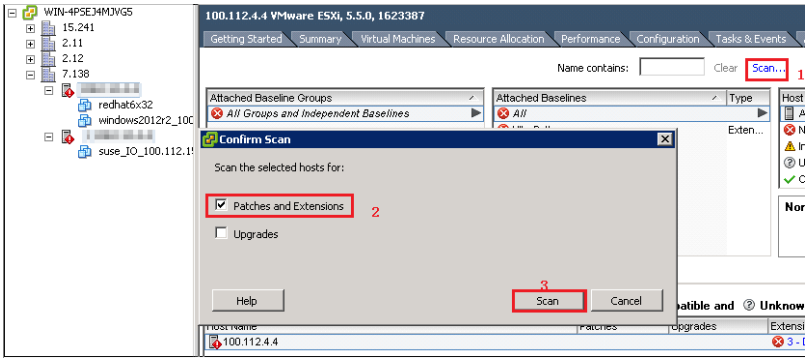
Step 6 Scan for the attached baselines and groups.

1. On the upper right, click **Scan**.

   The **Confirm Scan** dialog box is displayed.

2. Select **Patches and Extensions** and click **Scan**, as shown in **Figure 2-11**.

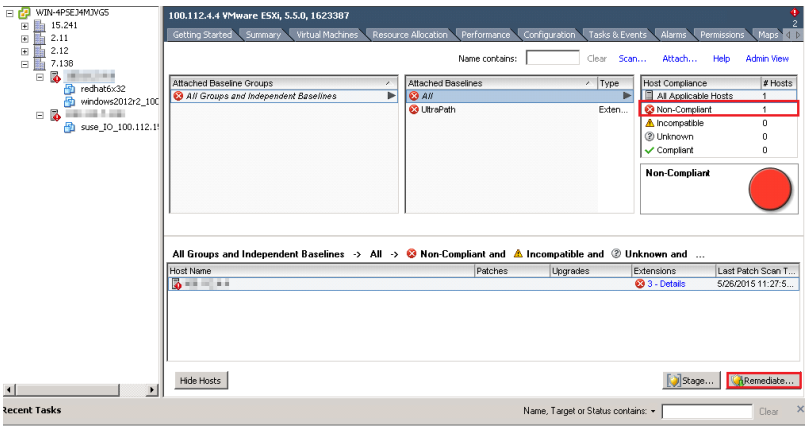
Figure 2-11 Scanning



Step 7 Remedy the patches.

1. After the scanning is complete, on the upper right, **Non-Compliance** is displayed under **Host Compliance**, and the circle in **Host Compliance** is red. On the lower right, click **Remediate**, as shown in **Figure 2-12**.

Figure 2-12 Non-Compliance



The **Remediate** dialog box is displayed.

2. In the **Baseline** function pane of the **Remediate** dialog box, select the objects you want to remedy and click **Next**, as shown in **Figure 2-13**.

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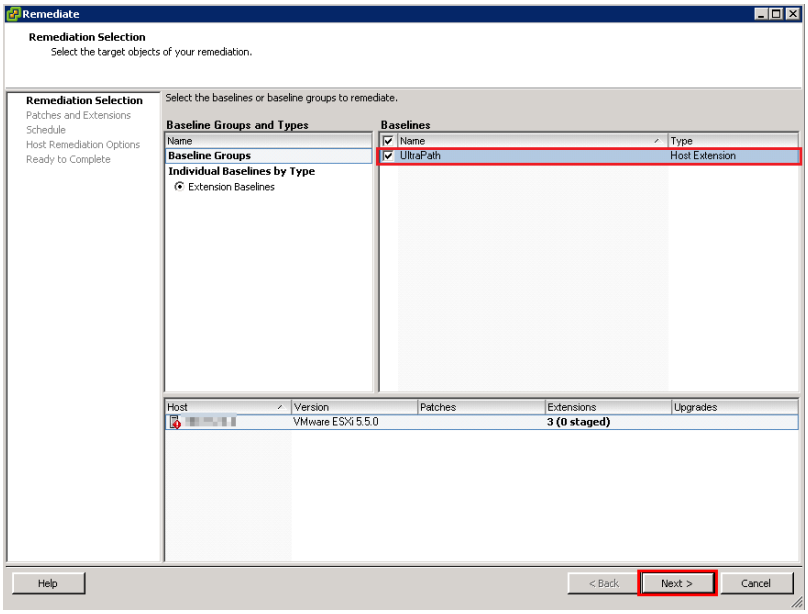
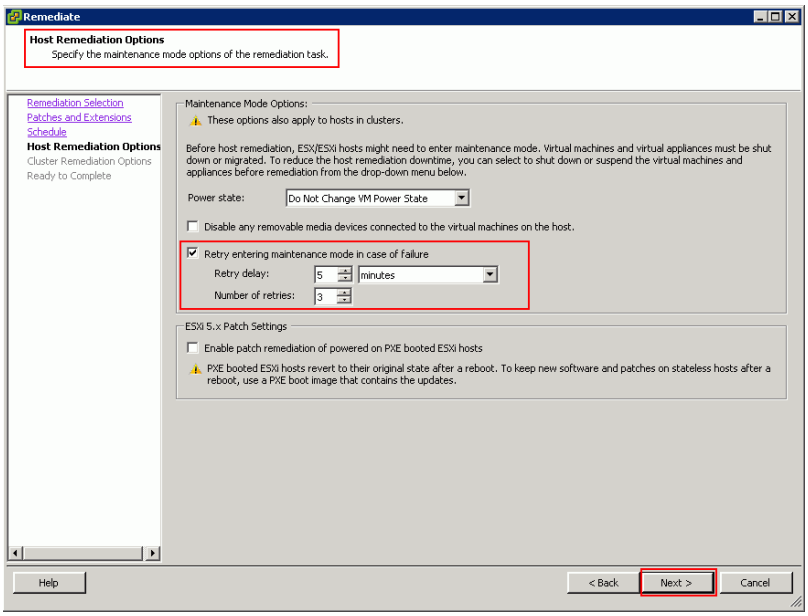
Figure 2-13 Selecting objects to remedy



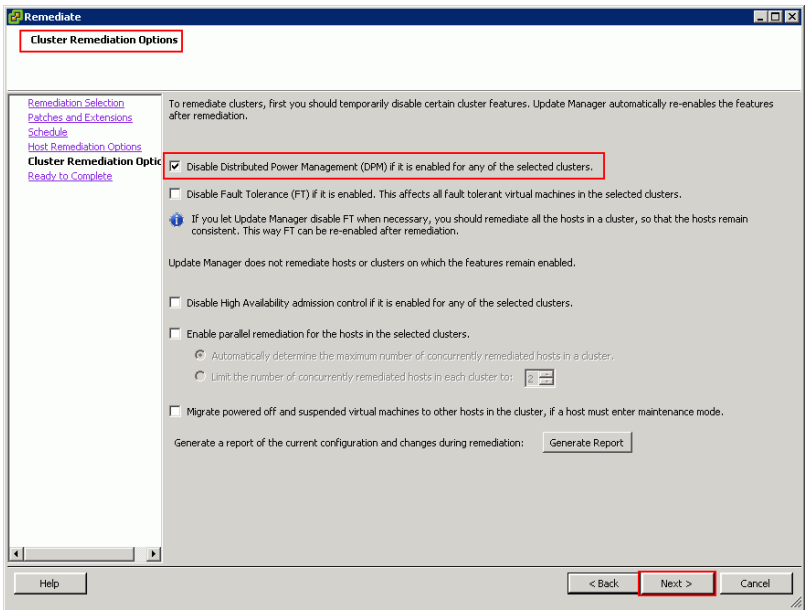
3. **Patches and Extensions** is displayed. Select the patches and extensions you want to use and click **Next**.
4. **Host Remediation Options** is displayed. Set the maintenance mode options for the tasks, as shown in **Figure 2-14**.

Figure 2-14 Host remediation options



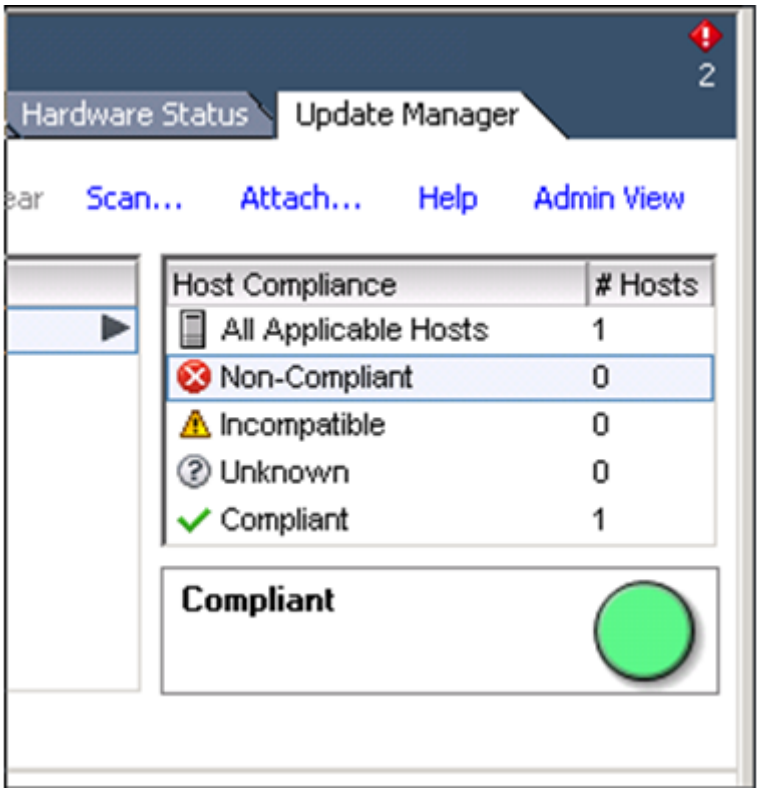
5. **Optional: Cluster Remediation Options** is displayed if system is cluster, as shown in **Figure 2-15**.

Figure 2-15 Cluster Remediation Options



6. In **Host Compliance** on the upper right, check that **0** is displayed after **Non-Compliant** and the circle in the **Compliant** function pane is green, as shown in **Figure 2-16**.

Figure 2-16 Compliant



----End

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Follow-up Procedure

- After the installation is complete, perform the following steps to check whether UltraPath is successfully installed:
  a. Run the **esxcli upadm show version** command to check whether the current UltraPath version is consistent with the driver version.
  ```
  ~ # esxcli upadm show version
   Software Version   : XX.XX.XXX
   Driver   Version   : XX.XX.XXX
  ```
  b. Run the **esxcli upadm show upconfig** command to check the UltraPath configuration. If the configuration information is displayed, UltraPath is successfully installed.

  NOTE

  - For details about how to configure the command output, see **A.2.2 Querying Configuration File Information**.
  - If the check fails, UltraPath does not take effect. Contact Huawei technical support.
- In SAN boot scenarios, restart the EXSi host immediately after UltraPath for ESXi is installed.
- In non-SAN boot scenarios, if you do not restart the ESXi host after UltraPath for ESXi is installed, perform the following steps:
  a. Run **/etc/init.d/hostd restart** to restart the **/etc/init.d/hostd** service.
  ```
  ~ # /etc/init.d/hostd restart
  ```
  b. Restart the CIM Agent service.
  i. If the CIM Agent service is disabled, or the ESXi 6.0 system is installed on the host before you install UltraPath for ESXi, enable the CIM Agent service after the installation.
  ```
  ~ # /sbin/esxcfg-advcfg -A CIMvmw_ultrapath-providerProviderEnabled -
  T int -E "Enable or Disable the CIMvmw_ultrapath-
  providerProviderEnabled" -F 1 -N 0 -M 1
  ~ # esxcfg-advcfg --set 1 /UserVars/CIMvmw_ultrapath-
  providerProviderEnabled
  ~ # /etc/init.d/sfcbd-watchdog restart
  ~ # /etc/init.d/sfcbd-watchdog status
  sfcbd is running.
  ```
  ii. For the ESXi 6.5 and ESXi 6.7 system, perform the following command to restart the CIM Agent service.
  ```
  /etc/init.d/sfcbd-watchdog restart
  /etc/init.d/sfcbd-watchdog status
  ```
- After the UltraPath is installed, change the system log size to provide sufficient storage space for system logs, facilitating subsequent analysis and maintenance of the UltraPath. You are advised to set the sizes of both **syslog.log** and **vmkernel.log** to **30M** and keep the default value **8** of rotations. For details about how to set these parameters, see **4.1 How to Set System Logs?** Select one method.

2.3.4 Installing UltraPath for ESXi on the vSphere CLI

This section describes how to install UltraPath for ESXi on the vSphere CLI.

Precautions

To ensure uninterrupted virtual machine (VM) services in a VMware HA cluster, you must enter the maintenance node on a host and wail until all VMs on the host have been migrated before installing UltraPath for ESXi on the host.

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Procedure

Step 1 Save the UltraPath for ESXi installation package to any directory on the ESXi host.

You are advised to create a new directory to save the installation package. This section uses the **/opt** directory to save the **UltraPath-XX.XX.XXX-ESXi6.x-offlinebundle.zip** installation package as an example.

Step 2 Log in to the application server (running Windows or Linux) where VMware vSphere CLI has been installed. The application server running Windows is used as an example.

Step 3 Run the following command to install UltraPath.

```
C:\Program Files (x86)\VMware\VMware vSphere CLI\bin>esxcli --server X.X.X.X
--username root --password xxxxxx software vib install -d /opt/UltraPath-
XX.XX.XXX-ESXi6.x-offline-bundle.zip
```

The following command output is displayed.

```
Installation Result
 Message: Operation finished successfully.
 Reboot Required: false
   VIBs Installed: HUAWEI_bootbank_ultrapath.cim_XX.XX.XXX-00,
HUAWEI_bootbank_ultrapath.cli_XX.XX.XXX-00,
HUAWEI_bootbank_ultrapath.mpp_XX.XX.XXX-00
 VIBs Removed:
 VIBs Skipped:
```

NOTE

- If you cannot log in to the ESXi host using VMware vSphere CLI 6.0, see **VMware Official Knowledge Base** to troubleshoot fault.
- VMware stops providing signature authentication for the software packages of ESXi 5.0 and 5.1 operating systems, so the software packages are not authenticated with signatures. Therefore, run the following command when the ESXi version is 5.0 or 5.1:

  ```
  C:\Program Files (x86)\VMware\VMware vSphere CLI\bin>esxcli --server
  X.X.X.X  --username root --password xxxxxx software vib install -d /opt/
  UltraPath-XX.XX.XXX-ESXi5.0-offline-bundle.zip --no-sig-check
  ```

Step 4 Login ESXi host and run **esxcli software vib list |grep ultrapath** to check whether the installation is successful. If the **ultrapath.cim**, **ultrapath.cli**, and **ultrapath.mpp** files are all displayed, the installation is successful. The following figures show possible outputs:

```
~ # esxcli software vib list |grep
ultrapath
ultrapath.cim         XX.XX.XXX-00                        HUAWEI
VMwareAccepted    2016-04-22
ultrapath.cli         XX.XX.XXX-00                        HUAWEI
VMwareAccepted    2016-04-22
ultrapath.mpp         XX.XX.XXX-00                        HUAWEI
VMwareAccepted    2016-04-22
```

NOTE

If **2.2 Pre-Installation Check** is not properly completed, restart the ESXi host.

----End

Follow-up Procedure

- After the installation is complete, perform the following steps to check whether UltraPath is successfully installed:

  a. Run the **esxcli upadm show version** command to check whether the current UltraPath version is consistent with the driver version.

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```
~ # esxcli upadm show version
 Software Version   : XX.XX.XXX
 Driver   Version   : XX.XX.XXX
```

b. Run the **esxcli upadm show upconfig** command to check the UltraPath configuration. If the configuration information is displayed, UltraPath is successfully installed.

NOTE

- For details about how to configure the command output, see **A.2.2 Querying Configuration File Information**.
- If the check fails, UltraPath does not take effect. Contact Huawei technical support.

- In SAN boot scenarios, restart the EXSi host immediately after UltraPath for ESXi is installed.
- In non-SAN boot scenarios, if you do not restart the ESXi host after UltraPath for ESXi is installed, perform the following steps:

a. Run **/etc/init.d/hostd restart** to restart the **/etc/init.d/hostd** service.

```
~ # /etc/init.d/hostd restart
```

b. Restart the CIM Agent service.

i. If the CIM Agent service is disabled, or the ESXi 6.0 system is installed on the host before you install UltraPath for ESXi, enable the CIM Agent service after the installation.

```
~ # /sbin/esxcfg-advcfg -A CIMvmw_ultrapath-providerProviderEnabled -
T int -E "Enable or Disable the CIMvmw_ultrapath-
providerProviderEnabled" -F 1 -N 0 -M 1
~ # esxcfg-advcfg --set 1 /UserVars/CIMvmw_ultrapath-
providerProviderEnabled
~ # /etc/init.d/sfcbd-watchdog restart
~ # /etc/init.d/sfcbd-watchdog status
sfcbd is running.
```

ii. For the ESXi 6.5 and ESXi 6.7 system, perform the following command to restart the CIM Agent service.

```
/etc/init.d/sfcbd-watchdog restart
/etc/init.d/sfcbd-watchdog status
```

- After the UltraPath is installed, change the system log size to provide sufficient storage space for system logs, facilitating subsequent analysis and maintenance of the UltraPath. You are advised to set the sizes of both **syslog.log** and **vmkernel.log** to **30M** and keep the default value **8** of rotations. For details about how to set these parameters, see **4.1 How to Set System Logs?** Select one method.

2.4 Installing UltraPath for vCenter

Installation methods for UltraPath for vCenter are different based on vCenter versions. This section describes how to install UltraPath for vCenter for different versions of vCenter.

2.4.1 Installing UltraPath for vCenter (for vCenter 5.X)

This section describes how to install UltraPath for vCenter in vCenter 5.X.

Precautions

- If the version of UltraPath for vCenter is earlier than that of UltraPath for ESXi, update the version of UltraPath for vCenter so that the versions of UltraPath for vCenter and UltraPath for ESXi are same. If the version of UltraPath for ESXi is V100R008, new

functions of UltraPath cannot be queried and configured in UltraPath for vCenter. You are advised to update the versions of UltraPath for ESXi to 21.1.X or later.

- UltraPath for vCenter provides both Chinese (simplified) and English (US) versions.

Procedure

Step 1 Use a digital signature verification tool to verify integrity of the software package.

NOTE

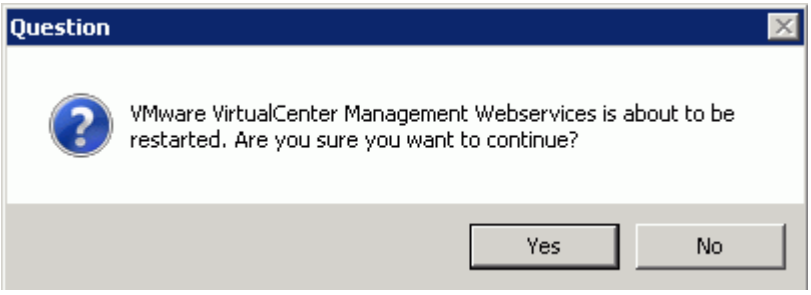
Download the digital signature verification tool from **http://support.huawei.com/enterprise/** to verify integrity of the software package. If the verification fails, contact technical support engineers to obtain the correct and secure software package.

Step 2 Decompress the UltraPath for vCenter installation package and copy **VMware_vSphere_5.X** under **/VMware_vCenter/Packages** to any directory of the vCenter server.

Step 3 Log in to the vCenter server.

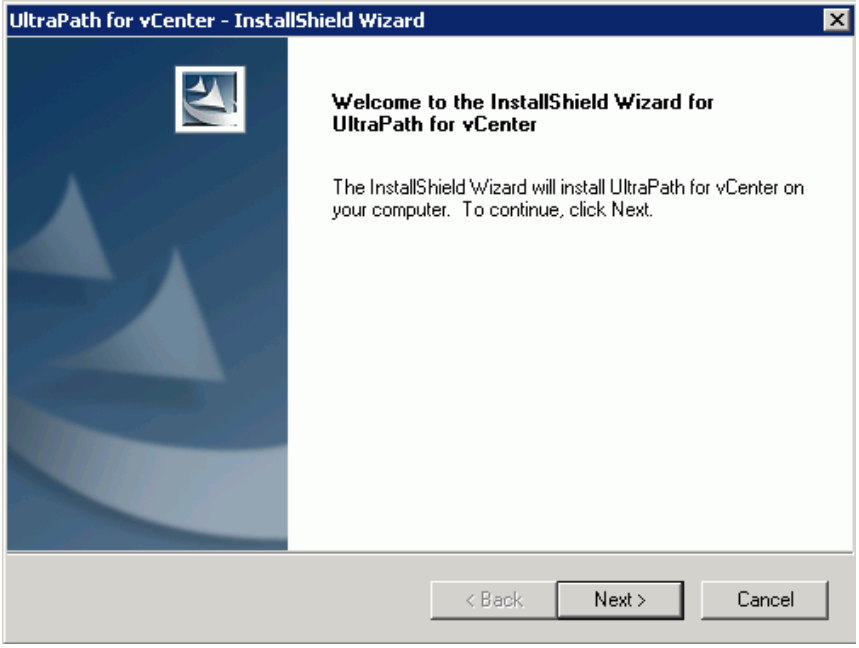
Step 4 Open the **VMware_vSphere_5.X** file folder and double-click the **UltraPath-XX.XX.XXX-vCenter.exe** icon. The **Figure 2-17** dialog box is displayed.

Figure 2-17 UltraPath for vCenter installation instruction page



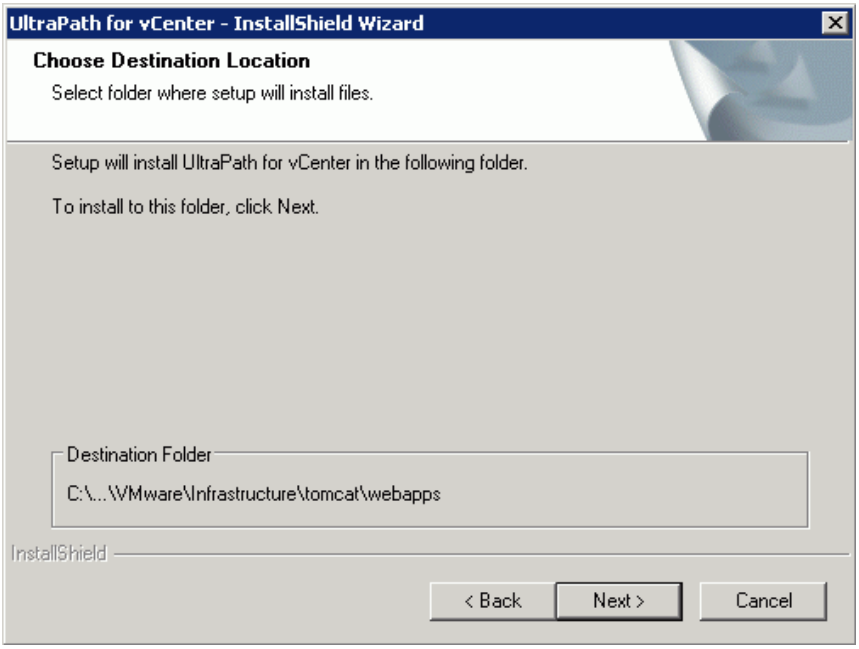
Step 5 Click **Yes**. The installation page of UltraPath for vCenter is displayed, as shown in **Figure 2-18**.

Figure 2-18 UltraPath for vCenter installation page



Step 6 Click **Next** on the installation page. The installation path instruction page is displayed, as shown in **Figure 2-19**.

Figure 2-19 UltraPath for vCenter installation path instruction page



Step 7 Keep the default installation path and click **Next**. The installation preparation page is displayed, as shown in **Figure 2-20**.

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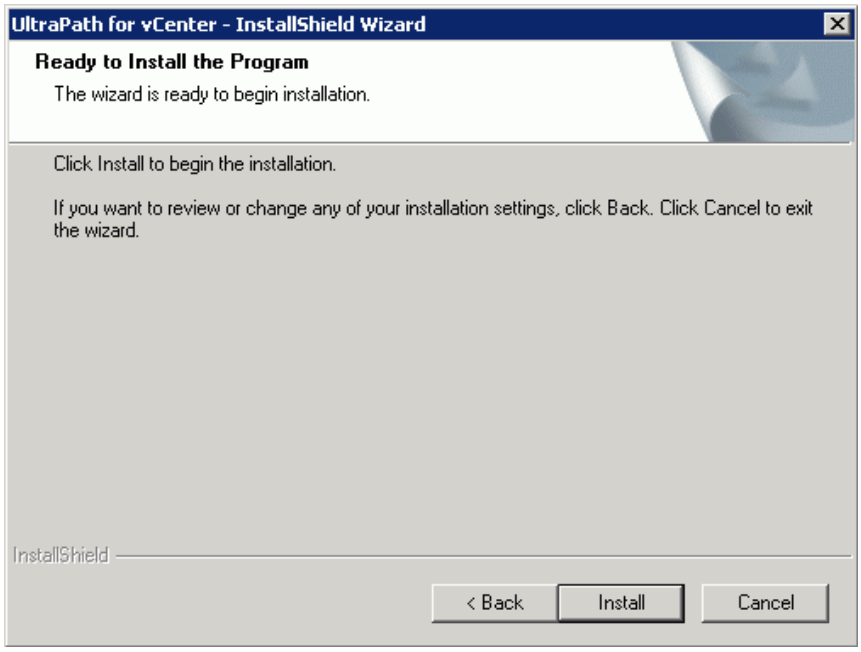
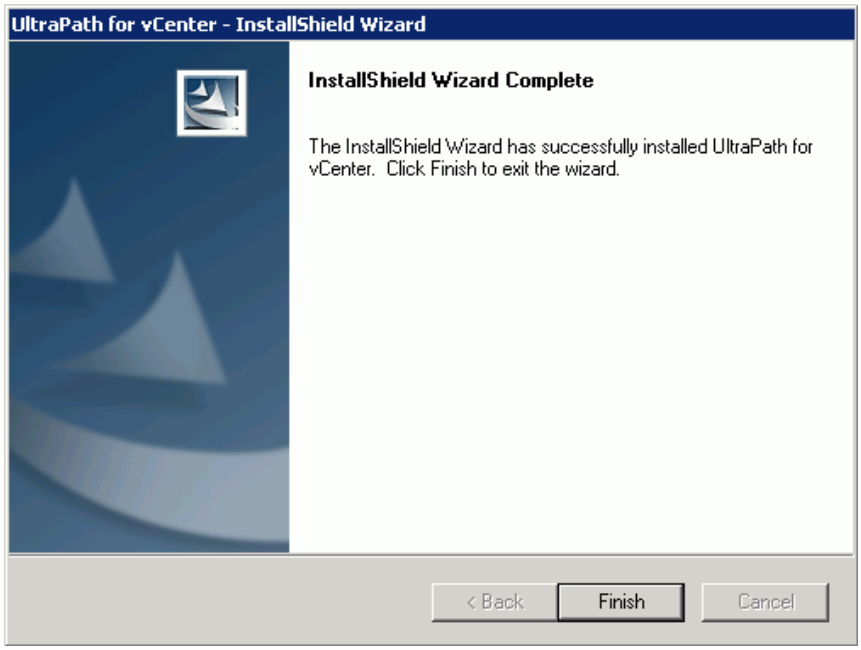
Figure 2-20 UltraPath for vCenter installation preparation page



Step 8 Click **Install** to start the installation.

Step 9 After the installation is complete, click **Finish**, as shown in **Figure 2-21**.

Figure 2-21 UltraPath for vCenter installation completion page



----End

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Follow-up Procedure

After the upgrade is completed, the **UltraPath Configuration** page is displayed.

NOTICE

Only vCenter administrators can perform registration and removal operations, other users, such as assigned to the cluster or ESXi host administrator, do not be allowed for such operation.

1. In **vCenter IP address**, enter the IP address of the vCenter server.
2. In **vCenter username**, enter the user name for logging in to the vCenter server. If there is a domain name in the user name, enter the user name with the domain name.
3. In **vCenter password**, enter the user password for logging in to the vCenter server.
4. In **Verification code**, Enter the verification code that is displayed in the right figure.
5. Click **Register**.

When going to the software removal page of the host where the vCenter server resides, manually enter the software registration page and input the following address for registration:

http://127.0.0.1:8080/ultrapathplugin/pluginmgmt/regplugin.

NOTE

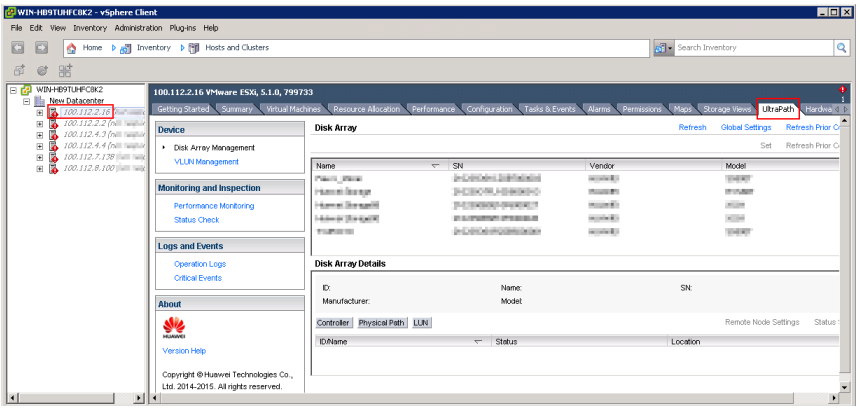
- You can remotely log in to the client of the vCenter server and enter the following address in the address box of the browser for registration:

  http://**vCenter IP**:8080/ultrapathplugin/pluginmgmt/unregplugin, where **vCenter IP** is the IP address of the vCenter server.
- Not register a plug-in by entering the **vCenter IP address** such as 127.0.0.1.
- After installing UltraPath for vCenter, run the vSphere Client again to log in to the vCenter. Then you can use UltraPath for vCenter.
- After upgrading vCenter on its server, perform logout and plug-in registration operations to ensure that UltraPath for vCenter can work properly.

Method used to go to the UltraPath management page of vCenter:

1. Open the vSphere Client and go to the vCenter host management page.
2. Select a host that you want to manage.
3. Click **UltraPath** on the right page, as shown in **Figure 2-22**

Figure 2-22 UltraPath management page



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2.4.2 Installing UltraPath for vCenter (for vCenter 6.X)

Installation methods for vCenter 6.X running on different host operating systems are different. This section describes how to install UltraPath for vCenter on Windows and Linux operating systems (VCSA 6.X).

2.4.2.1 Installing UltraPath for vCenter (for vCenter 6.X deployed on Windows)

This section describes how to install UltraPath for vCenter in vCenter 6.0, vCenter 6.5 and vCenter 6.7 running on Windows.

Precautions

- You can only use a browser in Windows to access vSphere Web Client. Supported browsers include:
  - Microsoft Internet Explorer 10.0.22 or later
  - Mozilla Firefox 34 or later
  - Google Chrome 39 or later
- If the version of UltraPath for vCenter is earlier than that of UltraPath for ESXi, update the version of UltraPath for vCenter so that the versions of UltraPath for vCenter and UltraPath for ESXi are same. If the version of UltraPath for ESXi is V100R008, new functions of UltraPath cannot be queried and configured in UltraPath for vCenter. You are advised to update the versions of UltraPath for ESXi to 21.1.X or later.
- UltraPath for vCenter provides both Chinese (simplified) and English (US) versions.
- For scenarios where platform service controllers (PSCs) are configured externally and manage multiple vCenter servers, you are advised to install UltraPath for vCenter on each vCenter server so that each vCenter management interface can use UltraPath properly. For vCenter 6.X, restart **VMware vSphere Web Client** after UltraPath for vCenter is installed on each vCenter server.

Procedure

Step 1 Use a digital signature verification tool to verify integrity of the software package.

NOTE

Download the digital signature verification tool from **http://support.huawei.com/enterprise/** to verify integrity of the software package. If the verification fails, contact technical support engineers to obtain the correct and secure software package.

Step 2 Decompress the UltraPath for vCenter installation package and copy **Windows** under **/VMware_vCenter/Packages/VMware_vSphere_6.X** to any directory of the vCenter server.

Step 3 Log in to the vCenter server.

Step 4 Open the **Windows** file folder and double-click the **UltraPath-XX.XX.XXX-vCenter6.exe** icon. The UltraPath for vCenter installation wizard and the **Figure 2-23** dialog box are displayed.

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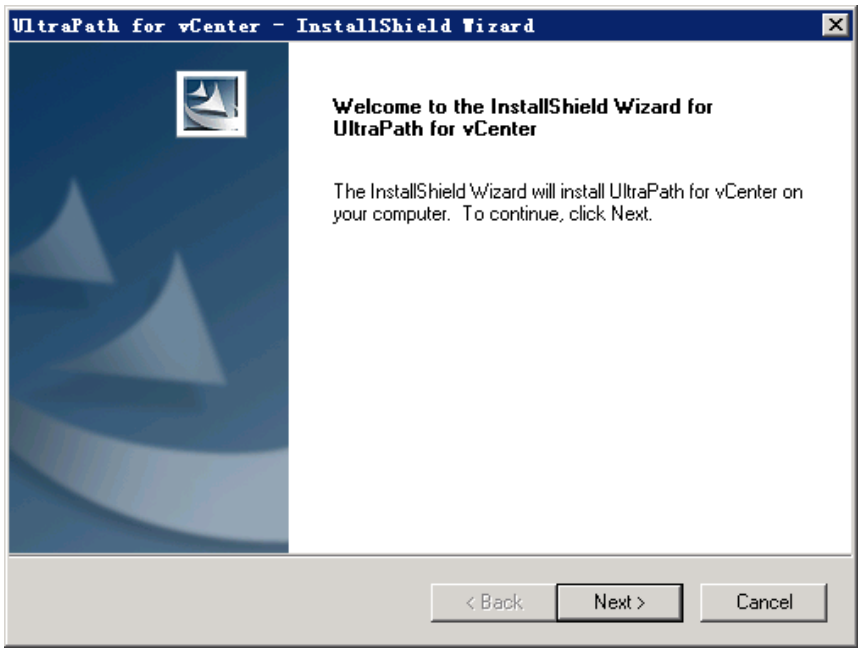
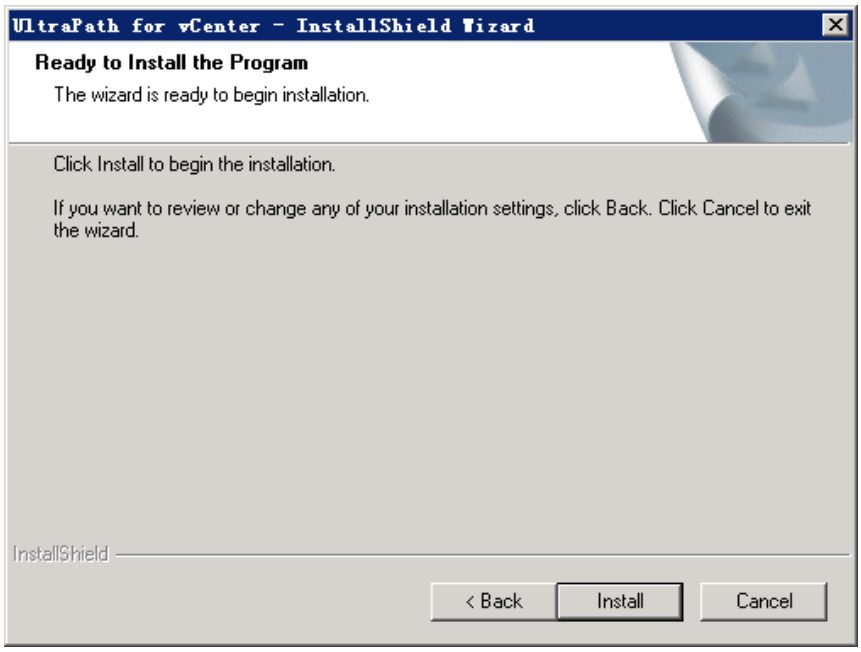
Figure 2-23 UltraPath for vCenter installation wizard



Step 5 Click **Next**. The UltraPath for vCenter installation page is displayed, as shown in **Figure 2-24**.

Figure 2-24 UltraPath for vCenter installation startup page



Step 6 Click **Install** to start the installation.

The installation is complete, as shown in **Figure 2-25**.

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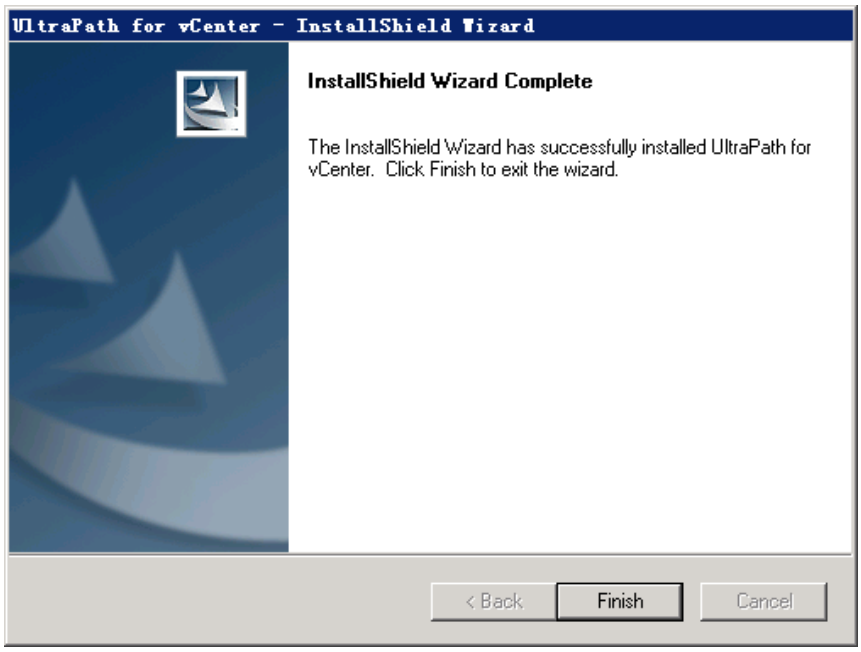
Figure 2-25 UltraPath for vCenter installation completion page



Step 7 Click **Finish**.

After UltraPath for vCenter is installed, the dialog box for registering UltraPath for vCenter is displayed, as shown in **Figure 2-26**. Click **Ok**.

Figure 2-26 UltraPath for vCenter installation completion page

Step 8 Register the UltraPath for vCenter plug-in.

For vCenter 6.0:

1. Copy the **install-config.xml** file in the **extension-registration\vCenter6.0** folder to any directory of host that installed VMware vSphere Client.
2. Log in to VMware vSphere Client in the host that installed VMware vSphere Client.
3. On the vSphere Client management interface, choose **Plug-ins** > **Manage Plug-ins**.

   The **Plug-ins Manager** dialog box is displayed.
4. Right-click the blank area in the dialog box that is displayed and choose **New Plug-in** from the shortcut menu.

   The **Register Plug-in** dialog box is displayed.

5. Click **Browse** and select the UltraPath for vCenter plug-in **install-config.xml** file that you want to install.
6. Click **Register Plug-in**.

   A success dialog box is displayed indicating that the vCenter plug-in is successfully registered.
7. Click **OK**.

For vCenter 6.5:

1. Run **cmd**.
2. Go to the **extension-registration\vCenter6.5\prebuilt** registration directory and run **extension-registration.bat -url https://xxx.xxx.xxx.xxx/sdk -username xxx -password xxx**.

   -url https://*xxx.xxx.xxx.xxx/sdk* is the host IP address used for registration. **-username** *xxx* is the vCenter user name. **-password** *xxx* is the vCenter password. For example:

```
C:\Users\Administrator\Desktop\Windows\extension-registration
\vCenter6.5\prebuilt>extension-registration.bat -url https://127.0.0.1/sdk -
username administrator@vsphere.local -password Huawei@123
INFO: Not using https for your plugin URL is OK for testing but not
recommended for production.
Users will have to include the flag allowHttp=true in their vSphere Client
webclient.properties otherwise the http URL will be ignored
Plugin: com.storage.issp.ultrapathplugin has been successfully registered in
vCenter <https://127.0.0.1/sdk>.
```

For vCenter 6.7:

1. Run **cmd**.
2. Go to the **extension-registration\vCenter6.7\prebuilt** registration directory and run **extension-registration.bat -url https://xxx.xxx.xxx.xxx/sdk -username xxx -password xxx**.

   -url https://*xxx.xxx.xxx.xxx/sdk* is the host IP address used for registration. **-username** *xxx* is the vCenter user name. **-password** *xxx* is the vCenter password. For example:

```
C:\Users\Administrator\Desktop\Windows\extension-registration
\vCenter6.7\prebuilt>extension-registration.bat -url https://127.0.0.1/sdk -
username administrator@vsphere.local -password Huawei@123
INFO: Not using https for your plugin URL is OK for testing but not
recommended for production.
Users will have to include the flag allowHttp=true in their vSphere Client
webclient.properties otherwise the http URL will be ignored
Plugin: com.storage.issp.ultrapathplugin has been successfully registered in
vCenter <https://127.0.0.1/sdk>.
```

NOTICE

If you are using a browser to visit vCenter 6.x while installing UltraPath for vCenter, UltraPath for vCenter that you have installed can only take effect after you re-log in after logout or restarting the browser.

----End

Follow-up Procedure

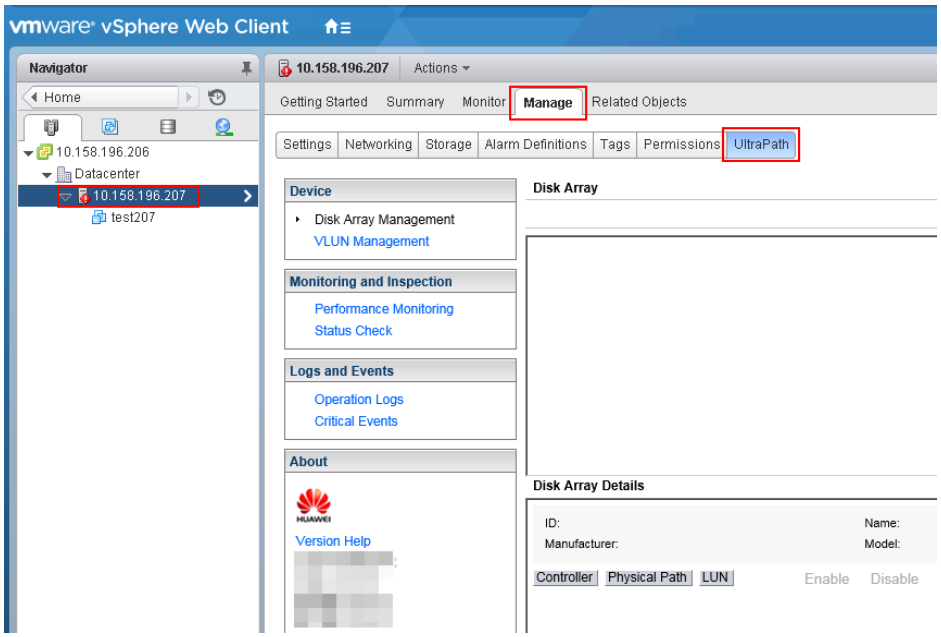
Method used to go to the UltraPath management page of vCenter:

1. Run a web browser and type **https://XXX.XXX.XXX.XXX:9443** in the address box and press **Enter**.

   XXX.XXX.XXX.XXX is the vCenter server's IP address. **9443** is the port for accessing the ESXi host information. If the IP address does not have **9443**, you cannot view UltraPath for vCenter.

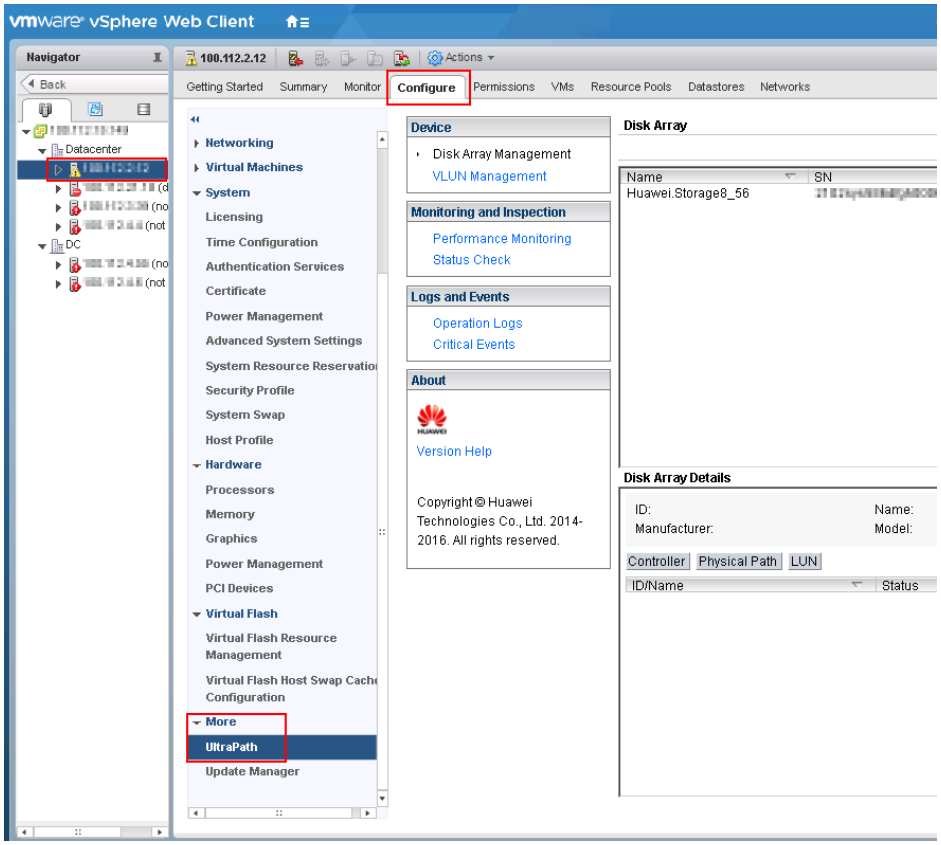
2. Enter the vCenter user name and password to go to the vSphere web client management page.
3. Click **Hosts and Clusters**.
4. Select a host that you want to manage.
   - For vCenter 6.0, click **Manage** > **UltraPath** on the right page, as shown in **Figure 2-27**.

     Figure 2-27 UltraPath management page (vCenter 6.0)



   - For vCenter 6.5 and vCenter 6.7, choose **Configure** > **More** > **UltraPath** on the right to go to the UltraPath management interface. as shown in **Figure 2-28**.

Figure 2-28 UltraPath management page (vCenter 6.5)



2.4.2.2 Installing UltraPath for vCenter (Applicable to vCenter 6.X on VCSA 6.X)

This section describes how to install UltraPath for vCenter in vCenter 6.0 deployed on VCSA 6.0, vCenter 6.5 deployed on VCSA 6.5 and vCenter 6.7 deployed on VCSA 6.7.

Prerequisites

In scenarios where vCenter 6.0 is deployed in VCSA 6.0, VMware vSphere Client that can connect to VCSA has been installed on the host.

Precautions

- You can only use a browser in Windows to access vSphere Web Client. Supported browsers include:
  - Microsoft Internet Explorer 10.0.22 or later
  - Mozilla Firefox 34 or later
  - Google Chrome 39 or later
- If the version of UltraPath for vCenter is earlier than that of UltraPath for ESXi, update the version of UltraPath for vCenter so that the versions of UltraPath for vCenter and UltraPath for ESXi are same. If the version of UltraPath for ESXi is V100R008, new functions of UltraPath cannot be queried and configured in UltraPath for vCenter. You are advised to update the versions of UltraPath for ESXi to 21.1.X or later.
- Strictly follow the sequence of the steps to install UltraPath for vCenter. Otherwise, irrevocable errors may be generated in the environment.

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- UltraPath for vCenter provides both Chinese (simplified) and English (US) versions.
- For scenarios where platform service controllers (PSCs) are configured externally and manage multiple vCenter servers, you are advised to install UltraPath for vCenter on each vCenter server so that each vCenter management interface can use UltraPath properly. For vCenter 6.X, restart **VMware vSphere Web Client** after UltraPath for vCenter is installed on each vCenter server.

Procedure

Step 1 Use a digital signature verification tool to verify integrity of the software package.

NOTE

Download the digital signature verification tool from **http://support.huawei.com/enterprise/** to verify integrity of the software package. If the verification fails, contact technical support engineers to obtain the correct and secure software package.

Step 2 Copy the installation file to the vCenter server.

1. Log in to the Linux host (the vCenter server) where VCSA 6.x resides as user root.

   If the following interface is displayed, perform **Step 2.2**.

```
VMware vCenter Server Appliance 6.0.

Type: vCenter Server with an embedded Platform Services Controller

Last login: Thu Jun 30 07:01:06 UTC 2016 from 100.90.4.94 on ssh
Last login: Thu Jun 30 07:46:17 2016 from 100.90.4.94
Connected to service

    * List APIs: "help api list"
    * List Plugins: "help pi list"
    * Enable BASH access: "shell.set --enabled True"
    * Launch BASH: "shell"

Command>
```

2. Run **shell.set --enabled True** and **shell** to go to the **shell** mode.

```
Command> shell.set --enabled True
Command> shell
    ---------- !!!! WARNING WARNING WARNING !!!! ----------

Your use of "pi shell" has been logged!

The "pi shell" is intended for advanced troubleshooting operations and while
supported in this release, is a deprecated interface, and may be removed in a
future version of the product.  For alternative commands, exit the "pi shell"
and run the "help" command.

The "pi shell" command launches a root bash shell.  Commands within the shell
are not audited, and improper use of this command can severely harm the
system.

Help us improve the product!  If your scenario requires "pi shell," please
submit a Service Request, or post your scenario to the
communities.vmware.com/community/vmtn/server/vcenter/cloudvm forum.

localhost:~ #
```

3. Run the **chsh -s /bin/bash root** command to enable the file uploading service on the vCenter server and upload the UltraPath installation package to the vCenter server.

4. Decompress the UltraPath for vCenter installation package and copy **VCSA6.X** under **/VMware_vCenter/Packages/VMware_vSphere_6.X** to any directory of the vCenter server.
5. Run the **chsh -s /bin/appliancesh root** command to disable the file uploading service on the vCenter server.

Step 3 Install UltraPath for vCenter.

1. Run **cd VCSA6.x** to go to the **VCSA6.x** directory.
2. Run **chmod +x** *install.sh* to change the executable permission on the file.
3. Run **sh** *install.sh* to start the installation.

```
localhost:~/VCSA6.x> chmod +x install.sh
localhost:~/VCSA6.x> sh install.sh
Preparing...                ##################################################
UltraPath-for-vCenter       ##################################################
UltraPath for vCenter has been successfully installed.Please make sure register
the UltraPath for vCenter plug-in to make the UltraPath for vCenter plug-in
effective.
```

Step 4 Register the UltraPath for vCenter plug-in.

For vCenter 6.0:

1. Copy the **install-config.xml** file in the **extension-registration/vCenter6.0** folder to any directory of host that installed VMware vSphere Client.
2. Log in to VMware vSphere Client in the host that installed VMware vSphere Client.
3. On the vSphere Client management interface, choose **Plug-ins** > **Manage Plug-ins**.

   The **Plug-ins Manager** dialog box is displayed.
4. Right-click the blank area in the dialog box that is displayed and choose **New Plug-in** from the shortcut menu.

   The **Register Plug-in** dialog box is displayed.
5. Click **Browse** and select the UltraPath for vCenter plug-in **install-config.xml** file that you want to install.
6. Click **Register Plug-in**.

   A success dialog box is displayed indicating that the vCenter plug-in is successfully registered.
7. Click **OK**.

For vCenter 6.5:

1. Open the command line interface of VCSA 6.5.
2. Run **cd VCSA6.x** to go to the **extension-registration/vCenter6.5/prebuilt** registration directory.
3. Run **sh extension-registration.sh -url https://xxx.xxx.xxx.xxx/sdk -username xxx -password xxx** command.

   -url https://*xxx.xxx.xxx.xxx/sdk* is the VCSA 6.5 IP address. **-username** *xxx* is the vCenter user name. **-password** *xxx* is the vCenter password. For example:

```
root@vcsa163 [ /usr/VCSA6.x/extension-registration/vCenter6.5/prebuilt ] sh
extension-registration.sh -url https://10.46.220.163/sdk -username
administrator@vsphere.local -password Huawei@123
Picked up JAVA_TOOL_OPTIONS: -Xms32M -Xmx128M
INFO: Not using https for your plugin URL is OK for testing but not
recommended for production.
Users will have to include the flag allowHttp=true in their vSphere Client
```

```
webclient.properties otherwise the http URL will be ignored
Plugin: com.storage.issp.ultrapathplugin has been successfully registered in
vCenter <https://10.46.220.163/sdk>.
```

For vCenter 6.7:

1. Open the command line interface of VCSA 6.7.
2. Run **cd VCSA6.x** to go to the **extension-registration/vCenter6.7/prebuilt** registration directory.
3. Run **sh extension-registration.sh -url https://xxx.xxx.xxx.xxx/sdk -username xxx -password xxx** command.

   -url https://*xxx.xxx.xxx.xxx/sdk* is the VCSA 6.7 IP address. **-username** *xxx* is the vCenter user name. **-password** *xxx* is the vCenter password. For example:

```
root@vcsa163 [ /usr/VCSA6.x/extension-registration/vCenter6.7/prebuilt ] sh
extension-registration.sh -url https://10.46.220.163/sdk -username
administrator@vsphere.local -password Huawei@123
Picked up JAVA_TOOL_OPTIONS: -Xms32M -Xmx128M
INFO: Not using https for your plugin URL is OK for testing but not
recommended for production.
Users will have to include the flag allowHttp=true in their vSphere Client
webclient.properties otherwise the http URL will be ignored
Plugin: com.storage.issp.ultrapathplugin has been successfully registered in
vCenter <https://10.46.220.163/sdk>.
```

NOTICE

If you are using a browser to visit VCSA 6.x while installing UltraPath for vCenter, UltraPath for vCenter that you have installed can only take effect after you re-log in after logout or restarting the browser.

----End

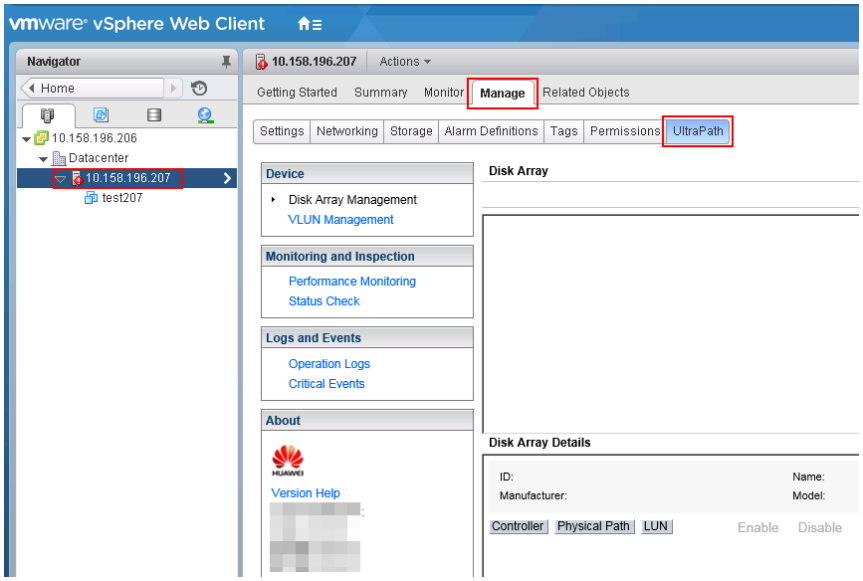
Follow-up Procedure

Method used to go to the UltraPath management page of vCenter:

1. Run a web browser and type **https://XXX.XXX.XXX.XXX:9443** in the address box and press **Enter**.

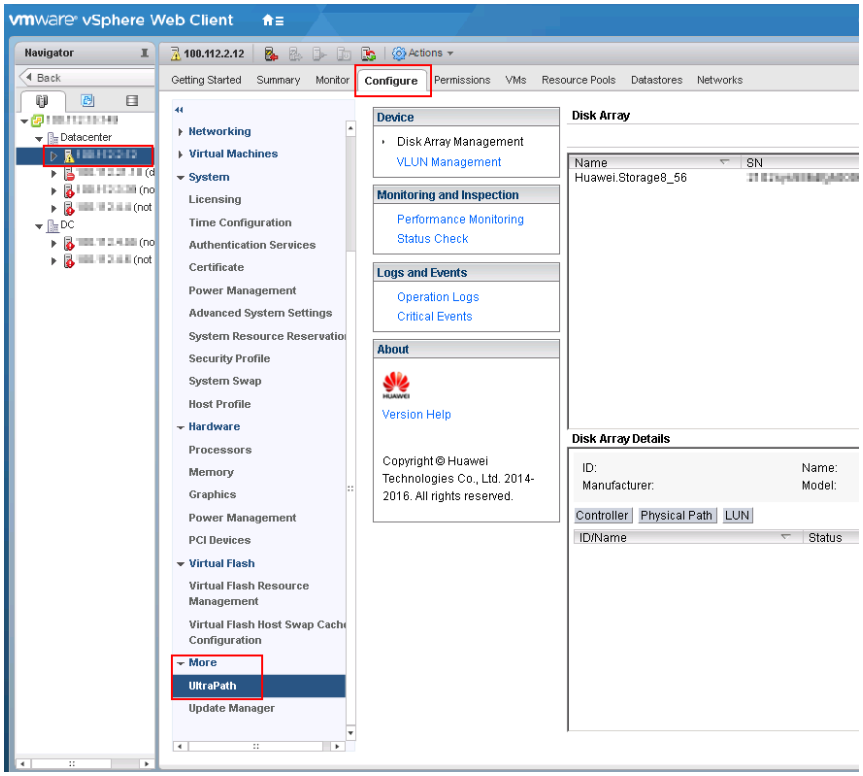
   XXX.XXX.XXX.XXX is the vCenter server's IP address. **9443** is the port for accessing the ESXi host information. If the IP address does not have **9443**, you cannot view UltraPath for vCenter.
2. Enter the vCenter user name and password to go to the vSphere web client management page.
3. Click **Hosts and Clusters**.
4. Select a host that you want to manage.
   - For vCenter 6.0, click **Manage** > **UltraPath** on the right page, as shown in **Figure 2-29**.

Figure 2-29 UltraPath management page (vCenter 6.0)



- For vCenter 6.5 and vCenter 6.7, choose **Configure** > **More** > **UltraPath** on the right to go to the UltraPath management interface. as shown in **Figure 2-30**.

Figure 2-30 UltraPath management page (vCenter 6.5)



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3 Management

About This Chapter

When UltraPath is installed, you can maintain, upgrade, or uninstall it based on service running conditions.

3.1 Routine Maintenance
Routine maintenance can help UltraPath play a better role in storage networks.

3.2 Upgrading UltraPath
You can upgrade UltraPath to the latest version to obtain latest UltraPath functions.

3.3 Uninstalling UltraPath
Due to service adjustment, UltraPath must be uninstalled. Perform the operations as instructed in this section. This chapter explains how to uninstall UltraPath for ESXi and UltraPath for vCenter.

3.1 Routine Maintenance

Routine maintenance can help UltraPath play a better role in storage networks.

3.1.1 Logging In to the UltraPath Management Interface

After logging in to UltraPath using the vCenter and completing certain configurations, you can use, manage, and maintain UltraPath for ESXi.

3.1.1.1 Logging In to the UltraPath Management Page (Applicable to vCenter 6.X)

This section describes how to log in to the UltraPath management page of vCenter 6.X.

Prerequisites

- The operating system of the VMware vSphere-resident client is running properly.
- The VMware vSphere client is communicating properly with the storage device.

Procedure

Step 1 Log in to the application server.

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Step 2 Log in to the VMware vSphere client.

1. Double-click the shortcut icon of the VMware vSphere client on the desktop.

   The **VMvare vSphere Client** page is displayed.
2. In **User name**, enter the user name for logging in to the VMware vSphere client.
3. In **Password**, enter the password for logging in to the VMware vSphere client.
4. Click **Login**. The **vSphere Client** page is displayed.

Step 3 Log in to the vCenter management page of UltraPath for ESXi.

1. In the left navigation tree on the **vSphere Client** page, click the target VMware ESXi host.
2. In the right pane, click the **UltraPath** tab to enter the vCenter management page.
3. In **vCenter username**, enter the user name for logging in to the vCenter.
4. In **vCenter password**, enter the password for logging in to the vCenter.
5. In **Verification code**, enter the verification code.
6. Click **Register**. The vCenter management page is displayed.

----End

3.1.1.2 Logging In to the UltraPath Management Page (Applicable to vCenter 6.X)

This section describes how to log in to the UltraPath management page of vCenter 6.X.

Prerequisites

- The operating system of the VMware vSphere-resident client is running properly.
- The VMware vSphere client is communicating properly with the storage device.

Procedure

Step 1 Log in to the application server.

Step 2 In the address box of your browser, type **https://XXX.XXX.XXX.XXX:9443** and press **Enter** to go to the vSphere Web Client management page. **XXX.XXX.XXX.XXX** indicates the IP address of the vCenter server.

Step 3 Click **Hosts and Clusters**.

Step 4 Select the host that you want to manage.

Step 5 Go to the UltraPath management page.

- For vCenter 6.0, choose **Manage** > **UltraPath** on the right to go to the UltraPath management interface, as shown in **Figure 3-1**.

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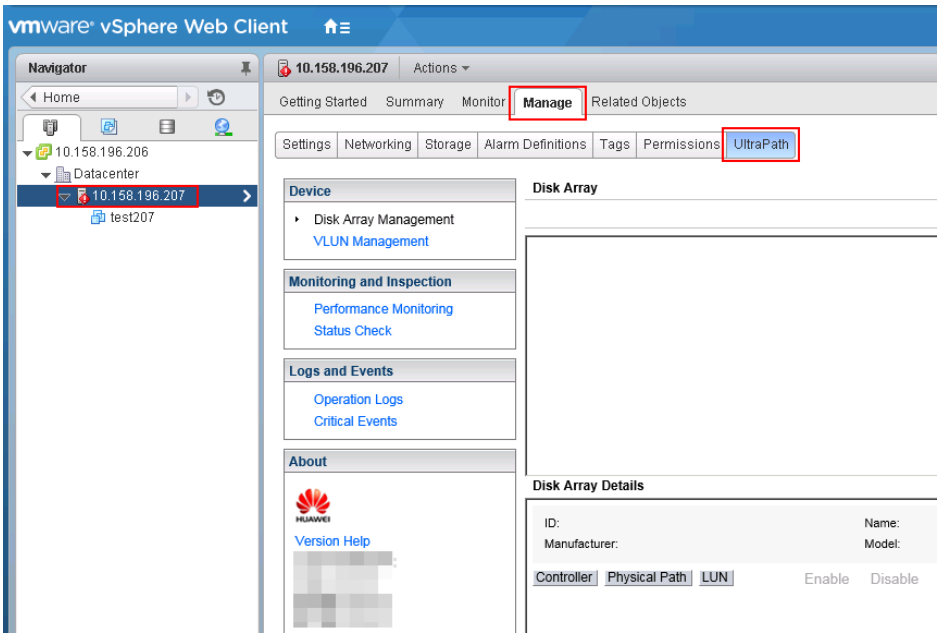
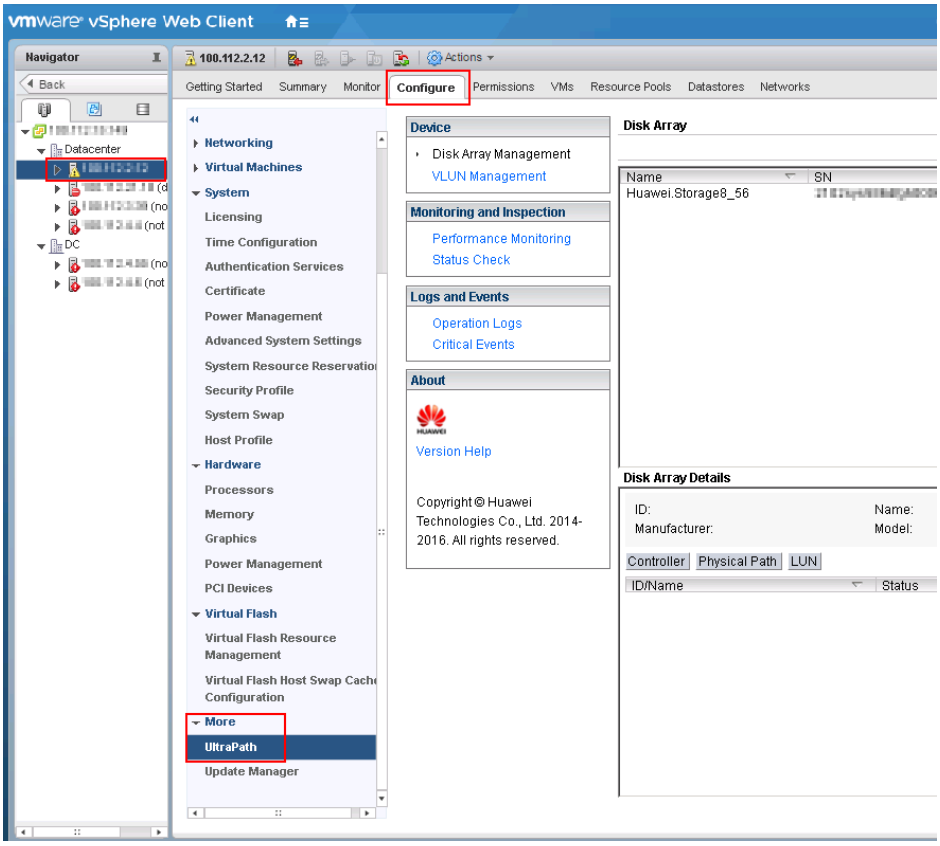
Figure 3-1 UltraPath management page (vCenter 6.0)



- For vCenter 6.5 and vCenter 6.7, choose **Configure** > **More** > **UltraPath** on the right to go to the UltraPath management interface. as shown in **Figure 3-2**.

Figure 3-2 UltraPath management page (vCenter 6.5)



----End

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3.1.2 Viewing Physical Path Information

This section describes how to view the detailed information about a physical disk array path.

Procedure

Step 1 In the **Device** area on the left of the vCenter management interface, click **Disk Array Management** to enter the array management page.

Step 2 Select the disk array that you want to view.

Step 3 In the **Disk Array Details** area, click **Physical Path** tab to view detailed information about a physical path. The following table describes related parameters:

Parameter	Description	Value
ID	ID of the physical path.	[Example] 0
Initiator Port	Name of an initiator port. **NOTE** For some arrays such as the S2600 and S5500, the initiator ports are displayed as the initiator port IDs in the SCSI address.	[Example] iqn.1998-01.com.vmvare:localhost-51a7d306
Controller	ID or name of a controller.	[Example] 0A
Port ID	Location of the port.	[Example] CTE0.B.H0
Target Port	Name of a target port. **NOTE** For some arrays such as the S2600 and S5500, the initiator ports are displayed as the initiator port IDs in the SCSI address.	[Example] iqn.2006-08.com.huawei:oceanstor:21000022a10ac1bf::129.97.50.2-1020400
Status	Working status of a physical path. The value can be **Normal**, **Fault**, **I/O discrete error degradation**, **Intermittent failure degradation**, **High latency degradation**, **Potential fault degradation** or **Disable**.	[Example] Normal

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Parameter	Description	Value
Check State	Health status of the physical path displayed when you initiate a query.	[Example] Checking
Port Type	Type of a link port.	[Example] iSCSI
I/O Retry Count	Number of I/O retry attempts.	[Example] 0
Path Fault Count	Number of times for which a path becomes faulty.	[Example] 0
Max. I/O Latency (ms)	Maximum average I/O latency within a sampling period.	[Example] 200
Min. I/O Latency (ms)	Minimum average I/O latency within a sampling period.	[Example] 1
Average. I/O Latency (ms)	Average I/O latency within a sampling period.	[Example] 1

----End

3.1.3 Viewing Array Information

This section describes how to view details about disk arrays on the storage management page of UltraPath for ESXi.

Procedure

Step 1 In the **Device** area on the left of the vCenter management interface, click **Disk Array Management** to enter the array management page.

Step 2 Select a disk array and view its details in the **Disk Array Details** area.

Parameter	Description	Value
ID	ID of the disk array.	[Example] 0
Name	Name of the disk array.	[Example] SN_2004
SN	Serial No. of the disk array.	[Example] 21000022a10ac1bf

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Parameter	Description	Value
Manufacturer	Manufacturer of the disk array.	[Example] HUAWEI
Model	Model of the disk array.	[Example] S5500T

NOTE

In the upper right part of the storage management page, click **Refresh** to view information about disk arrays managed by UltraPath for ESXi.

----End

3.1.4 Viewing Controller Information

This section describes how to view information about disk array controllers.

Procedure

Step 1 In the **Device** area on the left of the vCenter management interface, click **Disk Array Management** to enter the array management page.

Step 2 Select the disk array whose controller information you want to view.

Step 3 In the **Disk Array Details** area, click the **Controller** tab to view detailed information about a controller. The following table describes related parameters:

Parameter	Description	Value
ID/Name	ID or name of the controller.	[Example] 0A
Status	Status of the controller. The value can be either **Enable** or **Disable**.	[Example] Enabled
Location	Location of the controller.	[Default value] Local Device [Example] Local Device

----End

3.1.5 Viewing Virtual LUN Information

This section describes how to view the detailed information about a virtual LUN.

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Procedure

Step 1 In the **Device** area on the left of the vCenter management interface, click **Disk Array Management** to enter the array management page.

Step 2 Select the disk array whose controller information you want to view.

Step 3 In the **Disk Array Details** area, click the **LUN** tab to view the detailed information about a virtual LUN. The following table describes related parameters:

Parameter	Description	Value
ID	ID allocated by UltraPath for ESXi to the virtual LUN.	[Example] 1
Drive Letter	Name of the disk that corresponds to the virtual LUN on its ESX system.	[Example] naa.60022a11000ac1bf0cb9754a0000016e
LUN Name	Name of the virtual LUN. **NOTE** The name is specified when the LUN is created on its disk array.	[Example] LUN_01
Type	Type of the virtual LUN. The value can be **Common**, or **Hypermetro**.	[Example] Common
WWN	WWN of the virtual LUN.	[Example] 60022a11000ac1bf0cb9754a0000016e
Dev Lun ID	ID of the storage system LUN corresponding to the virtual LUN.	[Example] 1
DataStor	ID of the datastore that the virtual LUN belongs to on its ESX system.	[Example] datastore_1
Capacity	Capacity of the virtual LUN.	[Example] 10.00 GB

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Parameter	Description	Value
Status	Working status of the virtual LUN. The value can be **Normal**, **Fault**, **Degraded**, **Disabled**, or **--**. **NOTE** If the LUN on the array is in **Fault** state while the virtual LUN on the host is in **Normal** state (viewed by using UltraPath), the virtual LUN can be accessed by the host.	[Example] Normal
Working Controller	Working Controller of the virtual LUN.	[Example] 0A
Owning Controller	Owning Controller of the virtual LUN.	[Example] 0A

Step 4 **Optional:** Check path information about the virtual LUN.

1. Click **Details** under **Path**.

   The **Path** dialog box is displayed.

2. In the **Path List** area, view the detailed information about the virtual LUN. The following table describes related parameters:

Parameter	Description	Value
ID	ID of the physical path.	[Example] 0
Name	Name of the running HBA.	[Example] vmhba32
Initiator Port	Name of an initiator port.	[Example] iqn. 1998-01.com.vmware:localhost-51a7d306
Controller	ID or name of a controller.	[Example] 0A
Port ID	Location of the port.	[Example] CTE0.B.H0
Target Port	Name of a target port.	[Example] iqn.2006-08.com.huawei:oceanstor: 21000022a10ac1bf::129.97.50.2-1020400

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Parameter	Description	Value
Status	Working status of a physical path. The value can be **Normal**, **Fault**, **BUSY degradation**, **I/O discrete error degradation**, **Intermittent failure degradation**, **I/O timeout degradation**, **High latency degradation**, **Potential fault degradation** or **Disable**.	[Example] Normal
Port Type	Type of a link port.	[Example] iSCSI

----End

3.1.6 Performance Monitoring

The real-time performance monitoring function enables you to check the statuses of paths and virtual LUNs.

3.1.6.1 Setting Performance Monitoring

This section describes how to monitor the I/O performance of physical paths, disk paths, and virtual LUNs in real time.

3.1.6.1.1 Monitoring a Physical Path

This section describes how to monitor the running status of a specified physical path.

Procedure

Step 1 In the **Monitoring and Inspection** area on the left of the vCenter management interface, click **Performance Monitoring**.

Step 2 Select the object you want to monitor.

1. In **Monitor object** in the right function pane, select **Monitor object**.
2. Click **Select Monitor Object**.

   The **Select Physical Path to Monitor** dialog box is displayed.
3. In **Select disk array**, select the disk array whose physical paths you want to monitor.
4. In the lower area, select the physical paths you want to monitor.
5. Click **OK**.

Step 3 In **Indicators display in the chart**, select the monitoring indicators.

Step 4 In **Sampling interval (s)**, select the sampling interval for the monitoring.

Step 5 In the upper right corner of the function pane, click **Start** to start monitoring the physical paths.

----End

3.1.6.1.2 Monitoring a Disk Path

This section describes how to monitor the running status of a specified disk path.

Procedure

Step 1 In the **Monitoring and Inspection** area on the left of the vCenter management interface, click **Performance Monitoring**.

Step 2 Select the object you want to monitor.

1. In **Monitor object** in the right function pane, select **Disk**.
2. Click **Select Monitor Object**.

   The **Select Paths to Monitor** dialog box is displayed.
3. In the **LUN Information** area, select the LUN you want to monitor.
4. Click **Next**. The **Disk Path Information** page is displayed.
5. In the **Disk Path Information** area, select the disk path you want to monitor.
6. Click **Next**. The information summary is displayed.
7. Click **Finish**.

Step 3 In **Indicators display in the chart**, select the monitoring indicators.

Step 4 In **Sampling interval (s)**, select the sampling interval for the monitoring.

Step 5 In the upper right corner of the function pane, click **Start** to start monitoring the disk path.

----End

3.1.6.1.3 Monitoring a Virtual LUN

This section describes how to monitor the running status of a virtual LUN.

Procedure

Step 1 In the **Monitoring and Inspection** area on the left of the vCenter management interface, click **Performance Monitoring**.

Step 2 Select the object you want to monitor.

1. In **Monitor object** in the right function pane, select **LUN**.
2. Click **Select Monitor Object**.

   The **Select LUNs to Monitor** dialog box is displayed.
3. In **Select disk array**, select the disk array whose LUN you want to monitor.
4. In the lower area, select the LUN you want to monitor.
5. Click **OK**.

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Step 3 In **Indicators display in the chart**, select the monitoring indicators.

Step 4 In **Sampling interval (s)**, select the sampling interval for the monitoring.

Step 5 In the upper right corner of the function pane, click **Start** to start monitoring the virtual LUN.

----End

3.1.6.2 Exporting Performance Monitoring Data

This section describes how to export performance data generated by real-time monitoring.

Prerequisites

For vCenter 6.0, this document takes the IE browser to access the vCenter server as an example.

Procedure

Step 1 In the **Monitoring and Inspection** area on the left of the vCenter management interface, click **Performance Monitoring**.

Step 2 In the upper right part of the function pane, click **Export**.

The **File Download** dialog box is displayed.

Step 3 Click **Save**.

The **Save as** dialog box is displayed.

Step 4 Select a path for saving the performance data.

Step 5 Enter a file name in the **File name** text box.

The file name contains not more than 200 characters (excluding the file name extension).

Step 6 Click **Save** to save the performance data.

----End

3.1.7 Status Check

Status check mainly refers to the check of UltraPath for ESXi's running status. Status check can provide clues for fault troubleshooting.

3.1.7.1 Viewing Running Status

This section describes how to view the running status of UltraPath for ESXi and rectification suggestions.

Procedure

Step 1 In the **Monitoring and Inspection** area on the left of the vCenter management interface, click **Status Check**.

Step 2 In the upper right part of the function pane, select a severity from **Severity**.

Step 3 Select a disk array from **Disk array**.

Step 4 In the **Status Check Details** area, view the detailed status information and suggestions.

NOTE

In the upper right part of the function pane, click **Refresh** to refresh critical status information about UltraPath for ESXi during its running.

----End

3.1.7.2 Exporting Status Information

This section describes how to export the status information about UltraPath for ESXi to a local disk.

Prerequisites

For vCenter 6.0, this document takes the IE browser to access the vCenter server as an example.

Procedure

Step 1 In the **Monitoring and Inspection** area on the left of the vCenter management interface, click **Status Check**.

Step 2 In the upper right part of the function pane, click **Export All**.

The **File Download** dialog box is displayed.

Step 3 Click **Save**.

The **Save as** dialog box is displayed.

Step 4 Select a path for saving the information.

Step 5 Enter a file name in the **File name** text box.

The file name contains not more than 200 characters (excluding the file name extension).

Step 6 Click **Save**.

----End

3.1.8 Operation Logs

Operation logs include logs about the settings, modification, and deletion on UltraPath for ESXi. The operation logs help maintenance personnel locate and troubleshoot faults of UltraPath for ESXi.

3.1.8.1 Viewing Operation Logs

This section describes how to view operation logs about UltraPath for ESXi.

Procedure

Step 1 In the **Logs and Events** area on the left of the vCenter management interface, click **Operation Logs**.

Step 2 In the upper right part of the function pane, select a severity for operation logs from **Severity**.

Step 3 In the **Operation Logs** area, view the operation logs.

NOTE

In the upper right part of the function pane, click **Refresh** to refresh operation logs about UltraPath for ESXi.

----End

3.1.8.2 Exporting Operation Logs

This section describes how to export key events about UltraPath for ESXi to a local disk, helping maintenance personnel locate faults.

Prerequisites

For vCenter 6.0, this document takes the IE browser to access the vCenter server as an example.

Procedure

Step 1 In the **Logs and Events** area on the left of the vCenter management interface, click **Operation Logs**.

Step 2 In the upper right part of the function pane, click **Export All**.

The **File Download** dialog box is displayed.

Step 3 Click **Save**.

The **Save as** dialog box is displayed.

Step 4 Select a path for saving the exported operation logs.

Step 5 Enter a file name in the **File name** text box.

The file name contains not more than 200 characters (excluding the file name extension).

Step 6 Click **Save** to save the operation logs.

----End

3.1.9 Critical Events

3.1.9.1 Viewing Critical Events

This section describes how to view critical events during the running of UltraPath for ESXi.

Procedure

Step 1 In the **Logs and Events** area on the left of the vCenter management interface, click **Critical Events**.

Step 2 In the upper right part of the function pane, select a severity for critical events from **Severity**.

Step 3 Select a disk array from **Disk array**.

Step 4 In **Critical Events** and **Critical Event Details**, view information about critical events.

NOTE

In the upper right part of the function pane, click **Refresh** to refresh critical events about UltraPath for ESXi during its running.

----End

3.1.9.2 Exporting Critical Events

This section describes how to export key events about UltraPath for ESXi to a local disk, helping maintenance personnel locate faults.

Prerequisites

For vCenter 6.0, this document takes the IE browser to access the vCenter server as an example.

Procedure

Step 1 In the **Logs and Events** area on the left of the vCenter management interface, click **Critical Events**.

Step 2 In the upper right part of the function pane, click **Export All**.

The **File Download** dialog box is displayed.

Step 3 Click **Save**.

The **Save as** dialog box is displayed.

Step 4 Select a path for saving the exported critical events.

Step 5 Enter a file name in the **File name** text box.

The file name contains not more than 200 characters (excluding the file name extension).

Step 6 Click **Save**.

----End

3.1.10 Timeout Parameter Settings upon a Link Down Failure

This chapter describes how to set the timeout parameters upon a link down failure of an iSCSI initiator and some mainstream HBAs.

A link down failure triggers an I/O failover. This is a common fault mode. Under this condition, the time for the I/O failover consists of two parts: time for an initiator to sense the link down failure and timeout period of the link down failure of the initiator.

- Time for an initiator to sense a link down failure indicates a period from the physical link down failure to the initiator's identification of the link down failure. This period varies based on different initiator hardware, driver versions, networks, and physical fault locations. Generally, FC HBAs sense a link down failure faster than an iSCSI initiator does. The speed for sensing a link down failure accelerates when the fault location is close to a host.

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- The timeout period of a link down failure of an initiator indicates a period from the initiator's identification of the link down failure to I/O queue suspension. (After I/Os are suspended, the initiator returns I/Os that have the link down error code to UltraPath. UltraPath immediately switches I/O services to a standby path.) This timeout period depends on the timeout parameters of the initiator. You can control the time for an I/O failover by modifying the timeout parameters.

Typically, you can use the default timeout parameter configuration of an initiator upon a link down failure. However, some application services has special requirements on I/O latency. For example, Oracle RAC requires short I/O latency. Under this condition, you can set a short timeout period upon a link down failure. The timeout parameter value varies based on different service environments. If services have special requirements on an I/O failover, you are advised to set the timeout parameters based on the actual environment.

- For details about how to set the timeout parameter for a QLogic HBA, see **4.5 How to Set the Timeout Parameter for a QLogic HBA**.
- For details about how to set the timeout parameter for an Emulex HBA, see **4.6 How to Set the Timeout Parameter for an Emulex HBA**.
- For details about how to set the timeout parameters for the iSCSI initiator, see **4.7 How to Set Timeout Parameters of the iSCSI Initiator**.

3.2 Upgrading UltraPath

You can upgrade UltraPath to the latest version to obtain latest UltraPath functions.

For details about how to upgrade, see Upgrade Guide of UltraPath. Obtaining method is as follows:

Log in to Huawei technical support website (**http://support.huawei.com/enterprise/**). In the search field, enter **UltraPath**, and select a path from the paths that are automatically displayed to go to the document page of the UltraPath. Search, browse, and download the *Upgrade Guide* of the corresponding version.

3.3 Uninstalling UltraPath

Due to service adjustment, UltraPath must be uninstalled. Perform the operations as instructed in this section. This chapter explains how to uninstall UltraPath for ESXi and UltraPath for vCenter.

3.3.1 Uninstalling UltraPath for ESXi

This section describes the procedure for uninstalling UltraPath for ESXi.

3.3.1.1 Uninstalling UltraPath for ESXi on the ESXCLI

This section describes how to uninstall UltraPath for ESXi on the ESXCLI.

Prerequisites

Services running on the ESXi host have stopped.

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Procedure

Step 1 Log in to the ESXi host.

Step 2 Run **esxcli software vib remove -n** *ultrapath.cli* to uninstall **ultrapath.cli**.

```
~ # esxcli software vib remove -n ultrapath.cli
Removal Result
 Message: The update completed successfully, but the system needs to be rebooted
for the changes to be effective.
 Reboot Required: true
 VIBs Installed:
 VIBs Removed: HUAWEI_bootbank_ultrapath.cli_XX.XX.XXX-00
 VIBs Skipped:
```

Step 3 Run **esxcli software vib remove -n** *ultrapath.cim* to uninstall **ultrapath.cim**.

```
~ # esxcli software vib remove -n ultrapath.cim
Removal Result
 Message: The update completed successfully, but the system needs to be rebooted
for the changes to be effective.
 Reboot Required: true
 VIBs Installed:
 VIBs Removed: HUAWEI_bootbank_ultrapath.cim_XX.XX.XXX-00
 VIBs Skipped:
```

Step 4 Run **esxcli software vib remove -n** *ultrapath.mpp* to uninstall **ultrapath.mpp**.

```
~ # esxcli software vib remove -n ultrapath.mpp
Removal Result
 Message: The update completed successfully, but the system needs to be rebooted
for the changes to be effective.
 Reboot Required: true
 VIBs Installed:
 VIBs Removed: HUAWEI_bootbank_ultrapath.mpp_XX.XX.XXX-00
 VIBs Skipped:
```

Step 5 Restart the ESXi host.

----End

3.3.1.2 Uninstalling UltraPath for ESXi on the vSphere CLI

This section describes how to uninstall UltraPath for ESXi on the vSphere CLI.

Prerequisites

Services running on the ESXi host have stopped.

Procedure

Step 1 Log in to the application server (running Windows or Linux) where VMware vSphere CLI has been installed. The application server running Windows is used as an example.

Step 2 Run the following command to uninstall **ultrapath.cli**.

```
C:\Program Files (x86)\VMware\VMware vSphere CLI\bin>esxcli --server
10.158.196.104
--username root --password xxxxxx software vib remove -n ultrapath.cli
Removal Result
 Message: The update completed successfully, but the system needs to be rebooted
for the changes to be effective.
 Reboot Required: true
 VIBs Installed:
 VIBs Removed: HUAWEI_bootbank_ultrapath.cli_XX.XX.XXX-00
 VIBs Skipped:
```

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NOTE

If you cannot log in to the ESXi host using VMware vSphere CLI 6.0, see **VMware Official Knowledge Base** to troubleshoot fault.

Step 3 Run the following command to uninstall **ultrapath.cim**.

```
C:\Program Files (x86)\VMware\VMware vSphere CLI\bin>esxcli --server
10.158.196.104
--username root --password xxxxxx software vib remove -n ultrapath.cim
Removal Result
 Message: The update completed successfully, but the system needs to be rebooted
for the changes to be effective.
 Reboot Required: true
 VIBs Installed:
 VIBs Removed: HUAWEI_bootbank_ultrapath.cim_XX.XX.XXX-00
 VIBs Skipped:
```

Step 4 Run the following command to uninstall **ultrapath.mpp**.

```
C:\Program Files (x86)\VMware\VMware vSphere CLI\bin>esxcli --server
10.158.196.104
--username root --password xxxxxx software vib remove -n ultrapath.mpp
Removal Result
 Message: The update completed successfully, but the system needs to be rebooted
for the changes to be effective.
 Reboot Required: true
 VIBs Installed:
 VIBs Removed: HUAWEI_bootbank_ultrapath.mpp_XX.XX.XXX-00
 VIBs Skipped:
```

Step 5 Restart the ESXi host.

----End

3.3.2 Uninstalling UltraPath for vCenter

Uninstallation methods for UltraPath for vCenter are different based on vCenter versions. This section describes how to uninstall UltraPath for vCenter for different versions of vCenter.

3.3.2.1 Uninstalling UltraPath for vCenter (for vCenter 5.X)

This section describes how to uninstall UltraPath for vCenter in vCenter 5.X.

Procedure

Step 1 Log in to the vCenter server.

NOTE

The uninstallation procedure may vary depending on the operating system. Here Windows Server 2008 is used as an example.

Step 2 Choose **Start** > **Control Panel**. The control panel is displayed.

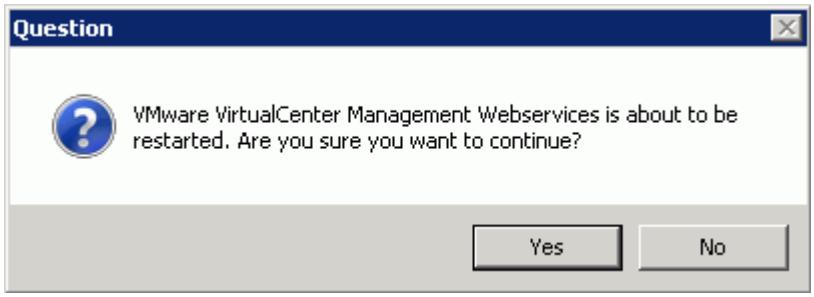
Step 3 Choose **Program**. The **Program** page is displayed.

Step 4 Choose **Programs and Features**. The uninstallation page is displayed.

Step 5 Right-click **UltraPath for vCenter** and choose **Uninstall** from the shortcut menu.

The **Question** dialog box is displayed, as shown in **Figure 3-3**.

Figure 3-3 Question dialog box



NOTE

During the uninstalling, the **UltraPath Configuration** page is displayed.

NOTICE

Only vCenter administrators can perform registration and removal operations, other users, such as assigned to the cluster or ESXi host administrator, do not be allowed for such operation.

1. In **vCenter IP address**, enter the IP address of the vCenter server.
2. In **vCenter username**, enter the user name for logging in to the vCenter server. If there is a domain name in the user name, enter the user name with the domain name.
3. In **vCenter password**, enter the user password for logging in to the vCenter server.
4. In **Verification code**, Enter the verification code that is displayed in the right figure.
5. Click **Remove**.

   When going to the software removal page of the host where the vCenter server resides, manually enter the software registration page and input the following address for removal:

   http://127.0.0.1:8080/ultrapathplugin/pluginmgmt/unregplugin.

   You can remotely log in to the client of the vCenter server and enter the following address in the address box of the browser for removal:

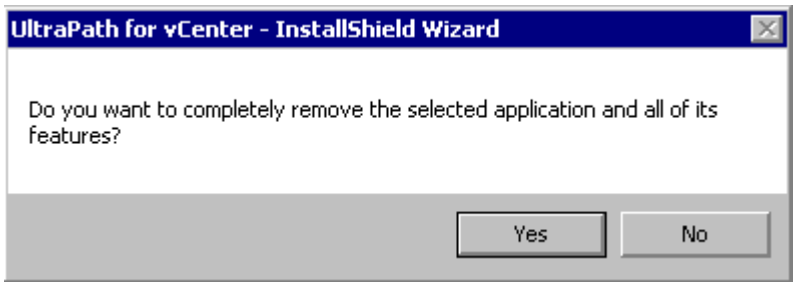
   http://**vCenter IP**:8080/ultrapathplugin/pluginmgmt/unregplugin, where **vCenter IP** is the IP address of the vCenter server.

   Not remove a plug-in by entering the **vCenter IP address** such as 127.0.0.1.

Step 6 Confirm the information and click **Yes**.

The uninstallation information dialog box is displayed, as shown in **Figure 3-4**.

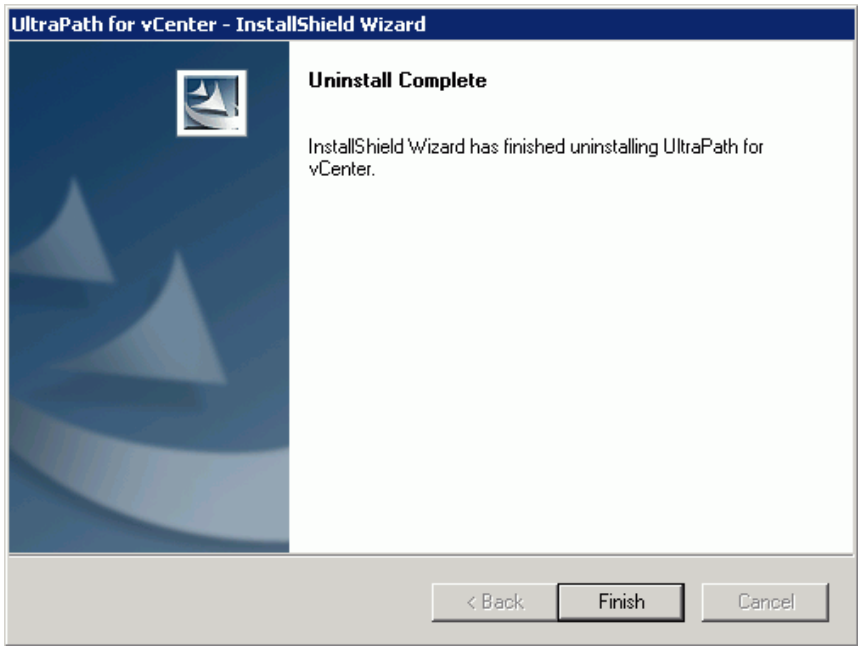
Figure 3-4 UltraPath for vCenter uninstallation information dialog box



Step 7 Click **Yes** to start the uninstallation.

Step 8 After the uninstallation is complete, click **Finish**, as shown in **Figure 3-5**.

Figure 3-5 UltraPath for vCenter uninstallation completion page



NOTE

If you uninstall UltraPath for vCenter when VMware vSphere Client is running, information about the UltraPath for vCenter plug-in will be left in VMware vSphere Client. The UltraPath for vCenter plug-in information has no impact at all on other service functions provided by VMware vSphere Client. If you want to clear the UltraPath for vCenter plug-in information, restart VMware vSphere Client.

----End

3.3.2.2 Uninstalling UltraPath for vCenter (for vCenter 6.X)

Uninstallation methods for vCenter 6.X running on different host operating systems are different. This section describes how to uninstall UltraPath for vCenter on Windows and Linux operating systems (VCSA 6.X).

3.3.2.2.1 Uninstalling UltraPath for vCenter (for vCenter 6.X deployed on Windows)

This section describes how to uninstall UltraPath for vCenter in vCenter 6.0 deployed on Windows.

Prerequisites

The maintenance terminal is communicating properly with the vCenter server.

Procedure

Step 1 Uninstall UltraPath for vCenter.

1. Log in to the vCenter server.

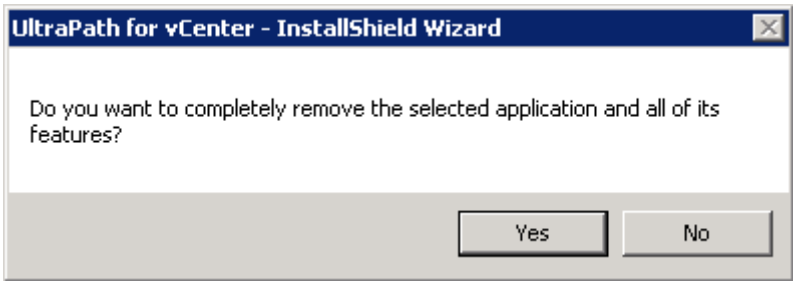
   NOTE

   The uninstallation procedure may vary depending on the operating system. Here Windows Server 2008 is used as an example.

2. Choose **Start** > **Control Panel**. The control panel is displayed.
3. Choose **Program**. The **Program** page is displayed.
4. Choose **Programs and Features**. The uninstallation page is displayed.
5. Right-click **UltraPath for vCenter** and choose **Uninstall** to start the uninstallation.

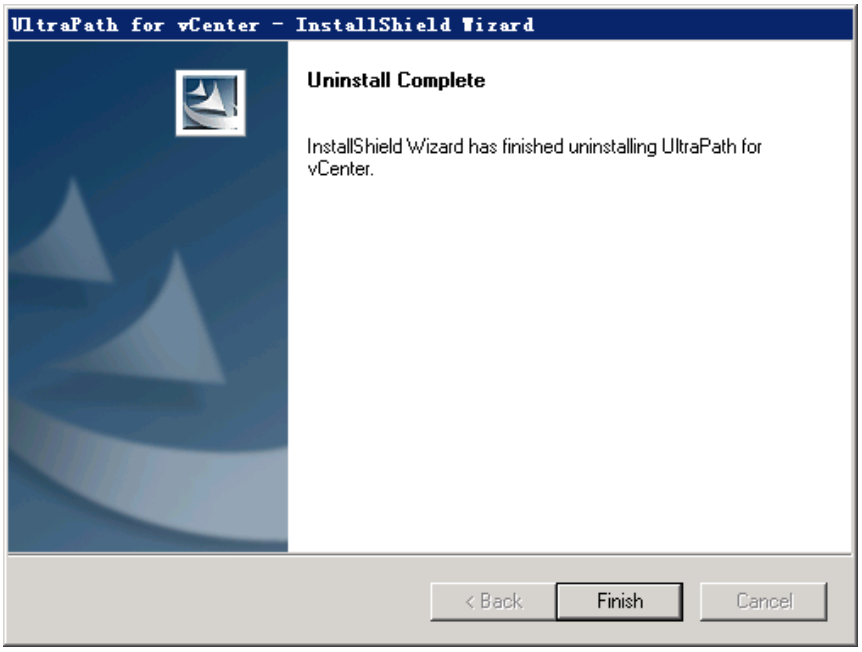
   The confirmation dialog box is displayed, as shown in **Figure 3-6**.

   Figure 3-6 Dialog box for confirming uninstallation



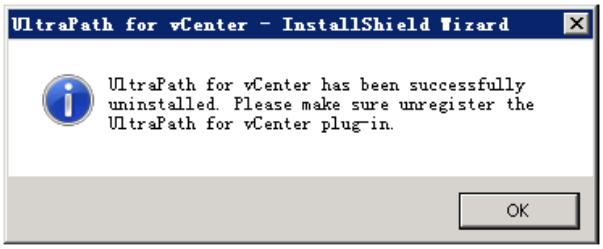
6. After confirmation, click **Yes** to start uninstallation.
7. After the uninstallation, click **Finish**, as shown in **Figure 3-7**.

   Figure 3-7 UltraPath for vCenter uninstallation completion page



After UltraPath for vCenter is uninstalled, the dialog box for deregistering UltraPath for vCenter is displayed, as shown in **Figure 3-8**. Click **Ok**.

Figure 3-8 UltraPath for vCenter uninstallation completion page



Step 2 Deregister UltraPath for vCenter.

1. Run a web browser on the maintenance terminal.
2. Type **https://XXX.XXX.XXX.XXX/mob** in the address box and press **Enter**.

   NOTE

   - **XXX.XXX.XXX.XXX** is the vCenter server's IP address.
   - The browser may display a message indicating that the website has a security certificate error. Ignore this error and continue the login if the entered IP address is correct.
   - You need to enter a user name and the password for the first login.

   The **ManagedObjectReference:ServiceInstance** page of the vCenter MOB (Managed Object Browser) is displayed.
3. Under **Properties**, click **content**.

   The **ServiceContent** page is displayed.
4. Under **Properties**, click **ExtensionManager**.

   The **ManagedObjectReference:ExtensionManager** page is displayed.
5. Under **Methods**, click **UnregisterExtension**.

   The **void UnregisterExtension** page under **ManagedObjectReference:ExtensionManager** is displayed.
6. For **VALUE** of **Parameters**, enter the name of the UltraPath for vCenter plug-in **com.storage.issp.ultrapathplugin**.
7. Click **Invoke Method** and the unregistration of the UltraPath for vCenter plug-in begins.

   If **Method Invocation Result: void** is displayed, the unregistration is successful.

----End

3.3.2.2.2 Uninstalling UltraPath for vCenter (Applicable to vCenter 6.X on VCSA 6.X)

This section describes how to uninstall UltraPath for vCenter in vCenter 6.X deployed on VCSA 6.X.

Prerequisites

The maintenance terminal is communicating properly with the vCenter server.

Procedure

Step 1 Uninstall UltraPath for vCenter.

1. Log in to the Linux host (the vCenter server) where VCSA 6.X resides as user root.

2. Run **rpm -qa** |*grep Ultra* to view the name of UltraPath for vCenter. This section shows how to uninstall **UltraPath-for-vCenter-1.6.50-2**.
```
localhost:~ # rpm -qa |grep Ultra
UltraPath-for-vCenter-1.6.50-2
```
3. Run **rpm -e** *UltraPath-for-vCenter-1.6.50-2* to uninstall UltraPath for vCenter.
```
localhost:~ # rpm -e UltraPath-for-vCenter-1.6.50-2
UltraPath for vCenter has been successfully uninstalled. Please make sure
unregister the UltraPath for vCenter plug-in.
```

Step 2 Deregister UltraPath for vCenter.

1. Run a web browser on the maintenance terminal.
2. Type **https://XXX.XXX.XXX.XXX/mob** in the address box and press **Enter**.

   NOTE

   - **XXX.XXX.XXX.XXX** is the vCenter server's IP address.
   - The browser may display a message indicating that the website has a security certificate error. Ignore this error and continue the login if the entered IP address is correct.
   - You need to enter a user name and the password for the first login.

   The **ManagedObjectReference:ServiceInstance** page of the vCenter MOB (Managed Object Browser) is displayed.
3. Under **Properties**, click **content**.

   The **ServiceContent** page is displayed.
4. Under **Properties**, click **ExtensionManager**.

   The **ManagedObjectReference:ExtensionManager** page is displayed.
5. Under **Methods**, click **UnregisterExtension**.

   The **void UnregisterExtension** page under **ManagedObjectReference:ExtensionManager** is displayed.
6. For **VALUE** of **Parameters**, enter the name of the UltraPath for vCenter plug-in **com.storage.issp.ultrapathplugin**.
7. Click **Invoke Method** and the unregistration of the UltraPath for vCenter plug-in begins.

   If **Method Invocation Result: void** is displayed, the unregistration is successful.

----End

4 FAQs

About This Chapter

This chapter provides answers to frequently asked questions about UltraPath for ESXi configuration or management. You can refer to this chapter when troubleshooting similar problems.

4.1 How to Set System Logs?

4.2 How to Correctly Change a LUN Mapping View on a Storage Array?

4.3 How Can I Configure the core dump Partition of ESXi Hosts in SAN Boot Scenarios?

4.4 Why Does PSOD Occur When HyerMetro LUNs Are Converted to Common LUNs and Remapped to the Host?

4.5 How to Set the Timeout Parameter for a QLogic HBA
This section describes how to configure the timeout parameter of a QLogic HBA by modifying the value of parameter **Port down retry**.

4.6 How to Set the Timeout Parameter for an Emulex HBA
This section describes how to configure the timeout parameter of an Emulex HBA by modifying the value of parameter **lpfc_devloss_tmo**.

4.7 How to Set Timeout Parameters of the iSCSI Initiator
This section describes how to set timeout parameters of the iSCSI initiator by modifying the values of **NoopOutInterval**, **NoopOutTimeout**, and **RecoveryTimeout**.

4.8 How Do I Determine Whether UltraPath Has Taken Effect By Using System Logs After a Host Restart?

4.9 After UltraPath is Installed, Why No Value is Selected for the Path Selection Policy?

4.1 How to Set System Logs?

Question

How to set system logs?

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Answer

After the UlraPath is installed, change the system log size to provide sufficient storage space for system logs, facilitating subsequent analysis and maintenance of the UltraPath. There are two ways to configure the syslog service on the ESXi host: vSphere Client and esxcli system syslog vCLI. For details about how to set system logs, refer to the following section

4.1.1 Setting syslog on the vSphere Client

This section describes how to set **syslog.log** and **vmkernel.log** on the vSphere Client.

Procedure

Step 1 Log in to the VMvare vSphere Client.

Step 2 In the left navigation tree, select the host you want to configure.

Step 3 Click the **Configuration** tab.

Step 4 In the **Software** area, click **Advanced Settings**.

The **Advanced Settings** page is displayed.

Step 5 Set system logs.

- Set **syslog.log**.
  a. On the **Advanced Settings** page, choose **Syslog** > **loggers** > **syslog**.
  b. In the right pane, set **Syslog.loggers.syslog.rotate** and **Syslog.loggers.syslog.size**.

  NOTE

  - Syslog.loggers.syslog.rotate: Sets the maximum number of archives. The default value is 8.
  - Syslog.loggers.syslog.size: Sets the default log size before the system rotates logs. The default value is 10,240.

  c. Click **OK** to complete the **syslog.log** settings.
- Set **vmkernel.log**.
  a. On the **Advanced Settings** page, choose **Syslog** > **loggers** > **vmkernel**.
  b. In the right pane, set **Syslog.loggers.vmkernel.rotate** and **Syslog. loggers.vmkernel.size**.

  NOTE

  - Syslog.loggers.vmkernel.rotate: Sets the maximum number of archives. The default value is 8.
  - Syslog. loggers.vmkernel.size: Sets the default log size before the system rotates logs. The default value is 10,240.

  c. Click **OK** to complete the **vmkernel.log** settings.

----End

4.1.2 Setting syslog on the vCLI

This section describes how to set **syslog.log** and **vmkernel.log** on the vCLI.

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Procedure

Step 1 Start the ESXi Shell client.

Step 2 Run **esxcli system syslog config logger list** to list the current log configuration information.

```
# esxcli system syslog config logger list
```

The syslog configuration information is as follows:

```
Description: Default syslog catch-all
Destination: syslog.log
ID: syslog
Rotation Size: 1024
Rotations: 8
```

The Vmkernel configuration information is as follows:

```
Description: vmkernel logs
Destination: vmkernel.log
ID: vmkernel
Rotation Size: 1024
    Rotations: 8
```

Step 3 Run **esxcli system syslog config logger set --id**=*syslog* **--rotate**=*8* **--size**=*30720* to set the **syslog.log** configuration information.

Step 4 Run **esxcli system syslog config logger set --id**=*vmkernel* **--rotate**=*8* **--size**=*30720* to set the **vmkernel.log** configuration information.

Step 5 After completing the settings, run **esxcli system syslog reload** for the settings to take effect.

Step 6 Run **esxcli system syslog config logger list** to list the current log configuration information.

```
# esxcli system syslog config logger list
```

The syslog configuration information is as follows:

```
Description: Default syslog catch-all
Destination: syslog.log
ID: syslog
Rotation Size: 30720
Rotations: 8
```

The Vmkernel configuration information is as follows:

```
Description: vmkernel logs
 Destination: vmkernel.log
 ID: vmkernel
 Rotation Size: 30720
 Rotations: 8
```

----End

4.1.3 Configuring the Remote Log on the esxcli

This section describes how to configure the remote log on the esxcli

Procedure

Step 1 Start the ESXi Shell client.

Step 2 Run **esxcli system syslog config get** to list the current log configuration information.

Step 3 Set the new host configuration information and options that need to be changed, as shown in the command output:

```
#esxcli system syslog config set --logdir=/path/to/vmfs/directory/ --
loghost=RemoteHostname --logdir-unique=true|false --default-rotate=NNN --default-
size=NNN
```

Configure the remote system log, as shown in the following command output:

```
#esxcli system syslog config set --loghost='tcp://10.11.12.13:1514'
```

Or

```
esxcli system syslog config set --loghost='udp://10.11.12.13:514'
```

NOTE

If ESXi5.0 needs to use UDP, you must download the ESXi patch. For details, see **VMware ESXi 5.0, Patch ESXi-5.0.0-20120704001-standard (2019113)**.

----End

4.1.4 Setting the Remote Log on the vSphere Client

This section describes how to configure a remote log on the vSphere Client.

Procedure

Step 1 Log in to the VMvare vSphere Client.

Step 2 In the right navigation tree, select the host you want to configure.

Step 3 Click the **Configuration** tab.

Step 4 In the **Software** area, click **Advanced Settings**.

The **Advanced Settings** page is displayed.

Step 5 On the **Advanced Settings** page, choose **Syslog** > **global**.

Step 6 In the right pane, set the remote log. **Table 4-1** describes related parameters.

Table 4-1 General parameters

Parameter	Description	Value
Syslog.global.defaultRotate	Sets the maximum number of archives to keep. You can set this number globally and for individual subloggers.	[Default value] 8
Syslog.global.defaultSize	Sets the default size of the log, in KB, before the system rotates logs. You can set this number globally and for individual subloggers.	[Default value] 30,960

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Parameter	Description	Value
Syslog.global.LogDir	Directory where logs are saved. The directory can be located on mounted NFS or VMFS volumes. Only the **/scratch** directory on the local file system is persistent across reboots. The directory should be specified as [*datastorename*] *path_to_file* where the path is relative to the root of the volume backing the datastore. For example, the path **[storage1] var/log/messages** maps to the path **/vmfs/volumes/storage1/var/log/messages**. If no path is specified, all log files are sent to **/var/log**.	[Default value] None
Syslog.global.LogHost	Remote host to which syslog messages are forwarded and port on which the remote host receives syslog messages. You can include the protocol and port, for example, ssl://hostName1:514. UDP (default), TCP, and SSL are supported. The remote host must have syslog installed and correctly configured to receive the forwarded syslog messages. See the documentation for the syslog service installed on the remote host for information on configuration.	[Default value] None

Step 7 Click **OK**.

NOTICE

If the remote log configuration requires enabling ports 514 and 1514 of the firewall outbound connection, run the following command on the esxcli:

```
#esxcli network firewall ruleset set --ruleset-id=syslog --enabled=true

#esxcli network firewall refresh
```

----End

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4.2 How to Correctly Change a LUN Mapping View on a Storage Array?

Question

How to correctly change a LUN mapping view on a storage array?

Answer

If you remove a LUN mapping on an array and add the LUN to the host again in a different mapping sequence, the corresponding **Host LUN ID** will change and a series of exceptions will be caused.

To rectify this fault, you must comply with the following steps to change the LUN mapping view.

Solution

- Scenario 1

  The LUN has been added to VMs in the mode of raw disk mapping or virtual disk mapping.

  a. Before removing the LUN mappings on the array, ask the administrator to stop the services running on the disk, namely, the LUN. Remove the corresponding raw disk mapping or virtual disk mapping from VMs.

  b. Delete the LUN mapping view on the GUI management page (ISM or DeviceManager) of the array and add a new LUN mapping to the host.

  c. Scan for the disk again.

     If the host operating system is ESXi 5.0, run the **esxcfg-rescan -A** command twice to scan for the disk. If the host operating system is ESXi 5.1/5.5/6.0/6.5/6.7, you only need to run the **esxcfg-rescan -A** command once to scan for the disk.

  d. Add the LUN to VMs again in the mode of raw disk mapping or virtual disk mapping.

  e. Contact the administrator to start services.

- Scenario 2

  The LUN is not provided for VMs.

  a. Delete the LUN mapping view on the GUI management page (ISM or DeviceManager) of the array and add a new LUN mapping to the host.

  b. If the host operating system is ESXi 5.0, run the **esxcfg-rescan -A** command twice to scan for the disk. If the host operating system is ESXi 5.1/5.5/6.0/6.5/6.7, you only need to run the **esxcfg-rescan -A** command once to scan for the disk. The disk information is thereby updated.

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4.3 How Can I Configure the core dump Partition of ESXi Hosts in SAN Boot Scenarios?

Question

How can I configure the **core dump** partition of ESXi hosts in SAN boot scenarios?

Answer

When **core dump** is triggered, the system saves the onsite information to a valid partition of a system disk on a host before the system breaks down. Only the latest onsite information is saved in the partition and all previous information is cleared. The valid partition is called **core dump**. ESXi hosts provide commands used to configure the **core dump** partition. In SAN boot scenarios, after an operating system is installed, a valid **core dump** partition has been automatically configured by default.

The method used to confirm and configure the **core dump** partition of ESXi hosts is as follows:

1. Run the **esxcfg-dumppart -l** command to check whether the **core dump** partition is activated.

```
~ # esxcfg-dumppart -l
VM Kernel Name                                  Console
Name                                                  Is Active Is Configured
naa.674a063100f89a1e026196260000001f:7          /vmfs/devices/disks/naa.
674a063100f89a1e026196260000001f:7 no             no
naa.674a063100f89a1e026196260000001f:9          /vmfs/devices/disks/naa.
674a063100f89a1e026196260000001f:9 yes            yes
```

2. The following conditions exist:
   a. If no dump partition is configured, the values of all **core dump** partitions' **Is Configured** parameters are **no**. Run the **esxcfg-dumppart -S** command to configure and activate them.
   b. If the value of one **core dump** partition's **Is Active** parameter is **yes**, the **core dump** partition has been activated. You do not need to configure the **core dump** partition. If the values of all **core dump** partitions' **Is Active** parameters are **no**, no **core dump** partition is activated. Run the **esxcfg-dumppart -a** command to activate a **core dump** partition.

4.4 Why Does PSOD Occur When HyerMetro LUNs Are Converted to Common LUNs and Remapped to the Host?

Question

Why does purple screen of death (PSOD) occur when HyerMetro LUNs are converted to common LUNs and remapped to the host?

Answer

PSOD occurs when the ESXi system detects file systems with the same UUID, as shown in **Figure 4-1**.

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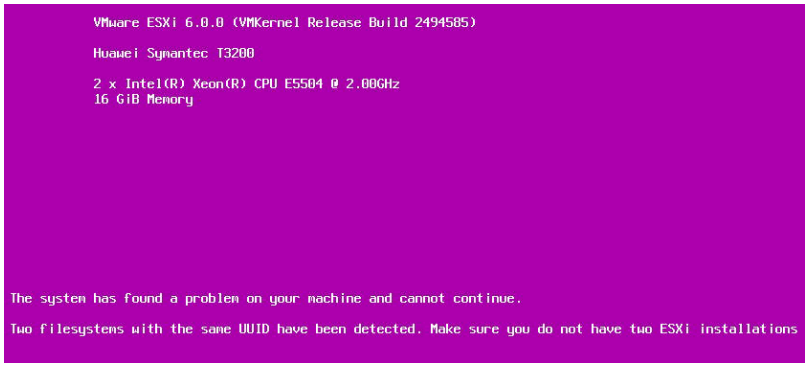
Figure 4-1 PSOD on the ESXi System



After HyerMetro LUNs are converted to common LUNs and re-mapped to the ESXi host, the system detects two file systems of the same UUID because the two LUNs are the same. As a result, PSOD occurs. To solve the problem, remove redundant LUN mappings not used by the host or format either LUN and then restart the host.

Do not add two same LUNs to an ESXi host. For details, see **VMware knowledge base**.

4.5 How to Set the Timeout Parameter for a QLogic HBA

This section describes how to configure the timeout parameter of a QLogic HBA by modifying the value of parameter **Port down retry**.

Procedure

Step 1 Check the QLogic HBA valid drive and execute the **esxcfg-scsidevs -a** command. In the following figure, the valid drive is **qlnativefc**.

```
[root@localhost:~] esxcfg-scsidevs -a
vmhba0 ata_piix link-n/a sata.vmhba0 (0000:00:1f.2) Intel Corporation ICH10 4
port SATA IDE Controller
vmhba1 ata_piix link-n/a sata.vmhba1 (0000:00:1f.5) Intel Corporation ICH10 2
port SATA IDE Controller
vmhba2 lpfc link-up fc.20000000c9bfe3e6:10000000c9bfe3e6 (0000:05:00.0) Emulex
Corporation Emulex LPe12000 8Gb PCIe Fibre Channel Adapter
vmhba3 lpfc link-up fc.20000000c9bfe3e7:10000000c9bfe3e7 (0000:05:00.1) Emulex
Corporation Emulex LPe12000 8Gb PCIe Fibre Channel Adapter
vmhba4 mptsas link-n/a sas.500062b000000280 (0000:07:00.0) LSI Logic / Symbios
Logic LSI1068E
vmhba5 qlnativefc link-up fc.20000024ff2e780e:21000024ff2e780e (0000:06:00.0)
QLogic Corp ISP2432-based 4Gb Fibre Channel to PCI Express HBA
vmhba6 qlnativefc link-up fc.20000024ff2e780f:21000024ff2e780f (0000:06:00.1)
QLogic Corp ISP2432-based 4Gb Fibre Channel to PCI Express HBA
vmhba32 ata_piix link-n/a sata.vmhba32 (0000:00:1f.2) Intel Corporation ICH10 4
port SATA IDE Controller
vmhba33 ata_piix link-n/a sata.vmhba33 (0000:00:1f.5) Intel Corporation ICH10 2
port SATA IDE Controller
[root@localhost:~]
```

Step 2 Check the value of the **Port down retry** parameter.

1. If the ESXi operating system version is 5.0 or 5.1, execute **cat /proc/scsi/qla2xxx/9**.**9** indicates **adapter_number**. Modify the number according to the actual environment.

```
root@~ #cat /proc/scsi/qla2xxx/9
QLogic PCI to Fibre Channel Host Adapter for QLE2562:
        FC Firmware version 5.06.05 (90d5), Driver version 902.k1.1-9vmw
```

```
Host Device Name vmhba2

BIOS version 2.16
FCODE version 2.00
EFI version 2.00
Flash FW version 4.04.00
ISP: ISP2532, Serial# RFD1207Y58822
Request Queue = 0xcd810000, Response Queue = 0xcd851000
Request Queue count = 2048, Response Queue count = 512
Number of response queues for multi-queue operation: 0
Total number of interrupts = 44612
    Device queue depth = 0x40
Number of free request entries = 161
Total number of outstanding commands: 0
Number of mailbox timeouts = 0
Number of ISP aborts = 0
Number of loop resyncs = 142
Host adapter:Loop State = <READY> , flags = 0x1aa68
Link speed = <8 Gbps>

Dpc flags = 0x0
Link down Timeout =  045
Port down retry = 001
Login retry count = 008
Execution throttle = 2048
ZIO mode = 0x6, ZIO timer = 1
Commands retried with dropped frame(s) = 0
Product ID = 4953 5020 2532 0002


NPIV Supported : Yes
Max Virtual Ports = 254

SCSI Device Information:
scsi-qla0-adapter-node=20000024ff372178:290600:0;
scsi-qla0-adapter-port=21000024ff372178:290600:0;

FC Target-Port List:
scsi-qla0-target-0=221020f17ce12dff:140100:83:Online;
scsi-qla0-target-1=222120f17ce12dff:140200:84:Online;
scsi-qla0-target-2=222220f17ce12dff:180100:85:Online;
scsi-qla0-target-3=200020f17ce12dff:180400:86:Online;
scsi-qla0-target-4=201148435a775148:210300:88:Online;
scsi-qla0-target-5=200148435a775147:210600:89:Online;
scsi-qla0-target-6=201348435a775147:210800:8a:Online;
scsi-qla0-target-7=200148435a775148:210301:8b:Online;
scsi-qla0-target-8=22000022a104056f:330500:8d:Online;
scsi-qla0-target-9=22180022a104056f:330600:8e:Online;
scsi-qla0-target-10=20084846fb8ca15f:331000:8f:Online;
scsi-qla0-target-11=20184846fb8ca15f:331200:90:Online;
scsi-qla0-target-12=22083400a30d9c5f:330200:9f:Online;
scsi-qla0-target-13=24113400a30d9c5f:330300:a0:Online;
```

2. If the ESXi operating system version is 5.5, 6.0, 6.5 or 6.7, execute **/usr/lib/vmware/vmkmgmt_keyval/vmkmgmt_keyval -a**.

```
[root@localhost:~] /usr/lib/vmware/vmkmgmt_keyval/vmkmgmt_keyval -a
Listing all system keys:
Key Value Instance:  vmhba3/Emulex
Listing keys:
Name: adapter
Type: string
value:
lpfc Adapter Page

Emulex LightPulse FC SCSI 10.2.309.8
EMC LPe12002-E 8Gb 2-port PCIe Fibre Channel Adapter on PCI bus 0000:05
device 00 fn 1 port 1 Link Speed: 8000 Gb

BoardNum: 1
FW Version: 2.00A5
```

```
HW Version: 31004549
ROM Version:    5.03a13
SerialNum:  VM14949181
Vendor Id:  f10010df

SLI Rev: 3
 MQ: Unavailable
 NPIV Supported: VPIs max 255  VPIs used 0
 RPIs max 4096  RPIs used 13 IOCBs inuse 0  IOCB max 9 txq cnt 0  txq max 0
txcmplq 0
 XRIs max 4096  FCP 1344
 FCP BDEs max 66  DMA buf size 1024

....
Dpc flags = 0x0
Link down Timeout =  045
Port down retry =  010
Login retry count =  010
Execution throttle = 2048
ZIO mode = 0x6, ZIO timer = 1
Commands retried with dropped frame(s) = 0
Product ID = 4953 5020 2432 0003

NPIV Supported : Yes
Max Virtual Ports = 127


....

Host Device Name vmhba6

BIOS version 3.00
FCODE version 3.15
EFI version 2.21
Flash FW version 5.04.01
ISP: ISP2432, Serial# RFD1111M56011
MSI-X enabled
Request Queue = 0x4302cb00a000, Response Queue = 0x4302cb02b000
Request Queue count = 2048, Response Queue count = 512
Number of response queues for CPU affinity operation: 0
Total number of interrupts = 1632347
Device queue depth = 0x40
Number of free request entries = 751
Total number of outstanding commands: 0
Number of mailbox timeouts = 0
Number of ISP aborts = 0
Number of loop resyncs = 59
Host adapter:Loop State = [READY], flags = 0xaa60
Link speed = [4 Gbps]

Dpc flags = 0x0
Link down Timeout =  045
Port down retry =  010
Login retry count =  010
Execution throttle = 2048
ZIO mode = 0x6, ZIO timer = 1
Commands retried with dropped frame(s) = 0
Product ID = 4953 5020 2432 0003

NPIV Supported : Yes
Max Virtual Ports = 127

....

Module Parameters

...
ql2xloadfwbin = 1
ql2xdbwr = 1
```

```
ql2xbypass_log_throttle = 0
ql2xt10protmask = 85
ql2xt10enable = 1
ql2xt10guard = 3
ql2xenablehba_err_chk = 2
qlfxdisablewatchdogtimer = 0
qlfxdisablereset = 0
qlfxmaxqdepth = 32
qlfxmaxqueues = 1
qlfxmaxlun = 65535
qlfxtargetreset = 1
qlfxcmdtimeout = 20
qlfxmaxsgs = 0
qlfxmaxxfersize = 0
[root@localhost:~]
```

Step 3 Modify the value of **Port down retry** according to the actual environment. For example, if you want to set the value to 1, execute **esxcli system module parameters set -p qlport_down_retry=***1* **-m** *qlnativefc*.

```
[root@localhost:~] esxcli system module parameters set -p qlport_down_retry=1 -m
qlnativefc
[root@localhost:~]
```

qlnativefc is the valid drive name queried in **4.5 How to Set the Timeout Parameter for a QLogic HBA**.

NOTICE

- If there is only one HBA, the command will change the parameters of both ports on the HBA.
- If there are multiple HBAs and the HBAs have the same valid drive name, the command will change the parameters of the ports on all the HBAs.

Step 4 Restart the ESXi host.

Step 5 Check whether the setting takes effect after the restart using the method in **Step 2**.

----End

4.6 How to Set the Timeout Parameter for an Emulex HBA

This section describes how to configure the timeout parameter of an Emulex HBA by modifying the value of parameter **lpfc_devloss_tmo**.

Procedure

Step 1 Check the Emulex HBA valid drive and execute the **esxcfg-scsidevs -a** command. In the following figure, the valid drive is **lpfc820**.

```
~ # esxcfg-scsidevs -a
vmhba0  ata_piix          link-n/a  sata.vmhba0
(0:0:31.2) Intel Corporation 2 port SATA IDE Controller (ICH9)
vmhba1  mptsas            link-n/a  sas.5782bcb0234e8000
(0:3:0.0) LSI Logic / Symbios Logic Dell SAS 6/iR Integrated
vmhba2  lpfc820           link-up fc.20000090fa76d5c6:10000090fa76d5c6
(0:4:0.0) Emulex Corporation LPe12000 8Gb Fibre Channel Host Adapter
vmhba3  lpfc820           link-n/a  fc.20000090fa76d5c7:10000090fa76d5c7
(0:4:0.1) Emulex Corporation LPe12000 8Gb Fibre Channel Host Adapter
```

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```
vmhba32 ata_piix          link-n/a  sata.vmhba32
(0:0:31.2) Intel Corporation 2 port SATA IDE Controller (ICH9)
vmhba33 iscsi_vmk         online    iscsi.vmhba33                          iSCSI
Software Adapter
```

Step 2 Check the current value of **lpfc_devloss_tmo**.

1. If the ESXi operating system version is 5.0 or 5.1, execute **esxcli system module parameters list -m** *lpfc820* **|grep -E "lpfc_devloss_tmo| -- |Description"**to check the value of **lpfc_devloss_tmo**. If the value is null, it indicates default value 10.

```
~ # esxcli system module parameters list -m lpfc820 |grep -E
"lpfc_devloss_tmo| -- |Description"
Name                          Type  Value
Description
lpfc_devloss_tmo              int 10     Seconds driver hold I/O waiting for a
loss device to return
```

   lpfc820 is the valid drive name queried in **Step 1**.

2. If the ESXi operating system version is 5.5, 6.0, 6.5 or 6.7, execute **/usr/lib/vmware/vmkmgmt_keyval/vmkmgmt_keyval -a**.

```
[root@localhost:~] /usr/lib/vmware/vmkmgmt_keyval/vmkmgmt_keyval -a
Listing all system keys:
Key Value Instance:  vmhba3/Emulex
Listing keys:
Name: adapter
Type: string
value:
lpfc Adapter Page

Emulex LightPulse FC SCSI 10.2.309.8
EMC LPe12002-E 8Gb 2-port PCIe Fibre Channel Adapter on PCI bus 0000:05
device 00 fn 1 port 1 Link Speed: 8000 Gb

BoardNum: 1
FW Version: 2.00A5
HW Version: 31004549
ROM Version:    5.03a13
SerialNum:  VM14949181
Vendor Id:  f10010df
...
Name: param
Type: string
value:  Configuration Parameters for lpfc1

Name                  Low      High    Dflt Current      Description
log-verbose             0    7fffffff       0       0      Verbose logging
bit-mask
lun-queue-depth         1         200      1e      1e      Max number of FCP
commands we can queue to a specific LUN
devloss-tmo             1          ff       a       1      Seconds driver
hold I/O waiting for a loss device to return
use-adisc               0           1       0       0      Use ADISC on
rediscovery to authenticate FCP devices
first-burst-size        0       10000       0       0      First burst size
for Targets that support first burst
max-scsicmpl-time       0        ea60       0       0      Use command
completion time to control queue depth
fcp2-no-tgt-reset       0           1       0       0      Determine bus
reset behavior for FCP2 devices 0-issue tgt reset, 1-no tgt reset
topology                0           6       0       0      Select Fibre
Channel topology: valid values are 0,1,2,4,6. See driver manual
link-speed              0          10       0       0      Select link speed:
[ 2 4 8 ] or 0 for auto negotiate
task-mgmt-tmo           5          b4      3c      3c      Maximum time to
wait for task management commands to complete
XLanePriority           0          7f       0       0      CS_CTL for
ExpressLane.
compression-log         5       15180     12c     12c      Frequency
compression logs are written (seconds)
```

```
throttle-log-cnt        1         3e8       a       a      Do not exceed this
number of messages logged within throttle_log_time
throttle-log-time       1          3c       1       1      Do not exceed
throttle_log_cnt within this limit (seconds)
...
Name: param
Type: string
value:  Configuration Parameters for lpfc0

Name                  Low        High    Dflt Current  Description
log-verbose             0    7fffffff       0       0      Verbose logging
bit-mask
lun-queue-depth         1         200      1e      1e      Max number of FCP
commands we can queue to a specific LUN
devloss-tmo             1          ff       a       1      Seconds driver
hold I/O waiting for a loss device to return
use-adisc               0           1       0       0      Use ADISC on
rediscovery to authenticate FCP devices
first-burst-size        0       10000       0       0      First burst size
for Targets that support first burst
max-scsicmpl-time       0        ea60       0       0      Use command
completion time to control queue depth
fcp2-no-tgt-reset       0           1       0       0      Determine bus
reset behavior for FCP2 devices 0-issue tgt reset, 1-no tgt reset
topology                0           6       0       0      Select Fibre
Channel topology: valid values are 0,1,2,4,6. See driver manual
link-speed              0          10       0       0      Select link speed:
[ 2 4 8 ] or 0 for auto negotiate
task-mgmt-tmo           5          b4      3c      3c      Maximum time to
wait for task management commands to complete
XLanePriority           0          7f       0       0      CS_CTL for
ExpressLane.
compression-log         5       15180     12c     12c      Frequency
compression logs are written (seconds)
throttle-log-cnt        1         3e8       a       a      Do not exceed this
number of messages logged within throttle_log_time
throttle-log-time       1          3c       1       1      Do not exceed
throttle_log_cnt within this limit (seconds)
...
Module Parameters

...
ql2xloadfwbin = 1
ql2xdbwr = 1
ql2xbypass_log_throttle = 0
ql2xt10protmask = 85
ql2xt10enable = 1
ql2xt10guard = 3
ql2xenablehba_err_chk = 2
qlfxdisablewatchdogtimer = 0
qlfxdisablereset = 0
qlfxmaxqdepth = 32
qlfxmaxqueues = 1
qlfxmaxlun = 65535
qlfxtargetreset = 1
qlfxcmdtimeout = 20
qlfxmaxsgs = 0
qlfxmaxxfersize = 0
```

Step 3 Modify the value of **lpfc_devloss_tmo** according to the actual environment. For example, if you want to set the value to 1, execute **esxcli system module parameters set -p lpfc_devloss_tmo=*1* -m** *lpfc820*.

```
[root@localhost:~] esxcli system module parameters set -p lpfc_devloss_tmo=1 -m
lpfc820
[root@localhost:~]
```

lpfc820 is the valid drive name queried in **Step 1**.

NOTICE

- If there is only one HBA, the command will change the parameters of both ports on the HBA.
- If there are multiple HBAs and the HBAs have the same valid drive name, the command will change the parameters of the ports on all the HBAs.

Step 4 Restart the ESXi host.

Step 5 Check whether the setting takes effect after the restart using the method in **Step 2**.

----End

4.7 How to Set Timeout Parameters of the iSCSI Initiator

This section describes how to set timeout parameters of the iSCSI initiator by modifying the values of **NoopOutInterval**, **NoopOutTimeout**, and **RecoveryTimeout**.

Procedure

Step 1 Execute the **esxcfg-scsidevs -a** command to check the iSCSI initiator name. As shown in the following figure, the iSCSI initiator name is **vnhba33**.

```
~ # esxcfg-scsidevs -a
vmhba0  mptsas            link-n/a  sas.5842b2b049c36300
(0:3:0.0) LSI Logic / Symbios Logic Dell SAS 6/iR Integrated
vmhba1  ata_piix          link-n/a  sata.vmhba1
(0:0:31.2) Intel Corporation 2 port SATA IDE Controller (ICH9)
vmhba32 ata_piix          link-n/a  sata.vmhba32
(0:0:31.2) Intel Corporation 2 port SATA IDE Controller (ICH9)
vmhba33 iscsi_vmk         online    iqn.1998-01.com.vmware:567eeb3f-45ad-1ca5-
bab4-842b2b0b0237-4bff319biSCSI Software Adapter
```

Step 2 Check the current parameter values of the iSCSI initiator by executing **esxcli iscsi adapter param get -A** *vmhba33*.

vmhba33 indicates the iSCSI initiator name queried in **Step 1**.

```
~ # esxcli iscsi adapter param get -A vmhba33
Name                   Current     Default     Min  Max        Settable  Inherit
--------------------   ----------  ----------  ---  --------   --------  -------
ErrorRecoveryLevel     0           0           0    2             false    false
InitialLoginRetryMax   4           4           0    64            false    false
InitialR2T             false       false       na na            false    false
FirstBurstLength       262144      262144      512  16777215       true    false
MaxBurstLength         262144      262144      512  16777215       true    false
MaxRecvDataSegment     131072      131072      512  16777215       true    false
MaxOutstandingR2T      1           1           1    8              true    false
MaxCmds                128         128         2    2048          false    false
ImmediateData          true        true        na na            false    false
DefaultTime2Retain     0           0           0    60            false    false
DefaultTime2Wait       2           2           0    60            false    false
LoginTimeout           5           5           1    60             true    false
LogoutTimeout          15          15          0    60            false    false
NoopOutInterval        15          15          1    60             true    false
NoopOutTimeout         10          10          10 30             true    false
RecoveryTimeout        10          10          1    120          true    false
DelayedAck             true        true        na na             true    false
HeaderDigest           prohibited  prohibited  na na             true    false
DataDigest             prohibited  prohibited  na na             true    false
```

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Step 3 Set parameter values of the iSCSI initiator according to the actual environment. For example, if you want to set **NoopOutInterval**, **NoopOutTimeout**, and **RecoveryTimeout** to **1**, **10**, and **1**, respectively, execute the following commands:

1. **esxcli iscsi adapter param set -A vmhba33 -k NoopOutInterval -v** *1*
```
 [root@localhost:~] esxcli iscsi adapter param set -A vmhba33 -k
NoopOutInterval -v 1
 [root@localhost:~]
```
2. **esxcli iscsi adapter param set -A vmhba33 -k NoopOutTimeout -v** *10*
```
 [root@localhost:~] esxcli iscsi adapter param set -A vmhba33 -k
NoopOutTimeout -v 10
 [root@localhost:~]
```
3. **esxcli iscsi adapter param set -A vmhba33 -k RecoveryTimeout -v** *1*
```
 [root@localhost:~] esxcli iscsi adapter param set -A vmhba33 -k
RecoveryTimeout -v 1
 [root@localhost:~]
```

Step 4 Restart the ESXi host.

Step 5 Check whether the setting takes effect after the restart using the method in **Step 2**.

----End

4.8 How Do I Determine Whether UltraPath Has Taken Effect By Using System Logs After a Host Restart?

Question

How Do I Determine Whether UltraPath Has Taken Effect By Using System Logs After a Host Restart?

Answer

Check the system log **/var/log/vmkernel.log**. If **UltraPath started successfully.** is recorded in the log after the host is started, UltraPath has taken effect.

NOTICE

vmkernel.log may be dumped. If **UltraPath started successfully.** is not recorded in the log after the host is started and the start time of log recording in **vmkernel.log** is later than host startup, you can check the system log that has been dumped **/scratch/log/vmkernel.*.gz**.

4.9 After UltraPath is Installed, Why No Value is Selected for the Path Selection Policy?

Question

After UltraPath is installed, why no value is selected for the path selection policy?

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Answer

After UltraPath is installed, it is normal that no value is selected for the path selection policy on vCenter/vClient. Because the path selection function is managed by UltraPath and UltraPath selects I/O paths by setting the load balancing mode. For details, see **A.2.9 Setting a Load Balancing Mode**.

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A Commonly Used CLI Management Commands

About This Chapter

The commonly used CLI management commands of UltraPath include basic operation commands, UltraPath management commands,and LUN management commands.

This document describes commands used by customers when they use Huawei products to deploy and maintain a network.

Some advanced commands are used to implement a project or locate faults. Improper use of those commands may cause device exceptions or service interruptions. This document does not provide the advanced commands. If you need such commands, contact Huawei for help.

Some arrays do not support query of some information. Such information is displayed as **--** in UltraPath.

A.1 Basic Operation Commands

Basic operation commands are used to query details about commands, and about how to log in to or log out of the UltraPath for ESXi management module.

A.1.1 Remotely Logging In to the CLI

This section describes how to remotely log in to the CLI of UltraPath for ESXi.

Procedure

Step 1 Download the **vSphere CLI** tool (supporting Windows and Linux only) based on your client's operating system and install the tool on a client that can access the ESXi host.

Step 2 In the the **vSphere CLI** directory of the **VMware** folder, open **Command Prompt**.

Step 3 On the cmd window, send settings or query commands to the ESXi host. The following uses the ESXi host whose IP address is **10.158.196.37** and the **show version** command as an example:

```
C:\Program Files (x86)\VMware\VMware vSphere CLI\bin>esxcli --server
10.158.196.37
--username root --password xxxxxx upadm show version
```

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NOTE

If you cannot log in to the ESXi host using VMware vSphere CLI 6.0, see **VMware Official Knowledge Base** to troubleshoot fault.

----End

A.1.2 Logging in to the CLI Locally

This section describes how to log in to the CLI of UltraPath for ESXi.

Function

The **esxcli upadm** command is used to log in to the command-line interface (CLI) of UltraPath for ESXi.

NOTE

All UltraPath for ESXi commands start with **esxcli upadm**, such as **esxcli upadm show version**. The description of **esxcli upadm** is not provided in the other parts of the document.

This document uses local CLI login as an example.

Format

esxcli upadm

Parameters

None

Level

User **root**

Usage Guidelines

Log in to the vSphere CLI management interface, run **esxcli upadm show version** to check the version of UltraPath for ESXi.

```
~ # esxcli upadm show version
Software Version : XX.XX.XXX
Driver Version : XX.XX.XXX
```

Example

To use the UltraPath CLI, log in to the vSphere CLI management interface from a local PC.

```
~ # esxcli upadm
Usage: esxcli upadm {cmd} [cmd options]
Available Namespaces:
  set                    Set UltraPath settings.
  check                  Check UltraPath settings.
  clear                  Clear UltraPath settings.
  show                   Display UltraPath information.
  start                  Start UltraPath operations.
```

System Response

The following table explains some parameters in the command output:

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Parameter	Description	Default Value
set	The **esxcli upadm set** command is used to display settings-related commands of UltraPath for ESXi.	None
check	The **esxcli upadm check** command is used to display check-related commands of UltraPath for ESXi.	None
clear	The **esxcli upadm clear** command is used to display clearing-related commands of UltraPath for ESXi.	None
show	The **esxcli upadm show** command is used to display query-related commands of UltraPath for ESXi.	None
start	The **esxcli upadm start** command is used to display start-related commands of UltraPath for ESXi.	None

A.1.3 Command Conventions

You are required to follow the format conventions when you use the CLI commands.

Table A-1 lists the format conventions.

Table A-1 Command conventions

Convention	Description
Boldface	The keywords of a command line are in **boldface**. This part should stay unchanged and need to be entered as it is.
Italic	Command arguments are in *italics*. This part needs to be replaced with an actual value.
[ ]	Items (keywords or arguments) in brackets [ ] are optional.
{ x | y | ... }	Optional items are grouped in braces and separated by vertical bars. One item is selected.
[x | y | ...]	Optional items are grouped in brackets and separated by vertical bars. One item is selected or no item is selected.
{ x | y | ... }*	Optional items are grouped in braces and separated by vertical bars. A minimum of one item or a maximum of all items can be selected.

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Convention	Description
[x | y | ...]*	Optional items are grouped in brackets and separated by vertical bars. Several items or no item can be selected.

NOTE

A.2 System Management Commands

The UltraPath system management commands include common management commands and commands for advanced parameter settings.

A.2.1 Querying the Version of UltraPath for ESXi

Function

The **show version** command is used to query the version of UltraPath for ESXi.

Format

show version [**--verbose** | **-v**]

Parameters

Parameter	Description	Default Value
--verbose or **-v**	Used to query the UltraPath version information.	None

Level

User **root**

Usage Guidelines

The version of UltraPath for ESXi can be queried only after the software is installed successfully.

- Run the **show version** command to query the information about UltraPath version and driver version.
- Run the **show version --verbose** command to query the information about UltraPath version, driver version, and product version.
- Run the **show version --v** command to query the information about UltraPath version, driver version, and product version.

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Example

- On the CLI, run the **esxcli upadm show version** command to query the information about UltraPath version and driver version.
```
~ # esxcli upadm show version
Software Version : XX.XX.XXX
Driver Version : XX.XX.XXX
```
- On the CLI, run the **esxcli upadm show version --verbose** command to query the information about UltraPath version, driver version, and product version.
```
~ # esxcli upadm show version --verbose
Software Version : XX.XX.XXX
Driver Version : XX.XX.XXX
Product  Version : XX.X.X
```
- On the CLI, run the **esxcli upadm show version -v** command to query the information about UltraPath version, driver version, and product version.
```
~ # esxcli upadm show version -v
Software Version : XX.XX.XXX
Driver Version : XX.XX.XXX
Product  Version : XX.X.X
```

System Response

None

A.2.2 Querying Configuration File Information

Function

The **show upconfig** command is used to query the configuration of UltraPath for ESXi, including the working mode, load balancing policy, and LUN trespass function.

Format

show upconfig [**-a** *array-id* | **-l** *vlun-id*]

Parameters

Keyword and Parameter	Description	Default Value
-a *array-id*	ID of a storage system. You can run **show diskarray** without an ID to display all storage system IDs.	None
-l *vlun-id*	ID of a virtual LUN. You can run **show vlun** without an ID to display all virtual LUN IDs.	None

Level

User **root**

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Usage Guidelines

- Run **show upconfig** to display all configuration information about UltraPath for ESXi.
- Run **show upconfig -a** *array-id* to check UltraPath for ESXi configuration information about a specified storage system.
- Run the **show upconfig -l** *vlun-id* command to check UltraPath for ESXi configuration information about a specified virtual LUN.

Example

- Query all configuration information about UltraPath for ESXi.

```
~ # esxcli upadm show upconfig
=====================================================
UltraPath Configuration
=====================================================
Basic Configuration
    Working Mode : load balancing between controllers
    LoadBalance Mode : min-queue-depth
    Loadbanlance io threshold : 100
    LUN Trespass : off

Advanced Configuration
    Io Retry Times : 10
    Io Retry Delay : 0
    Faulty path check interval : 10
    Idle path check interval : 60
    Failback Delay Time : 60
    Io Suspension Time : 60
    Max io retry timeout : 1800
    Performance Record : off

Path reliability configuration
    Timeout degraded statistical time : 600
    Timeout degraded threshold : 1
    Timeout degraded path recovery time : 1800
    Intermittent IO error degraded statistical time : 300
    Min. I/Os for intermittent IO error degraded statistical : 5000
    Intermittent IO error degraded threshold : 20
    Intermittent IO error degraded path recovery time : 1800
    Intermittent fault degraded statistical time : 1800
    Intermittent fault degraded threshold : 3
    Intermittent fault degraded path recovery time : 3600
    High latency degraded statistical time : 300
    High latency degraded threshold : 1000
    High latency degraded path recovery time : 3600
    Sensitive delayed degraded threshold : 30000
    Sensitive delayed degraded recovery time : 120

HyperMetro configuration
    HyperMetro Primary Array SN : 2102350RMG10H2000006
    HyperMetro WorkingMode : read write between both arrays
    HyperMetro Split Size : 128MB
    HyperMetro Load Balance Mode : split-size
```

- Query UltraPath for ESXi configuration information about a specified storage system.

```
~ # esxcli upadm show upconfig -a 0
=====================================================
UltraPath Configuration
=====================================================
Working Mode : load balancing within controller
LoadBalance Mode : min-queue-depth
Loadbanlance io threshold : 1
LUN Trespass : on
Io Suspension Time : 60
Max io retry timeout : 1800
```

- Query UltraPath for ESXi configuration information about a specified virtual LUN.

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```
~ # esxcli upadm show upconfig -l 1
====================================================
UltraPath Configuration
====================================================
Working Mode : load balancing within controller
LoadBalance Mode : min-queue-depth
Loadbanlance io threshold : 1
LUN Trespass : on
Io Suspension Time : 60
Max io retry timeout : 1800
~ # esxcli upadm show upconfig -l 2
====================================================
UltraPath Configuration
====================================================
Working Mode : load balancing within controller
LoadBalance Mode : min-task
Loadbanlance io threshold : 1
LUN Trespass : on
Io Suspension Time : 0
Max io retry timeout : 1800
HyperMetro Primary Array SN : 210235980510E8000015
HyperMetro WorkingMode : read write between both arrays
HyperMetro Split Size : 4KB
HyperMetro Load Balance Mode : split-size
```

System Response

None

A.2.3 Querying Physical Path Information

Function

The **show path** command is used to query information about a specified or all physical paths, including the working status, owning storage system, owning controller, and owning HBA.

Format

show path [**-a** *array-id* | **-p** *path-id*]

Parameters

Keyword and Parameter	Description	Default Value
-a *array-id*	ID of a storage system. You can run **show diskarray** without an ID to display all storage system IDs.	None

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Keyword and Parameter	Description	Default Value
-p *path-id*	ID of a physical path. You can run **show path** without an ID to display all physical path IDs. **NOTE** You can query a maximum of eight physical paths' performance statistics at a time. Use comas (,) to separate physical path IDs.	None

Level

User **root**

Usage Guidelines

- Run the **show path** command to check the working status of all physical paths.

NOTE

When the **show path** command is executed, you can only view the information about a maximum of eight paths on one controller.

- Run the **show path -a** *array-id* command to check the working status of a specified storage system's physical paths.
- Run the **show path -p** *path-id* command to check the working status of a specified physical path.

Example

- Check the working status and path IDs of all physical paths.

```
~ # esxcli upadm show path
--------------------------------------------------------------------------------
-------------------------------------
 Path ID Initiator Port Array Name Controller    Target Port     Path State
Check State  Port Type  Port ID
    0     10000000c9ae9406  HVS.Storage      0B      24110022a10e24d0
Normal        --          FC        --
    1     10000000c9ae9406  HVS.Storage      0A      22010022a10e24d0
Normal        --          FC        --
    2     10000000c9ae9407  HVS.Storage      0A      22000022a10e24d0
Normal        --          FC        --
    3     10000000c9ae9407  HVS.Storage      0B      24100022a10e24d0
Normal        --          FC        --
--------------------------------------------------------------------------------
-------------------------------------
```

- Check the physical paths of the storage system whose ID is **0**.

```
~ # esxcli upadm show path -a 0
--------------------------------------------------------------------------------
-------------------------------------
 Path ID Initiator Port Array Name Controller    Target Port     Path State
Check State  Port Type  Port ID
    0     10000000c9ae9406  HVS.Storage      0B      24110022a10e24d0
Normal        --          FC        --
    1     10000000c9ae9406  HVS.Storage      0A      22010022a10e24d0
Normal        --          FC        --
```


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```
    2     10000000c9ae9407  HVS.Storage      0A      22000022a10e24d0
Normal        --          FC        --
    3     10000000c9ae9407  HVS.Storage      0B      24100022a10e24d0
Normal        --          FC        --
-------------------------------------------------------------------------------
-------------------------------------
```

- Check the working status of the physical path whose ID is **0**.

```
~ # esxcli upadm show path -p 0
========================================
           Path#0 Information
========================================
Initiator Port  :  10000000c9ae9406
Array Name      :  HVS.Storage
Controller      :  0B
Target Port     :  24110022a10e24d0
Path State      :  Normal
Check State     :  --
Port Type       :  FC
I/O Retry count :  765
Path Fault count:  18
Latency-Low(ms) :  0
Latency-High(ms):  0
Latency-avg(ms) :  0
Queued I/O      :  0
Port ID         :  --
========================================
```

System Response

The following table explains some parameters in the command output:

Parameter	Description	Default Value
Path ID	ID of the physical path.	None
Initiator Port	Port of the initiator. **NOTE** For some arrays such as the S2600 and S5500, the initiator ports are displayed as the initiator port IDs in the SCSI address.	None
Target Port	Port of the target. **NOTE** For some arrays such as the S2600 and S5500, the initiator ports are displayed as the initiator port IDs in the SCSI address.	None
Controller	Name of a controller. **NOTE** If the controller name is followed by **Remote** information, the controller is a remote controller.	None

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Parameter	Description	Default Value
Path State	State of the physical path. Possible values are as follows: ● Normal: The path is normal. ● Fault: The path is faulty. ● I/O discrete error degradation: The path is degraded due to discrete I/O errors. ● Intermittent failure degradation: The path is degraded due to intermittent failures. ● I/O timeout degradation: The path is degraded due to I/O timeout. ● High latency degradation: The path is degraded due to high latency. ● Potential fault degradation: The path is degraded due to potential fault. ● Disable: The path is disabled.	None
Check State	State check of a path. Possible values are as follows: ● Checking: The path is being checked. ● Waiting: The path is waiting to be checked. ● Succeed: The path status check succeeded. ● Fail: The path status check failed. ● Ignore: The path status check is ignored. ● --: The path is not checked.	None
I/O Retry Count	Number of I/O retry attempts.	None

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Parameter	Description	Default Value
Path Fault Count	Number of times for which a path becomes faulty.	None
Port ID	Location of the port.	None

A.2.4 Resetting the Status of a Physical Path

Function

The **set phypathnormal** command is used to restore the working status of a degraded path to normal.

Format

set phypathnormal *-p path-id*

Parameters

Keyword and Parameter	Description	Default Value
-p path-id	ID of the physical path. You can run **show path** without an ID to display all physical path IDs.	None

Level

User **root**

Usage Guidelines

You can perform the following operations to recover an unstable path degraded and isolated by UltraPath for ESXi if the maintenance personnel have replaced the fault components and eliminated link faults. After the path is recovered, UltraPath for ESXi will deliver I/Os to it. If you are not sure whether all link faults have been cleared, run the **start pathcheck** command to check the health status of the path. If the path passes the check, reset the path to normal.

Example

Restore the working status of the path whose ID is **0** to normal.

```
~ # esxcli upadm set phypathnormal -p 0
Succeeded in executing the command.
```

System Response

None

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A.2.5 Setting the Status of a Physical Path

Function

The **set pathstate** command is used to enable or disable a specified physical path.

Format

set pathstate -p *path-id* **-s** *state*

Parameters

Keyword and Parameter	Description	Default Value
-p *path-id*	ID of a physical path. You can run **show path** without an ID to display all physical path IDs.	None
-s *state*	Enabling or disabling a physical path. The value is either enable or disable. ● enable: enables a physical path. ● disable: disables a physical path.	None

Level

User **root**

Usage Guidelines

NOTICE

- Once the command is run, UltraPath will not choose this path to deliver I/O.

- Only T series V100R005 or later storage systems using Fibre Channel networks support this command.
- If a controller module is disabled by running the **set tpgstate** command, you cannot run the **set pathstate** command to change the status of the controller's path.
- When you replace an HBA, run the **set pathstate -p** *path-id* **-s** *disable* command to disable the designated physical path. UltraPath will switch I/Os smoothly to other physical paths.
- When the HBA is replaced, run the **set pathstate -p** *path-id* **-s** *enable* command to enable the physical path mentioned earlier.

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Example

Enable the physical path whose ID is **0**.

```
~ # esxcli upadm set pathstate -p 0 -s enable
Succeeded in executing the command.
```

System Response

None

A.2.6 Clearing Statistics About Physical Paths

Function

The **clear pathstatistic** command can be used to clear statistics about all or specific physical paths, including I/O Retry count, Path Fault count, Latency-Low, Latency-High, and Latency-avg.

Format

clear pathstatistic [**-a**=*array-id* | **-p**=*path-id*]

Parameters

Parameter	Description	Default Value
-p=*path-id*	ID of a physical path. You can run **show path** without parameters to obtain all physical path IDs. **NOTE** You can clear statistics about eight physical paths at most at a time. To clear statistics about multiple physical paths, use comma (,) to separate the path IDs.	None
-a=*array-id*	Storage array ID. You can run the **show diskarray** command without parameters to obtain IDs of storage arrays. **NOTE** You can clear statistics about physical paths of eight storage arrays at most at a time. To clear statistics about physical paths of multiple storage arrays, use comma (,) to separate the storage array IDs.	None

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Level

User **root**

Usage Guidelines

- Run **clear pathstatistic** to clear statistics about all physical paths.

NOTE

When **clear pathstatistic** is used, statistics about at most eight paths of a controller can be cleared.

- Run **clear pathstatistic -p**=*path-id* to clear statistics about specific physical paths.
- Run **clear pathstatistic -a**=*array-id* to clear statistics about physical paths of specific storage arrays.

Example

- Clear statistics about all physical paths.
```
~ # esxcli upadm clear pathstatistic
Statistics of all paths cleared successfully.
```
- Clear statistics about the physical path whose ID is **0**.
```
~ # esxcli upadm clear pathstatistic -p 0
Statistics of all specified paths cleared successfully.
```
- Clear statistics about physical paths of storage array whose ID is **0**.
```
~ # esxcli upadm clear pathstatistic -a 0
Statistics of all specified arrays cleared successfully.
```

A.2.7 Setting a Controller's Paths

Function

The **set tpgstate** command is used to enable or disable the paths of a specified controller.

Format

set tpgstate -a *array-id* **-t** *tpg-id* **-s** *state*

Parameters

Keyword and Parameter	Description	Default Value
-a *array-id*	ID of a storage system. You can run **show diskarray** without an ID to display all storage system IDs.	None
-t *tpg-id*	ID of a controller.	None

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Keyword and Parameter	Description	Default Value
-s *state*	Enabling or disabling a controller's path. The value is either enable or disable. ● enable: enables a controller's paths. ● disable: disables a controller's paths.	None

Level

User **root**

Usage Guidelines

NOTICE

Once the command is run, UltraPath will not choose this path to deliver I/O.

When changing the controller of a storage system or before powering off the controller for maintenance, you can run this command to disable paths of the controller. After the paths are disabled, UltraPath for ESXi smoothly switches I/Os over to other controller's paths, preventing I/O latency caused by failback.

NOTICE

After the replacement or maintenance, you can run the command again to enable the paths of the controller, increasing redundance and balancing controller workload.

Example

Enable the paths of controller **0A** of the storage system whose ID is **0**.

```
~ # esxcli upadm set tpgstate -a 0 -t 0A -s enable
Succeeded in executing the command.
```

System Response

None

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A.2.8 Setting Working Mode for UltraPath

Function

The **set workingmode** is used to set cross-controller or intra-controller load balancing of UltraPath.

Format

set workingmode [**-a** *array-id* | **-l** *vlun-id*] **-m** *mode*

Parameters

Keyword and Parameter	Description	Default Value
-a *array-id*	ID of a storage system. You can run **show diskarray** without an ID to display all storage system IDs.	None
-l *vlun-id*	ID of a virtual LUN. You can run **show vlun** without an ID to display all virtual LUN IDs.	None
-m *mode*	Load balancing mode of UltraPath. The value can be **0** or **1**. ● 0: cross-controller load balancing mode. That is, I/Os are delivered through paths of all controllers. ● 1: intra-controller load balancing mode. That is, I/Os are delivered through paths of the current working controller.	1

Level

User **root**

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Usage Guidelines

NOTE

If cross-controller load balancing mode is used, UltraPath for ESXi does not distinguish between preferred and non-preferred working controllers of a LUN and uses all paths to deliver I/Os. For an OceanStor storage system with asymmetric active-active controllers, I/Os are forwarded between controllers, increasing I/O processing latency. Therefore, cross-controller load balancing is recommended only when the performance bottleneck lies in the transfer paths between a host and the storage system.

- Run **set workingmode -a** *array-id* **-m** *mode* to set a working mode for a specified storage system.
- **set workingmode -l** *vlun-id* **-m** *mode* to set a working mode for a specified virtual LUN.

Example

- Set the working mode of the storage system whose ID is **0** to **Cross-controller load balancing**.
```
~ # esxcli upadm set workingmode -a 0 -m 0
Succeeded in executing the command.
```
- Set the working mode of the LUN whose ID is **0** to **Cross-controller load balancing**.
```
~ # esxcli upadm set workingmode -l 0 -m 0
Succeeded in executing the command.
```

System Response

None

A.2.9 Setting a Load Balancing Mode

Function

The **set loadbalancemode** command is used to set a load balancing mode for UltraPath for ESXi.

Format

set loadbalancemode [**-a** *array-id* | **-l** *vlun-id*] **-m** *mode*

Parameters

Keyword and Parameter	Description	Default Value
-a *array-id*	ID of a storage system. You can run **show diskarray** without an ID to display all storage system IDs.	None
-l *vlun-id*	ID of a virtual LUN. You can run **show vlun** without an ID to display all virtual LUN IDs.	None

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Keyword and Parameter	Description	Default Value
-m *mode*	Load balancing mode. The value can be **round-robin**, **min-queue-depth**, or **min-task**. ● round-robin: round-robin load balancing ● min-queue-depth: minimum queue depth load balancing ● min-task: minimum task load balancing	min-queue-depth

Level

User **root**

Usage Guidelines

Before resetting the load balancing mode, you are advised to run the **show upconfig** command to query the current load balancing mode. The load balancing modes are described as follows:

- To set the load balancing mode to minimum task, run the **set loadbalancemode -m** *round-robin* command to set the load balancing mode to **round-robin**. When an application server delivers I/Os to a storage system, UltraPath for ESXi sends the first set of I/Os through path 1 and second set of I/Os through path 2, and so on. Paths are used in turn to ensure that each path is fully utilized. When an application server delivers I/Os to a storage system, the minimum I/O queue takes precedence over other queues in I/O sending.
- To set the load balancing mode to minimum task, run the **set loadbalancemode -m** *min-queue-depth* command to set the load balancing policy to **min-queuedepth**. In this mode, UltraPath for ESXi calculates the number of waiting I/Os on each path in real time, and then delivers new I/Os to the path with the minimum waiting I/Os.
- To set the load balancing mode to minimum task, run the **set loadbalancemode -m** *min-task* command to set the load balancing policy to **min-task**. In this mode, UltraPath for ESXi calculates the number of waiting I/Os on each path and the data block size of each I/O in real time. Then UltraPath for ESXi delivers new I/Os to the path with the lightest load. Before resetting the load balancing mode, you are advised to run the **show upconfig** command to query the current load balancing mode.

Example

Set the load balancing mode of the storage system whose ID is **0** to **round-robin**.

```
~ # esxcli upadm set loadbalancemode -a 0 -m round-robin
Succeeded in executing the command.
```


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System Response

None

A.2.10 Setting the Working Controller Trespass Policy for a LUN

Function

The **set luntrespass** command is used to set the working controller trespass policy for a LUN.

Format

set luntrespass [**-a** *array-id* | **-l** *vlun-id*] **-m** *mode*

Parameters

Keyword and Parameter	Description	Default Value
-a *array-id*	ID of a storage system. You can run **show diskarray** without an ID to display all storage system IDs.	None
-l *vlun-id*	ID of a virtual LUN. You can run **show vlun** without an ID to display all virtual LUN IDs.	None
-m *mode*	Working controller trespass policy of a LUN. The value is either **on** or **off**. ● on: Enables working controller trespass for a LUN. ● off: Disables working controller trespass for a LUN.	off

Level

User **root**

Usage Guidelines

None

Example

Set the LUN working controller trespass of the storage system whose ID is **0** to **on**.

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```
~ # esxcli upadm set luntrespass -a 0 -m on
Succeeded in executing the command.
```

System Response

None

A.2.11 Setting Failback Delay

Function

The **set failbackdelaytime** command is used to set failback delay.

Format

set failbackdelaytime -t *time*

Parameters

Keyword and Parameter	Description	Default Value
-t *time*	Failback delay. The value ranges from 0 to 3600, expressed in seconds.	60

Level

User **root**

Usage Guidelines

NOTE

To prevent intermittent communication interruption between links and service instability, UltraPath for ESXi does not immediately implement failback upon detecting the recovery of a faulty path. Instead, UltraPath for ESXi continues to monitor the path and implements failback if the path remains normal to improve system reliability. The failback delay may cause slight performance drop, but it is for the balance between reliability and performance.

Example

Set failback delay to 600 seconds.

```
~ # esxcli upadm set failbackdelaytime -t 600
Succeeded in executing the command.
```

System Response

None

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A.2.12 Querying I/O Count Information

Function

The **show iocount** command is used to query the I/O count of all virtual LUNs or on logical paths of the specified virtual LUNs. The I/O count information includes the error I/O count, queue I/O count, error command count, and queue command count.

Format

show iocount [**-l** *vlun-id*]

Parameters

Parameter	Description	Default Value
-l *vlun-id*	ID of a virtual LUN If you run **show vlun** without specifying any parameters, all virtual LUN IDs can be obtained. You can run **show iocount** with this parameter to query the I/O count on the logical paths of these virtual LUNs. **NOTE** You can query a maximum of eight virtual LUNs at a time. Use commas (,) to separate IDs of the virtual LUNs.	None

Level

User **root**

Usage Guidelines

- Run **show iocount** to obtain the I/O count information of all virtual LUNs.
- Run **show iocount -l** *vlun-id* to query the I/O count information on logical paths of the specified virtual LUNs.

Example

- Query the I/O count information of all virtual LUNs.

```
~ # esxcli upadm show iocount
--------------------------------------------------------------------------------
---------------------
 Vlun ID    Disk Name     Error I/O Count  Queue I/O Count  Error Command
Count  Queue Command Count
    0     LUN002_dcd0000         1                0
0                    0
    1     LUN002_dcd0001         1                0
0                    0
```


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```
    2     LUN002_dcd0002         1                0
0                    0
    3     LUN002_dcd0003         1                0
0                    0
    4     LUN002_dcd0004         1                0
0                    0
    5     LUN002_dcd0005         1                0
0                    0
    6     LUN002_dcd0006         1                0
0                    0
    7     LUN002_dcd0007         1                0
0                    0
--------------------------------------------------------------------------------
---------------------
```

- Query the I/O count information on logical paths of the specified virtual LUNs.

```
~ # esxcli upadm show iocount -l 0
--------------------------------------------------------------------------------
----------------------------
 Vlun ID    Disk Name     Path ID  Error I/O Count  Queue I/O Count  Error
Command Count  Queue Command Count
    0     LUN002_dcd0000     0            1                0
0                    0
--------------------------------------------------------------------------------
----------------------------
```

System Response

None

A.2.13 Clearing I/O Count Information

Function

The **clear iocount** command is used to clear I/O count information.

Format

clear iocount

Parameters

None

Level

User **root**

Usage Guidelines

None

Example

Clear I/O count information.

```
~ # esxcli upadm clear iocount
Succeeded in executing the command.
```

System Response

None

A.2.14 Querying I/O Latency Information

Function

The **show iolatency** command is used to query the latest I/O latency, max I/O latency, and average I/O latency of all virtual LUNs or on the logical paths of the specific virtual LUNs.

Format

show iolatency [**-l** *vlun-id*]

Parameters

Parameter	Description	Default Value
-l *vlun-id*	ID of a virtual LUN If you run **show vlun** without specifying any parameters, all virtual LUN IDs can be obtained. You can run **show iolatency** with this parameter to query the I/O latency on the logical paths of these virtual LUNs. **NOTE** You can query a maximum of eight virtual LUNs at a time. Use commas (,) to separate IDs of the virtual LUNs.	None

Level

User **root**

Usage Guidelines

- Run **show iolatency** to obtain the I/O latency information of all virtual LUNs.
- Run **show iolatency -l** *vlun-id* to query the I/O count information on the logical paths of the specified virtual LUNs.

Example

- Query the I/O latency information of all virtual LUNs.

```
~ # esxcli upadm show iolatency
--------------------------------------------------------------------------------
-----
 Vlun ID    Disk Name     Latest I/O Latency  Max I/O Latency  Average I/O
```

```
Latency
    0     LUN002_dcd0000          0                 11
0
    1     LUN002_dcd0001          0                  9
0
    2     LUN002_dcd0002          0                 11
0
    3     LUN002_dcd0003          0                  9
0
    4     LUN002_dcd0004          0                 11
0
    5     LUN002_dcd0005          0                 11
0
    6     LUN002_dcd0006          0                 11
0
    7     LUN002_dcd0007          0                 502
0
-------------------------------------------------------------------------------
-----
```

- Query the I/O latency information on the logical paths of the specific virtual LUNs.

```
~ # esxcli upadm show iolatency -l 0
-------------------------------------------------------------------------------
------------
 Vlun ID    Disk Name     Path ID  Latest I/O Latency  Max I/O Latency
Average I/O Latency
    0     LUN002_dcd0000     0             0
11                  0
-------------------------------------------------------------------------------
------------
```

System Response

None

A.2.15 Setting I/O Latency Threshold

Function

The **set iolatencythreshold** command is used to set the I/O latency threshold. If the average I/O latency in one minute exceeds this threshold, a critical event about long I/O latency will be recorded.

Format

set iolatencythreshold -t *time*

Parameters

Parameter	Description	Default Value
-t *time*	I/O latency threshold The value ranges from 0 to 120000, expressed in milliseconds, 0 indicates disabled.	0

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Level

User **root**

Usage Guidelines

None

Example

Set the I/O latency threshold to 30 milliseconds.

```
~ # esxcli upadm set iolatencythreshold -t 30
Succeeded in executing the command.
```

System Response

None

A.2.16 Querying I/O Latency Threshold

Function

The **show iolatencythreshold** command is used to query the I/O latency threshold.

Format

show iolatencythreshold

Parameters

None

Level

User **root**

Usage Guidelines

None

Example

Query the I/O latency threshold.

```
~ # esxcli upadm show iolatencythreshold
io_latency_threshold : 30
```

System Response

None

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A.2.17 Setting I/O Retry Times and Interval

Function

The **set ioretry** command is used to set the number of I/O retries and an I/O retry interval.

Format

set ioretry -i *ioretrydelay* **-t** *time*

Parameters

Keyword and Parameter	Description	Default Value
-i *ioretrydelay*	Interval of I/O retry. The value ranges from 0 to 10, expressed in seconds.	0
-t *time*	Number of I/O retry times. The value ranges from 0 to 60.	10

Level

User **root**

Usage Guidelines

NOTE

Increasing I/O retry times and retry interval can reduce the service interruption rate when intermittent path disconnection occurs, but it also prolongs service blockage. Therefore, set the two parameters based your service needs.

Example

Set the I/O retry times to 3 and retry interval to 10 seconds.

```
~ # esxcli upadm set ioretry -i 10 -t 3
Succeeded in executing the command.
```

System Response

None

A.2.18 Checking a Physical Path's Status

Function

The **start pathcheck** command is used to check the working status of a specified physical path.

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Format

start pathcheck -p *path-id*

Parameters

Keyword and Parameter	Description	Default Value
-p *path-id*	ID of a physical path. You can run **show path** without an ID to display all physical path IDs.	None

Level

User **root**

Usage Guidelines

If you are not sure whether all link faults have been cleared, run the **start pathcheck** command to check the health status of the path. If the path passes the check, reset the path to normal.

Example

Check the working status of the physical path whose ID is **0**.

```
~ # esxcli upadm start pathcheck -p 0
Check path command send on all pathes successfully, use "show path"command to
investigate the check result.
```

System Response

None

A.2.19 Setting a Time Window for I/O Timeout Isolation

Function

The **set todtime** command is used to set a time window for path degradation and isolation upon an I/O timeout.

Format

set todtime -t *time*

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Parameters

Keyword and Parameter	Description	Default Value
-t *time*	Time window for path degradation and isolation upon an I/O timeout. The value ranges from 60 to 2,592,000, expressed in seconds.	600

Level

User **root**

Usage Guidelines

None

Example

Set the time window for path degradation and isolation upon an I/O timeout to 600 seconds.

```
~ # esxcli upadm set todtime -t 600
Succeeded in executing the command.
```

System Response

None

A.2.20 Setting a Timeout Threshold for Path Degradation and Isolation

Function

The **set todthreshold** command is used to set a timeout threshold for path degradation and isolation.

Format

set todthreshold -t *number*

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Parameters

Keyword and Parameter	Description	Default Value
-t *number*	I/O timeout threshold for path degradation and isolation upon an I/O timeout. The value ranges from 0 to 65,535.	1

Level

User **root**

Usage Guidelines

None

Example

Set the I/O timeout threshold for path degradation and isolation to 3.

```
~ # esxcli upadm set todthreshold -t 3
Succeeded in executing the command.
```

System Response

None

A.2.21 Setting the Recovery Time of a Degraded Path

Function

The **set todrecoverytime** command is used to set the recovery time of a degraded path.

Format

set todrecoverytime -t *time*

Parameters

Keyword and Parameter	Description	Default Value
-t *time*	Recovery timeout of a degraded path. The value ranges from 1,800 to 2,592,000, expressed in seconds.	1800

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Level

User **root**

Usage Guidelines

None

Example

Set the recovery time of a degraded path to 1800 seconds.

```
~ # esxcli upadm set todrecoverytime -t 1800
Succeeded in executing the command.
```

System Response

None

A.2.22 Setting a Time Window for Calculating Discrete I/O Errors

Function

The **set iedtime** command is used to set a time window for calculating discrete I/O errors.

Format

set iedtime -t *time*

Parameters

Keyword and Parameter	Description	Default Value
-t *time*	Time window for collecting discrete I/O errors. The value ranges from 60 to 2,592,000, expressed in seconds.	300

Level

User **root**

Usage Guidelines

None

Example

Set the time window for calculating discrete I/O errors to 300 seconds.

```
~ # esxcli upadm set iedtime -t 300
```


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```
Succeeded in executing the command.
```

System Response

None

A.2.23 Setting a Rate Threshold for Discrete I/O Error Isolation

Function

The **set iedthreshold** command is used to set a rate threshold for discrete I/O error isolation.

Format

set iedthreshold -r *rate*

Parameters

Keyword and Parameter	Description	Default Value
-r *rate*	Rate threshold for discrete I/O error isolation. The value ranges from 0% to 100%.	20

Level

User **root**

Usage Guidelines

None

Example

Set the rate threshold for discrete I/O error isolation to 20%.

```
~ # esxcli upadm set iedthreshold -r 20
Succeeded in executing the command.
```

System Response

None

A.2.24 Setting the minimum number of I/Os for the I/O discrete error isolation mechanism

Function

The **set iedminio** command is used to set the minimum number of I/Os for the I/O discrete error isolation mechanism.

Format

set iedminio -n *number*

Parameters

Keyword and Parameter	Description	Default Value
-n *number*	The minimum number of I/Os for the I/O discrete error isolation mechanism. The value ranges from 5,000 to 65,535.	5000

Level

User **root**

Usage Guidelines

None

Example

Set the minimum number of I/Os for the I/O discrete error isolation mechanism to 5000.

```
~ # esxcli upadm set iedminio -n 5000
Succeeded in executing the command.
```

System Response

None

A.2.25 Setting the Recovery Time of a Path with Discrete I/O Errors

Function

The **set iedrecoverytime** command is used to set the recovery time of a path with discrete I/O errors.

Format

set iedrecoverytime -t *time*

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Parameters

Keyword and Parameter	Description	Default Value
-t *time*	Recovery time of a path with discrete I/O errors. The value ranges from 1800 to 2,592,000, expressed in seconds.	1800

Level

User **root**

Usage Guidelines

None

Example

Set the recovery time of a path with discrete I/O errors to 1800 seconds.

```
~ # esxcli upadm set iedrecoverytime -t 1800
Succeeded in executing the command.
```

System Response

None

A.2.26 Setting a Time Window for Collecting Intermittent Path Errors

Function

The **set ifdtime** command is used to set a time window for collecting intermittent path errors.

Format

set ifdtime -t *time*

Parameters

Keyword and Parameter	Description	Default Value
-t *time*	Time window for collecting intermittent path errors. The value ranges from 60 to 2,592,000, expressed in seconds.	1800

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Level

User **root**

Usage Guidelines

None

Example

Set the time window for collecting intermittent path errors to 1800 seconds.

```
~ # esxcli upadm set ifdtime -t 1800
Succeeded in executing the command.
```

System Response

None

A.2.27 Setting an Intermittent Path Error Threshold for Path Isolation

Function

The **set ifdthreshold** command is used to set an intermittent path error threshold for path isolation.

Format

set ifdthreshold -n *number*

Parameters

Keyword and Parameter	Description	Default Value
-n *number*	Intermittent path error threshold for path isolation. The value ranges from 0 to 65,535.	3

Level

User **root**

Usage Guidelines

None

Example

Set the intermittent path error threshold for path isolation to 3.

```
~ # esxcli upadm set ifdthreshold -n 3
Succeeded in executing the command.
```

System Response

None

A.2.28 Setting the Recovery Time of a Path with Intermittent Errors

Function

The **set todrecoverytime** command is used to set the recovery time of a path with intermittent errors.

Format

set ifdrecoverytime -t *time*

Parameters

Keyword and Parameter	Description	Default Value
-t *time*	Recovery time of a path with intermittent errors. The value ranges from 60 to 2,592,000, expressed in seconds.	3600

Level

User **root**

Usage Guidelines

None

Example

Set the recovery time of a path with intermittent errors to 3600 seconds.

```
~ # esxcli upadm set ifdrecoverytime -t 3600
Succeeded in executing the command.
```

System Response

None

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A.2.29 Setting a Time Window for Determining a High-latency Path

Function

The **set hldtime** command is used to set a time window for determining a high-latency path.

Format

set hldtime -t *time*

Parameters

Keyword and Parameter	Description	Default Value
-t *time*	Time window for determining a high-latency path. The value ranges from 60 to 18,000, expressed in seconds.	300

Level

User **root**

Usage Guidelines

None

Example

Set the time window for determining a high-latency path to 300 seconds.

```
~ # esxcli upadm set hldtime -t 300
Succeeded in executing the command.
```

System Response

None

A.2.30 Setting a Latency Threshold for High-latency Path Isolation

Function

The **set hldthreshold** command is used to set a latency threshold for high-latency path isolation.

Format

set hldthreshold -t *time*

Parameters

Keyword and Parameter	Description	Default Value
-t *time*	Latency threshold for high-latency path isolation. The value ranges from 0 to 65,535, expressed in milliseconds.	1000

Level

User **root**

Usage Guidelines

None

Example

Set the latency threshold for high-latency path isolation to 1000 ms.

```
~ # esxcli upadm set hldthreshold -t 1000
Succeeded in executing the command.
```

System Response

None

A.2.31 Setting the Recover Time of a High-latency Path

Function

The **set hldrecoverytime** command is used to set the recovery time of a high-latency path.

Format

set hldrecoverytime -t *time*

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Parameters

Keyword and Parameter	Description	Default Value
-t *time*	Recover time of a high-latency path. The value ranges from 60 to 2,592,000, expressed in seconds.	3600

Level

User **root**

Usage Guidelines

None

Example

Set the recovery time of a high-latency path to 3600 seconds.

```
~ # esxcli upadm set hldrecoverytime -t 3600
Succeeded in executing the command.
```

System Response

None

A.2.32 Setting the Threshold of Switching a Latency-sensitive Path

Function

set sddthreshold is used to set the threshold of switching a latency-sensitive path.

Format

set sddthreshold -t *time*

Parameters

Parameter	Description	Default Value
-t *time*	Threshold of switching a latency-sensitive path The value ranges from 100 to 60,000, expressed in milliseconds.	30000

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Level

User **root**

Usage Guidelines

None

Example

This example shows how to set the threshold of switching a latency-sensitive path to 1000 milliseconds.

```
~ # esxcli upadm set sddthreshold -t 1000
Succeeded in executing the command.
```

System Response

None

A.2.33 Setting the Recovery Time of a Latency-sensitive Path

Function

set sddrecoverytime is used to set the recovery time of a latency-sensitive path.

Format

set sddrecoverytime -t *time*

Parameters

Parameter	Description	Default Value
-t *time*	Recovery time of a latency-sensitive path The value ranges from 1 to 2,592,000, expressed in seconds.	120

Level

User **root**

Usage Guidelines

None

Example

This example shows how to set the recovery time of a latency-sensitive path to 600 seconds.

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```
~ # esxcli upadm set sddrecoverytime -t 600
Succeeded in executing the command.
```

System Response

None

A.2.34 Setting an Interval for Routine Detection of Faulty Paths

Function

The **set faultypathcheckinterval** command is used to set an interval for rountine detection of faulty paths.

Format

set faultypathcheckinterval -i *interval*

Parameters

Keyword and Parameter	Description	Default Value
-i *interval*	Interval for routine inspection of faulty paths. The value ranges from 1 to 2,592,000, expressed in seconds.	10

Level

User **root**

Usage Guidelines

NOTE

Although a smaller interval helps detect faulty paths more quickly, more system resources are consumed. Therefore, when setting the interval, try to strike a balance between system reliability and performance.

Example

Set the interval for routine detection of faulty paths to 10 seconds.

```
~ # esxcli upadm set faultypathcheckinterval -i 10
Succeeded in executing the command.
```

System Response

None

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A.2.35 Setting an Interval for Routine Inspection of Idle Paths

Function

The **set idlepathcheckinterval** command is used to set an interval for rountine inspection of idle paths.

Format

set idlepathcheckinterval -i *interval*

Parameters

Keyword and Parameter	Description	Default Value
-i *interval*	Interval for routine inspection of idle paths. The value ranges from 1 to 2,592,000, expressed in seconds.	60

Level

User **root**

Usage Guidelines

None

Example

Set the interval for routine detection of idle paths to 60 seconds.

```
~ # esxcli upadm set idlepathcheckinterval -i 60
Succeeded in executing the command.
```

System Response

None

A.2.36 Setting I/O Retry Timeout

Function

The **set maxioretrytimeout** command is used to set the timeout period for I/O retry on UltraPath for ESXi.

Format

set maxioretrytimeout -t *time* [**-a** *array-id* | **-l** *vlun-id*]

Parameters

Keyword and Parameter	Description	Default Value
-t *time*	Timeout period for I/O retry on UltraPath for ESXi. The value ranges from 1 to 2,592,000, expressed in seconds.	1800
-a *array-id*	ID of a storage system. You can run **show diskarray** without an ID to display all storage system IDs.	None
-l *vlun-id*	ID of a virtual LUN. You can run **show vlun** without an ID to display all virtual LUN IDs.	None

Level

User **root**

Usage Guidelines

- Run **set maxioretrytimeout -t** *time* to set the I/O retry timeout of all storage systems.
- Run **set maxioretrytimeout -t** *time* **-a** *array-id* to set the I/O retry timeout of a specified storage system.
- Run **set maxioretrytimeout -t** *time* **-l** *vlun-id* to set the I/O retry timeout of a specified virtual LUN.

NOTE

In some cases, I/Os are not successfully processed (for example, due to fully-loaded HBAs) even if no clear faults occur on paths. UltraPath for ESXi will retry to avoid I/O failure. However, if the I/Os are not returned for a long time, the impact on some upper-layer applications may be worse than an I/O failure. In this case, you can set the timeout period for I/O retry to prevent such an impact.

Example

Set the timeout period for I/O retry on UltraPath for ESXi to 1800 seconds.

```
~ # esxcli upadm set maxioretrytimeout -t 1800
Succeeded in executing the command.
```

System Response

None

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A.2.37 Setting the Number of Consecutive I/Os on a Path

Function

The **set lbiothreshold** command is used to set the number of consecutive I/Os on a path in load balancing mode.

Format

set lbiothreshold -n *number* [**-a** *array-id* | **-l** *vlun-id*]

Parameters

Keyword and Parameter	Description	Default Value
-n *number*	Number of consecutive I/Os on a path. The value ranges from 1 to 10,000.	1
-a *array-id*	ID of a storage system. You can run **show diskarray** without an ID to display all storage system IDs.	None
-l *vlun-id*	ID of a virtual LUN. You can run **show vlun** without an ID to display all virtual LUN IDs.	None

Level

User **root**

Usage Guidelines

NOTE

Increasing the consecutive I/Os of a path can improve the efficiency of processing sequential I/Os. However, it does not apply to discrete I/Os, and an extra-large amount of consecutive I/Os causes path blockage for short periods of time. Therefore, set an appropriate value based on the your service I/O model to improve performance.

Example

Set the number of consecutive I/Os on a path in load balancing mode to 1.

```
~ # esxcli upadm set lbiothreshold -n 1
Succeeded in executing the command.
```


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System Response

None

A.2.38 Setting the Remote Controller of a VIS Storage System

Function

The **set remotecontroller** command is used to set the remote controller of a VIS storage system.

Format

set remotecontroller -a *array-id* **-t** *tpg-id* **-s** *state*

Parameters

Keyword and Parameter	Description	Default Value
-a *array-id*	ID of a storage system allocated by UltraPath for ESXi. You can run **show diskarray** without an ID to display all storage system IDs.	None
-t *tpg-id*	ID of a controller. **NOTE** You can specify multiple controllers at the same time.	None
-s *state*	Status of a remote controller. The value can be **local** or **remote**. ● local: local controller ● remote: remote controller	remote

Level

User **root**

Usage Guidelines

NOTE

UltraPath for ESXi supports remote active-active VIS storage systems. In this mode, the I/O processing latency on the local VIS node is much smaller than that on the remote one. Therefore, UltraPath for ESXi prefers the local VIS node for delivering I/Os. The remote VIS node is used only if the local node experiences a path fault.

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Example

Set remote controller **0** of the storage system whose ID is **0** as a local node.

```
~ # esxcli upadm set remotecontroller -a 0 -t 0 -s local
Succeeded in executing the command.
```

System Response

None

A.2.39 Clearing Configuration Information

Function

The **clear upconfig** command is used to clear the configuration information about a virtual LUN or storage system.

Format

clear upconfig { **-a** *array-id* | **-l** *vlun-id* }

Parameters

Keyword and Parameter	Description	Default Value
-a *array-id*	ID of a storage system. You can run **show diskarray** without an ID to display all storage system IDs.	None
-l *vlun-id*	ID of a virtual LUN. You can run **show vlun** without an ID to display all virtual LUN IDs.	None

Level

User **root**

Usage Guidelines

- Run **clear upconfig -a** *array-id* to clear the configuration information about a specified storage system.
- Run **clear upconfig -l** *vlun-id* to clear the configuration information about a specified virtual LUN.

Example

- Clear the configuration information about the storage system whose ID is **0**.

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```
~ # esxcli upadm clear upconfig -a 0
Succeeded in executing the command.
```

- Clear the configuration information about the virtual LUN whose ID is **1**.

```
~ # esxcli upadm clear upconfig -l 1
Succeeded in executing the command.
```

System Response

None

A.2.40 Deleting Obsolete Physical Path Information

Function

The **clear obsoletepath** command is used to delete obsolete physical path information.

Format

clear obsoletepath -p *path-id*

Parameters

Keyword and Parameter	Description	Default Value
-p *path-id*	ID of a physical path. You can run **show path** without an ID to display all physical path IDs.	None

Level

User **root**

Usage Guidelines

NOTE

- If a storage system administrator changes the path network (for example, changes the Fibre Channel port connected to the storage system), some paths managed by UltraPath for ESXi may enter faulty state, interfering the administrator's detection of faulty paths. In this case, run the command to delete the paths from UltraPath for ESXi.
- On an operating system that does not support hot swap or when an iSCSI software initiator is used, changing path ports does not trigger SCSI device deletion on the corresponding host. The path information cannot be deleted, either. In this case, you need run the command provided by the operating system to refresh devices.

Example

Delete the information about the obsolete physical path whose ID is **1**.

```
~ # esxcli upadm clear obsoletepath -p 1
Succeeded in executing the command.
```


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System Response

None

A.2.41 Setting the Pending Delete Period of Obsolete Path Information

Function

The **set obsoletepathcleardelaytime** command is used to set the pending delete period of information about obsolete paths.

Format

- **set obsoletepathcleardelaytime -t** *time*
- **set obsoletepathcleardelaytime --time** *time*

Parameters

Parameter	Description	Default Value
time	● The pending delete period of information about obsolete paths. ● The value ranges from 7,200 to 2,592,000, expressed in seconds.	28,800

Level

User **root**

Usage Guidelines

NOTE

- When the network is faulty (for example, the optical fiber link is interrupted), some paths managed by UltraPath will be set to faulty state automatically. If the storage system administrator has not adjusted the pending delete period, the system will delete information about the paths in faulty state automatically eight hours later.
- If the storage system administrator wants to reserve the path information for fault analysis or clear the path information earlier to reduce interference, the administrator can use this command to adjust the pending delete period.

Example

Setting the pending delete period of obsolete path information to 7200s.

```
[root@localhost:~] esxcli upadm set obsoletepathcleardelaytime -t 7200
Succeeded in executing the command.
[root@localhost:~] esxcli upadm set obsoletepathcleardelaytime --time 7200
Succeeded in executing the command.
```


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System Response

None

A.2.42 Checking the Status of UltraPath for ESXi

Function

The **check status** command is used to check UltraPath for ESXi, including the check of exceptions, software integrity, and environment configuration.

Format

check status

Parameters

None

Level

User **root**

Usage Guidelines

The configuration of the UltraPath for ESXi can be queried only after it is successfully installed.

Example

Check the status of UltraPath for ESXi.

```
~ # esxcli upadm check status
------------------------------------------------------------
Checking path status:
Serverity    Array               Type
description
Major        210000e0fccecc85    No redundant controllers No redundant
controllers.
------------------------------------------------------------
Checking envirment and config:
Pass
------------------------------------------------------------
```

System Response

The check result is **Pass**, indicating that no anomaly is detected during the running of UltraPath for ESXi.

A.2.43 Viewing Critical Events

Function

The **show event** command is used to view critical events about UltraPath for ESXi.

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Format

show event [**-c** *count*]

Parameters

Keyword and Parameter	Description	Default Value
-c *count*	Printing number of critical events. The value ranges from 1 to 10,000.	1000

Level

User **root**

Usage Guidelines

None

Example

View critical events of UltraPath for ESXi that occurred on the current day.

```
~ # esxcli upadm show event
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
-------------------------------------
 SN           Array                    Type                      Time
Serverity        Description
 1     zhongjunsetsn1234567      Add path to disk       2014-11-29 23:35:49.668
info  Add a path to disk {0},Host Lun ID {1}.
 2     zhongjunsetsn1234567     Create virtual disk     2014-11-29 23:35:49.669
info  Create virtual disk {0}, WWN{63400a31000d844d00146f4a00000004}, SpecialLun
{thick lun}.
 3     zhongjunsetsn1234567 Register host to array    2014-11-29 23:35:49.671
info  Register host: UltraPath {8.1.34}, Interface {2.3}.
 4     zhongjunsetsn1234567      Add path to disk       2014-11-29 23:35:49.673
info  Add a path to disk {1},Host Lun ID {2}.
 5     zhongjunsetsn1234567     Create virtual disk     2014-11-29 23:35:49.674
info  Create virtual disk {1}, WWN{63400a31000d844d01143f590000000f}, SpecialLun
{thin lun}.
 6     zhongjunsetsn1234567      Add path to disk       2014-11-29 23:35:49.677
info  Add a path to disk {2},Host Lun ID {3}.
 7     zhongjunsetsn1234567     Create virtual disk     2014-11-29 23:35:49.678
info  Create virtual disk {2}, WWN{63400a31000d844d00146f8d00000005}, SpecialLun
{thick lun}.
 8     zhongjunsetsn1234567      Add path to disk       2014-11-29 23:35:49.680
info  Add a path to disk {3},Host Lun ID {4}.
 9     zhongjunsetsn1234567     Create virtual disk     2014-11-29 23:35:49.681
info  Create virtual disk {3}, WWN{63400a31000d844d00f5d9ed0000000d}, SpecialLun
{thick lun}.
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
-------------------------------------
```


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System Response

None

A.2.44 Refreshing the Preferred Controller

Function

The **start rebalancelun** command is used to check whether a LUN's working controller settings are optimum and implement a working controller trespass if necessary.

Format

start rebalancelun [**-a** *array-id* | **-v** *vlun-id*]

Parameters

Keyword and Parameter	Description	Default Value
-a *array-id*	ID of a storage system. You can run **show diskarray** without an ID to display all storage system IDs.	None
-v *vlun-id*	ID of a virtual LUN. You can run **show vlun** without an ID to display all virtual LUN IDs.	None

Level

User **root**

Usage Guidelines

NOTE

If a LUN's working controller settings are not optimum (for example, the working controller differs from the initially configured owning controller, resulting load imbalance), you can use this command to manually check the working controller and update the settings.

Example

```
~ # esxcli upadm start rebalancelun
Succeeded in executing the command.
```

System Response

None

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A.2.45 Converting APD to PDL

Function

The **set apdtopdl** command is used to convert APD to PDL.

Format

set apdtopdl -m *mode* **-t** *timeout*

Parameters

Parameter	Description	Default Value
-m *mode*	Enable or disable conversion from APD to PDL. Possible values are on or off, where: ● on: enables the conversion from APD to PDL. ● off: disables the conversion from APD to PDL.	The default value is off.
-t *timeout*	Timeout period of converting APD to PDL. The value ranges from 1 to 140, expressed in seconds.	10

Level

User **root**

Usage Guidelines

- When the conversion from APD to PDL is enabled and its timeout period is set to N seconds, all logical paths of the virtual LUNs become faulty. After this situation lasts for N seconds, UltraPath sets the corresponding SCSI device of the virtual LUNs to PDL.
- When APD to PDL is enabled, the disk status will be set to PDL if all paths are faulty. If VMs are using this disk whose status is PDL, the disk will not be removed automatically. After the paths are recovered, the disk cannot return to the normal status. After enabling APD to PDL, set **Disk.terminateVMOnPDLDefault** to **True** (for ESXi 5.0/5.1) or select **VMkernel.Boot.terminateVMOnPDL** (for ESXi 5.5 or later) in **Advanced Settings**.

Example

The conversion from APD to PDL is enabled, and its timeout period is set to 60 seconds.

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```
~ # esxcli upadm set apdtopdl -m on -t 60
Succeeded in executing the command.
```

System Response

None

A.2.46 Exporting Performance Statistics

Function

The **show iostat** command is used to export IOPS and performance statistics (IOPS, bandwidth and response time) of a storage system or a virtual LUN.

Format

show iostat [**-a** *array-id* | **-v** *vlun-id*] [**-f** *file_name* [**-r** *archive_time*] [**-d** *duration*]] [**-t** *type*]

Parameters

Parameter	Description	Default Value
-a *array-id*	Specifies IDs of storage systems. You can run **show diskarray** to obtain all storage system IDs. **NOTE** You can query a maximum of eight storage systems' performance statistics at a time. Use comas (,) to separate storage systems.	None
-v *vlun-id*	Specifies IDs of virtual LUNs. You can run **show vlun -t**=*all* to obtain all virtual LUN IDs. **NOTE** You can query a maximum of eight virtual LUNs' performance statistics at a time. Use comas (,) to separate virtual LUN IDs.	None

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Parameter	Description	Default Value
-f *file_name*	Specifies the saving path and name of the performance report. **NOTE** You must specify the saving path and name of the performance report. The system automatically adds suffix **.CSV** to the name.	None
-r *archive_time*	Specifies an interval for performance statistics collection. The value can be 5, 60, 120, 300, 1800, and 3600, expressed in seconds. **NOTE** This parameter is valid only when **file_name** is specified. The system writes performance data to the report at the specified time interval.	60
-d *duration*	Statistics duration The value ranges from 60 to 259,200, expressed in seconds. **NOTE** This parameter is valid only when **file_name** is specified. The system stops performance statistics after the specified duration.	900
-t *type*	View the virtual LUN information of a specific type. If the **type** parameter is not specified, common virtual LUN information will be queried. Possible values are all, hypermetro, and migration, where: ● all: all the virtual LUNs ● hypermetro: virtual HyperMetro LUNs ● migration: virtual migration LUNs	None

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Level

User **root**

Usage Guidelines

- If a performance report with the specified name exists in the path, the function of performance statistics is not supported. Delete the existing report or enter a new name. Then export the report.
- If the remaining space of the directory to save the report is smaller than 180 MB, the performance report cannot be exported.
- The performance statistics report file you exported can only be saved in the user file system space. The method for confirming path information about user file systems:

  For example, the report is exported to **datastore1 (11)**. The path is **/vmfs/volumes/52c6da5e-f7c5da8a-afa3-842b2b0b0239**, a combination of **52c6da5e-f7c5da8a-afa3-842b2b0b0239** (the numbers after **->**) and **/vmfs/volumes/**.

```
[root@localhost:~] ls -l /vmfs/volumes/
total 10241
drwxr-xr-x    1 root     root             8 Jan  1  1970
271d4976-4a1ce895-9e7c-c6867647c80e
drwxr-xr-t    1 root     root          2940 Nov 19 21:10 52c6da5e-f7c5da8a-
afa3-842b2b0b0239
lrwxr-xr-x    1 root     root            35 Nov 21 18:19 datastore1 (11) ->
52c6da5e-f7c5da8a-afa3-842b2b0b0239
drwxrwxrwx  6 root     root             8 Oct 19  2016 f6bbdbfb-c9b83c6d
lrwxr-xr-x    1 root     root            35 Nov 21 18:19 storage1 (2) ->
562aa923-a0622054-1f30-842b2b0b0237
lrwxr-xr-x    1 root     root            35 Nov 21 18:19 storage2 (2) ->
562aa925-7e18d762-4a75-842b2b0b0237
lrwxr-xr-x    1 root     root            35 Nov 21 18:19 storage3 (2) ->
562aa927-7ecf10cb-9fa2-842b2b0b0237
lrwxr-xr-x    1 root     root            35 Nov 21 18:19 storage4 (2) ->
562aa929-8482177e-2fd0-842b2b0b0237
lrwxr-xr-x    1 root     root            35 Nov 21 18:19 storage5 (2) ->
562aa92c-88f3e822-25c8-842b2b0b0237
lrwxr-xr-x    1 root     root            35 Nov 21 18:19 storage6 (2) ->
562aa92e-a1820b61-d7e8-842b2b0b0237
lrwxr-xr-x    1 root     root            35 Nov 21 18:19 storage7 (2) ->
562aa931-ccf63bfe-10a4-842b2b0b0237
lrwxr-xr-x    1 root     root            35 Nov 21 18:19 storage8 (2) ->
562aa933-1bf9f203-c746-842b2b0b0237
lrwxr-xr-x    1 root     root            17 Nov 21 18:19 vaai -> f6bbdbfb-
c9b83c6d
lrwxr-xr-x    1 root     root            17 Nov 21 18:19 vaai2 ->
a72f0228-2a9766d9
```

Example

- Export the performance statistics report for storage system **0**, and specify **/vmfs/volumes/52c6da5e-f7c5da8a-afa3-842b2b0b0239** as the directory and **record** as the report name to save the report.

```
[root@localhost:~] esxcli upadm show iostat -a 0 -f /vmfs/volumes/52c6da5e-
f7c5da8a-afa3-842b2b0b0239/record
The performance record is running in background.
```

- Export the performance statistics report for virtual LUN **0**, and specify **/vmfs/volumes/52c6da5e-f7c5da8a-afa3-842b2b0b0239** as the directory and **record-lun** as the report name to save the report.

```
[root@localhost:~] esxcli upadm show iostat -v 0 -f /vmfs/volumes/52c6da5e-
f7c5da8a-afa3-842b2b0b0239/record-lun
The performance record is running in background.
```


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System Response

The system generates a performance report with suffix **.CSV** in the specified path.

A.2.47 Disabling the Function of Exporting the Performance Statistics Report

Function

clear iostatprocess is used to disable the function of exporting the performance statistics report on UltraPath.

Format

clear iostatprocess

Parameters

None

Level

User **root**

Usage Guidelines

None

Example

Disable the function of exporting the performance statistics report on UltraPath.

```
[root@localhost:~] esxcli upadm clear iostatprocess
Succeeded in executing the command.
```

System Response

None

A.2.48 Enabling and Disabling the Performance Data Record Function

Function

set performancerecord is used to enable and disable the performance data record function.

Format

set performancerecord -m *mode* **-p** *file-path* [**-d** *duration*]

Parameters

Parameter	Description	Default Value
-m *mode*	Performance data record function The value can be **on** or **off**. ● on: Enable the performance data record function. ● off: Disable the performance data record function.	off
-p *file-path*	Specify a directory for saving the performance data file. ● Do not specify the system directory for saving the performance data file. ● The remaining space of the specified directory must be greater than 180 MB.	None
-d *duration*	Time during which the performance data record function works The value ranges from 0 to 8,760, expressed in hours. **0** indicates that the performance data record function works permanently.	0

Level

User **root**

Usage Guidelines

- You are not required to specify **duration** when disabling the performance data record function.
- If the size of a specified path is smaller than 180 MB, the performance data record function is automatically disabled.
- When the size of the performance data file reaches 30 MB, the system automatically dumps it to the **perf_record** directory which is in the same directory as the performance data file.

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Example

- Enable the performance data record function, and specify **/vmfs/volumes/datastore** as the directory for saving the performance data file, and set **duration** to 24 hours.
```
~ # esxcli upadm set performancerecord -m on -p /vmfs/volumes/datastore -d 24
Succeeded in executing the command.
```
- Disable the performance data record function.
```
~ # esxcli upadm set performancerecord -m off
Succeeded in executing the command.
```

System Response

None

A.3 LUN Management Commands

LUN management commands include commands for viewing storage system information and virtual disk information.

NOTE

If the storage array name or LUN name on the storage array is Chinese and the encoding format of the login tool does not support Chinese characters, UltraPath for ESXi will display marbled characters after command execution. If this occurs, change the encoding format of the login tool so that Chinese characters are supported.

A.3.1 Commands for Configuring and Managing HyperMetro

This topic describes how to configure the HyperMetro working mode and manage HyperMetro.

A.3.1.1 Setting the HyperMetro Working Mode

Function

The **set hypermetro workingmode** command is used to set the HyperMetro working mode.

Format

set hypermetro workingmode -m *mode* **-p primary_array_id** [**-l** *vlun_id*]

Parameters

Parameter	Description	Default Value
workingmode={ *priority* | *balance* }	HyperMetro working mode. Possible values are priority and balance, where: ● priority: primary array mode ● balance: load balance mode	priority **NOTE** In default configurations, namely manual configuration has not been performed, the system compares the array SNs and selects the largest numbered array as the preferred one.

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Parameter	Description	Default Value
primary_array_id=*ID*	ID of the primary array. You can run **show diskarray** to display all array IDs. **NOTE** ● In priority mode, the primary array indicates the array that delivers I/O first. ● In balance mode, the primary array indicates the array where the first fragment range resides. ● If an array is connected to multiple hosts, the array ID varies on different hosts. Use the array SN to determine whether the arrays queried on different hosts are the same.	None
-l *vlun_id*	ID of an virtual HyperMetro LUN. Run the **show vlun type**=*hypermetro* command to obtain the IDs of the virtual HyperMetro LUNs.	None

Level

User **root**

Usage Guidelines

NOTE

- Setting the HyperMetro working mode of a specified virtual LUN with a higher priority than that of storage systems. If the HyperMetro working mode of a virtual LUN has been set, its working mode remains unchanged after the HyperMetro working mode of storage systems is set.
- When the working mode is set to load balance mode, UltraPath chooses to deliver a specific array based on the start address of I/Os, fragment size, and priority array.

  For example, if the fragment size is 128 MB, then the I/Os with start addresses from 0 MB to 128 MB are delivered to the priority array, and the I/Os with start addresses from 128 MB to 256 MB are delivered to non-priority arrays. When the working mode is set to primary array mode, UltraPath delivers I/Os to the priority array. UltraPath will deliver I/Os to non-priority arrays only when the primary array encounters a fault.

- Run the **set hypermetro workingmode -m** { *priority* | *balance* } **-p primary_array_id** command to set the HyperMetro working mode for all storage systems.
- Run the **set hypermetro workingmode -m** { *priority* | *balance* } **-p primary_array_id -l** *vlun_id* command to set the HyperMetro working mode of a specific virtual LUN.

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Example

- Set the HyperMetro working mode to **primary array mode** for all storage systems, and set the storage systems whose ID is **0**, to the primary array.
```
~ # esxcli upadm set hypermetro workingmode -m priority -p 0
Succeeded in executing the command.
```
- Set the HyperMetro working mode of the virtual LUNs whose ID is **0**, to **primary array mode**, and set the storage systems whose ID is **0**, to the primary array.
```
~ # esxcli upadm set hypermetro workingmode -m priority -p 0 -l 0
Succeeded in executing the command.
```

System Response

None

A.3.1.2 Setting the Size of a HyperMetro Fragment

Function

The **set hypermetro split_size** command is used to set the fragment size when HyperMetro cross-array load balancing is applied.

Format

set hypermetro splitsize -s *size* [**-l** *vlun_id*]

Parameters

Parameter	Description	Default Value
-s *size*	Fragment size. The value ranges from 512 bytes to 1 GB. The unit is byte. **NOTE** The value must be an integer multiple of 512 and a power of 2.	128 MB
-l *vlun_id*	ID of an virtual HyperMetro LUN. Run the **show vlun -t** *hypermetro* command to obtain the IDs of the virtual HyperMetro LUNs.	None

Level

User **root**

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Usage Guidelines

- Run the **set hypermetro splitsize -s** *size* command to set the HyperMetro fragment size for all storage systems.
- Run the **set hypermetro splitsize -s** *size* **-l** *vlun_id* command to set the HyperMetro fragment size of the virtual LUNs.

Example

- Set the HyperMetro fragment size to 128 MB for all storage systems.
```
~ # esxcli upadm set hypermetro splitsize -s 128M
Succeeded in executing the command.
```
- Set the HyperMetro fragment size of the virtual LUNs whose ID is **0** to 128 MB.
```
~ # esxcli upadm set hypermetro splitsize -s 128M -l 0
Succeeded in executing the command.
```

System Response

None

A.3.1.3 Setting Load Balance Mode for a HyperMetro System

Function

You can run the **set hypermetro loadbalancemode** command to set load balance mode for HyperMetro configured across arrays.

Format

set hypermetro loadbalancemode -m *mode* [**-l** *vlun_id*]

Parameters

Parameter	Description	Default Value
-m *mode*	Load balance mode for a HyperMetro system Its value can be **split-size** or **round-robin**. Parameter descriptions are as follows: ● split-size: splitting mode across arrays. ● round-robin: round-robin mode across arrays. **NOTE** ● Load balance mode of a HyperMetro storage system only takes effect when the HyperMetro working mode is set to balance.	split-size

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Parameter	Description	Default Value
-l *vlun_id*	Specifies the ID of a virtual HyperMetro LUN. Run the **show vlun type** =*hypermetro* command to obtain ID information about HyperMetro virtual LUNs.	None

Level

root user

Usage Guidelines

- Descriptions about load balance mode for a HyperMetro system are as follows:
  - If split-size mode is selected, UltraPath delivers I/Os to a specific storage array based on the start addresses of I/Os, the size of slices that are set, and the preferred storage array. If the fragment size is 128 MB, the I/Os with start addresses from 0 MB to 128 MB are delivered to the preferred storage array, and the I/Os with start addresses from 128 MB to 256 MB are delivered to the non-preferred storage array.
  - If round-robin mode is selected, UltraPath delivers I/Os to two storage systems in turn.
- Run the **set hypermetro loadbalancemode -m** *mode* command to set the HyperMetro working mode for all storage systems.
- Run the **set hypermetro loadbalancemode -m** *mode* **-l** *vlun_id* command to set the HyperMetro working mode of a specific virtual LUN.

Example

- Set HyperMetro load balance mode of all storage systems to **split-size**.
```
UltraPath CLI #2 >set hypermetro loadbalancemode=split-size
Succeeded in executing the command
```
- Set HyperMetro load balance mode of virtual LUNs with an ID of **0** to **split-size**.
```
UltraPath CLI #3 > set hypermetro loadbalancemode=split-size vlun_id=0
Succeeded in executing the command.
```

System Response

None

A.3.2 Querying Storage System Information

Function

The **show diskarray** command is used to query information about a specified or all storage systems connected to the application server.

Format

show diskarray [**-a** *array-id* [**-v**]]

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Parameters

Keyword and Parameter	Description	Default Value
-a *array-id*	ID of a storage system. You can run **show diskarray** without an ID to display all storage system IDs.	None
-v	Viewing details about a specified storage system. **NOTE** Parameter-**v** can display details about a specified storage system only when it is used with parameter **-a**.	None

Level

User **root**

Usage Guidelines

- Run **show diskarray** to view information about all storage systems connected to the application server.
- Run **show diskarray -a** *array-id* to view information about a specified storage system.
- Run **show diskarray -a** *array-id* **-v** to view detailed configuration information about a specified storage system.

Example

- Run the following command to query information about all storage systems connected to the application server:

```
~ # esxcli upadm show diskarray
--------------------------------------------------------------------------------
--------
 Array ID           Name                  Array SN        Vendor Name
Product Name
    0           HUAWEI S5300        2102315401Z083000004    HUAWEI
S5300
    1      SN_210235G6EDZ0C2000001  210235G6EDZ0C2000001    HUASY
S5600T
--------------------------------------------------------------------------------
--------
```

- Run the following command to view information about the storage system whose ID is **1**:

```
~ # esxcli upadm show diskarray -a 1
=======================================================
                  Array#1 Information
=======================================================
Name           : SN_210235G6EDZ0C2000001
Array SN       : 210235G6EDZ0C2000001
Vendor Name    : HUASY
Product Name : S5600T
Controller 0A:
       Status  : Enable
```


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```
       LunCount: 4
       PathInfo:
                Path1: Normal
Controller 0B:
       Status  : Enable
       LunCount: 4
       PathInfo:
                Path2: Normal

=======================================================
```

- Run the following command to view detailed configuration information about the storage system whose ID is **1**:

```
~ # esxcli upadm show diskarray -a 1 -v
=======================================================
                  Array#1 Information
=======================================================
Name           : SN_210235G6EDZ0C2000001
Array SN       : 210235G6EDZ0C2000001
Vendor Name    : HUASY
Product Name : S5600T
Controller 0A:
       Status  : Enable
       LunCount: 4
       PathInfo:
                Path1: Normal
Controller 0B:
       Status  : Enable
       LunCount: 4
       PathInfo:
                Path2: Normal

Working Mode : load balancing within controller
LUN Trespass : on
LoadBalance Mode          : min-queue-depth
Loadbanlance io threshold : 1
Max io retry timeout      : 1800
=======================================================
```

System Response

The following table explains some parameters in the command output:

Parameter	Description	Default Value
Name	Name of the storage system.	None
Array SN	Serial No. of the storage system.	None
Vendor Name	Vendor of the storage system.	None
Product Name	Model of the storage system.	None
Working Mode	Working mode of the UltraPath.	1
LUN Trespass	Enabling or disabling LUN trespass.	Enable

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Parameter	Description	Default Value
LoadBalance Mode	Policies of load balancing implemented by the UltraPath. The value can be:	min-queue-depth
Loadbanlance io threshold	Number of consecutive I/Os for load balancing.	1
Max io retry timeout	Maximum I/O retry timeout.	1800
Controller	Name of the controller. **NOTE** ● If **Remote** information is displayed after the controller name, the controller is a remote controller. ● You can only view the information about a maximum of eight paths on one controller.	None

A.3.3 Viewing Virtual LUN Information

Function

The **show vlun** command is used to query information about a specified LUN or all LUNs mapped from a storage system to an application server.

Format

show vlun [**-l** *vlun-id* [**-v**] | **-a** *array-id* | **-d** diskname [**-v**] | **-t** *type*]

Parameters

Keyword and Parameter	Description	Default Value
-a *array-id*	ID of a storage system. You can run **show diskarray** without an ID to display all storage system IDs.	None

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Keyword and Parameter	Description	Default Value
-l *vlun-id*	ID of a virtual LUN. You can run **show vlun** without an ID to display all virtual LUN IDs. **NOTE** There are two kinds of values: ● **-l** *ID*: ID of a single virtual LUN. ● **-l** *ID1,ID2...*: IDs of multiple virtual LUNs which are not necessarily related. You can query a maximum of eight virtual LUNs' performance statistics at a time.	None
-d *diskname*	Drive letter name of a virtual LUN. **NOTE** You can run this command to view information about only one virtual LUN at a time.	None
-v	Viewing path information about a virtual LUN. **NOTE** Parameter **-v** can be used to view detailed information about a specified virtual LUN only when it is used together with either parameter **-l** or **-d**.	None
-t *type*	View the virtual LUN information of a specific type. If the **-t** parameter is not specified, common virtual LUN information will be queried. Possible values are all, hypermetro, migration, and pe, where: ● all: all virtual LUNs ● hypermetro: virtual HyperMetro LUNs ● migration: virtual migration LUNs ● pe: PE LUN	None

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Level

User **root**

Usage Guidelines

- Run **show vlun** to query information about all common virtual LUNs mounted on the application server.
- Run **show vlun -a** *array-id* to view common virtual LUN information about a specified storage system.
- Run **show vlun -l** *vlun-id* to view information about a specified common virtual LUN.
- Run **show vlun -d** *diskname* to view information about a specified common virtual LUN.
- Run **show vlun -l** *vlun-id* **-v** to view details configuration information about a specified common virtual LUN.
- Run **show vlun -d** *diskname* **-v** to view details configuration information about a specified common virtual LUN.
- Run **show vlun -t** *all* to query information about all virtual LUNs mounted on the application server.
- Run **show vlun -a** *array-id* **-t** *all* to view all virtual LUN information about a specified storage system.
- Run **show vlun -t** *hypermetro* to query information about all virtual HyperMetro LUNs mounted on the application server.
- Run **show vlun -l** *vlun-id* **-t** *all* to view information about a specified virtual LUN.
- Run **show vlun -d** *diskname* **-t** *all* to view information about a specified virtual LUN.
- Run **show vlun -l** *vlun-id* **-t** *hypermetro* to view information about a specified virtual HyperMetro LUN.
- Run **show vlun -d** *diskname* **-t** *hypermetro* to view information about a specified virtual HyperMetro LUN.

Example

- View information about all common virtual LUNs.

```
~ # esxcli upadm show vlun
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
---------------------------------------------
 Vlun ID                  Disk                      Name
Lun WWN                Status  Capacity  Ctrl(Own/Work)       Array
Name        Dev Lun ID  No. of Paths(Available/Total)
    1     naa.64846fb1008ca15f2015a48700000091  test_210_0000
64846fb1008ca15f2015a48700000091  Normal 1.00GB       0B/0B
Huawei.Storage217.210     145                   2/2
    2     naa.64846fb1008ca15f2015a4c500000092  test_210_0001
64846fb1008ca15f2015a4c500000092  Normal 1.00GB       0A/0A
Huawei.Storage217.210     146                   2/2
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
---------------------------------------------
```

- View common virtual LUN information about the storage system whose ID is **0**.

```
~ # esxcli upadm show vlun -a 0
-----------------------------------------------------------------------------
-----------------------------------------------------------------------------
---------------------------------------------
 Vlun ID                  Disk                      Name
```

```
Lun WWN               Status  Capacity  Ctrl(Own/Work)       Array
Name        Dev Lun ID  No. of Paths(Available/Total)
    1     naa.64846fb1008ca15f2015a48700000091  test_210_0000
64846fb1008ca15f2015a48700000091  Normal 1.00GB       0B/0B
Huawei.Storage217.210     145                   2/2
    2     naa.64846fb1008ca15f2015a4c500000092  test_210_0001
64846fb1008ca15f2015a4c500000092  Normal 1.00GB       0A/0A
Huawei.Storage217.210     146                   2/2
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
----------------------------------------------
```

- View details about the common virtual LUN whose ID is **1**.

```
~ # esxcli upadm show vlun -l 1
=======================================================
                  VLUN#1 Information
=======================================================
Disk                  : naa.64846fb1008ca15f2015a48700000091
Name                  : test_210_0000
Status                : Normal
Capacity              : 1.00GB
Driver                : Vendor-specific(DEFAULT)
Product Name          : XSG1
Vendor Name           : HUAWEI
Owning Controller     : 0B
Working Controller    : 0B
Num of Paths          : 2
LUN WWN               : 64846fb1008ca15f2015a48700000091
Array Name            : Huawei.Storage217.210
Controller 0A
    Path 0 [vmhba33:C1:T38:L1]  : Normal
    Path 4 [vmhba33:C1:T39:L1]  : Normal
Dev Lun ID        : 145
-------------------------------------------------------
```

- View information about the virtual LUN whose drive letter name is **naa.64846fb1008ca15f2015a48700000091**.

```
~ # esxcli upadm show vlun -d naa.64846fb1008ca15f2015a48700000091
=======================================================
                  VLUN#1 Information
=======================================================
Disk                  : naa.64846fb1008ca15f2015a48700000091
Name                  : test_210_0000
Status                : Normal
Capacity              : 1.00GB
Driver                : Vendor-specific(DEFAULT)
Product Name          : XSG1
Vendor Name           : HUAWEI
Owning Controller     : 0B
Working Controller    : 0B
Num of Paths          : 2
LUN WWN               : 64846fb1008ca15f2015a48700000091
Array Name            : Huawei.Storage217.210
Controller 0A
    Path 0 [vmhba33:C1:T38:L1]  : Normal
    Path 4 [vmhba33:C1:T39:L1]  : Normal
Dev Lun ID        : 145
-------------------------------------------------------
```

- View details configuration information about the common virtual LUN whose ID is **1**.

```
~ # esxcli upadm show vlun -l 1 -v
=======================================================
                  VLUN#1 Information
=======================================================
Disk                  : naa.64846fb1008ca15f2015a48700000091
Name                  : test_210_0000
Status                : Normal
Capacity              : 1.00GB
Driver                : Vendor-specific(DEFAULT)
Product Name          : XSG1
```


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```
Vendor Name           : HUAWEI
Owning Controller     : 0B
Working Controller    : 0B
Num of Paths          : 2
LUN WWN               : 64846fb1008ca15f2015a48700000091
Array Name            : Huawei.Storage217.210
Controller 0A
    Path 0 [vmhba33:C1:T38:L1]  : Normal
    Path 4 [vmhba33:C1:T39:L1]  : Normal
Working Mode      : load balancing within controller
LUN Trespass      : on
LoadBalance Mode  : min-queue-depth
Loadbanlance io threshold : 1
Max io retry timeout      : 1800
Dev Lun ID        : 145
-------------------------------------------------------
```

- View details configuration information about the common virtual LUN whose drive letter name is **naa.64846fb1008ca15f2015a48700000091**.

```
~ # esxcli upadm show vlun -d naa.64846fb1008ca15f2015a48700000091 -v
=======================================================
                  VLUN#1 Information
=======================================================
Disk                  : naa.64846fb1008ca15f2015a48700000091
Name                  : test_210_0000
Status                : Normal
Capacity              : 1.00GB
Driver                : Vendor-specific(DEFAULT)
Product Name          : XSG1
Vendor Name           : HUAWEI
Owning Controller     : 0B
Working Controller    : 0B
Num of Paths          : 2
LUN WWN               : 64846fb1008ca15f2015a48700000091
Array Name            : Huawei.Storage217.210
Controller 0A
    Path 0 [vmhba33:C1:T38:L1]  : Normal
    Path 4 [vmhba33:C1:T39:L1]  : Normal
Working Mode      : load balancing within controller
LUN Trespass      : on
LoadBalance Mode  : min-queue-depth
Loadbanlance io threshold : 1
Max io retry timeout      : 1800
Dev Lun ID        : 145
-------------------------------------------------------
```

- View information about all virtual LUNs.

```
~ # esxcli upadm show vlun -t all
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
-----------------------------------------------
 Vlun ID                  Disk                       Name
Lun WWN               Status  Capacity  Ctrl(Own/Work)       Array
Name        Dev Lun ID  No. of Paths(Available/Total)
    0     naa.64846fb1008ca15f1460f8b100000076 lm_test0000
64846fb1008ca15f1460f8b100000076  Normal 1.00GB       0A/0B
Huawei.Storage217.210     118                   1/1
    1     naa.64846fb1008ca15f1460f8e400000077 lm_test0001
64846fb1008ca15f1460f8e400000077  Normal 1.00GB       0B/0B
Huawei.Storage217.210     119                   1/1
    2     naa.64846fb1008ca15f1460f92300000078 lm_test0002
64846fb1008ca15f1460f92300000078  Normal 1.00GB       0A/0B
Huawei.Storage217.210     120                   1/1
    3     naa.64846fb1008ca15f14610e9400000079 lm_test_0003
64846fb1008ca15f14610e9400000079  Normal 2.00GB       0B/0B
Huawei.Storage217.210     121                   1/1
    4     naa.64846fb1008ca15f14828bcd0000007a lm_test_0004
64846fb1008ca15f14828bcd0000007a  Normal 5.00GB       0A/0B
Huawei.Storage217.210     122                   1/1
    5     naa.63237361003130411fdda86c00000138  eDevLUN143_001
```


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```
63237361003130411fdda86c00000138  Normal 1.00GB       0B/0B
Huawei.Storage217.210     142                   1/1
    6     naa.63237361003130411fdda89600000139  eDevLUN143_002
63237361003130411fdda89600000139  Normal 1.00GB       0A/0B
Huawei.Storage217.210     143                   1/1
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
----------------------------------------------
```

- View all virtual LUN information about the storage system whose ID is **0**.

```
~ # esxcli upadm show vlun -a 0 -t all
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
----------------------------------------------
 Vlun ID                  Disk                       Name
Lun WWN               Status  Capacity  Ctrl(Own/Work)       Array
Name        Dev Lun ID  No. of Paths(Available/Total)
    0     naa.64846fb1008ca15f1460f8b100000076 lm_test0000
64846fb1008ca15f1460f8b100000076  Normal 1.00GB       0A/0B
Huawei.Storage217.210     118                   1/1
    1     naa.64846fb1008ca15f1460f8e400000077 lm_test0001
64846fb1008ca15f1460f8e400000077  Normal 1.00GB       0B/0B
Huawei.Storage217.210     119                   1/1
    2     naa.64846fb1008ca15f1460f92300000078 lm_test0002
64846fb1008ca15f1460f92300000078  Normal 1.00GB       0A/0B
Huawei.Storage217.210     120                   1/1
    3     naa.64846fb1008ca15f14610e9400000079 lm_test_0003
64846fb1008ca15f14610e9400000079  Normal 2.00GB       0B/0B
Huawei.Storage217.210     121                   1/1
    4     naa.64846fb1008ca15f14828bcd0000007a lm_test_0004
64846fb1008ca15f14828bcd0000007a  Normal 5.00GB       0A/0B
Huawei.Storage217.210     122                   1/1
    5     naa.63237361003130411fdda86c00000138  eDevLUN143_001
63237361003130411fdda86c00000138  Normal 1.00GB       0B/0B
Huawei.Storage217.210     142                   1/1
    6     naa.63237361003130411fdda89600000139  eDevLUN143_002
63237361003130411fdda89600000139  Normal 1.00GB       0A/0B
Huawei.Storage217.210     143                   1/1
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
----------------------------------------------
```

- View information about all virtual HyperMetro LUNs.

```
~ # esxcli upadm show vlun -t hypermetro
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
----------------------------------------------
 Vlun ID                  Disk                       Name                  Lun
WWN               Status  Capacity  Ctrl(Own/Work)       Array Name
Dev Lun ID  No. of Paths(Available/Total)
    0     naa.64846fb1008ca15f1460f8b100000076  lm_test0000
64846fb1008ca15f1460f8b100000076  Normal 1.00GB       0A/0B
Huawei.Storage217.210     118                   1/1
    1     naa.64846fb1008ca15f1460f8e400000077  lm_test0001
64846fb1008ca15f1460f8e400000077  Normal 1.00GB       0B/0B
Huawei.Storage217.210     119                   1/1
    4     naa.64846fb1008ca15f14828bcd0000007a  lm_test_0004
64846fb1008ca15f14828bcd0000007a  Normal 5.00GB       0A/0B
Huawei.Storage217.210     122                   1/1
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
----------------------------------------------
```

- View details about the virtual LUN whose ID is **2**.

```
~ # esxcli upadm show vlun -l 2 -t all
=====================================================
                   VLUN#2 Information
=====================================================
Disk                  : naa.64846fb1008ca15f1460f92300000078
Name                  : lm_test0002
Status                : Normal
```

```
Capacity              : 1.00GB
Driver                : Vendor-specific(DEFAULT)
Product Name          : XSG1
Vendor Name           : HUAWEI
Owning Controller     : 0A
Working Controller    : 0B
Num of Paths          : 1
LUN WWN               : 64846fb1008ca15f1460f92300000078
Array Name            : Huawei.Storage217.210
Controller 0B
    Path 0 [vmhba4:C0:T7:L4]  : Normal
Dev Lun ID        : 120
-------------------------------------------------------
```

- View information about the virtual LUN whose drive letter name is **naa.64846fb1008ca15f1460f92300000078**.

```
~ # esxcli upadm show vlun -d naa.64846fb1008ca15f1460f92300000078 -t all
=======================================================
                  VLUN#2 Information
=======================================================
Disk                  : naa.64846fb1008ca15f1460f92300000078
Name                  : lm_test0002
Status                : Normal
Capacity              : 1.00GB
Driver                : Vendor-specific(DEFAULT)
Product Name          : XSG1
Vendor Name           : HUAWEI
Owning Controller     : 0A
Working Controller    : 0B
Num of Paths          : 1
LUN WWN               : 64846fb1008ca15f1460f92300000078
Array Name            : Huawei.Storage217.210
Controller 0B
    Path 0 [vmhba4:C0:T7:L4]  : Normal
Dev Lun ID        : 120
-------------------------------------------------------
```

- View details about the virtual HyperMetro LUN whose ID is **2**.

```
~ # esxcli upadm show vlun -l 2 -t hypermetro
=======================================================
                  VLUN#8 Information
=======================================================
Disk                      : naa.64846fb1008ca15f1460f8b100000076
Aggregation Type          : Hyper Metro
Aggregation Specific Attribution
    WorkingMode             : read write within primary array
    Primary Array SN        : SN987654321076543210
Aggregation Member#0 Infomation
    Name              : lm_test0000
    Status            : Fault
    Capacity          : 1.00GB
    Aggregation Specific Attribution : N/A
    LUN WWN           : 64846fb1008ca15f1460f8b100000076
    Array Name        : Huawei.Storage217.210
    Array SN          : SN987654321076543210
    Driver            : Vendor-specific(DEFAULT)
    Product Name      : XSG1
    Vendor Name       : HUAWEI
    Reservation       : 0
    Queued I/O        : 0
    Owning Controller : 0A
    Working Controller: 0B
    Num of Paths      : 2
    Controller 0A
        Path 6 [vmhba3:C0:T7:L2]  : Fault
    Controller 0B
        Path 5 [vmhba3:C0:T8:L2]  : Fault
Aggregation Member#1 Infomation
    Name              : lm_test_74_0000
    Status            : Normal
```


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```
    Capacity          : 1.00GB
    Aggregation Specific Attribution : N/A
    LUN WWN           : 64846fb1008ca15f1460f8b100000076
    Array Name        : Storage217_74
    Array SN          : 210235980510E8000015
    Driver            : Vendor-specific(DEFAULT)
    Product Name      : XSG1
    Vendor Name       : HUAWEI
    Reservation       : 0
    Queued I/O        : 0
    Owning Controller : 0B
    Working Controller: 0A
    Num of Paths      : 1
    Controller 0A
        Path 4 [vmhba3:C0:T6:L1]  : Normal
-------------------------------------------------------
```

- View details about the virtual HyperMetro LUN whose drive letter name is **naa.64846fb1008ca15f1460f8b100000076**.

```
~ # esxcli upadm show vlun -d naa.64846fb1008ca15f1460f8b100000076 -t
hypermetro
=======================================================
                  VLUN#8 Information
=======================================================
Disk                      : naa.64846fb1008ca15f1460f8b100000076
Aggregation Type          : Hyper Metro
Aggregation Specific Attribution
    WorkingMode             : read write within primary array
    Primary Array SN        : SN987654321076543210
Aggregation Member#0 Infomation
    Name              : lm_test0000
    Status            : Fault
    Capacity          : 1.00GB
    Aggregation Specific Attribution : N/A
    LUN WWN           : 64846fb1008ca15f1460f8b100000076
    Array Name        : Huawei.Storage217.210
    Array SN          : SN987654321076543210
    Driver            : Vendor-specific(DEFAULT)
    Product Name      : XSG1
    Vendor Name       : HUAWEI
    Reservation       : 0
    Queued I/O        : 0
    Owning Controller : 0A
    Working Controller: 0B
    Num of Paths      : 2
    Controller 0A
        Path 6 [vmhba3:C0:T7:L2]  : Fault
    Controller 0B
        Path 5 [vmhba3:C0:T8:L2]  : Fault
Aggregation Member#1 Infomation
    Name              : lm_test_74_0000
    Status            : Normal
    Capacity          : 1.00GB
    Aggregation Specific Attribution : N/A
    LUN WWN           : 64846fb1008ca15f1460f8b100000076
    Array Name        : Storage217_74
    Array SN          : 210235980510E8000015
    Driver            : Vendor-specific(DEFAULT)
    Product Name      : XSG1
    Vendor Name       : HUAWEI
    Reservation       : 0
    Queued I/O        : 0
    Owning Controller : 0B
    Working Controller: 0A
    Num of Paths      : 1
    Controller 0A
        Path 4 [vmhba3:C0:T6:L1]  : Normal
-------------------------------------------------------
```

System Response

The following table explains some parameters in the command output:

Parameter	Description	Default Value
Disk	Name of the disk that corresponds to the virtual LUN on an ESX system.	None
Name	Name of the virtual LUN. **NOTE** The name is specified when the LUN is created on its storage array.	None
Status	Status of the virtual LUN. Possible values are as follows: ● Normal: The virtual LUN is normal. ● Fault: The virtual LUN is faulty. ● Degraded: The virtual LUN is degraded. ● Unavailable: The virtual LUN is unavailable. **NOTE** ● If the LUN on the array is in **Fault** state while the virtual LUN on the host is in **Available** state (viewed by using UltraPath), the virtual LUN can be accessed by the host. ● If you remap a LUN from the storage array to a host but do not rescan LUNs on the host, the mapping between the LUN on the storage array and the virtual LUN changes and the status of the virtual LUN is **Unavailable**.	None
Capacity	Capacity of the virtual LUN.	None
Product Name	Model of the storage system.	None
Vendor Name	Vendor of the storage system.	None

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Parameter	Description	Default Value
Num of Paths	Number of logical paths. **NOTE** You can only view the information about a maximum of eight paths on one controller.	None
LUN WWN	WWN of the virtual LUN.	None
Dev Lun ID	ID of the storage system LUN corresponding to the virtual LUN.	None
Aggregation Type	Type of the aggregation LUN. Possible values are as follows: ● Hyper Metro: virtual HyperMetro LUNs ● Migration: virtual migration LUNs.	None
Aggregation Specific Attribution	Attribution of the aggregation LUN. For virtual HyperMetro LUNs: ● WorkingMode: working mode for virtual HyperMetro LUNs. ● Primary Array SN: SN of the primary array. For migration virtual LUNs: ● IO Direction: switch I/O to the target array or source array. ● Rollback: enable or disable automatic I/O switchback.	None
No. of Paths(Available/Total)	Number of available logical paths of virtual LUNs/Total number of logical paths of virtual LUNs. **NOTE** ● **Available**: Indicates number of available logical paths of virtual LUNs. ● **Total**: Indicates total number of logical paths of virtual LUNs.	None

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A.4 UltraPath Other Commands

Introduce UltraPath other commands that are excluded in above.

A.4.1 Executing a Non-disruptive Upgrade of UltraPath

Function

The **install.sh** command is used to execute a non-disruptive upgrade of UltraPath.

Format

install.sh -ndu [**ndu_free_disk_space**=*zzz*]

Parameters

Keyword and Parameter	Description	Default Value
-ndu	Checks whether an non-disruptive upgrade can be implemented.	None
ndu_free_disk_space	Set the minimum system disk capacity for an non-disruptive upgrade. The unit is MB.	10

Level

User **root**

Usage Guidelines

Run the command to execute a non-disruptive upgrade of UltraPath.

Example

None

System Response

None

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A.4.2 Viewing the Status of the Host Alarm Push Switch

Function

show alarmenable is used to view the status of the host alarm push switch.

Format

show alarmenable

Parameters

None

Level

User **root**

Usage Guidelines

None

Example

View the alarm push switch for UltraPath:

```
~ # esxcli upadm show alarmenable
alarmenable: on
```

System Response

None

A.4.3 Setting the Switch of Host Alarm Push

Function

set alarmenable is used to set the switch of host alarm push.

Format

set alarmenable -m *mode*

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Parameters

Parameter	Description	Default Value
-m *mode*	Alarm push switch for UltraPath. The value can be **on** or **off**, where: ● **on**: Enables the alarm push switch. ● **off**: Disables the alarm push switch.	on

Level

User **root**

Usage Guidelines

- When the alarm push switch is enabled, UltraPath will detect the single-controller connectivity, link down, and link degrade, and send the link status to the storage system through alarms.
- When the alarm push switch is disabled, the alarms reported by UltraPath to arrays cannot be cleared on the arrays. Therefore, disable the switch cautiously.

Example

Disable the alarm push switch for UltraPath:

```
~ # esxcli upadm set alarmenable -m off
Succeeded in executing the command.
Please clear the alarm in the array manually, thanks.
```

System Response

None

A.4.4 Viewing the Status of the UltraPath Link Degrade Switch

Function

show pathreliabilityenable is used to view the status of the UltraPath link degrade switch.

Format

show pathreliabilityenable

Parameters

None

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Level

root

Usage Guidelines

None

Example

View the status of the UltraPath link degrade switch:

```
~ # esxcli upadm show pathreliabilityenable
path reliabilityenable: on
```

System Response

None

A.4.5 Setting the Switch for UltraPath Link Degrade

Function

set pathreliabilityenable is used to set the switch for UltraPath link degrade.

Format

set pathreliabilityenable -m *mode*

Parameters

Parameter	Description	Default Value
-m *mode*	Alarm push switch for UltraPath. The value can be **on** or **off**, where: ● **on**: Enables the link degrade switch. ● **off**: Disables the link degrade switch.	on

Level

User **root**

Usage Guidelines

- When the link degrade switch is enabled, UltraPath will detect and isolate degraded links.

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- When the link degrade switch is disabled, some faults cannot be isolated by UltraPath, which results in the deterioration of the host performance. Therefore, disable the switch cautiously.

Example

Disable the link degrade switch for UltraPath:

```
~ # esxcli upadm set pathreliabilityenable -m off
Succeeded in executing the command.
```

System Response

None

A.4.6 Clearing Inactive Drivers in Online Upgrade Process

Function

The **ouc** command is used to clear drivers that do not take effect during an online upgrade.

Format

ouc -r

Parameters

Parameter	Description	Default Value
-r	Clear drivers that do not take effect during an online upgrade.	None

Level

User **root**

Usage Guidelines

Decompress the ***.zip** package in the **\VMware_vSphere\Packages\ESXi** directory where the UltraPath for ESXi software installation package is saved and obtain the **ouc** file. Copy this file to any directory (for example, directory A) of the ESXi host. Use CLI to switch to directory A and run the **ouc -r** command.

Run **ouc -r** to clear drivers that do not take effect during an online upgrade.

Example

Clear drivers that do not take effect during the online upgrade.

```
# ./ouc -r
Clear invalid nxup driver success
```

System Response

None

A.4.7 Viewing the Running Status of the UltraPath Working Thread

Function

The **show workerstate** command is used to view the running status of the UltraPath working thread.

Format

show workerstate

Parameters

None

Level

User **root**

Usage Guidelines

This command is used to show the status of the UltraPath working thread. Administrators can view last refresh time and present time to determine whether the working thread is blocked and calculated the block duration.

Example

View the status of the UltraPath working thread.

```
~ # esxcli upadm show workerstate
worker name: USIImmediateWkq_1          last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: USIDefererdWkq_1           last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: KLSWriteLogWorkQueue_1     last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: VLMVLunNotifyWkq_1         last refresh time: 2016-07-26 08:13:06
present time: 2016-07-26 08:13:07
worker name: CodeStreamWorkQueue_1      last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: LPMSyncCmdPost_1           last refresh time: 2016-07-26 08:13:06
present time: 2016-07-26 08:13:07
worker name: LPMPathMgrWkq_1            last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: PingSpecialWorkQueue_1     last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: PingWorkQueue_1            last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: PcmCmdWorkQueue_0_1        last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: PcmCmdWorkQueue_1_1        last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: PcmCmdWorkQueue_2_1        last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
```


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```
worker name: PcmCmdWorkQueue_3_1        last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: PcmCmdWorkQueue_4_1        last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: PCM_AttachCmdWkQueue_1     last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
```

System Response

Parameter	Description	Default Value
worker name	Working thread name.	None
last refresh time	Last refresh time of the working thread.	None
present time	Current system time, that is, execution time of the command.	None

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B Files Related to the UltraPath

After the UltraPath is correctly installed on a vSphere operating system, the UltraPath adds and modifies certain files that ensure its proper running. Do not modify or delete these files unnecessarily.

Files Added to the UltraPath

File Name	Path	Description
upadm	/opt/UltraPath/bin/upadm	UltraPath command line tool.
esxcli-ultrapath.xml	/usr/lib/vmware/esxcli/ext/esxcli-ultrapath.xml	File for UltraPath command parameter parsing.
user_cfg.xml	/etc/cim/config/user_cfg.xml	UltraPath configuration file.
event_log oper_log ouc_log.txt serial_oper	/etc/cim/log/event_log /etc/cim/log/oper_log /etc/cim/log/ouc_log.txt /etc/cim/log/serial_oper	UltraPath log files.
libultrapathprovider.so	/usr/lib/cim/libultrapathprovider.so	Binary program of UltraPath provider.
provider.conf	/etc/cim/openwsman/provider.conf	ACME attribute file of UltraPath provider.
ultrapath-provider-0.0	/var/lib/sfcb/registration/repository/ultrapath-provider-0.0/	File directory for UltraPath provider registration.
vmw_ultrapath-provider-providerRegister	/var/lib/sfcb/registration/vmw_ultrapath-provider-providerRegister	Attribute configuration file of UltraPath provider.

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File Name	Path	Description
mp-plugin-ultrapath	usr/lib/vmware/vmkmod/mp-plugin-ultrapath	UltraPath driver file.
psa-mp-plugin-ultrapath-rules.json psa-mp-plugin-ultrapath.json	usr/libexec/jumpstart/plugins/psa-mp-plugin-ultrapath-rules.json usr/libexec/jumpstart/plugins/psa-mp-plugin-ultrapath.json	File for UltraPath driver loading.
ultrapathplugin	C:\Program Files\VMware\Infrastructure\tomcat\webapps\ultrapathplugin	Main program installation directory of the UltraPath vCenter plug-in.
UltraPath	C:\UltraPath	Directory where scripts for logging and registering/deregistering of the UltraPath vCenter plug-in reside.

File Modified by the UltraPath

None.

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C How to Obtain Help

About This Chapter

If a problem persists in routine maintenance or troubleshooting, contact Huawei for technical support.

C.1 Preparations for Contacting Huawei

To better solve the problem, you need to collect troubleshooting information and make debugging preparations before contacting Huawei.

C.1.1 Collecting Troubleshooting Information

You need to collect troubleshooting information before troubleshoot.

You need to collect the following information:

- Name and address of the customer
- Contact person and telephone number
- Time when the fault occurred
- Description of the fault phenomena
- Device type and software version
- Measures taken after the fault occurs and the relevant results
- Troubleshooting level and required solution deadline

C.1.2 Making Debugging Preparations

When you contact Huawei for help, the technical support engineer of Huawei might help you do certain operations to collect information about the fault or rectify the fault directly.

Before contacting Huawei for help, you need to prepare the boards, port modules, screwdrivers, screws, cables for serial ports, network cables, and other required materials.

C.2 How to Use the Document

Huawei provides guide documents shipped with the device. The guide documents can be used to handle the common problems occurring in daily maintenance or troubleshooting.

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To better solve the problems, use the documents before you contact Huawei for technical support.

C.3 How to Obtain Help from Website

Huawei provides users with timely and efficient technical support through the regional offices, secondary technical support system, telephone technical support, remote technical support, and on-site technical support.

Contents of the Huawei technical support system are as follows:

- Huawei headquarters technical support department
- Regional office technical support center
- Customer service center
- Technical support website: **http://enterprise.huawei.com**

You can query how to contact the regional offices at **http://enterprise.huawei.com**.

C.4 Ways to Contact Huawei

Huawei Technologies Co., Ltd. provides customers with comprehensive technical support and service. For any assistance, contact our local office or company headquarters.

Huawei Technologies Co., Ltd.

Address: Huawei Industrial Base Bantian, Longgang Shenzhen 518129 People's Republic of China

Website: **http://support.huawei.com/enterprise/**

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D Acronyms and Abbreviations

F	
FC	Fiber Channel
H	
HBA	Host Bus Adapter
L	
LUN	Logical Unit Number
S	
SAS	Serial Attached SCSI
SCSI	Small Computer System Interface
SSD	Solid State Disk
U	
UUID	Universally Unique Identifier
W	
WWN	World Wide Name

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