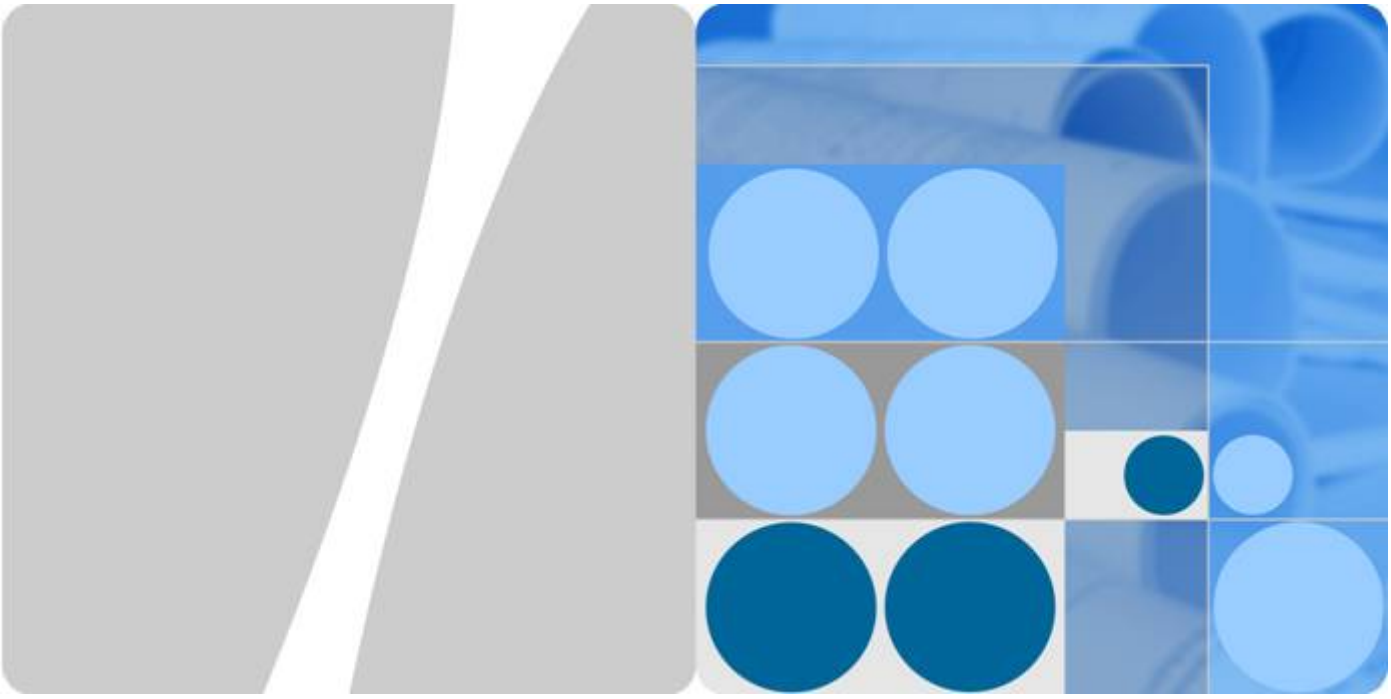

OceanStor UltraPath for vSphere

V100R008C50

User Guide

Issue 03

Date 2016-12-20

HUAWEI TECHNOLOGIES CO., LTD.

HUAWEI

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Huawei Technologies Co., Ltd.

Address: Huawei Industrial Base
Bantian, Longgang
Shenzhen 518129
People's Republic of China

Website: http://e.huawei.com

About This Document

Intended Audience

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.

This document is intended for:

- Technical support engineers
- Maintenance engineers

Conventions

As part of an effort to improve and enhance the product performance and capabilities, Huawei periodically releases revisions of the hardware and software. Therefore, some functions described in this document may not be supported by all versions of the software or hardware currently in use. For the most up-to-date information about product features, refer to the product release notes.

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

To obtain the Open Source Software Notice, go to the following website: **http://support.huawei.com/enterprise/**.

Change History

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

Issue 03 (2016-12-20)

This issue is the third official release.

Optimized the document structure

Optimized the operation description of installing and uninstalling UltraPath for vCenter.

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Supported SAN Boot scenarios.

Issue 02 (2016-09-20)

This issue is the second official release.

Added description of software functions.

Issue 01 (2016-05-20)

This issue is the first official release.

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1 Overview

About This Chapter

OceanStor UltraPath for vSphere is the multipathing software developed by Huawei. Its functions include optimum path selection, failover and failback, I/O load balancing, performance monitoring, and path fault alarming. These functions enable your storage network to be intelligent, stable, and fast.

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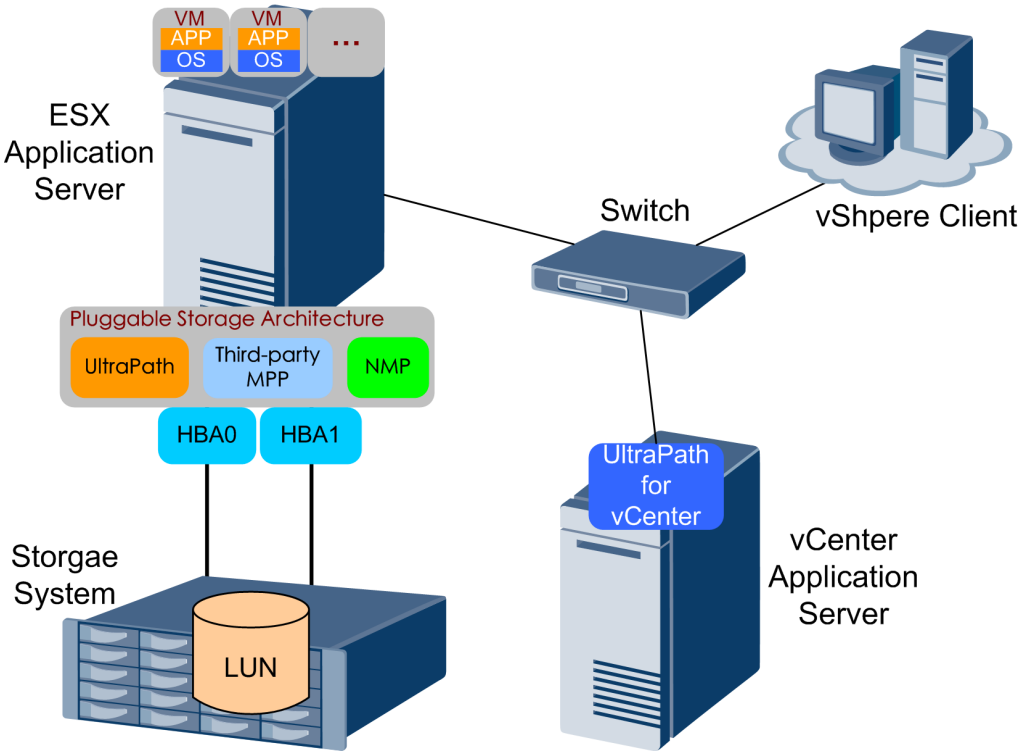
1.1 Introduction to OceanStor UltraPath for vSphere

When setting up your storage network, you surely want it to be available 24/7 hours. Also, when the service load is heavy, data traffic is automatically controlled to prevent data blocking; when a link is faulty, the network actively detects the fault and switches the data on the faulty link to other normal links. To meet these needs of yours, Huawei has developed OceanStor UltraPath for vSphere (UltraPath for vSphere) to work with your OceanStor storage system.

About OceanStor UltraPath for vSphere

OceaStor UltraPath for vSphere (UltraPath for vSphere for short) is a piece of multipathing software developed by Huawei Technologies Co., Ltd (Huawei for short). UltraPath for vSphere runs on VMware Pluggable Storage Architecture (PSA) as a third-party plug-in and works with VMware's Native Multipathing Plugin (NMP) without interference, as shown in **Figure 1-1**. UltraPath for vSphere manages data transfer between ESXi hosts and OceanStor storage systems. The UltraPath improves the efficiency and reliability of data transfer between an application server and a storage system, serving as a simple, convenient, and efficient storage path management solution.

Figure 1-1 Basic network diagram of UltraPath for vSphere



Functions and Features

UltraPath for vSphere provides the following functions and features:

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- Optimal path selection

  By accessing LUN configuration information of a storage system, UltraPath for vSphere finds the fastest path to transfer each data stream to the storage system and uses the path for data transfer. For details, see **1.2.1 Optimum Path Selection**.

- Failover and failback

  UltraPath for vSphere automatically and periodically monitors path status. Once a path is found faulty, UltraPath for vSphere switches data on the faulty path to another normal one. After the faulty path recovers, the software switches the data back to the path. During the failover and failback processes, services on the application server remain online and applications continue to meet reliability and service level agreement (SLA) requirements. For details, see **1.2.2 Failover and Failback**.

- I/O load balancing

  If there are more than one optimum path between the application server and the storage system, UltraPath for vSphere balances I/O load on these optimum paths to boost I/O performance. For details, see **1.2.3 I/O Load Balancing**.

- Performance monitoring

  UltraPath for vSphere monitors IOPS and bandwidth on LUNs, physical paths, and logical paths. The monitored statistics serves as a basis for routine maintenance and service analysis. For details, see **1.2.4 Performance Monitoring**.

- Path fault alarming

  If a data transfer path has a fault or risk, UltraPath for vSphere reports a path warning. The warning, together with failover and failback, lowers the service interruption risk by helping users detect and resolve potential faults in time. For details, see **1.2.5 Path Fault Warning**.

Application Scenarios

UltraPath for vSphere is applicable to the following scenarios:

- Dual-link direct connection
- Dual-link single-switch interconnection
- Dual-link dual-switch interconnection

These three applications have their own advantages and applicable scenarios. For details about application scenarios, see **1.3 Application Scenarios**.

Installation and Use

The installation program of UltraPath for vSphere is accessible from the delivery-attached CD-ROM. Before installing UltraPath for vSphere, ensure that you have the administrative permission of the installation program.

The installation procedure of UltraPath for vSphere is basically the same as that of other software on the application server. The default settings are optimum. Therefore, the software is ready for use after installation without additional configuration. For details about how to install and use the software, see **2 Installation**.

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NOTE

- In complex scenarios (for example, clusters), some additional settings are required for UltraPath for vSphere to work better. Therefore, pay attention to the notes in installation steps.
- In a cluster environment, all cluster hosts must be managed by either NMP or UltraPath for vSphere.
- Different paths of a disk cannot be managed by both the UltraPath for vSphere and NMP.

Routine Maintenance

To learn about the storage network status to identify possible bottlenecks and faults, you can use UltraPath for vSphere to gather statistics about LUNs, physical paths, and logical paths. For details about how to use the software for maintenance, see **4.1 Routine Maintenance**.

Command Reference

UltraPath for vSphere supports CLI so that you can run commands to configure, monitor, manage, and maintain the software. Command types include basic operation commands, system management commands, LUN management commands, and alarm management commands. For details about the CLI commands, see **A Commonly Used CLI Management Commands**.

1.2 Functions and Features

UltraPath for vSphere provides powerful functions and features, ensuring secure, stable, and fast service operation.

1.2.1 Optimum Path Selection

By accessing LUN configuration information of a storage system, UltraPath for vSphere finds the fastest path to transfer each data stream to the storage system and uses the path for data transfer.

To ensure stable system running, a storage system is usually equipped with two or more controllers to implement redundant backup. To prevent two or more controllers from simultaneously writing the same LUN to damage data, the storage system must specify an owning controller for the LUN so that only the owning controller can read and write the LUN. If the application server requests accessing the LUN through a non-owning controller, the request is forwarded to the owning controller. In this case, the direct path between the LUN and its owning controller delivers the fastest I/Os. Therefore, it is the optimum path.

UltraPath for vSphere is able to obtain information about an owning controller. Therefore, it can automatically select one or more paths for data streams to achieve the optimum I/O speed.

For example, in **Figure 1-2**, controller A is the owning controller and UltraPath for vSphere selects the path between the application server and controller A as the optimum path.

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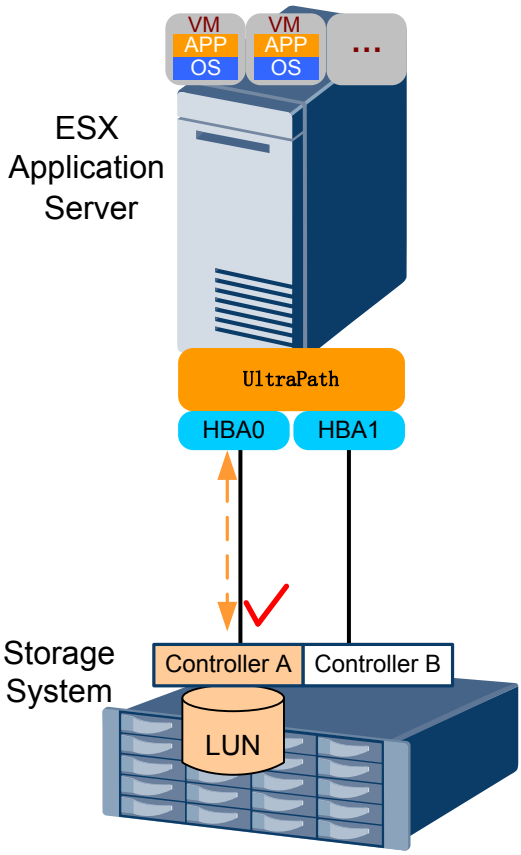
Figure 1-2 Optimum path selection by UltraPath for vSphere



1.2.2 Failover and Failback

UltraPath for vSphere automatically and periodically monitors path status. Once a path is found faulty, UltraPath for vSphere switches data on the faulty path to another normal one. After the faulty path recovers, the software switches the data back to the path. During the failover and failback processes, services on the application server remain online and applications continue to meet reliability and service level agreement (SLA) requirements.

Typical path fault scenarios are as follows:

- In dual-link connection, the optimum path is faulty, as shown in **Figure 1-3**.
- In dual-link switch connection, the optimum path is faulty on the application server side, as shown in **Figure 1-4**.
- In dual-link switch connection, the optimum path on the storage system side is faulty, as shown in **Figure 1-5**.

As shown in **Figure 1-3**, the LUN belongs to controller A and UltraPath for vSphere selects the path between controller A and the application server as the optimum path. If the optimum path becomes faulty, UltraPath for vSphere switches data from the faulty path to the other path between the application server and controller B, ensuring service continuity.

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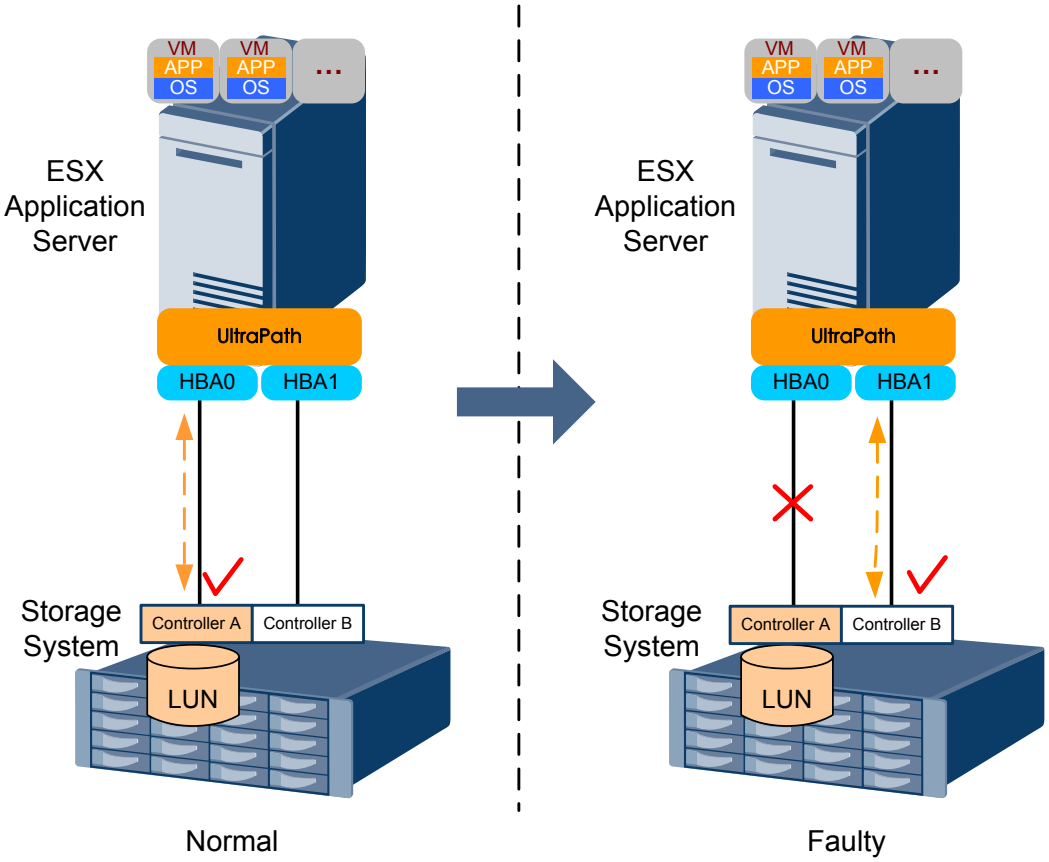
Figure 1-3 Path failover scenario 1



As shown in **Figure 1-4**, the optimum path is from the HBA0 to the switch and then to controller A. If the link between the switch to controller A is faulty, UltraPath for vSphere replaces the faulty link with the link between HBA1 to the switch. The link between the switch and controller A is retained. In this way, the new path after service failover remains the optimum path, ensuring service continuity.

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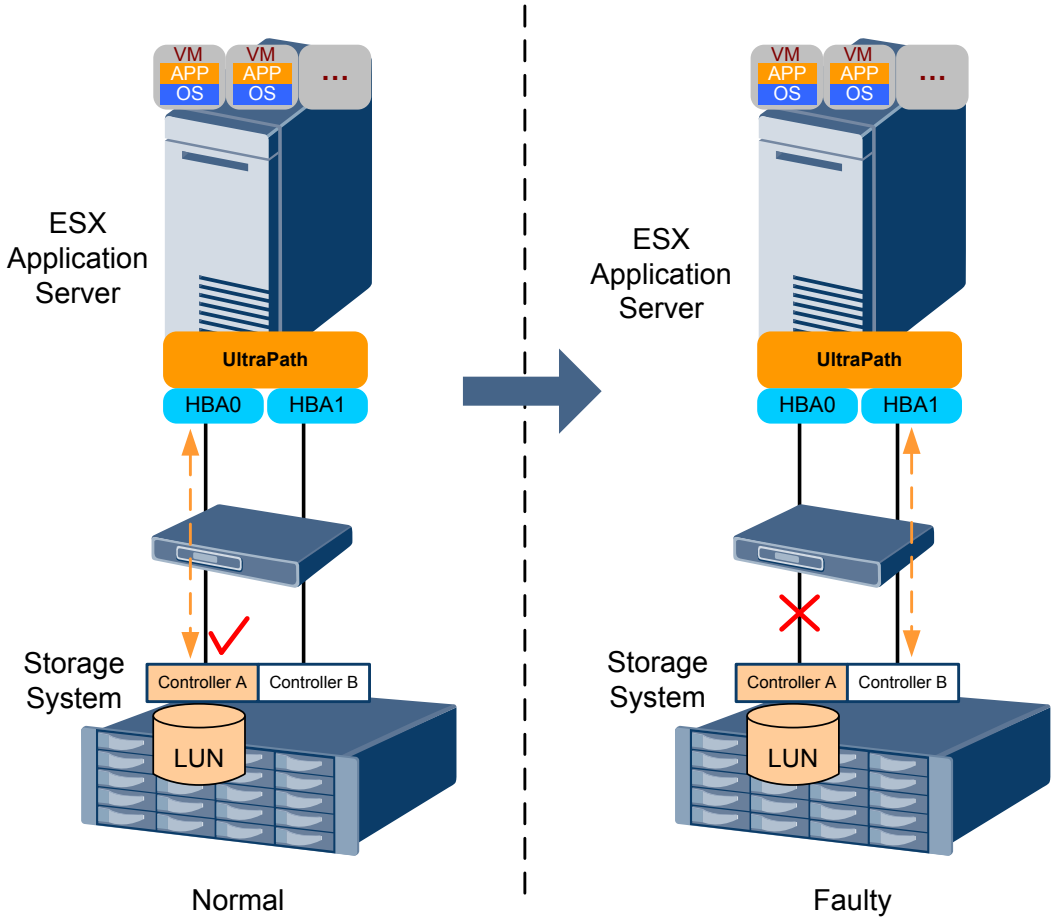
Figure 1-4 Path failover scenario 2



As shown in **Figure 1-5**, the paths work in the same way as that in **Figure 1-4**. If the link between the switch and controller A is faulty, UltraPath for vSphere replaces the faulty link with the link between the switch and controller B. The link between HBA0 and the switch is retained. In this way, the link fault's impact on the upper-layer service is minimized.

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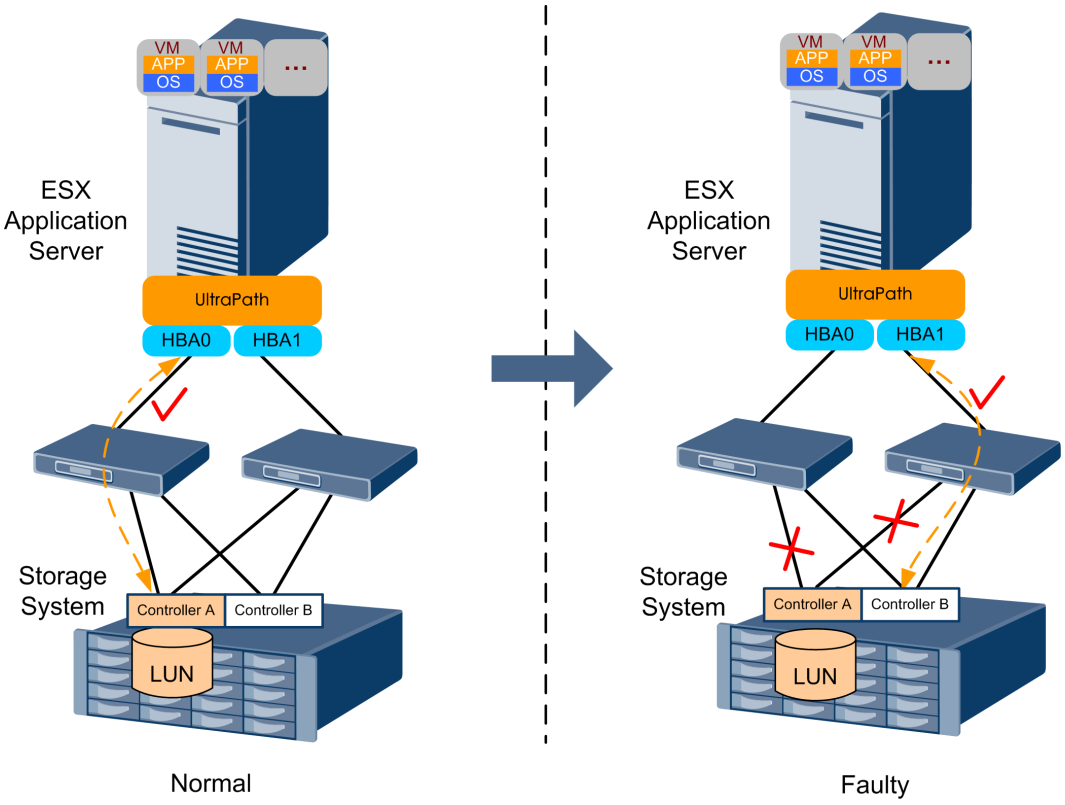
Figure 1-5 Path failover scenario 3



1.2.3 I/O Load Balancing

If there are more than one optimum path between the application server and the storage system, UltraPath for vSphere balances I/O load on these optimum paths to boost I/O performance.

UltraPath for vSphere provides load balancing within a controller and between controllers.

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

For details about how to configure the I/O load balancing function, see **A.2.8 Setting a Load Balancing Mode**.

1.2.4 Performance Monitoring

UltraPath for vSphere monitors IOPS and data traffic on LUNs, physical paths, and logical paths. The monitored statistics serves as a basis for routine maintenance and service analysis.

By comparing the monitored IOPS statistics with your specified thresholds and policies, you can locate performance bottlenecks on your storage network. The monitored data traffic on paths and LUNs enables you to identify possible faults. You can also use the statistics to determine whether an application's performance issue is caused by path I/Os.

For details about how to use the performance monitoring function, see **4.1.3 Performance Monitoring**.

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1.2.5 Path Fault Warning

If a data transfer path has a fault or risk, UltraPath for vSphere reports a path warning.

UltraPath for vSphere's path fault warning function generates alarms on lack of redundant controllers, intermittent path disconnection, and sub-healthy paths. In addition, sub-healthy paths are automatically isolated. These functions lower the service interruption risk by helping you detect and resolve potential faults in time.

For details about how to obtain path fault alarms, see **4.1.6 Critical Events**.

1.3 Application Scenarios

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

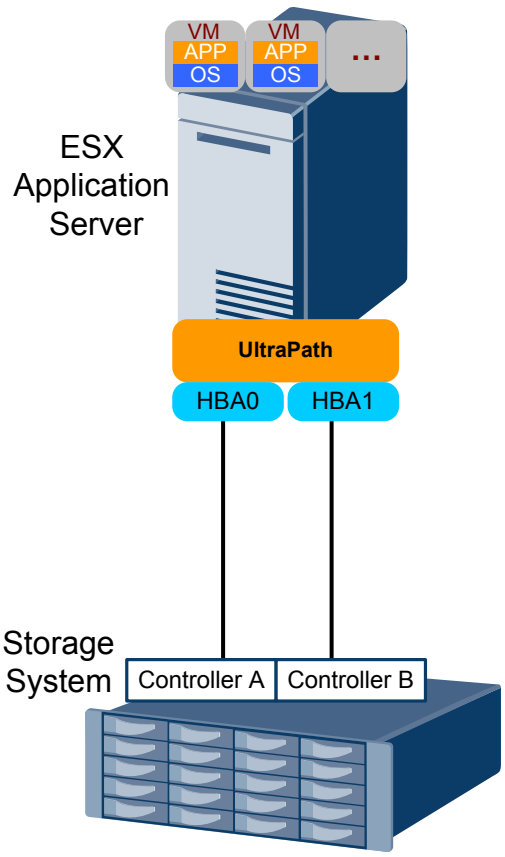
UltraPath for vSphere is applicable to the following scenarios:

- Dual-link direct connection
- Dual-link single-switch interconnection
- Dual-link dual-switch interconnection

Dual-Link Direct Connection

Dual-link direct connection is the simplest, most inexpensive, and most reliable storage network connection, as shown in **Figure 1-6**.

Figure 1-6 UltraPath for vSphere in dual-link direct connection



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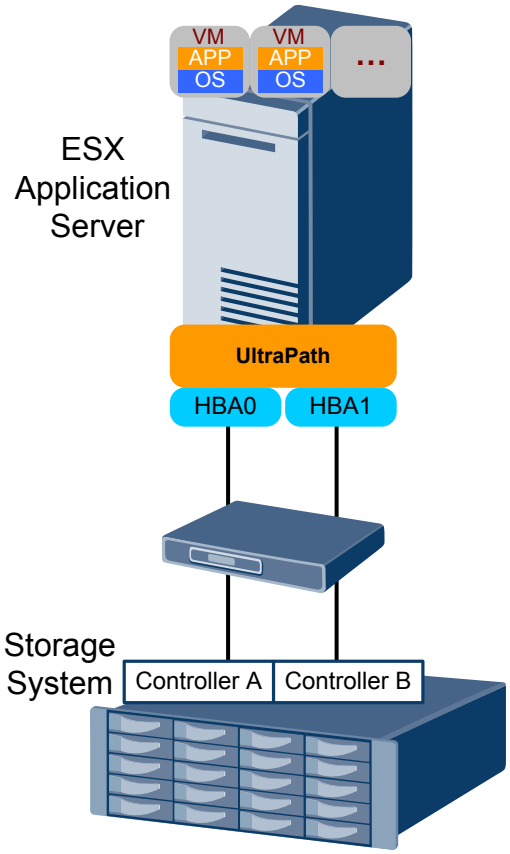
The application server uses optical fibers to connect different storage controllers for redundancy. In this networking mode, the path between the application server and the LUN's owning controller is the optimum one while other paths stand by.

In normal cases, UltraPath for vSphere 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 1-7**.

Figure 1-7 UltraPath for vSphere in dual-link single-switch interconnection



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 1-8**.

There are four paths between the host and the storage system. The two between the application server and LUN's owning controller are the optimum paths, and the other two are standby paths. In different scenarios, UltraPath for vSphere works as follows:

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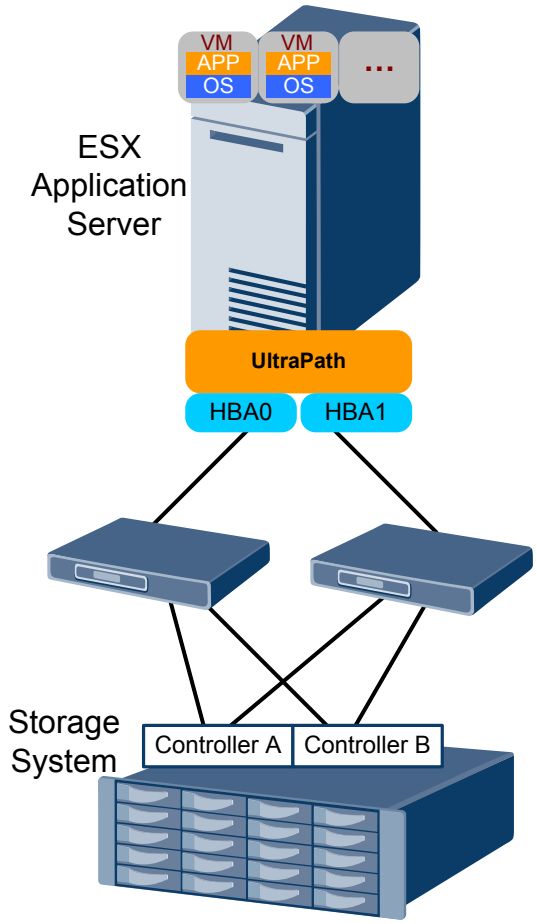
- In normal cases, UltraPath for vSphere selects the two optimum paths for data transfer.
- If one optimum path is faulty, UltraPath for vSphere switches all data to the other optimum path.
- If both optimum paths are faulty, UltraPath for vSphere uses the two standby paths for data transfer.

After an optimum path recovers, it takes over data transfer again.

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 1-8**.

Figure 1-8 UltraPath for vSphere in dual-link dual-switch interconnection



With two switches, the network prevents switch single points of failure to boost the network robustness. In this networking mode, UltraPath for vSphere works in the same way as in **Dual-Link Single-Switch Interconnection**.

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NOTICE

On an ESXi host, if LUNs are allocated to a VM in Raw Device Mapping (RDM) mode, the UltraPath cannot be installed on the VM, such as installing UltraPath for Windows on a Windows VM.

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

This chapter describes installation environment requirements, pre-installation preparations, and the installation procedure of UltraPath for vSphere and UltraPath for vCenter.

2.1 Environment Requirements
Before installing UltraPath for vSphere, check whether the application server and storage system meet the operating requirements and whether the software package is ready.

2.2 Pre-Installation Check
This section describes the check before the installation of UltraPath for vSphere.

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

2.4 Installing UltraPath for vCenter (for V100R008C50SPC500)
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.

2.5 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.

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2.1 Environment Requirements

Before installing UltraPath for vSphere, check whether the application server and storage system meet the operating requirements and whether the software package is ready.

2.1.1 Application Server

This section describes the requirements on the operating system of the application server.

UltraPath for vSphere supports the following VMware ESXi operating systems:

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

You need to acquire root permission to install UltraPath for vSphere.

If UltraPath for vSphere needs to be installed on the application server, select a version compatible with your application server and restart the application server after software installation.

2.1.2 Software Packages

This section describes the requirements on software packages.

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

Table 2-1 Required software packages

Software Name	Content	Description
UltraPath for vSphere installation package	**Docs** and **Packages**	CD-ROM directory: **/VMware_vSphere**

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Software Name	Content	Description
UltraPath for vSphere installation file	**UltraPath-8.XX.XXX-ESXi5.0-offline-bundle.zip**, **UltraPath-8.XX.XXX-ESXi5.5-offline-bundle.zip**, **UltraPath-8.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-8.XX.XXX-ESXi5.0-offline-bundle.zip**. ● For VMware ESXi 5.5, use **UltraPath-8.XX.XXX-ESXi5.5-offline-bundle.zip**. ● For VMware ESXi 6.0, use **UltraPath-8.XX.XXX-ESXi6.x-offline-bundle.zip**.	CD-ROM directory: **/VMware_vSphere/Packages/ESXi**
UltraPath for vCenter installation file (for vCenter 5.0, vCenter 5.1, and vCenter 5.5)	**UltraPath-8.XX.XXX-vCenter.exe** and **Config**	CD-ROM directory: **/VMware_vSphere/Packages/vCenter-Plugin/VMware_vSphere_5.X**
UltraPath for vCenter installation file (for vCenter 6.0)	**Windows** and **VCSA6.0** **NOTE** For vCenter 6.0 running on Windows operating system, use **Windows**. For vCenter 6.0 running on Linux operating system (VCSA 6.0), use **VCSA6.0**.	CD-ROM directory: **/VMware_vSphere/Packages/vCenter-Plugin/VMware_vSphere_6.X**

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.

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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.

2.2 Pre-Installation Check

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

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 vSphere 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 vSphere. If you do not remove them in advance, restart the host after installing UltraPath for vSphere on it.

  NOTE

  In SAN boot scenarios, if Huawei storage devices do not need to be removed, install UltraPath for vSphere 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
```


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```
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            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 vSphere:

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

- For UltraPath for vSphere, the claim rule number ranges from 400 to 475. Therefore, check whether claim rule numbers that range from 400 to 475 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 vSphere. 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
```


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```
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 vSphere

This chapter explains how to install UltraPath for vSphere.

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.

2.3.1 Installing UltraPath for vSphere on the ESXCLI

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

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Procedure

Step 1 Save the UltraPath for vSphere 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-8.XX.XXX-ESXi5.0-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-8.XX.XXX-ESXi5.0-offlinebundle.zip* to start the installation.

```
~ # esxcli software vib install -d /opt/UltraPath-8.06.010-ESXi5.0-offline-
bundle.zip
Installation Result
   Message: Operation finished successfully.
   Reboot Required: false
   VIBs Installed: HUAWEI_bootbank_ultrapath.cim_8.06.010-00,
HUAWEI_bootbank_ultrapath.cli_8.06.010-00,
HUAWEI_bootbank_ultrapath.mpp_8.06.010-00
   VIBs Removed:
   VIBs Skipped:
```

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         8.06.010-00                           HUAWEI
VMwareAccepted    2016-04-22
ultrapath.cli         8.06.010-00                           HUAWEI
VMwareAccepted    2016-04-22
ultrapath.mpp         8.06.010-00                           HUAWEI
VMwareAccepted    2016-04-22
```

NOTE

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

----End

Follow-up Procedure

In SAN boot scenarios, restart the EXSi host immediately after UltraPath for vSphere is installed. In non-SAN boot scenarios, perform the following operations:

1. Run **/etc/init.d/hostd restart** command to restart the **/etc/init.d/hostd** service on ESXCLI.
   ```
   ~ # /etc/init.d/hostd restart
   ```
2. If the CIM Agent service is disabled, or the ESXi 6.0 system is installed on the host before you install UltraPath for vSphere, 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.
   ```


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NOTE

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.

2.3.2 Installing UltraPath for vSphere By Executing a Script

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

2.3.2.1 Silent Installation

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

Procedure

Step 1 Save the UltraPath for vSphere 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 vSphere installation package. In the following example, the **UltraPath-8.XX.XXX-ESXi5.0-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**.

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

Table 2-2 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**.	[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

NOTICE

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**.

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_8.06.010-00,
HUAWEI_bootbank_ultrapath.cli_8.06.010-00,
HUAWEI_bootbank_ultrapath.mpp_8.06.010-00
   VIBs Removed:
```


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```
   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
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.
```

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

```
esxcli software vib list |grep ultrapath
ultrapath.cim                  8.06.010-00                           HUAWEI
VMwareAccepted    2016-03-14
ultrapath.cli                  8.06.010-00                           HUAWEI
VMwareAccepted    2016-03-14
ultrapath.mpp                  8.06.010-00                           HUAWEI
VMwareAccepted    2016-03-14
```

----End

Follow-up Procedure

In SAN boot scenarios, restart the EXSi host immediately after UltraPath for vSphere is installed. In non-SAN boot scenarios, perform the following operations:

1. Run **/etc/init.d/hostd restart** command to restart the **/etc/init.d/hostd** service on ESXCLI.
   ```
   ~ # /etc/init.d/hostd restart
   ```
2. If the CIM Agent service is disabled, or the ESXi 6.0 system is installed on the host before you install UltraPath for vSphere, 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.
   ```

NOTE

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.

2.3.2.2 Non-Silent Installation

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

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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 vSphere on the host.

Procedure

Step 1 Save the UltraPath for vSphere 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-8.XX.XXX-ESXi5.0-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_8.06.010-00,
HUAWEI_bootbank_ultrapath.cli_8.06.010-00,
HUAWEI_bootbank_ultrapath.mpp_8.06.010-00
   VIBs Removed:
   VIBs Skipped:
Please make sure your host name is uniqueness in data center.
Please restart the /etc/init.d/hostd manually.
```

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         8.06.010-00                          HUAWEI
VMwareAccepted    2016-04-22
ultrapath.cli         8.06.010-00                          HUAWEI
VMwareAccepted    2016-04-22
ultrapath.mpp         8.06.010-00                          HUAWEI
VMwareAccepted    2016-04-22
```

----End

Follow-up Procedure

In SAN boot scenarios, restart the EXSi host immediately after UltraPath for vSphere is installed. In non-SAN boot scenarios, perform the following operations:

1. Run **/etc/init.d/hostd restart** command to restart the **/etc/init.d/hostd** service on ESXCLI.
   ```
   ~ # /etc/init.d/hostd restart
   ```
2. If the CIM Agent service is disabled, or the ESXi 6.0 system is installed on the host before you install UltraPath for vSphere, 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.
   ```


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NOTE

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.

2.3.3 Installing UltraPath for vSphere Using VUM

This section describes how to install UltraPath for vSphere 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 vSphere Using VUM.

Procedure

Step 1 Log in to vCenter.

Step 2 Proceed to **Update Manager**.

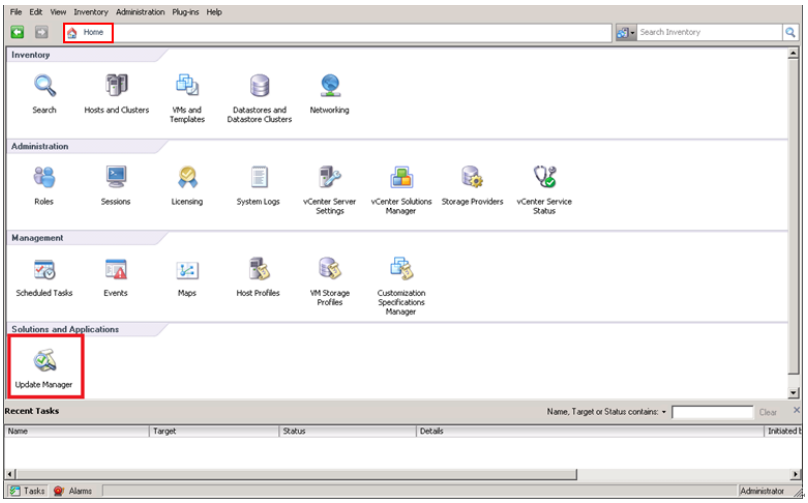
1. On the menu bar of the ***— **vSphere Client** page, click **Home**.

   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**.

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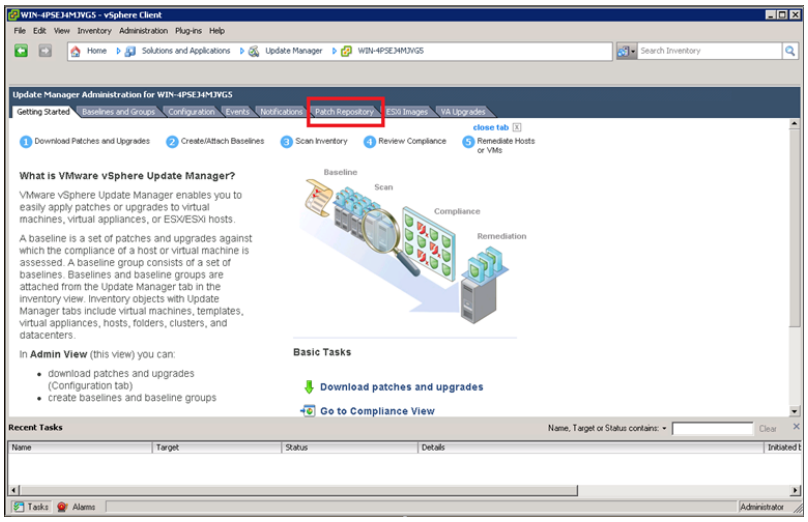
Figure 2-2 Clicking **Patch Repository**



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

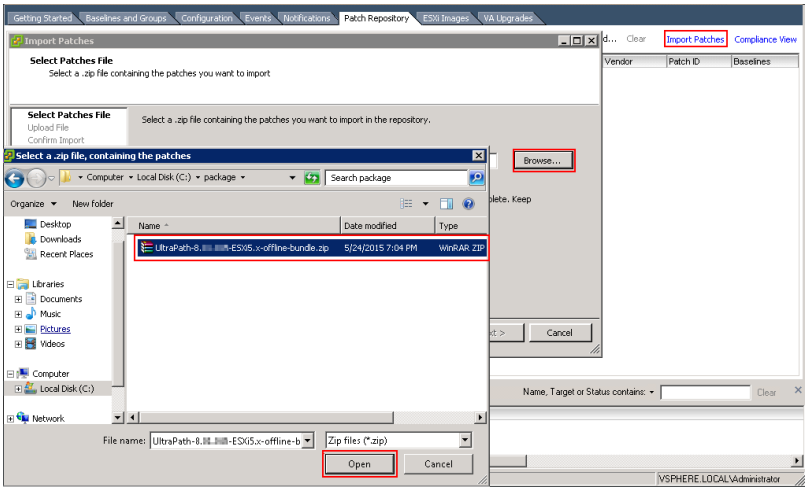
   The **Import Patches** dialog box is displayed.

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**.

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**.

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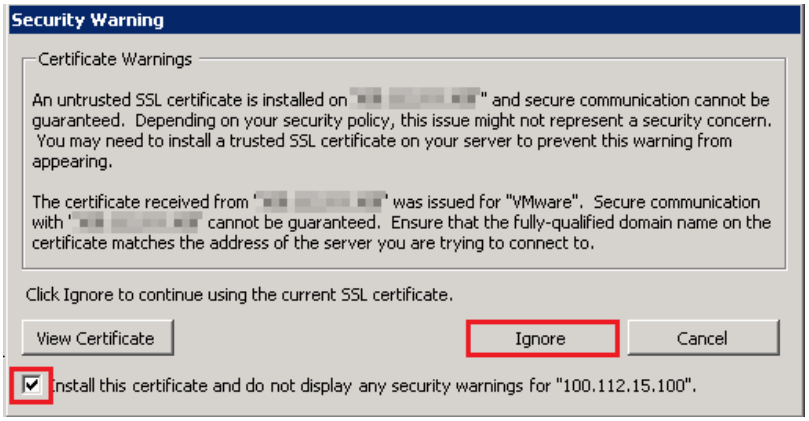
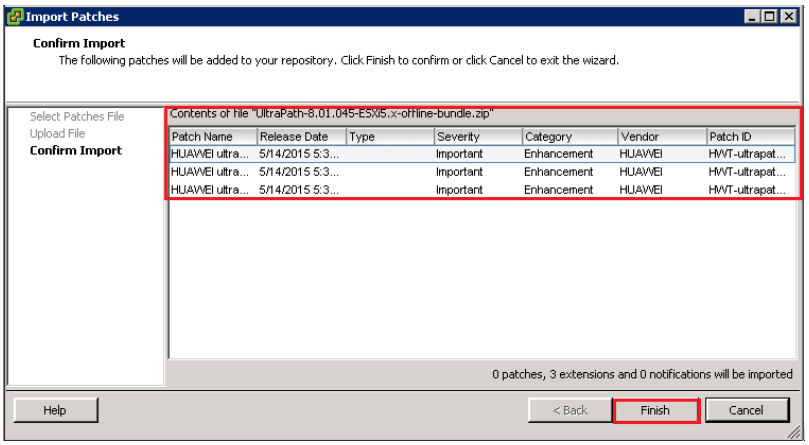
Figure 2-4 Security warning



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

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

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**.

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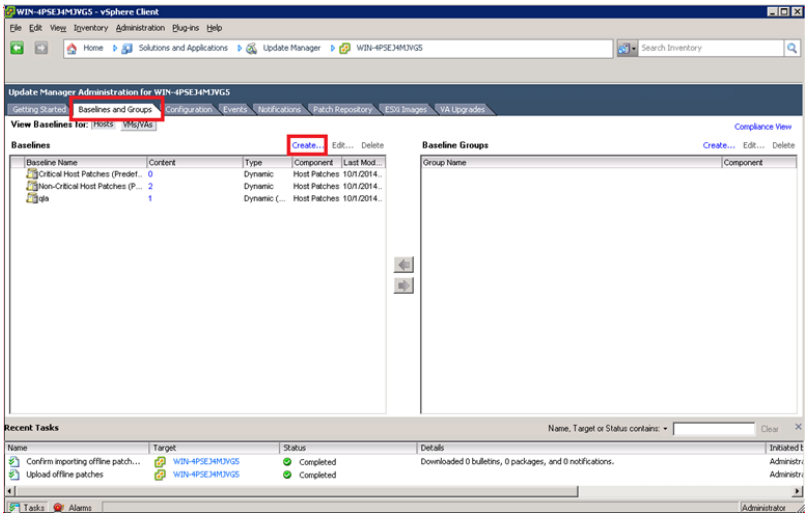
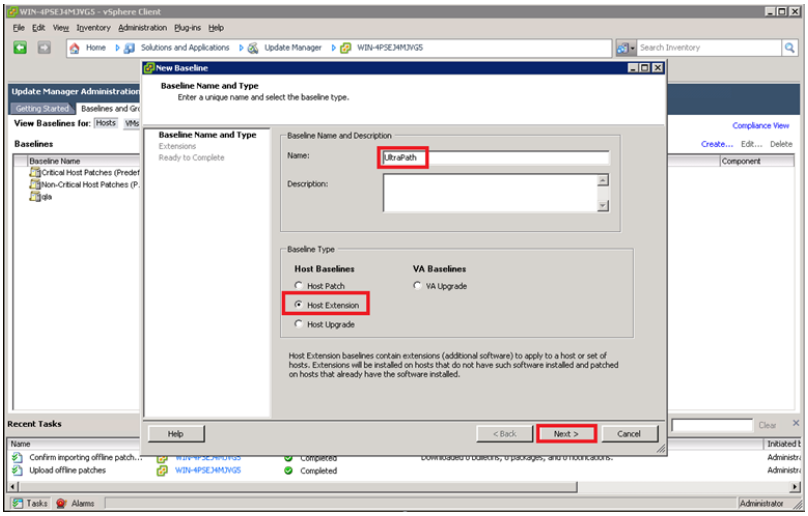
Figure 2-6 Creating baseline and group



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

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

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**.

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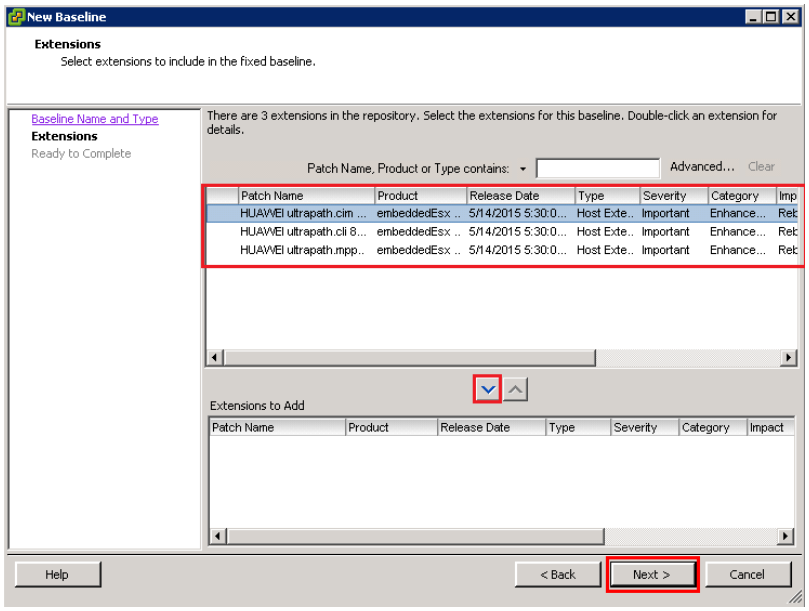
Figure 2-8 Creating a new baseline

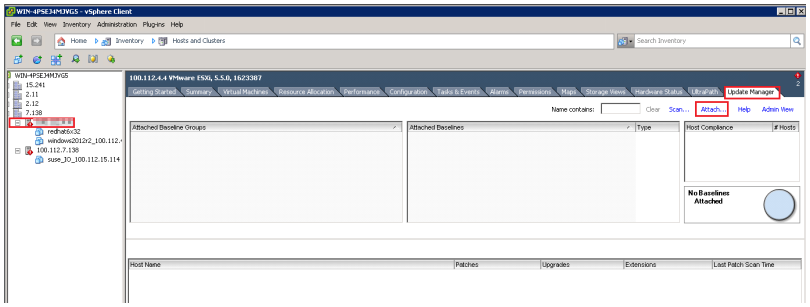


5. Click **Next**.
6. Click **Finish**.

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**.

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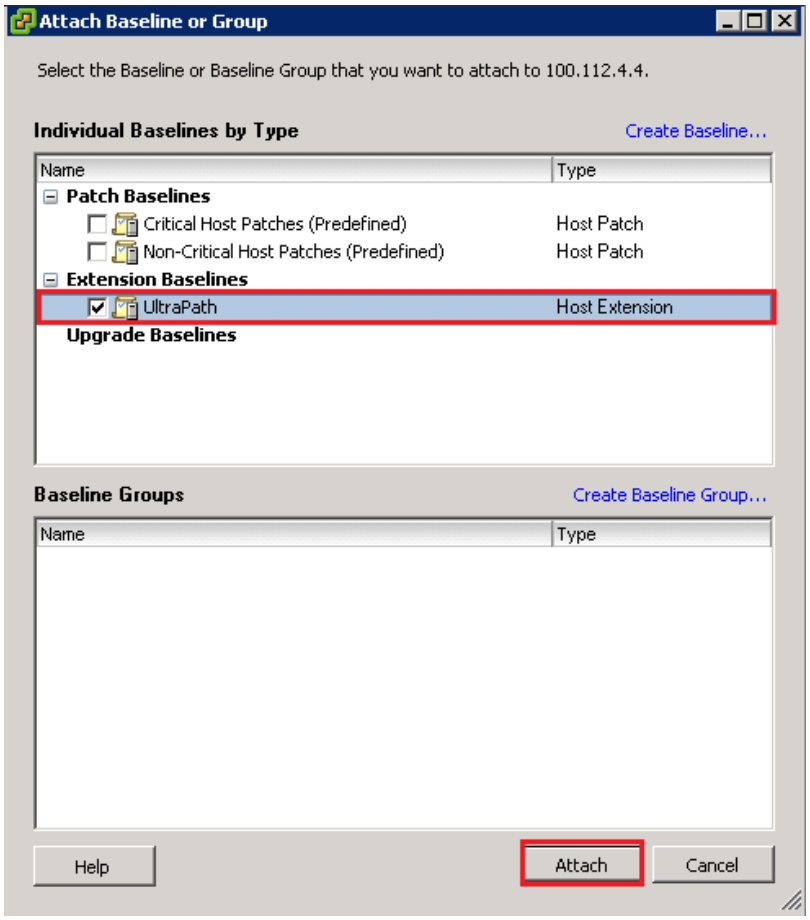
Figure 2-10 Attaching baselines and groups



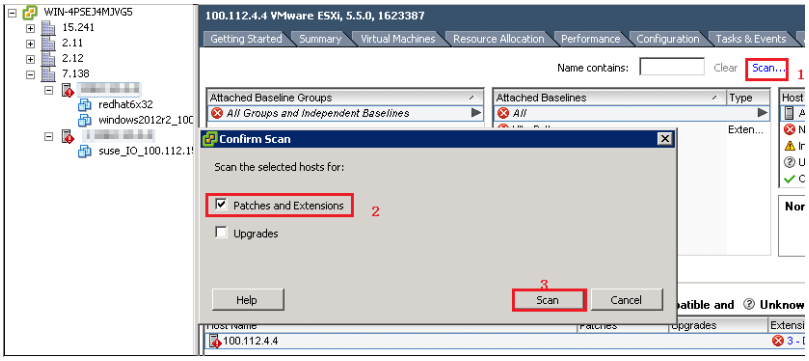
Step 6 Scan for the attached baselines and groups.

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.

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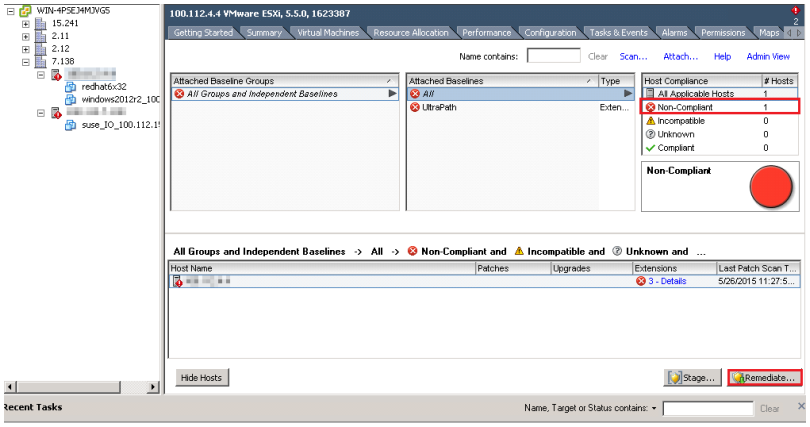
1. After the scanning is complete, on the upper right, **Non-Compliance** is displayed under **Host Compliance**, and the circle in **Host Compliance** is red. On the lower right, click **Remediate**, as shown in **Figure 2-12**.

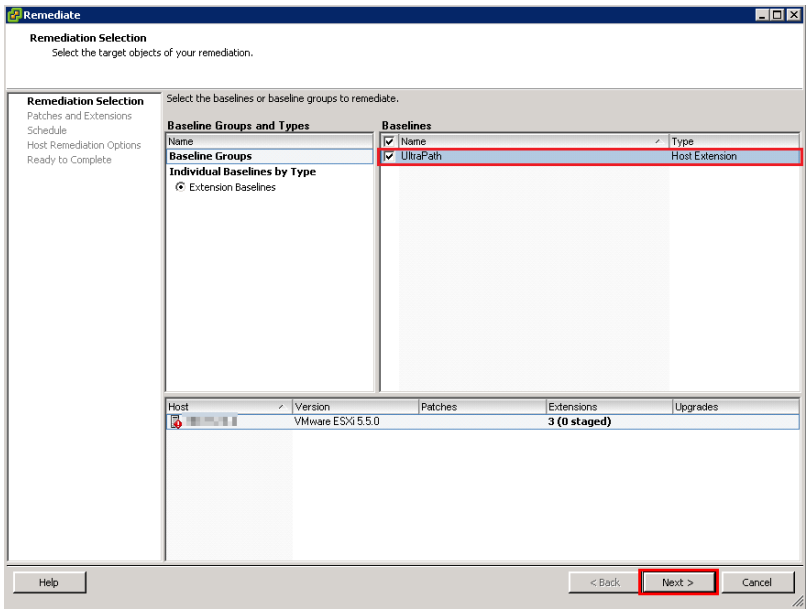
Figure 2-12



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**.

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**.

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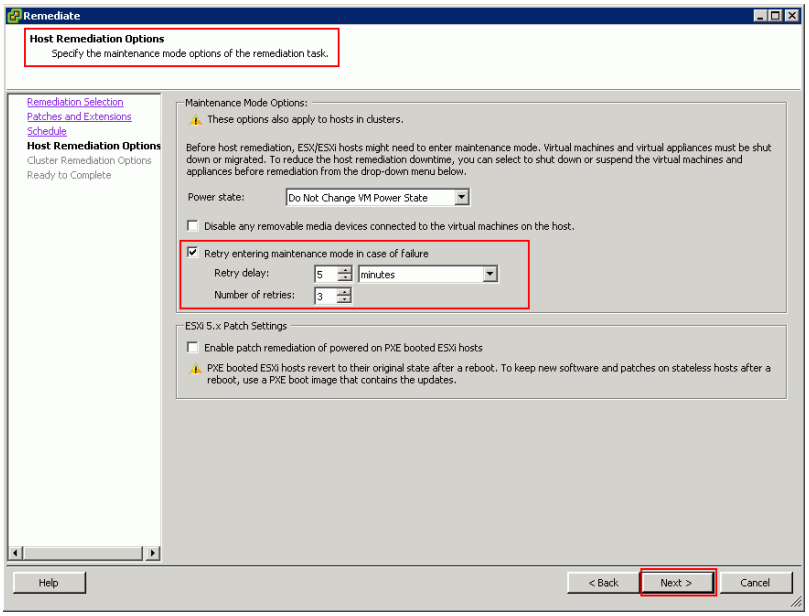
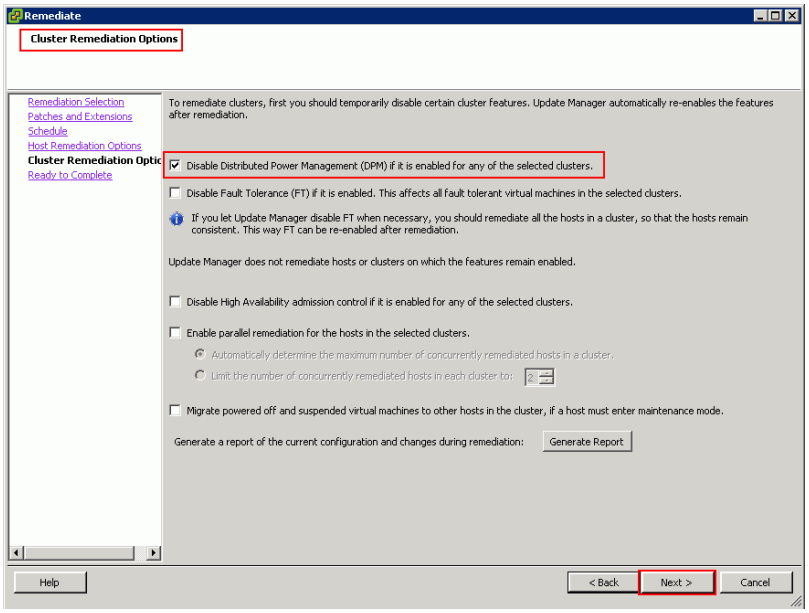
Figure 2-14 Host remediation options



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**.

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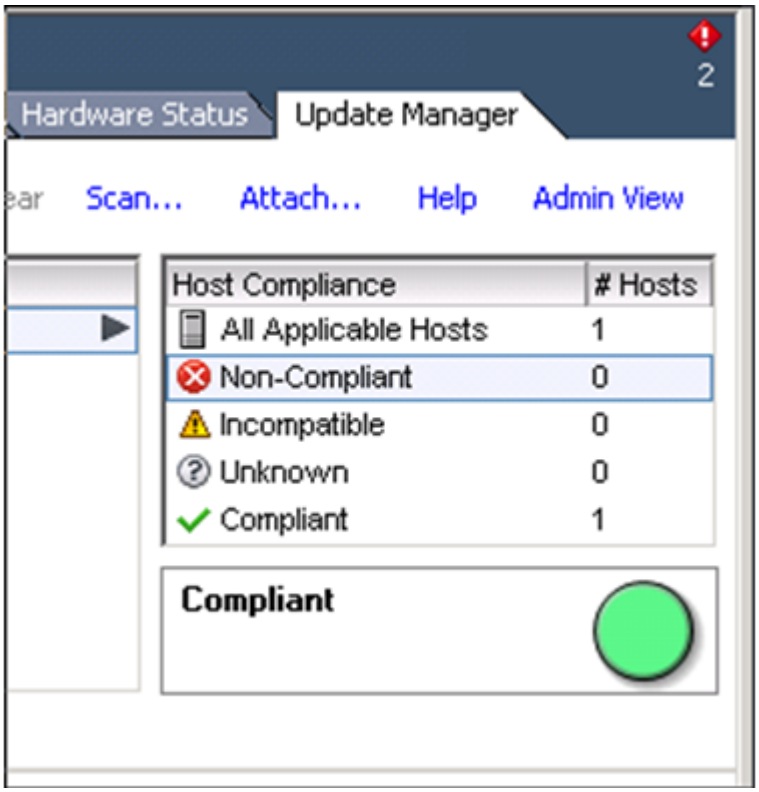
Figure 2-16 Compliant



----End

Follow-up Procedure

In SAN boot scenarios, restart the EXSi host immediately after UltraPath for vSphere is installed. In non-SAN boot scenarios, perform the following operations:

1. Run **/etc/init.d/hostd restart** command to restart the **/etc/init.d/hostd** service on ESXCLI.
```
~ # /etc/init.d/hostd restart
```
2. If the CIM Agent service is disabled, or the ESXi 6.0 system is installed on the host before you install UltraPath for vSphere, 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.
```

NOTE

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.

2.3.4 Installing UltraPath for vSphere on the vSphere CLI

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

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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 vSphere on the host.

Procedure

Step 1 Save the UltraPath for vSphere 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-8.XX.XXX-ESXi5.0-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
10.158.196.104
--username root --password xxxxxx software vib install -d /opt/UltraPath-8.06.010-
ESXi5.0-offline-bundle.zip
```

The following command output is displayed.

```
Installation Result
   Message: Operation finished successfully.
   Reboot Required: false
   VIBs Installed: HUAWEI_bootbank_ultrapath.cim_8.06.010-00,
HUAWEI_bootbank_ultrapath.cli_8.06.010-00,
HUAWEI_bootbank_ultrapath.mpp_8.06.010-00
   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.

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         8.06.010-00                          HUAWEI
VMwareAccepted    2016-04-22
ultrapath.cli         8.06.010-00                          HUAWEI
VMwareAccepted    2016-04-22
ultrapath.mpp         8.06.010-00                          HUAWEI
VMwareAccepted    2016-04-22
```

NOTE

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

----End

Follow-up Procedure

In SAN boot scenarios, restart the EXSi host immediately after UltraPath for vSphere is installed. In non-SAN boot scenarios, perform the following operations:

1. Run **/etc/init.d/hostd restart** command to restart the **/etc/init.d/hostd** service on ESXCLI.

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

2. If the CIM Agent service is disabled, or the ESXi 6.0 system is installed on the host before you install UltraPath for vSphere, 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.
```

NOTE

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.

2.4 Installing UltraPath for vCenter (for V100R008C50SPC500)

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

- Ensure that the version of UltraPath for vCenter is same as that of UltraPath for vSphere. If the version of UltraPath for vCenter is earlier than that of UltraPath for vSphere, update the version of UltraPath for vCenter so that the versions of UltraPath for vCenter and UltraPath for vSphere are same. If the version of UltraPath for vCenter is later than that of UltraPath for vSphere, new functions of UltraPath cannot be queried and configured. You are advised to update the version of UltraPath for vCenter so that the versions of UltraPath for vCenter and UltraPath for vSphere are same.
- 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 installation package and copy **VMware_vSphere_5.X** under **/VMware_vSphere/Packages/vCenter-Plugin** 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-8.XX.XXX-vCenter.exe** icon. The **Figure 2-17** dialog box is displayed.

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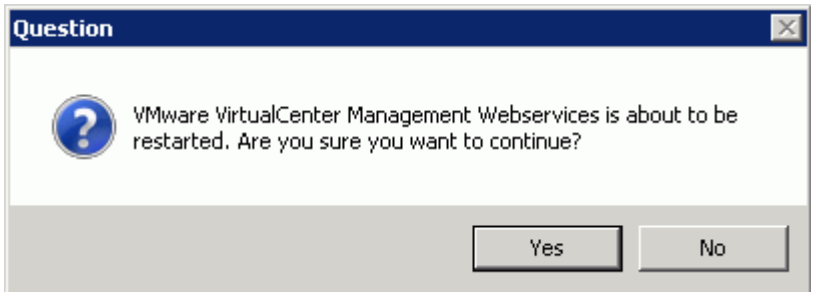
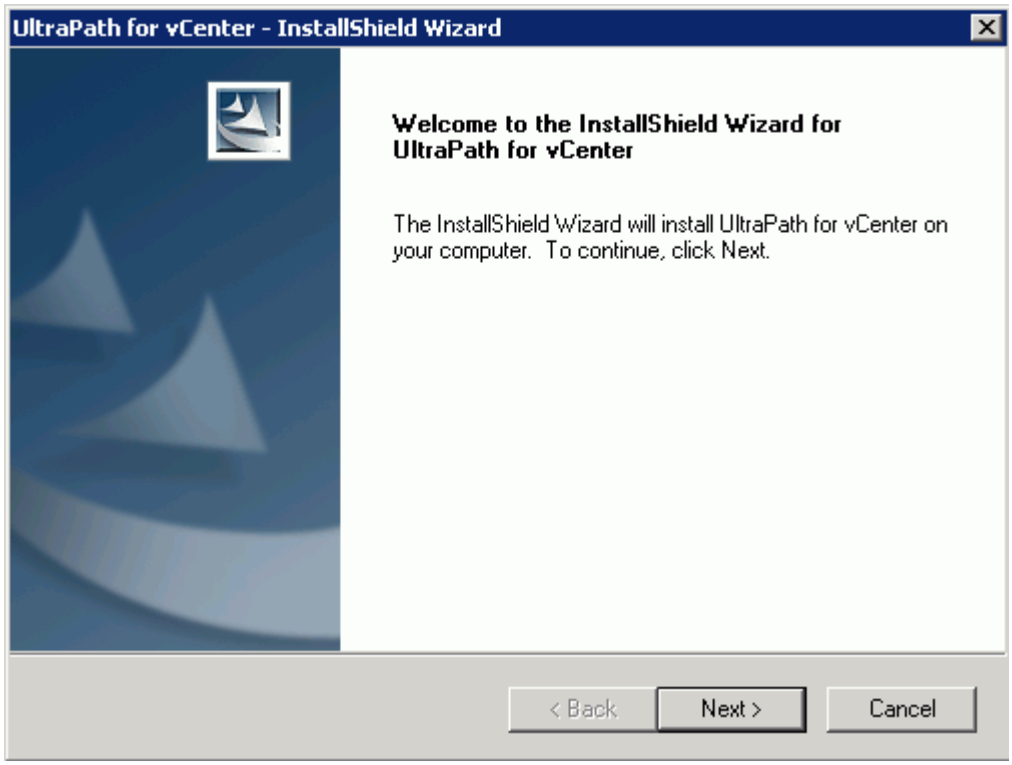
Figure 2-17 UltraPath for vCenter installation instruction page



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**.

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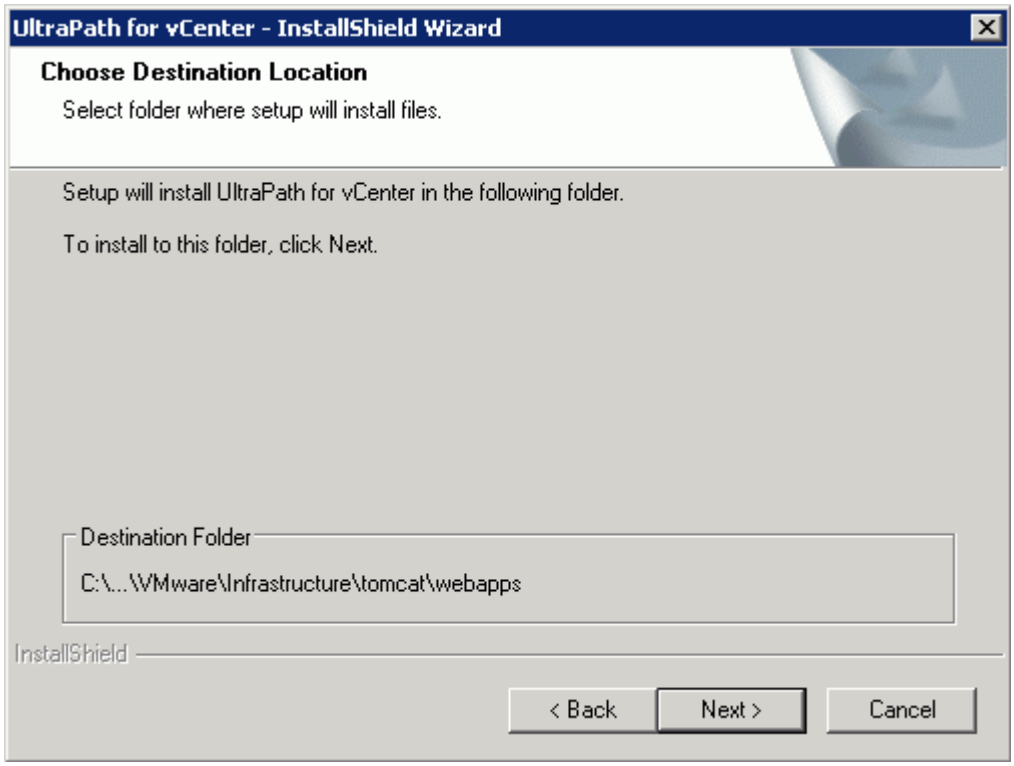
Figure 2-19 UltraPath for vCenter installation path instruction page



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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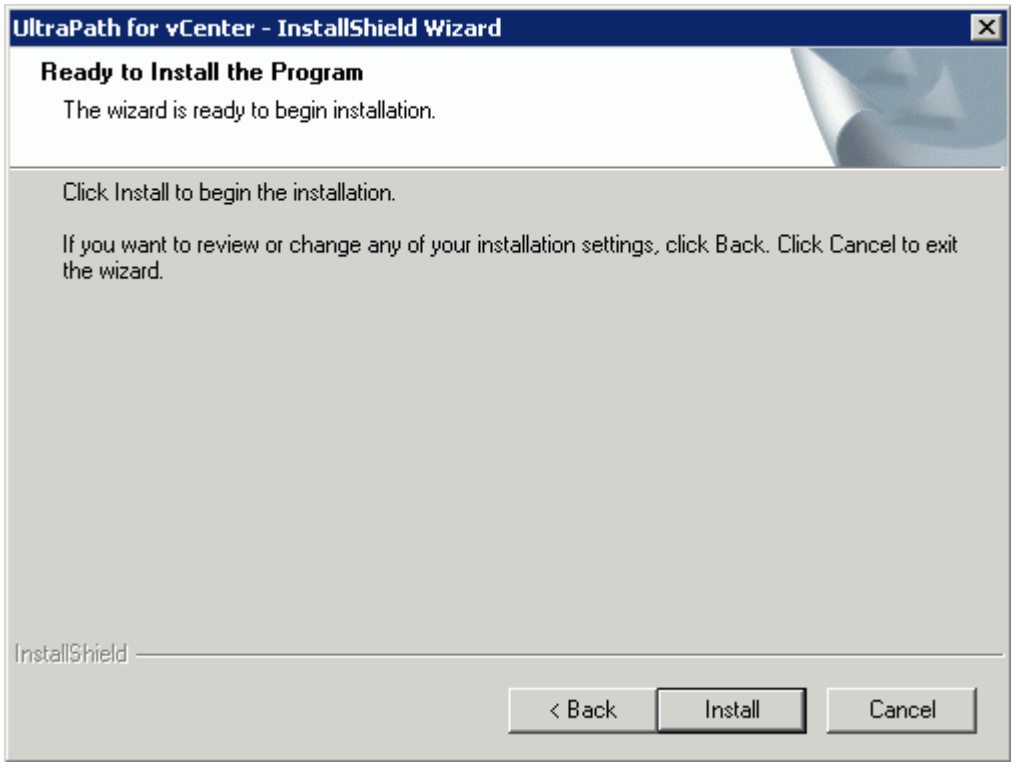
Figure 2-20 UltraPath for vCenter installation preparation page



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

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

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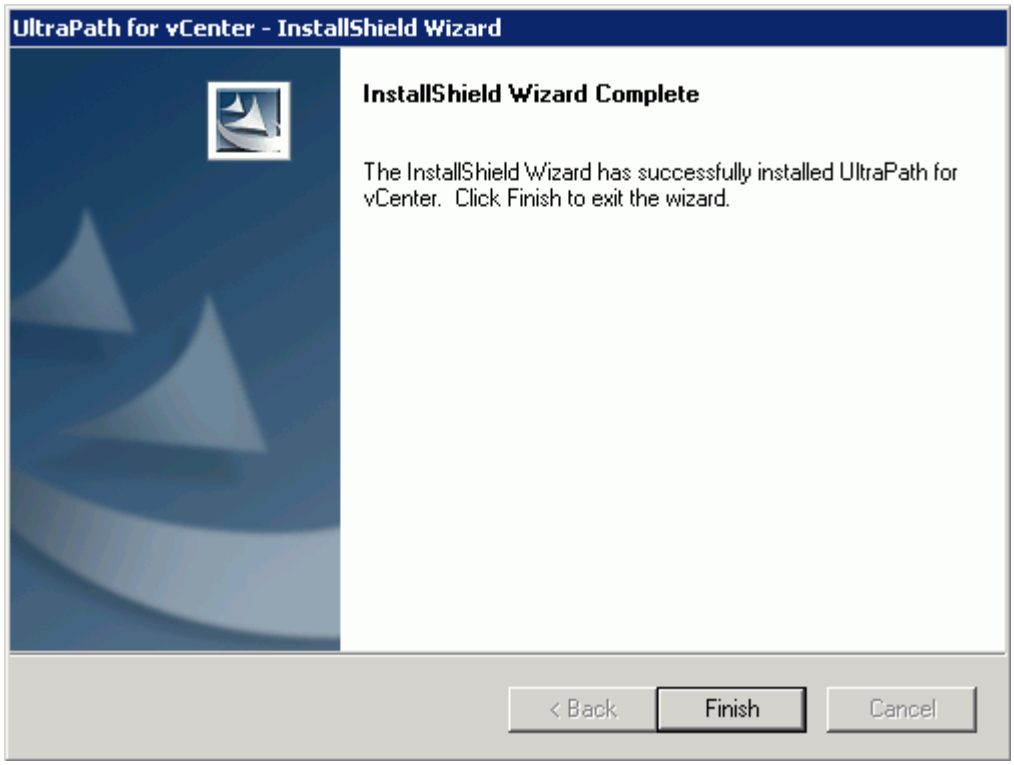
Figure 2-21 UltraPath for vCenter installation completion page



----End

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.

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NOTE

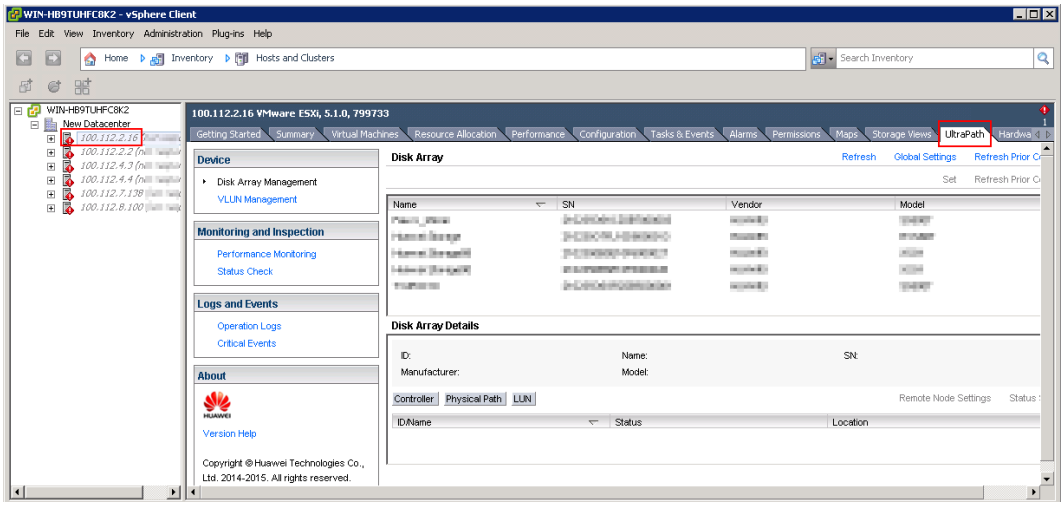
- You can remotely log in to the client of the vCenter server and enter the following address in the address box of the browser for registration:

  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



2.4.2 Installing UltraPath for vCenter (for vCenter 6.0)

Installation methods for vCenter 6.0 running on different host operating systems are different. This section describes how to install UltraPath for vCenter on Windows and Linux operating systems (VCSA 6.0).

2.4.2.1 Installing UltraPath for vCenter (for vCenter 6.0 deployed on Windows)

This section describes how to install UltraPath for vCenter in vCenter 6.0 running on Windows. This operation is only applicable to UltraPath V100R008C50SPC500.

Precautions

- You can only use a browser in Windows to access vSphere Web Client. Supported browsers include:

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  - Microsoft Internet Explorer 10.0.22 or later
  - Mozilla Firefox 34 or later
  - Google Chrome 39 or later
- Ensure that the version of UltraPath for vCenter is same as that of UltraPath for vSphere. If the version of UltraPath for vCenter is earlier than that of UltraPath for vSphere, update the version of UltraPath for vCenter so that the versions of UltraPath for vCenter and UltraPath for vSphere are same. If the version of UltraPath for vCenter is later than that of UltraPath for vSphere, new functions of UltraPath cannot be queried and configured. You are advised to update the version of UltraPath for vCenter so that the versions of UltraPath for vCenter and UltraPath for vSphere are same.
- 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 installation package and copy **Windows** under **/VMware_vSphere/Packages/vCenter-Plugin/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-8.XX.XXX-vCenter6.exe** icon. The UltraPath for vCenter installation wizard and the **Figure 2-23**dialog box are displayed.

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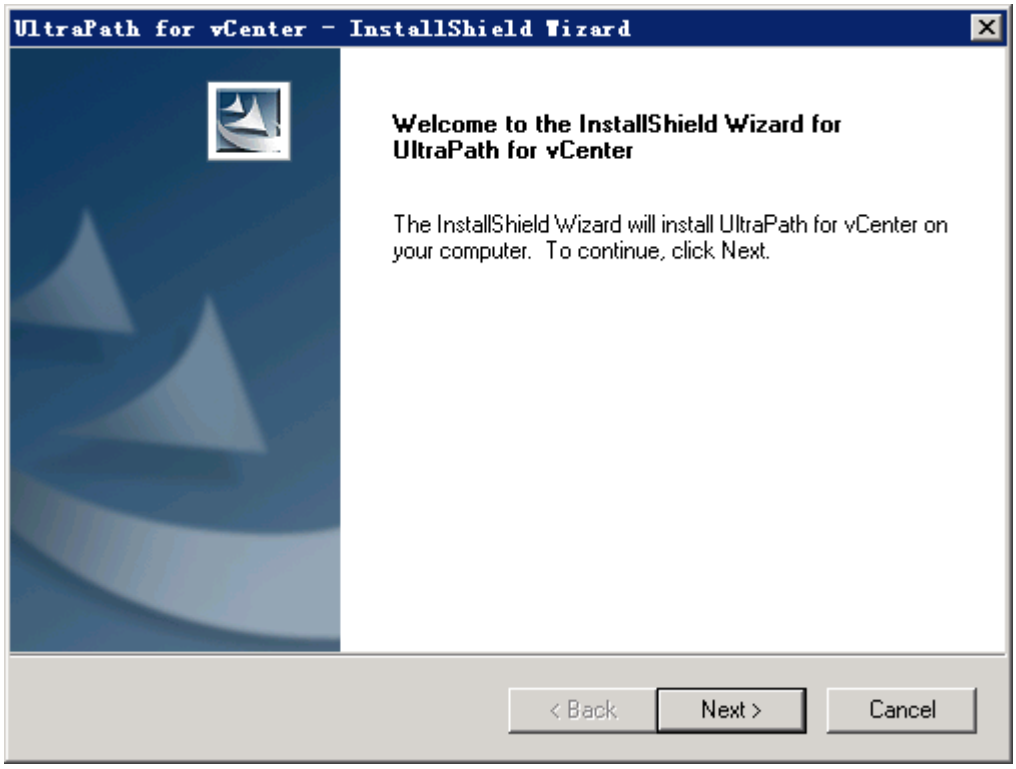
Figure 2-23 UltraPath for vCenter installation wizard



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

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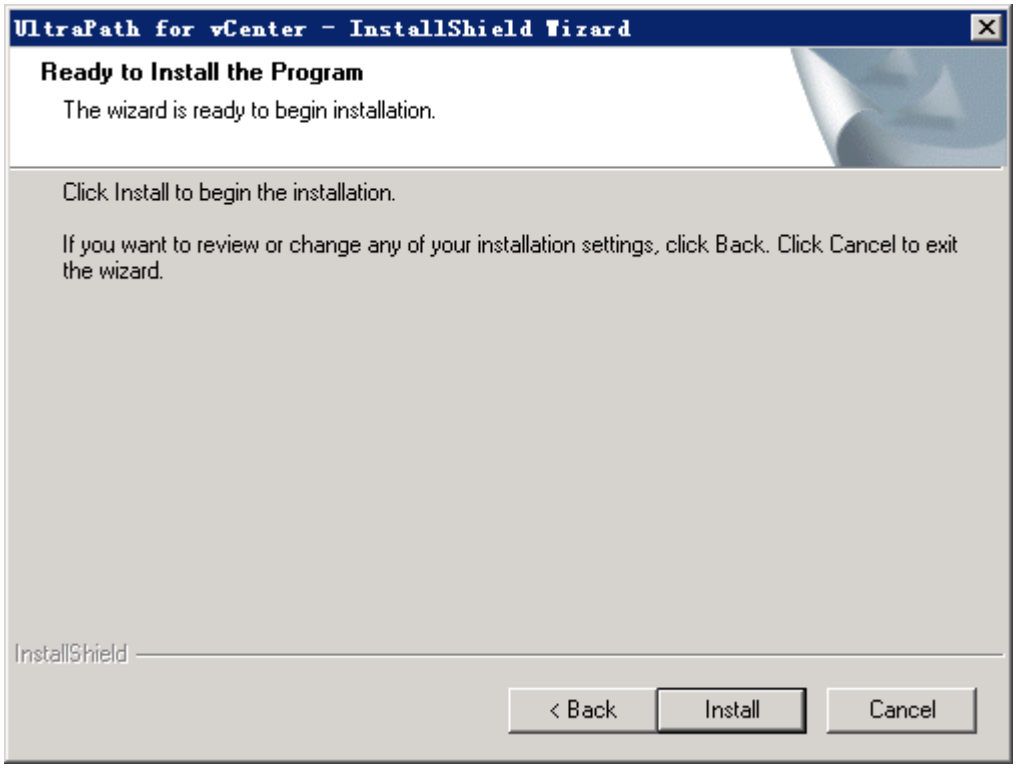
Figure 2-24 UltraPath for vCenter installation startup page



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

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

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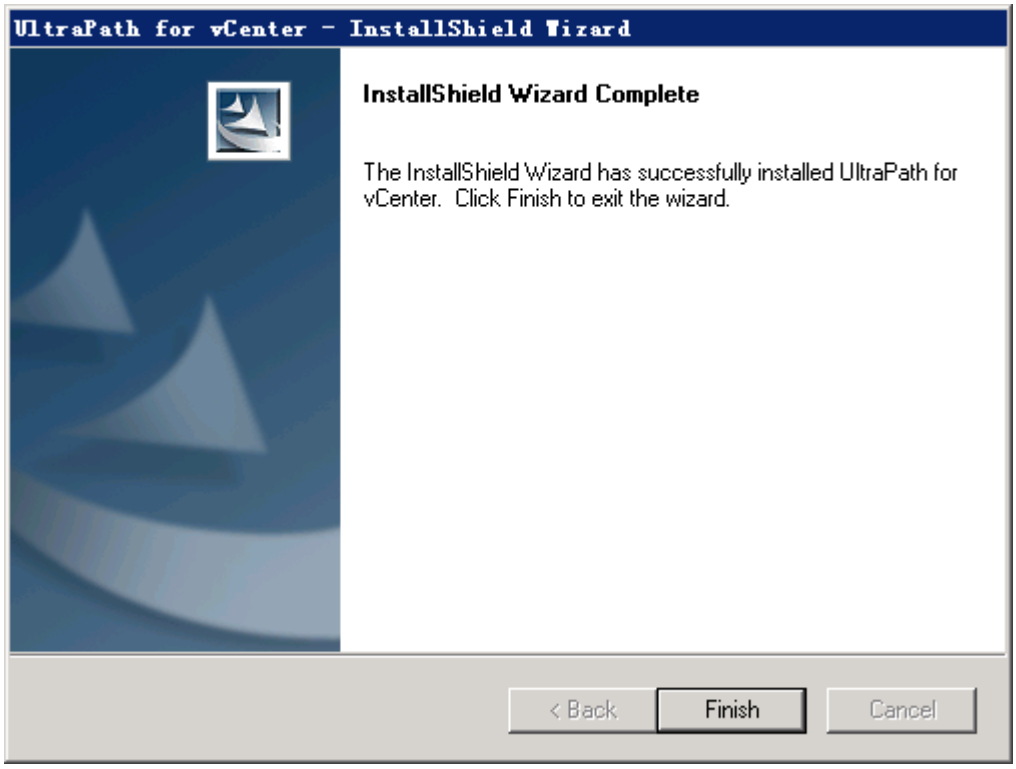
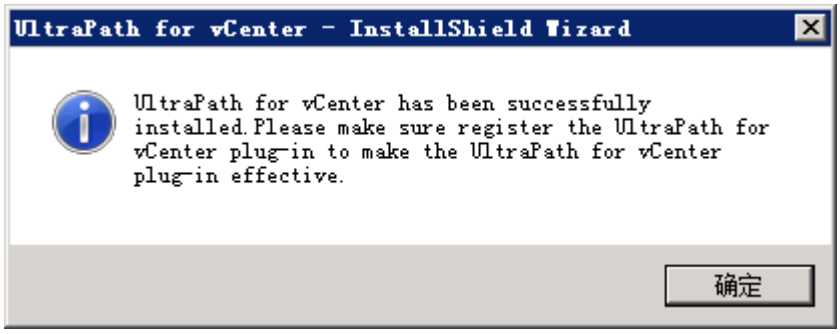
Figure 2-25 UltraPath for vCenter installation completion page



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.

1. Log in to VMware vSphere Client in the host that installed VMware vSphere Client.
2. On the vSphere Client management interface, choose**Plug-ins** > **Manage Plug-ins**.

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

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

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

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

----End

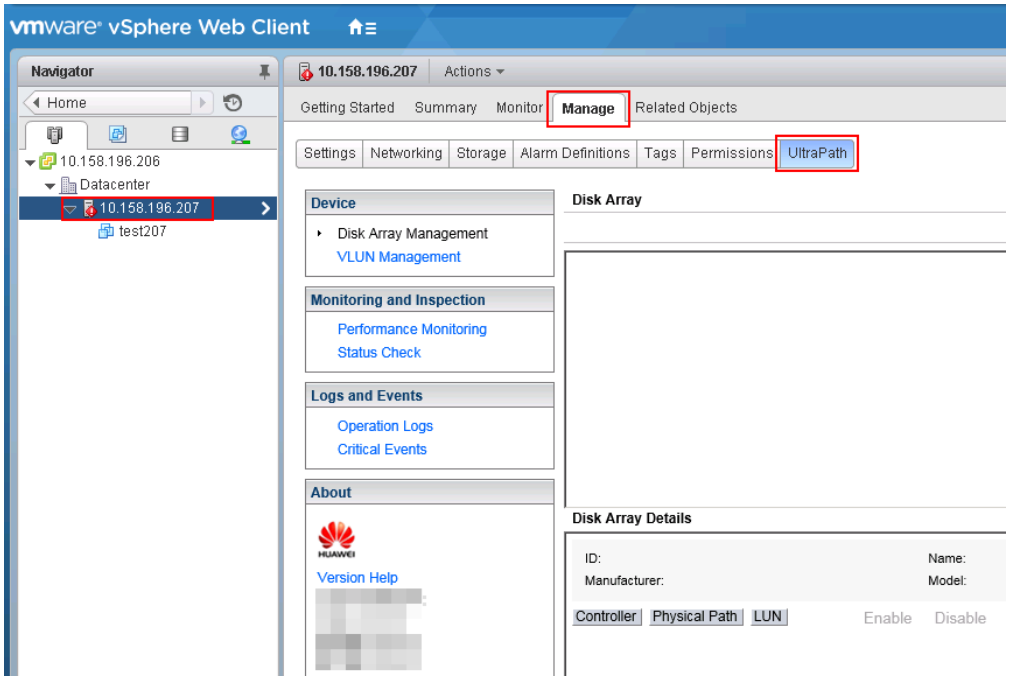
Follow-up Procedure

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.
5. Click **Manage** > **UltraPath** on the right page, as shown in **Figure 2-27**.

Figure 2-27 UltraPath management page



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2.4.2.2 Installing UltraPath for vCenter (Applicable to vCenter 6.0 on VCSA 6.0)

This section describes how to install UltraPath for vCenter in vCenter 6.0 deployed on VCSA 6.0. This operation is only applicable to UltraPath V100R008C50SPC500.

Prerequisites

VMware vSphere Client that can connect to VCSA has been installed.

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
- Ensure that the version of UltraPath for vCenter is same as that of UltraPath for vSphere. If the version of UltraPath for vCenter is earlier than that of UltraPath for vSphere, update the version of UltraPath for vCenter so that the versions of UltraPath for vCenter and UltraPath for vSphere are same. If the version of UltraPath for vCenter is later than that of UltraPath for vSphere, new functions of UltraPath cannot be queried and configured. You are advised to update the version of UltraPath for vCenter so that the versions of UltraPath for vCenter and UltraPath for vSphere are same.
- Strictly follow the sequence of the steps to install UltraPath for vCenter. Otherwise, irrevocable errors may be generated in the environment.
- UltraPath for vCenter provides both Chinese (simplified) and English (US) versions.

Procedure

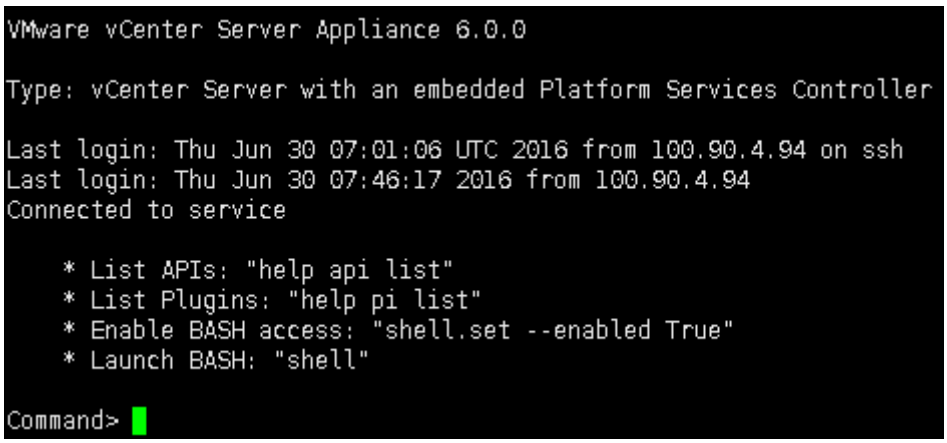
Step 1 Use a digital signature verification tool to verify integrity of the software package.

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 Copy the installation file to the vCenter server.

1. Log in to the Linux host (the vCenter server) where VCSA 6.0 resides as user root.
   If the following interface is displayed, perform **Step 2.2**.



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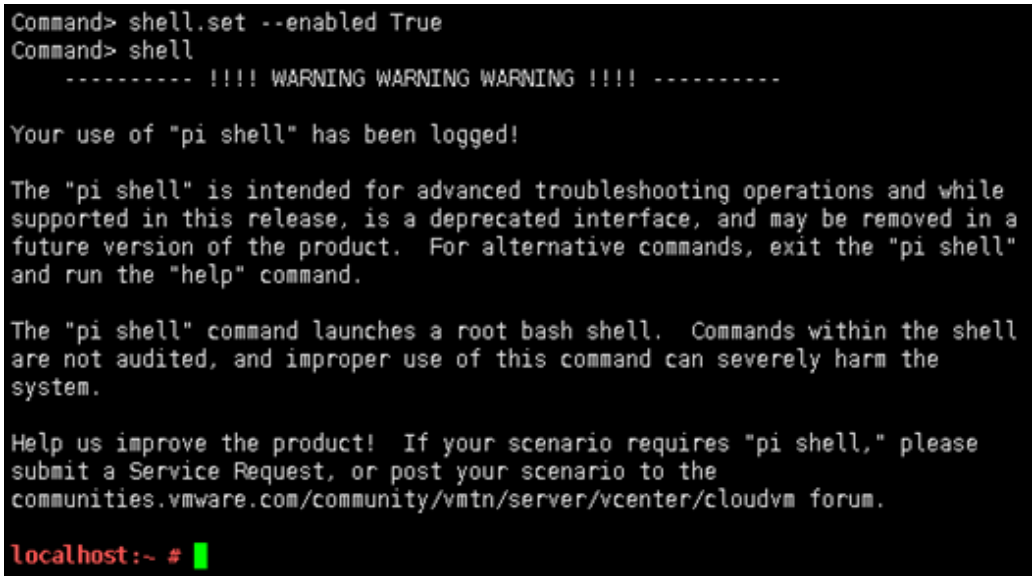
2. Run **shell.set --enabled true** and **shell** to go to the shell mode.



3. Run the **sed -i 's/appliancesh/bash/' /etc/passwd** 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 installation package and copy **VCSA6.0** under **/VMware_vSphere/Packages/vCenter-Plugin/VMware_vSphere_6.X** to any directory of the vCenter server.

Step 3 Install UltraPath for vCenter.

1. Run **cd VCSA6.0** to go to the **VCSA6.0** 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:~/VCSA6.0> chmod +x install.sh
localhost:~/VCSA6.0> 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.

1. Log in to VMware vSphere Client in the host that installed VMware vSphere Client.
2. On the vSphere Client management interface, choose **Plug-ins** > **Manage Plug-ins**.

   The **Plug-ins Manager** dialog box is displayed.
3. 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.
4. Click **Browse** and select the UltraPath for vCenter plug-in **install-config.xml** file that you want to install.
5. Click **Register Plug-in**.

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

6. Click **OK**.

> **NOTICE**
>
> If you are using a browser to visit VCSA 6.0 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

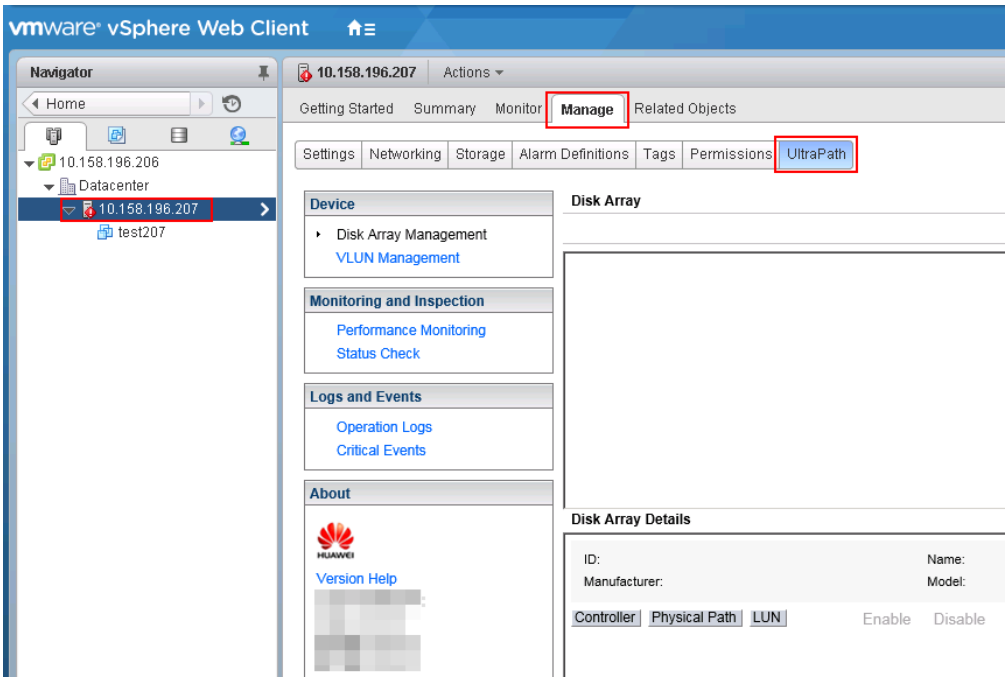
Follow-up Procedure

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.
5. Click **Manage** > **UltraPath** on the right page, as shown in **Figure 2-28**.

Figure 2-28 UltraPath management page



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2.5 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.

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

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

Precautions

- Ensure that the version of UltraPath for vCenter is same as that of UltraPath for vSphere. If the version of UltraPath for vCenter is earlier than that of UltraPath for vSphere, update the version of UltraPath for vCenter so that the versions of UltraPath for vCenter and UltraPath for vSphere are same. If the version of UltraPath for vCenter is later than that of UltraPath for vSphere, new functions of UltraPath cannot be queried and configured. You are advised to update the version of UltraPath for vCenter so that the versions of UltraPath for vCenter and UltraPath for vSphere are same.
- 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

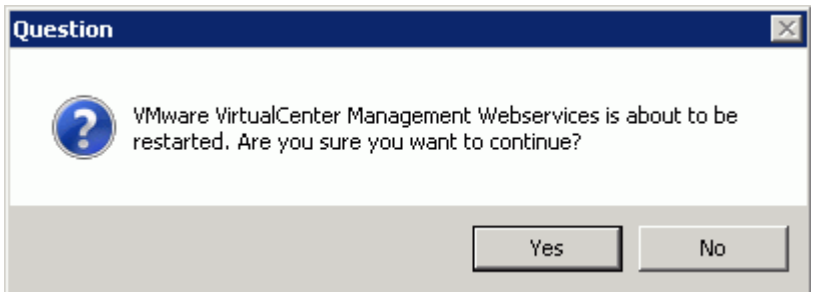
Download the digital signature verification tool from **http://support.huawei.com/enterprise/** to verify integrity of the software package. If the verification fails, contact technical support engineers to obtain the correct and secure software package.

Step 2 Decompress the UltraPath installation package and copy **VMware_vSphere_5.X** under **/VMware_vSphere/Packages/vCenter-Plugin** 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-8.XX.XXX-vCenter.exe** icon. The **Figure 2-29** dialog box is displayed.

Figure 2-29 UltraPath for vCenter installation instruction page



Step 5 Click **Yes**. The installation page of UltraPath for vCenter is displayed, as shown in **Figure 2-30**.

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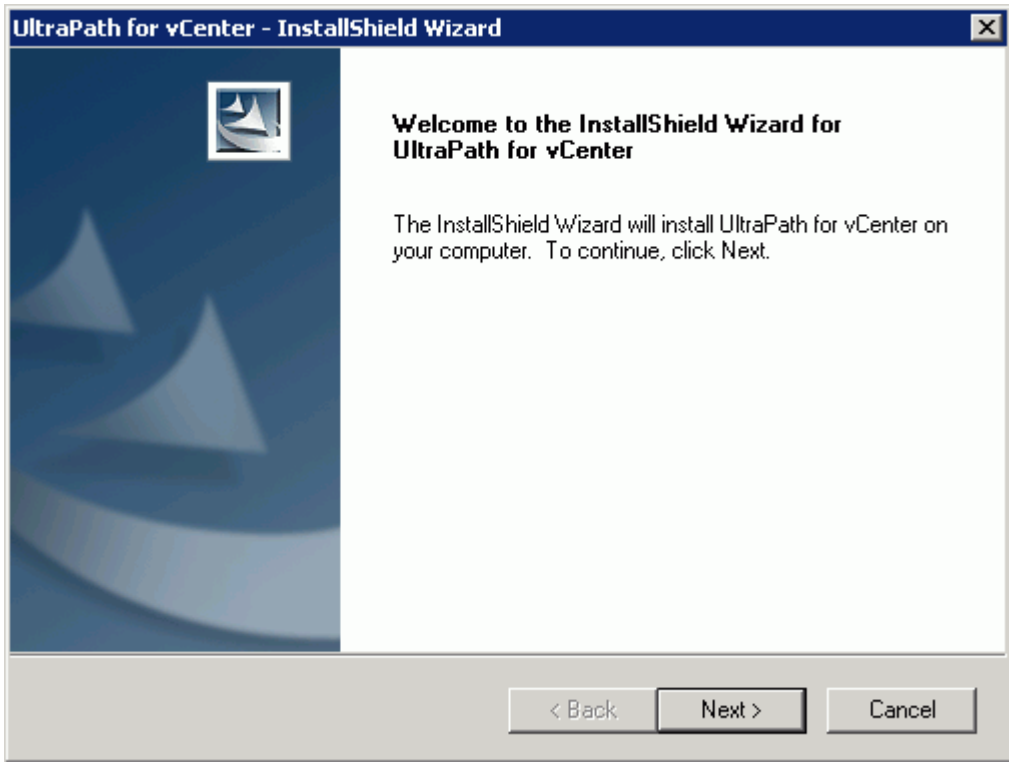
Figure 2-30 UltraPath for vCenter installation page



Step 6 Click **Next** on the installation page. The installation path instruction page is displayed, as shown in **Figure 2-31**.

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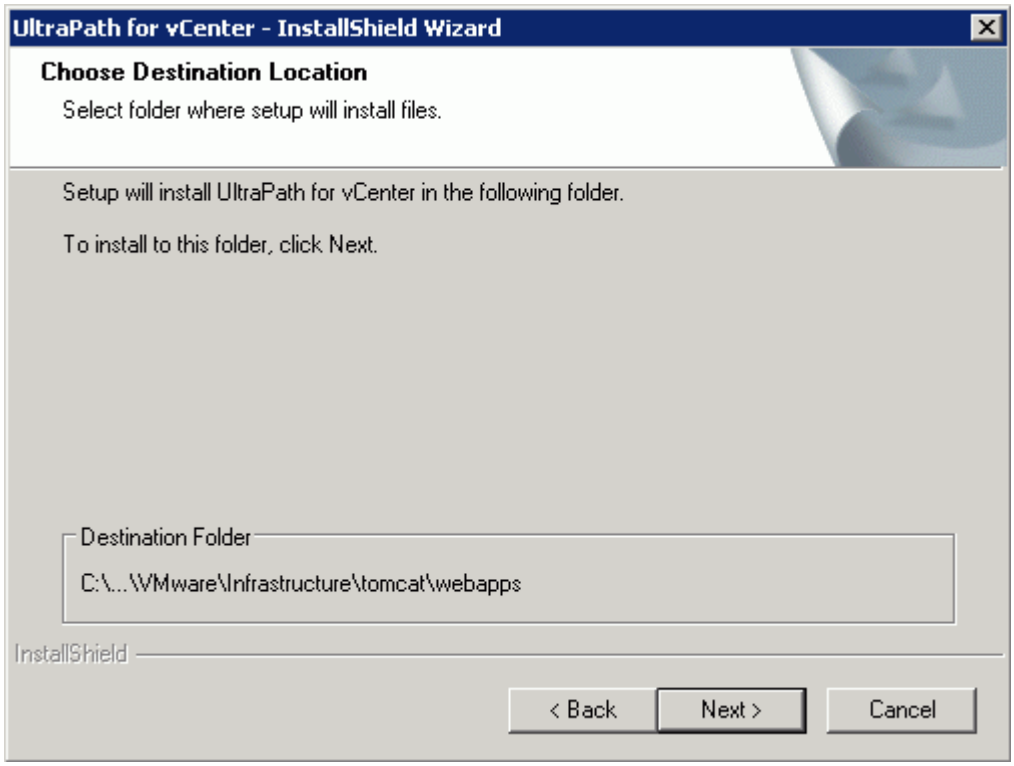
Figure 2-31 UltraPath for vCenter installation path instruction page



Step 7 Keep the default installation path and click **Next**. The installation preparation page is displayed, as shown in **Figure 2-32**.

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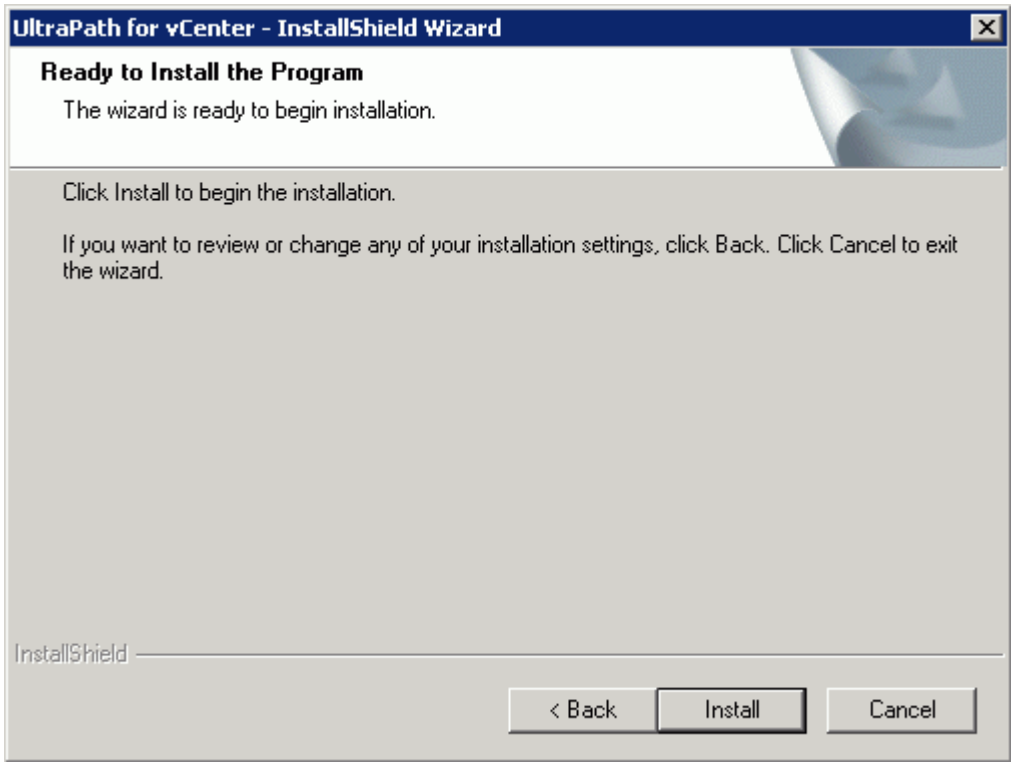
Figure 2-32 UltraPath for vCenter installation preparation page



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

Step 9 After the installation is complete, click **Finish**, as shown in **Figure 2-33**.

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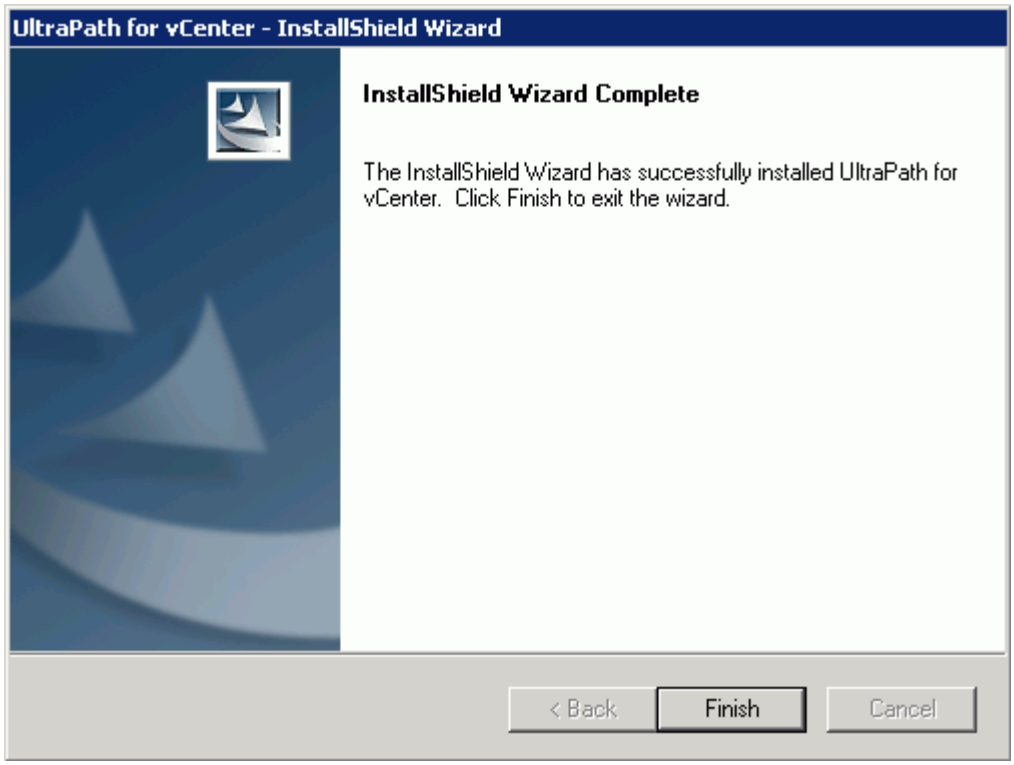
Figure 2-33 UltraPath for vCenter installation completion page



----End

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.

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NOTE

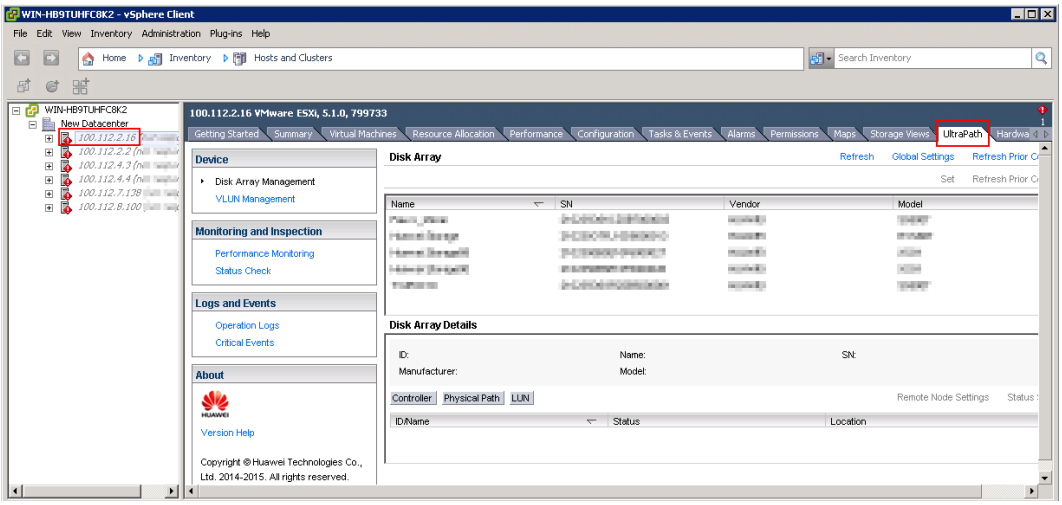
- You can remotely log in to the client of the vCenter server and enter the following address in the address box of the browser for registration:

  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 2-34**

Figure 2-34 UltraPath management page



2.5.2 Installing UltraPath for vCenter (for vCenter 6.0 deployed on Windows)

This section explains how to install UltraPath for vCenter.

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
- Ensure that the version of UltraPath for vCenter is same as that of UltraPath for vSphere. If the version of UltraPath for vCenter is earlier than that of UltraPath for vSphere,

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update the version of UltraPath for vCenter so that the versions of UltraPath for vCenter and UltraPath for vSphere are same. If the version of UltraPath for vCenter is later than that of UltraPath for vSphere, new functions of UltraPath cannot be queried and configured. You are advised to update the version of UltraPath for vCenter so that the versions of UltraPath for vCenter and UltraPath for vSphere are same.

- 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

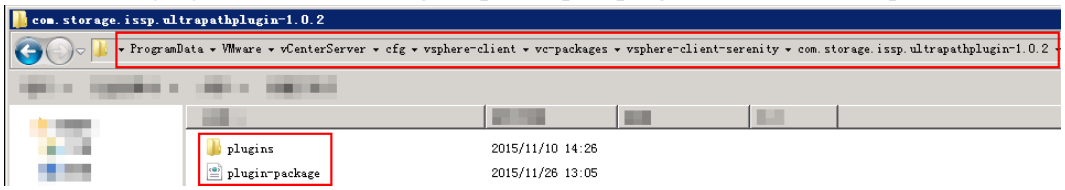
Download the digital signature verification tool from **http://support.huawei.com/enterprise/** to verify integrity of the software package. If the verification fails, contact technical support engineers to obtain the correct and secure software package.

Step 2 Store the **UltraPath-8.XX.XXX-vCenter.zip** file in the **/VMware_vSphere/Packages/vCenter-Plugin/VMware_vSphere_6.X** folder of the UltraPath software package to any directory of vCenter server and decompress the **UltraPath-8.XX.XXX-vCenter.zip**. Copy the **com.storage.issp.ultrapathplugin-1.x.x** folder to the **ProgramData\VMware\vCenterServer\cfg\vsphere-client\vc-packages\vsphere-client-serenity** installation directory of vCenter server.

NOTE

- Probably, the **ProgramData** file is a hidden file.
- If the **vc-packages\vsphere-client-serenity** directory does not exist, you need to manually create this directory.

The following figure uses **com.storage.issp.ultrapathplugin-1.0.2** as an example.



Then copy the **install-config.xml** file in the **InstallConfig** folder to any directory of host that installed VMware vSphere Client.

Step 3 Register the UltraPath for vCenter plug-in.

1. Log in to VMware vSphere Client in the host that installed VMware vSphere Client.
2. On the the vSphere Client management interface, choose > **Plug-ins** > **Manage Plug-ins**.

   The **Plug-ins Manager** dialog box is displayed.
3. 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.
4. Click **Browse** and select the UltraPath for vCenter plug-in **install-config.xml** file that you want to install.
5. Click **Register Plug-in**.

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

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Step 4 Make the UltraPath for vCenter plug-in effective.

1. Log in to the vCenter server.
2. In vCenter's server list, select **VMware VirtualCenter Server**.
3. Right-click and choose **Restart** from the shortcut menu.

   The **Restart Other Services** dialog box is displayed.
4. Click **Yes**.

   VMware VirtualCenter Server restarts and the restart will take several minutes.
5. After restarting the service is completed, login to the vSphere Web Client management interface by waiting a few minutes later. Check whether you can see the **UltraPath** tab.
   - If yes, the UltraPath for vCenter Plug-in is installed successfully.
   - If no, the UltraPath for vCenter Plug-in fails to be installed. Contact Huawei technical support.

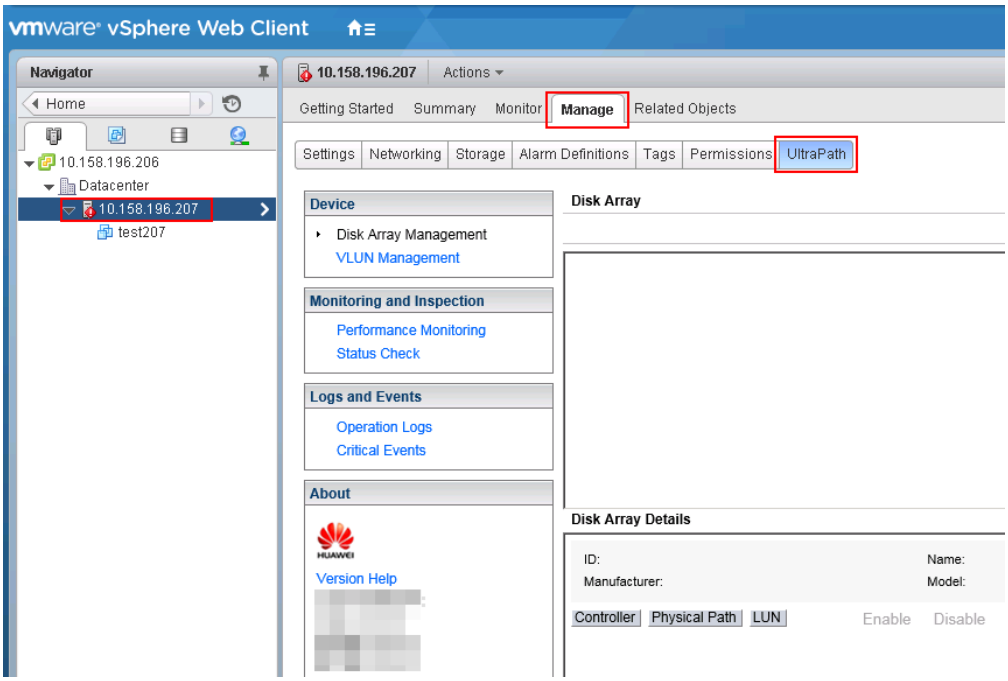
----End

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.
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.
5. Click **Manage** > **UltraPath** on the right page, as shown in **Figure 2-35**.

Figure 2-35 UltraPath management page



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2.5.2.1 Installing UltraPath for vCenter (for vCenter 6.0 deployed on Windows)

This section explains how to install UltraPath for vCenter.

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
- Ensure that the version of UltraPath for vCenter is same as that of UltraPath for vSphere. If the version of UltraPath for vCenter is earlier than that of UltraPath for vSphere, update the version of UltraPath for vCenter so that the versions of UltraPath for vCenter and UltraPath for vSphere are same. If the version of UltraPath for vCenter is later than that of UltraPath for vSphere, new functions of UltraPath cannot be queried and configured. You are advised to update the version of UltraPath for vCenter so that the versions of UltraPath for vCenter and UltraPath for vSphere are same.
- 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

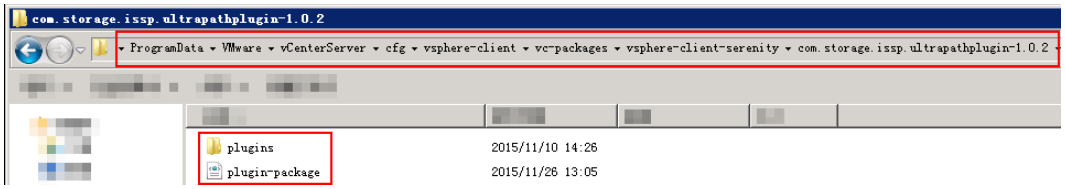
Download the digital signature verification tool from **http://support.huawei.com/enterprise/** to verify integrity of the software package. If the verification fails, contact technical support engineers to obtain the correct and secure software package.

Step 2 Store the **UltraPath-8.XX.XXX-vCenter.zip** file in the **/VMware_vSphere/Packages/vCenter-Plugin/VMware_vSphere_6.X** folder of the UltraPath software package to any directory of vCenter server and decompress the **UltraPath-8.XX.XXX-vCenter.zip**. Copy the **com.storage.issp.ultrapathplugin-1.x.x** folder to the **ProgramData\VMware\vCenterServer\cfg\vsphere-client\vc-packages\vsphere-client-serenity** installation directory of vCenter server.

NOTE

- Probably, the **ProgramData** file is a hidden file.
- If the **vc-packages\vsphere-client-serenity** directory does not exist, you need to manually create this directory.

The following figure uses **com.storage.issp.ultrapathplugin-1.0.2** as an example.



Then copy the **install-config.xml** file in the **InstallConfig** folder to any directory of host that installed VMware vSphere Client.

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Step 3 Register the UltraPath for vCenter plug-in.

1. Log in to VMware vSphere Client in the host that installed VMware vSphere Client.
2. On the the vSphere Client management interface, choose > **Plug-ins** > **Manage Plug-ins**.

   The **Plug-ins Manager** dialog box is displayed.
3. 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.
4. Click **Browse** and select the UltraPath for vCenter plug-in **install-config.xml** file that you want to install.
5. Click **Register Plug-in**.

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

Step 4 Make the UltraPath for vCenter plug-in effective.

1. Log in to the vCenter server.
2. In vCenter's server list, select **VMware VirtualCenter Server**.
3. Right-click and choose **Restart** from the shortcut menu.

   The **Restart Other Services** dialog box is displayed.
4. Click **Yes**.

   VMware VirtualCenter Server restarts and the restart will take several minutes.
5. After restarting the service is completed, login to the vSphere Web Client management interface by waiting a few minutes later. Check whether you can see the **UltraPath** tab.
   - If yes, the UltraPath for vCenter Plug-in is installed successfully.
   - If no, the UltraPath for vCenter Plug-in fails to be installed. Contact Huawei technical support.

----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.
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.
5. Click **Manage** > **UltraPath** on the right page, as shown in **Figure 2-36**.

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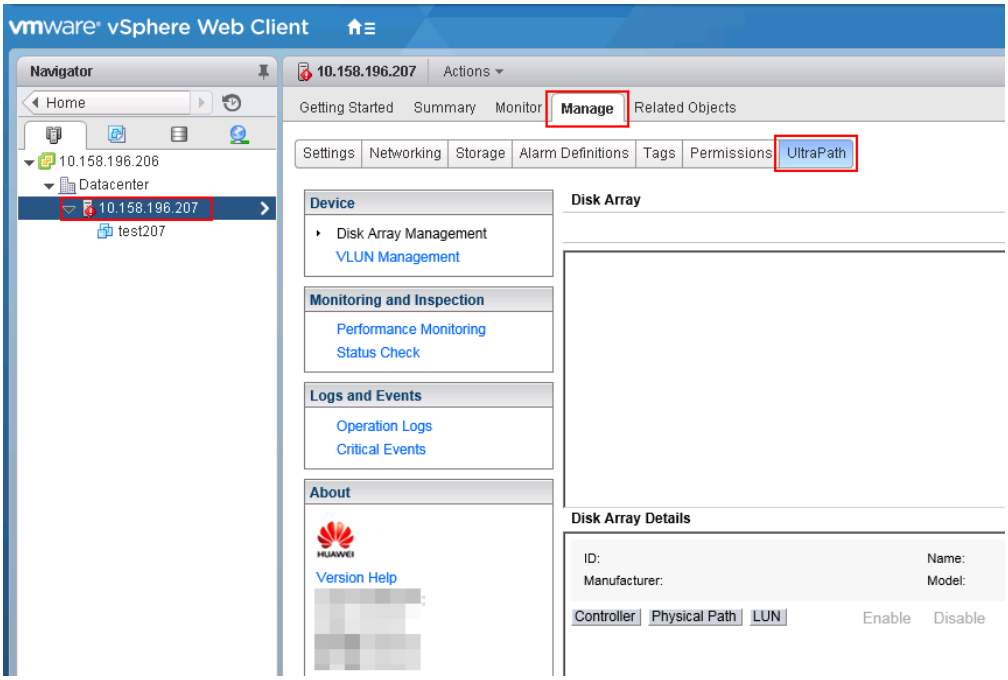
Figure 2-36 UltraPath management page



2.5.2.2 Installing UltraPath for vCenter (for VCSA 6.0)

This section explains how to install UltraPath for vCenter.

Prerequisites

VMware vSphere Client that can connect to VCSA has been installed.

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
- Ensure that the version of UltraPath for vCenter is same as that of UltraPath for vSphere. If the version of UltraPath for vCenter is earlier than that of UltraPath for vSphere, update the version of UltraPath for vCenter so that the versions of UltraPath for vCenter and UltraPath for vSphere are same. If the version of UltraPath for vCenter is later than that of UltraPath for vSphere, new functions of UltraPath cannot be queried and configured. You are advised to update the version of UltraPath for vCenter so that the versions of UltraPath for vCenter and UltraPath for vSphere are same.
- Strictly follow the sequence of the steps to install UltraPath for vCenter. Otherwise, irrevocable errors may be generated in the environment.
- UltraPath for vCenter provides both Chinese (simplified) and English (US) versions.

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Procedure

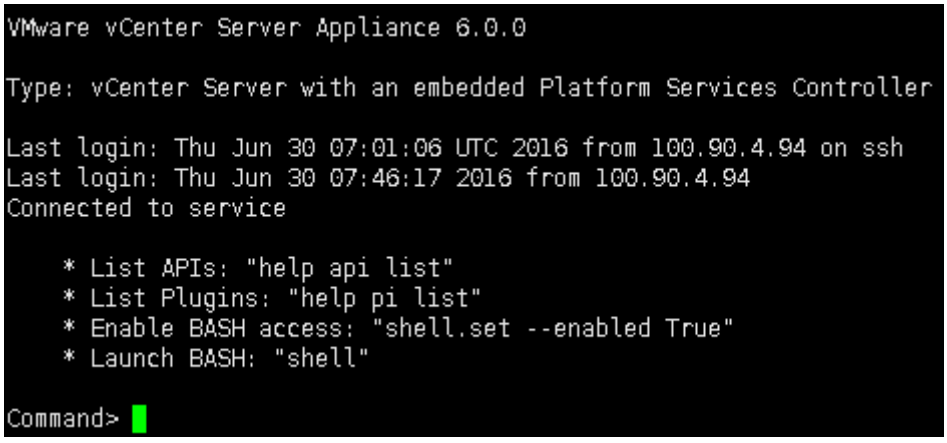
Step 1 Use a digital signature verification tool to verify integrity of the software package.

NOTE

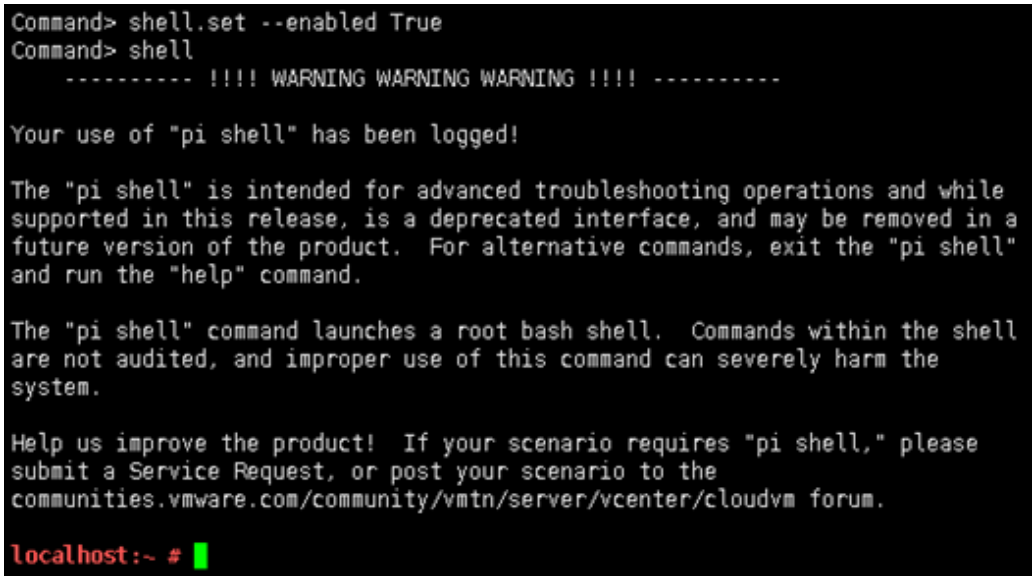
Download the digital signature verification tool from **http://support.huawei.com/enterprise/** to verify integrity of the software package. If the verification fails, contact technical support engineers to obtain the correct and secure software package.

Step 2 Decompress the zip package and copy the files to the designated path.

1. Log in to the Linux host (the vCenter server) where VCSA 6.0 resides as user root.
   If the following interface is displayed, perform **Step 2.2**.



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



3. Run the **sed -i 's/appliancesh/bash/' /etc/passwd** command to enable the file uploading service on the vCenter server and upload the UltraPath installation package to the vCenter server.

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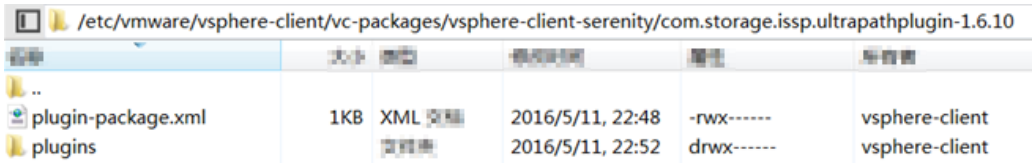
4. Copy **UltraPath-8.XX.XXX-vCenter.zip** under **/VMware_vSphere/Packages/vCenter-Plugin/VMware_vSphere_6.X** where the UltraPath installation package resides to any directory of the vCenter server and decompress it. After decompression, copy the **com.storage.issp.ultrapathplugin-1.x.x** file folder to **/etc/vmware/vsphere-client/vc-packages/vsphere-client-serenity/** which contains installation data of the vCenter server.

   NOTE

   If **vc-packages\vsphere-client-serenity** does not exist, you need to create it manually.

   The following figure uses **com.storage.issp.ultrapathplugin-1.6.10** as an example.

Step 3 Modify properties, owners, and groups of vc-packages directories and subdirectories to meet vCenter access requirements.

1. Run the following command to modify the owners of the **vc-packages** directory to vsphere-client.

   ```
   localhost:/etc/vmware/vsphere-client/vc-packages # chown -R vsphere-
   client /etc/vmware/vsphere-client/vc-packages/
   ```

2. Run the following command to modify the groups of the **vc-packages** directory to users.

   ```
   localhost:/etc/vmware/vsphere-client/vc-packages # chgrp -R users /etc/vmware/
   vsphere-client/vc-packages/
   ```

3. Run the following command to modify the properties of the **vc-packages** directory so that vsphere-client users can perform operations on it.

   ```
   localhost:/etc/vmware/vsphere-client/vc-packages # chmod -R 700 /etc/vmware/
   vsphere-client/vc-packages/
   ```

Step 4 Register the UltraPath for vCenter plug-in.

1. Log in to VMware vSphere Client in the host that installed VMware vSphere Client.
2. On the vSphere Client management interface, choose > **Plug-ins** > **Manage Plug-ins**.

   The **Plug-ins Manager** dialog box is displayed.
3. 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.
4. Click **Browse** and select the UltraPath for vCenter plug-in **install-config.xml** file that you want to install.
5. Click **Register Plug-in**.

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

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NOTICE

If you are using a browser to visit VCSA 6.0 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.

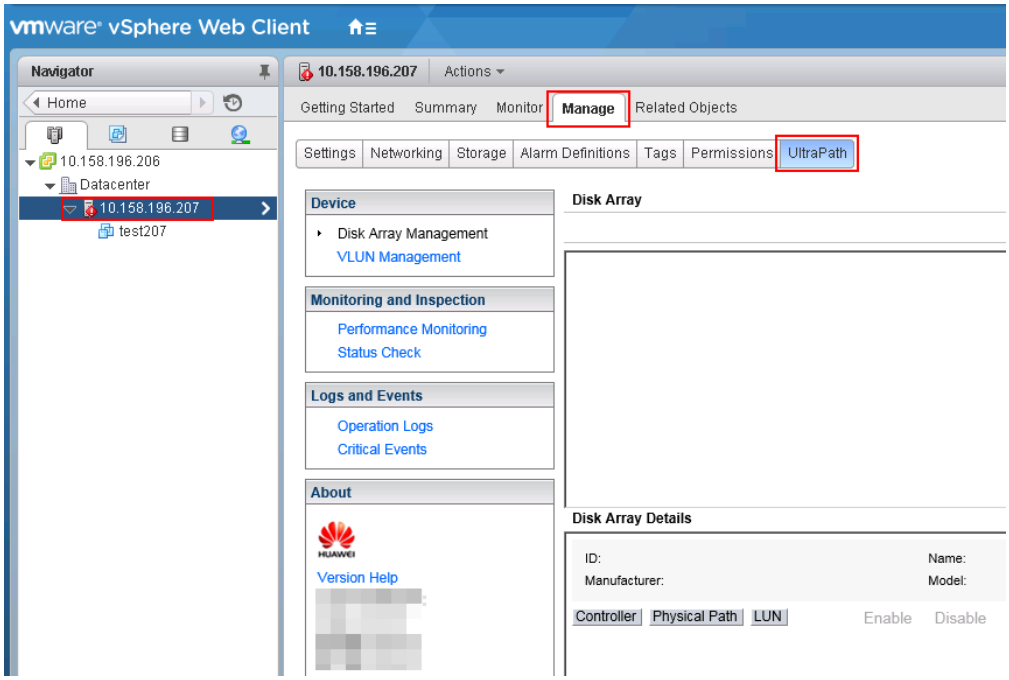
----End

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.
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.
5. Click **Manage** > **UltraPath** on the right page, as shown in **Figure 2-37**.

Figure 2-37 UltraPath management page



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3 Initial Configuration

About This Chapter

The initial configuration of UltraPath for vSphere includes the configuration of path status and parameters related to a disk array.

3.1 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 vSphere.

3.2 Global Settings
To ensure secure, proper, and efficient running of UltraPath for vSphere, set its global parameters properly.

3.3 Setting Disk Array Parameters
This section describes how to set parameters of a specified disk array.

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3.1 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 vSphere.

3.1.1 Logging In to the UltraPath Management Page

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

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 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 vSphere.

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

3.1.2 Logging In to the UltraPath Management Page (Applicable to vCenter 6.0)

This section describes how to log in to the UltraPath management page of vCenter 6.0.

Prerequisites

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

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Procedure

Step 1 Log in to the application server.

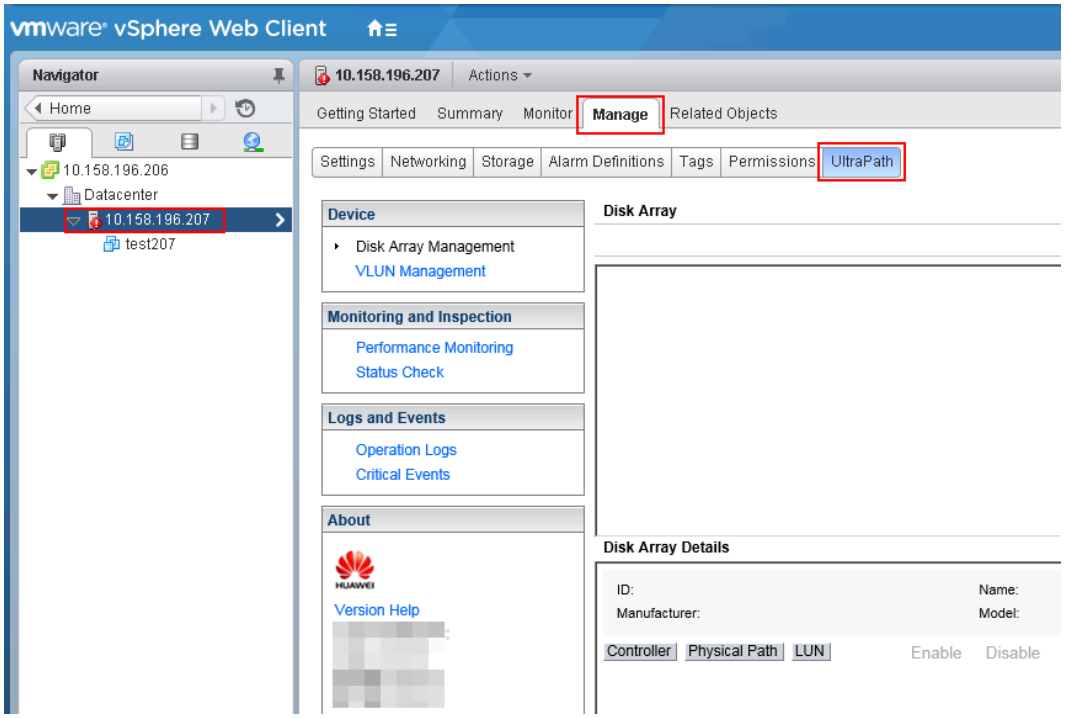
Step 2 In the address box of your browser, type **https://XXX.XXX.XXX.XXX:9443** and press **Enter** to go to the vSphere Web Client management page. **XXX.XXX.XXX.XXX** indicates the IP address of the vCenter server.

Step 3 Click **Hosts and Clusters**.

Step 4 Select the host that you want to manage.

Step 5 Choose **Manage** > **UltraPath** to go to the UltraPath management page.**Figure 3-1** shows the page.

Figure 3-1 UltraPath management page



----End

3.2 Global Settings

To ensure secure, proper, and efficient running of UltraPath for vSphere, set its global parameters properly.

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NOTE

- After UltraPath global settings, parameters of the storage arrays and VLUNs managed by UltraPath will be automatically configured. In the mean time, after UltraPath global settings, you can configure parameters for a storage array or VLUN. However, subsequent global settings will not apply to the storage array or VLUN.
- If Firefox is used to access vSphere Web Client , select **Cancel** when the **Prevent this page from creating additional dialogs** page is displayed.

3.2.1 General Settings

This section describes how to set the general parameters of UltraPath for vSphere.

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 At the upper right corner, click **Global Settings**.

The **Global Parameter Settings** dialog box is displayed.

Step 3 Click the **General** tab and set the general parameters in the **Common Settings** area. The following table describes the parameters:

Parameter	Description	Value
Load balancing mode	Load balancing mode of UltraPath for vSphere. The value is either **Within controller** or **Between controllers**.	[Default value] Within controller [Example] Within controller
Load balancing algorithm	Path selection algorithm of UltraPath for vSphere. The value can be **Minimum queue depth**, **Minimum task**, or **Round robin**.	[Default value] Minimum queue depth [Example] Minimum queue depth
LUN trespass	Enabling or disabling LUN trespass. The value can be either **Enable** or **Disable**.	[Default value] Enable [Example] Enable

Step 4 Set the number of consecutive I/Os for load balancing.

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 your service I/O model to improve performance.

1. Click **Continuous I/O Quantity Settings** next to **Load balancing algorithm**.

   The **Continuous I/O Quantity** dialog box is displayed.

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2. In **Load balancing continuous I/O quantity**, set the number of consecutive I/Os.

   The value ranges from 1 to 10,000. The default value is 1.

3. Click **OK**.

Step 5 Click **OK**.

NOTE

If you want to restore the default global settings, click **Restore to Default**.

----End

3.2.2 Advanced Settings

This section describes how to set the advanced parameters of UltraPath for vSphere.

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 At the upper right corner, click **Global Settings**.

The **Global Parameter Settings** dialog box is displayed.

Step 3 Click the **General** tab.

Step 4 In the **Common Settings** area, click **Advanced Setting**.

The **Advanced Settings** dialog box is displayed.

Step 5 In the **I/O Retry Settings** area, set the I/O retry parameters. The following table describes the parameters:

Parameter	Description	Value
Retry times	I/O retry times. The value ranges from 0 to 60.	[Default value] 10 [Example] 10
Retry interval (s)	I/O retry interval. The value ranges from 0 to 10.	[Default value] 0 [Example] 0

Step 6 In the **Routine Path Test Settings** area, set the path inspection parameters. The following table describes the parameters:

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Parameter	Description	Value
Idle path routine test interval (s)	Routine test interval of idle paths. The value ranges from 1 to 2,592,000.	[Default value] 60 [Example] 60
Faulty path routine test interval (s)	Routine test interval of faulty paths. The value ranges from 1 to 2,592,000.	[Default value] 10 [Example] 10

Step 7 In the **Others** area, set other advanced parameters. The following table describes the parameters:

Parameter	Description	Value
Failback latency time (s)	Latency for path failover. The value ranges from 0 to 3,600. **NOTE** If you set the value to **0**, failback latency is closed.	[Default value] 600 [Example] 600
Max. I/O timeout period (s)	Maximal I/O timeout period of a LUN. The value ranges from 1 to 2,592,000.	[Default value] 1800 [Example] 1800

Step 8 In the **HyperMetro Settings** area, set the HyperMetro parameters. The following table describes the parameters:

Parameter	Description	Value
HyperMetro Mode	HyperMetro working mode. The value can be either **Priority** or **Balance**.	[Default value] Priority [Example] Priority
Primary Array Sn	The SN of the primary array.	[Default value] None [Example] 210235G6GRZ0B5000024

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Parameter	Description	Value
Split Size	Fragment size. The value ranges from 512 bytes to 1 GB.	[Default value] 128MB [Example] 128MB

Step 9 Click **OK**.

NOTE

If you want to restore the default global settings, click **Restore to Default**.

----End

3.2.3 Link Reliability Settings

This section describes how to set the link parameters of UltraPath for vSphere.

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 At the upper right corner, click **Global Settings**.

The **Global Parameter Settings** dialog box is displayed.

Step 3 Click the **Link Reliability** tab.

Step 4 In the **Timeout Isolation Settings** area, set the timeout parameters. The following table describes the parameters:

Parameter	Description	Value
Time window for I/O timeout isolation statistics (s)	The value ranges from 60 to 2,592,000.	[Default value] 600 [Example] 600
I/O timeout isolation threshold	The value ranges from 0 to 65,535.	[Default value] 1 [Example] 1
I/O timeout path recovery time (s)	The value ranges from 1800 to 2,592,000.	[Default value] 1800 [Example] 1800

Step 5 In the **Discrete Error Isolation Settings** area, set the discrete error isolation parameters. The following table describes the parameters:

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Parameter	Description	Value
Time window for I/O discrete error isolation statistics (s)	The value ranges from 60 to 2,592,000.	[Default value] 300 [Example] 300
Min. I/Os for I/O discrete error isolation	The value ranges from 5,000 to 65,535.	[Default value] 5000 [Example] 5000
I/O discrete error isolation threshold (%)	The value ranges from 0 to 100.	[Default value] 20 [Example] 20
I/O discrete error path recovery time (s)	The value ranges from 1,800 to 2,592,000.	[Default value] 1800 [Example] 1800

Step 6 In the **Path Intermittent Settings** area, set the intermittent error isolation parameters. The following table describes the parameters:

Parameter	Description	Value
Time window for intermittent path failure statistics (s)	The value ranges from 60 to 2,592,000.	[Default value] 1800 [Example] 1800
Intermittent path failure isolation threshold	The value ranges from 0 to 65,535.	[Default value] 3 [Example] 3
Intermittent path failure recovery time (s)	The value ranges from 60 to 2,592,000.	[Default value] 3600 [Example] 3600

Step 7 In the **iSCSI Settings** area, set the iSCSI parameters. The following table describes the parameters:

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Parameter	Description	Value
Time window for high latency path check statistics (s)	The value ranges from 60 to 18,000.	[Default value] 300 [Example] 300
High latency path isolation threshold (ms)	The value ranges from 0 to 65,535.	[Default value] 1000 [Example] 1000
High latency path recovery time (s)	The value ranges from 60 to 2,592,000.	[Default value] 3600 [Example] 3600

Step 8 In the **I/O Latency Threshold Settings** area, set the I/O latency threshold parameters. The following table describes the parameters:

Parameter	Description	Value
I/O Latency Threshold (ms)	The value ranges from 0 to 120,000.	[Default value] 20 [Example] 20

Step 9 Click **OK**.

NOTE

If you want to restore the default global settings, click **Restore to Default**.

----End

3.3 Setting Disk Array Parameters

This section describes how to set parameters of a specified disk array.

Precaution

After storage array parameters settings, parameters of the VLUNs from the storage array will be automatically configured. Aggregation VLUNs do not be automatically configured. In the mean time, after storage array parameters settings, you can configure parameters for a VLUN from the storage array. However, subsequent storage array parameters settings will not apply to the VLUN.

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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 that you want to set.

Step 3 At the upper right corner, click **Set**.

The **Disk Array Parameter Settings** dialog box is displayed.

Step 4 In the **Common Settings** area, set the basic parameters of UltraPath for vSphere. The following table describes the parameters:

Parameter	Description	Value
Load balancing mode	Load balancing mode of UltraPath for vSphere. The value is either **Within controller** or **Between controllers**.	[Default value] Within controller [Example] Within controller
Load balancing algorithm	Path selection algorithm of UltraPath for vSphere. The value can be **Minimum queue depth**, **Minimum task**, or **Round robin**.	[Default value] Minimum queue depth [Example] Minimum queue depth
LUN trespass	Enabling or disabling LUN trespass. The value can be either **Enable** or **Disable**.	[Default value] Enable [Example] Enable

Step 5 Set the number of consecutive I/Os for load balancing.

1. Click **Continuous I/O Quantity Settings** next to **Load balancing algorithm**.

   The **Continuous I/O Quantity** dialog box is displayed.
2. In **Load balancing continuous I/O quantity**, set the number of consecutive I/Os.

   The value ranges from 1 to 10,000. The default value is 1.
3. Click **OK**.

Step 6 **Optional:** Set the advanced parameters of the disk array.

1. Click **Advanced Settings**.

   The **Advanced Settings** dialog box is displayed.
2. In **Max. I/O timeout period (s)**, set the maximum I/O timeout period.

   The value ranges from 1 to 2,592,000. The default value is 1,800.
3. Click **OK**.

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Step 7 Click **OK**.

----End

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4 Management

About This Chapter

The Management of UltraPath includes performing routine maintenance , upgrading and uninstalling the UltraPath for vSphere and UltraPath for vCenter.

4.1 Routine Maintenance
This chapter describes how to perform routine maintenance. You can check whether UltraPath for vSphere is running properly by viewing information about physical paths, logical paths, virtual disk attributes, performance statistics, and other key information.

4.2 Update
This chapter explains how to upgrade UltraPath for vSphere and UltraPath for vCenter.

4.3 Uninstallation
This chapter explains how to uninstall UltraPath for vSphere and UltraPath for vCenter.

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4.1 Routine Maintenance

This chapter describes how to perform routine maintenance. You can check whether UltraPath for vSphere is running properly by viewing information about physical paths, logical paths, virtual disk attributes, performance statistics, and other key information.

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

4.1.1 Array Management

You can use UltraPath for vSphere to view and set path status and disk array–related parameters.

4.1.1.1 Viewing Array Information

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

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
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 vSphere.

----End

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4.1.1.2 Controller Management

Controller management includes viewing controller information and setting controllers.

4.1.1.2.1 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

4.1.1.2.2 Setting a Controller

This section describes how to set a disk array controller status.

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 set.

Step 3 Set the controller status.

1. In the **Disk Array Details** area, click the **Controller** tab.
2. Under **Disk Array Details**, select the controller that you want to set.
3. On the right of the **Disk Array Details** area, click **Status Settings**.
   The **Status Settings** dialog box is displayed.
4. In **Status Settings**, set the controller status.

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- Enable: enables the controller.
- Disable: disables the controller.

5. Click **OK**.

----End

4.1.1.2.3 Setting the Remote Controller Node of a VIS Disk Array

This section describes how to set the remote controller node of a VIS disk array so that host I/Os are delivered preferentially from the local VIS node, therefore shortening latency.

Context

If UltraPath for vSphere manages a VIS disk array, the **Remote Node Settings** option is available.

NOTE

UltraPath for vSphere supports remote active-active VIS disk arrays. 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 vSphere prefers the local VIS node for delivering I/Os. The remote VIS node is used only if the local node experiences a path fault.

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 set.

Step 3 Set the remote node of the VIS disk array.

1. Select the controller you want to set.
2. On the right of the **Disk Array Details** area, click **Remote Node Settings**.
   The **Remote Node Settings** dialog box is displayed.
3. In **Remote Node Settings**, set the controller's location information.
4. Click **OK**.

----End

4.1.1.3 Physical Path Management

Physical path management includes viewing physical path information, enabling/disabling physical paths, resetting physical path status, checking path health status, and deleting faulty physical paths.

4.1.1.3.1 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.

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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**, **Disable**, or **--**.	[Example] Normal
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

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Parameter	Description	Value
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

4.1.1.3.2 Enabling or Disabling a Physical Path

This section describes how to enable or disable a physical path of a storage system.

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 set.

Step 3 Enable or disable a physical path of the disk array.

1. In the **Disk Array Details** area, click the **Physical Path** tab.
2. Under **Disk Array Details**, select the physical path you want to set.
3. On the right of the **Disk Array Details** area, click **Enable** or **Disable** to enable or disable the physical path.

   NOTE

   The **Enable** and **Disable** options are available only when the path type is not SCSI. If the path type is iSCSI, you can **Enable** or **Disable** the path in the **Status Settings** of the path's controller.
4. Click **OK**.

----End

4.1.1.3.3 Resetting the Status of a Physical Path

This section describes how to reset a physical path status of a disk array.

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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 that you want to set.

Step 3 Reset a path status.

1. In the **Disk Array Details** area, click the **Physical Path** tab.
2. Select the physical path you want to reset.
3. On the right of the **Disk Array Details** area, click **Reset Link Status**.
   The **Confirm** dialog box is displayed.
4. Confirm the information and click **OK**.

----End

4.1.1.3.4 Checking the Health Status of a Path

This section describes how to check the health status of a 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 set.

Step 3 Check the health status of a path.

1. In the **Disk Array Details** area, click the **Physical Path** tab.
2. Select the physical path whose health status you want to check.
3. On the right of the **Disk Array Details** area, click **Health Check**.
   The **Health Check** dialog box is displayed.

   NOTE

   Read the instructions and precautions in the **Health Check** area.
4. Click **OK**.
   The **Confirm** dialog box is displayed.
5. Confirm the information and click **OK**.
   The **Result** dialog box is displayed.
6. Click **OK**.

----End

4.1.1.3.5 Deleting a Faulty Physical Path

This section describes how to delete a faulty physical 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.

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

Step 3 Delete a faulty physical path.

1. In the **Disk Array Details** area, click the **Physical Path** tab.
2. Select the faulty physical path you want to delete.
3. On the right of the **Disk Array Details** area, click **Delete**.
   The **Confirm** dialog box is displayed.
4. Confirm the information and click **OK**.
   The **Result** dialog box is displayed.
5. Click **OK**.

----End

4.1.1.4 Virtual LUN Management

Virtual LUN management includes viewing virtual LUN information and setting virtual LUNs.

4.1.1.4.1 Viewing Virtual LUN Information

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

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 vSphere 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

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Parameter	Description	Value
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
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

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Parameter	Description	Value
Name	Name of the running HBA.	[Example] vmhba32
Initiator Port	Name of an initiator port.	[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.	[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**, **BUSY degradation**, **I/O discrete error degradation**, **Intermittent failure degradation**, **I/O timeout degradation**, **High latency degradation**, **Disable**, or **--**.	[Example] Normal
Port Type	Type of a link port.	[Example] iSCSI

----End

4.1.1.4.2 Setting a Virtual LUN

This section describes how to set a virtual LUN.

Procedure

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

Step 2 Select the virtual LUN you want to set.

Step 3 Set the general parameters of the LUN.

1. At the upper right corner, click **Set**.
   The **LUN Parameter Settings** dialog box is displayed.

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2. In the **Common Settings** area, set the basic parameters of UltraPath for vSphere. The following table describes the parameters:

Parameter	Description	Value
Load balancing mode	Load balancing mode of UltraPath for vSphere. The value is either **Within controller** or **Between controllers**.	[Default value] Within controller [Example] Within controller
Load balancing algorithm	Path selection algorithm of UltraPath for vSphere. The value can be **Minimum queue depth**, **Minimum task**, or **Round robin**.	[Default value] Minimum queue depth [Example] Minimum queue depth
LUN trespass	Enabling or disabling LUN trespass. The value can be either **Enable** or **Disable**.	[Default value] Enable [Example] Enable

3. Click **OK**.

Step 4 Set the number of consecutive I/Os for load balancing.

1. Click **Continuous I/O Quantity Settings** next to **Load balancing algorithm**.
   The **Continuous I/O Quantity** dialog box is displayed.
2. In **Load balancing continuous I/O quantity**, set the number of consecutive I/Os.
   The value ranges from 1 to 10,000. The default value is 1.
3. Click **OK**.

Step 5 **Optional:** Set the advanced parameters of the disk array.

1. Click **Advanced Settings**.
   The **Advanced Settings** dialog box is displayed.
2. In **Max. I/O timeout period (s)**, set the maximum I/O timeout period.
3. Click **OK**.

NOTE
To clear LUN parameters, click **Clear**.

----End

4.1.1.4.3 Setting a Virtual HyperMetro LUN

This section describes how to set a virtual HyperMetro LUN.

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Procedure

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

Step 2 Select the virtual HyperMetro LUN you want to set.

Step 3 At the upper right corner, click **Set**.

The **LUN Parameter Settings** dialog box is displayed.

Step 4 On the **LUN Parameter Settings** dialog box, click **Advanced Setting**.

The **Advanced Settings** dialog box is displayed.

Step 5 In the **HyperMetro LUN Settings** area, set the parameters of virtual HyperMetro LUN. The following table describes the parameters:

Parameter	Description	Value
HyperMetro Mode	HyperMetro working mode. The value can be either **Priority** or **Balance**.	[Default value] Priority [Example] Priority
Primary Array Sn	The SN of the primary array.	[Default value] None [Example] 210235G6GRZ0B5000024
Split Size	Fragment size. The value ranges from 512 bytes to 1 GB.	[Default value] 128MB [Example] 128MB

Step 6 Click **OK**.

----End

4.1.1.4.4 Managing I/O Count Information

You can query, refresh, and clear the I/O count information.

?.1. Querying I/O Count Information

This operation enables you to query the I/O count of all virtual LUNs or on logical paths of a specific virtual LUN. The I/O count information includes the error I/O count, queue I/O count, error command count, and queue command count.

Procedure

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

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Step 2 Query the I/O count of virtual LUNs.

- Query the I/O count of all virtual LUNs.
  a. In the function pane, click **I/O Count**.
     The **I/O Count** dialog box is displayed.
  b. In the **I/O Count** dialog box that is displayed, view count information about all virtual LUNs. Related parameters are explained in the following table.

Parameter	Description	Value
Error I/O Count	The number of error I/Os returned to UltraPath by a virtual LUN	[Example] 1
Queue I/O Count	The number of I/Os not returned to UltraPath by a virtual LUN	[Example] 1
Error Command Count	The number of UltraPath internal commands that receive execution errors from a virtual LUN	[Example] 1
Queue Command Count	The number of UltraPath internal commands that have not received execution results from a virtual LUN	[Example] 1

- Query the I/O count on logical paths of a specific virtual LUN.
  a. In the function pane, select the virtual LUN that you want to query.
  b. Click the **I/O Count** tab page and view the I/O count information about this virtual LUN.

Parameter	Description	Value
Error I/O Count	The number of error I/Os returned to UltraPath by a virtual LUN	[Example] 1
Queue I/O Count	The number of I/Os not returned to UltraPath by a virtual LUN	[Example] 1

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Parameter	Description	Value
Error Command Count	The number of UltraPath internal commands that receive execution errors from a virtual LUN	[Example] 1
Queue Command Count	The number of UltraPath internal commands that have not received execution results from a virtual LUN	[Example] 1

----End

?.2. Refreshing I/O Count Information

This operation enables you to query the latest I/O count information.

Procedure

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

Step 2 In the function pane, click **I/O Count**.

The **I/O Count** dialog box is displayed.

Step 3 Click **Refresh**. Then you can view the latest I/O count information on the page.

Step 4 Click **OK**. The operation is complete.

----End

?.3. Clearing I/O Count Information

This operation enables you to clear all the I/O count information of virtual LUNs.

Procedure

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

Step 2 In the function pane, click **I/O Count**.

The **I/O Count** dialog box is displayed.

Step 3 Click **Clear**.

The **Information** dialog box is displayed, indicating that the operation succeeded.

Step 4 Click **OK**.

The **I/O Count** dialog box is displayed.

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Step 5 Click **OK**. The operation is complete.

----End

4.1.1.4.5 Managing I/O Latency Information

You can query and refresh the I/O latency information.

?.1. Querying I/O Latency Information

This operation enables you to query the latest I/O latency, max I/O latency, and average I/O latency of all virtual LUNs or on logical paths of a specific virtual LUN.

Procedure

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

Step 2 Query the I/O latency of virtual LUNs.

- Query the I/O latency of all virtual LUNs.
  a. In the function pane, click **I/O Latency**.
     The **I/O Latency** dialog box is displayed.
  b. In the **I/O Latency** dialog box that is displayed, view latency information about all virtual LUNs. Related parameters are explained in the following table.

Parameter	Description	Value
Latest I/O Latency	Latency of the latest I/O returned from a virtual LUN to UltraPath The latency unit is millisecond.	[Example] 31
Max I/O Latency	Maximum latency among I/Os returned from a virtual LUN to UltraPath The latency unit is millisecond.	[Example] 45
Average I/O Latency	Average latency of I/Os returned from a virtual LUN to UltraPath in the last one minute The latency unit is millisecond.	[Example] 15

- Query the I/O latency on logical paths of a specific virtual LUN.
  a. In the function pane, select the virtual LUN that you want to query.

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b. Click the **I/O Latency** tab page and view the I/O latency information about this virtual LUN.

Parameter	Description	Value
Latest I/O Latency	Latency of the latest I/O returned from a virtual LUN to UltraPath The latency unit is millisecond.	[Example] 31
Max I/O Latency	Maximum latency among I/Os returned from a virtual LUN to UltraPath The latency unit is millisecond.	[Example] 45
Average I/O Latency	Average latency of I/Os returned from a virtual LUN to UltraPath in the last one minute The latency unit is millisecond.	[Example] 15

----End

?.2. Refreshing I/O Latency Information

This operation enables you to query the latest I/O latency information.

Procedure

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

Step 2 In the function pane, click **I/O Latency**.
The **I/O Latency** dialog box is displayed.

Step 3 Click **Refresh**. Then you can view the latest I/O latency information on the page.

Step 4 Click **OK**. The operation is complete.

----End

4.1.2 Refreshing the Preferred Controller

This section describes how to refresh the preferred controller of a LUN.

4.1.2.1 Refreshing All LUNs

This section describes how to refresh the preferred controllers of all LUNs.

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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 At the upper right corner, click **Refresh Prior Controller**.

The **Success** dialog box is displayed, indicating that the operation succeeded.

Step 3 Click **OK**.

----End

4.1.2.2 Refreshing LUNs of a Specified Disk Array

This section describes how to refresh the preferred controllers of a specified disk array's LUNs.

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 LUN you want to refresh.

Step 3 At the upper right corner, click **Refresh Prior Controller**.

The **Success** dialog box is displayed, indicating that the operation succeeded.

Step 4 Click **OK**.

----End

4.1.2.3 Refreshing a Specified LUN

This section describes how to refresh the preferred controller of a specified LUN.

Procedure

Step 1 In the **Device** area on the left of the vCenter management interface, click **VLUN Management** to enter the virtual LUN management page.

Step 2 Select the LUN you want to switch.

Step 3 At the upper right corner, click **Refresh Prior Controller**.

The **Success** dialog box is displayed, indicating that the operation succeeded.

Step 4 Click **OK**.

----End

4.1.3 Performance Monitoring

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

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4.1.3.1 Setting Performance Monitoring

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

4.1.3.1.1 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

4.1.3.1.2 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.

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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

4.1.3.1.3 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**.

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

4.1.3.2 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.

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

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

----End

4.1.4 Status Check

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

4.1.4.1 Viewing Running Status

This section describes how to view the running status of UltraPath for vSphere 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 vSphere during its running.

----End

4.1.4.2 Exporting Status Information

This section describes how to export the status information about UltraPath for vSphere 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.

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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

4.1.5 Operation Logs

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

4.1.5.1 Viewing Operation Logs

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

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 vSphere.

----End

4.1.5.2 Exporting Operation Logs

This section describes how to export key events about UltraPath for vSphere 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.

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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

4.1.6 Critical Events

4.1.6.1 Viewing Critical Events

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

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 vSphere during its running.

----End

4.1.6.2 Exporting Critical Events

This section describes how to export key events about UltraPath for vSphere 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.

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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

4.2 Update

This chapter explains how to upgrade UltraPath for vSphere and UltraPath for vCenter.

For details about how to perform UltraPath for vSphere upgrade and UltraPath for vCenter, see *Upgrade Guide* of UltraPath. Obtaining method is as follows:

Log in to Huawei technical support website (**http://support.huawei.com/enterprise/**), choose **Support** > **Downloads** > **IT** > **Storage** > **Unified Storage** > **UltraPath**, and view the *Upgrade Guide* specific to the UltraPath version.

4.3 Uninstallation

This chapter explains how to uninstall UltraPath for vSphere and UltraPath for vCenter.

4.3.1 Uninstalling UltraPath for vSphere

This section describes the procedure for uninstalling UltraPath for vSphere.

4.3.1.1 Uninstalling UltraPath for vSphere on the ESXCLI

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

Prerequisites

Services running on the ESXi host have stopped.

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_8.06.010-00
   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_8.06.010-00
   VIBs Skipped:
```


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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_8.06.010-00
   VIBs Skipped:
```

Step 5 Restart the ESXi host.

----End

4.3.1.2 Uninstalling UltraPath for vSphere on the vSphere CLI

This section describes how to uninstall UltraPath for vSphere 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_8.06.010-00
   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.

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_8.06.010-00
   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
```


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```
   VIBs Installed:
   VIBs Removed: HUAWEI_bootbank_ultrapath.mpp_8.06.010-00
   VIBs Skipped:
```

Step 5 Restart the ESXi host.

----End

4.3.2 Uninstalling UltraPath for vCenter (for V100R008C50SPC500)

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.

4.3.2.1 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.

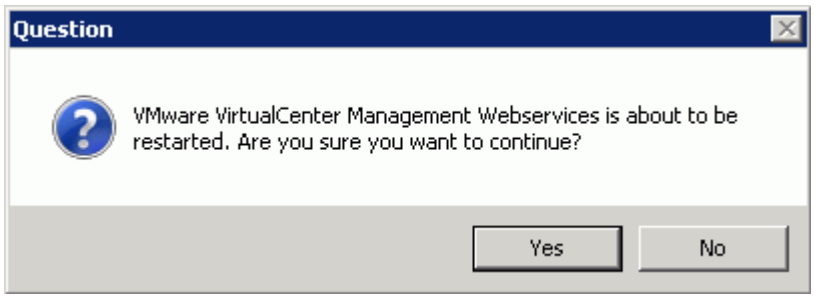
Step 3 Choose **Program**. The **Program** page is displayed.

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 4-1**.

Figure 4-1 Question dialog box



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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:

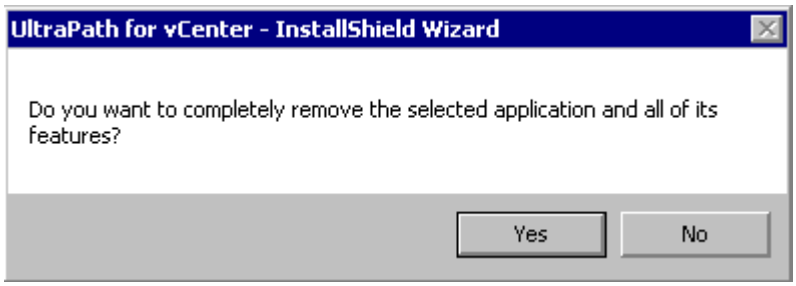
http://**vCenter IP**:8080/ultrapathplugin/pluginmgmt/unregplugin, where **vCenter IP** is the IP address of the vCenter server.

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 4-2**.

Figure 4-2 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 4-3**.

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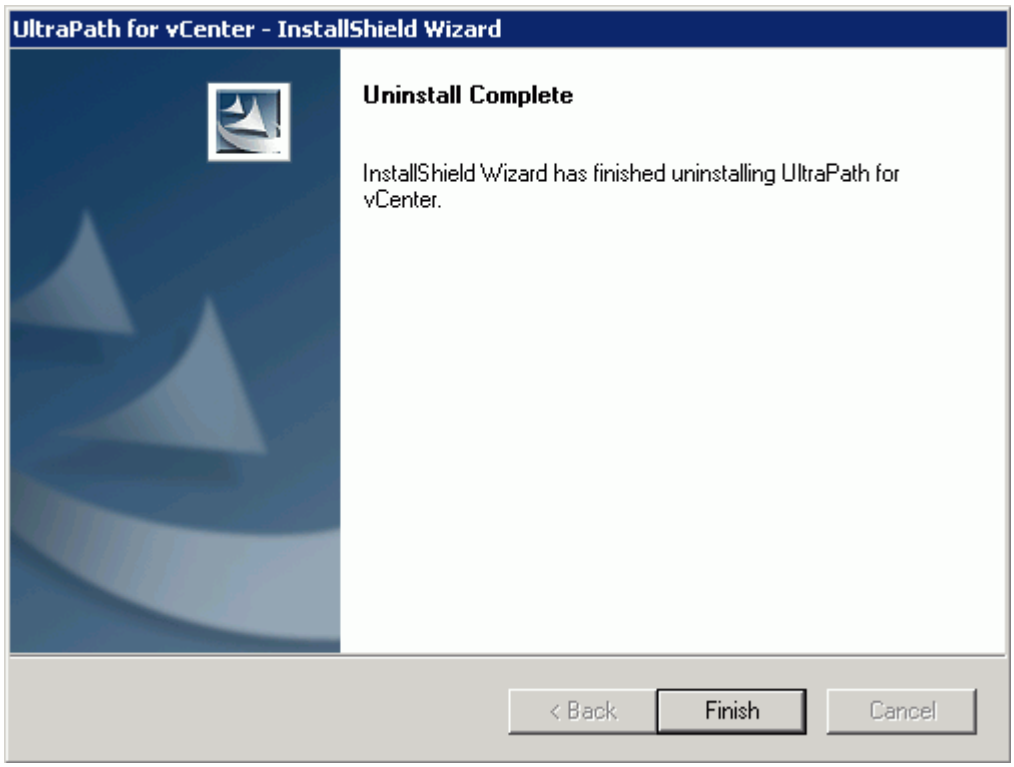
Figure 4-3 UltraPath for vCenter uninstallation completion page



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

4.3.2.2 Uninstalling UltraPath for vCenter (for vCenter 6.0)

Uninstallation methods for vCenter 6.0 running on different host operating systems are different. This section describes how to uninstall UltraPath for vCenter on Windows and Linux operating systems (VCSA 6.0).

4.3.2.2.1 Uninstalling UltraPath for vCenter (for vCenter 6.0 deployed on Windows)

This section describes how to uninstall UltraPath for vCenter in vCenter 6.0 deployed on Windows. This operation is only applicable to UltraPath V100R008C50SPC500.

Prerequisites

The maintenance terminal is communicating properly with the vCenter server.

Procedure

Step 1 Uninstall UltraPath for vCenter.

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1. Log in to the vCenter server.

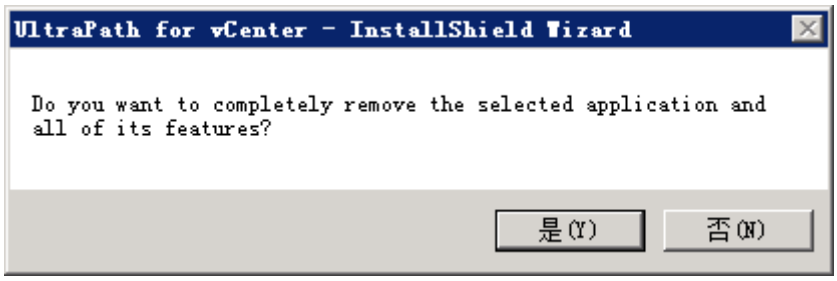
   NOTE

   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.

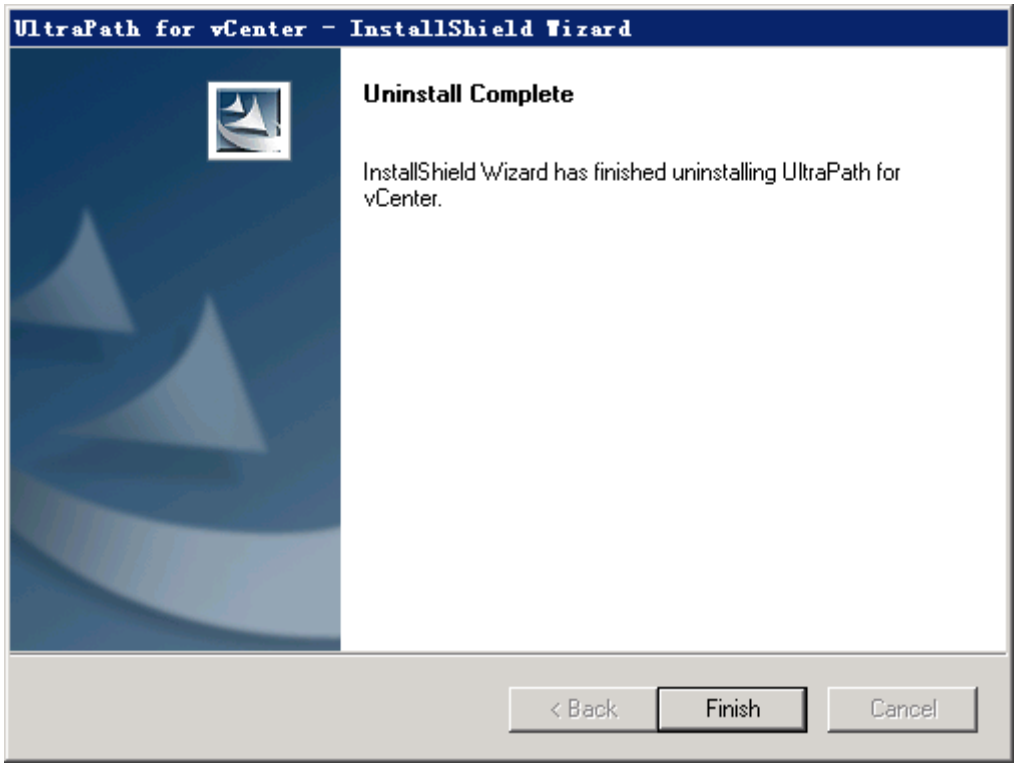
   The confirmation dialog box is displayed, as shown in **Figure 4-4**.

Figure 4-4 Dialog box for confirming uninstallation



6. After confirmation, click **Yes** to start uninstallation.
7. After the uninstallation, click **Finish**, as shown in **Figure 4-5**.

Figure 4-5 UltraPath for vCenter uninstallation completion page



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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

4.3.2.2.2 Uninstalling UltraPath for vCenter (Applicable to vCenter 6.0 on VCSA 6.0)

This section describes how to uninstall UltraPath for vCenter in vCenter 6.0 deployed on VCSA 6.0. This operation is only applicable to UltraPath V100R008C50SPC500.

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 6.0 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.

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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

4.3.3 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.

4.3.3.1 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 4-6**.

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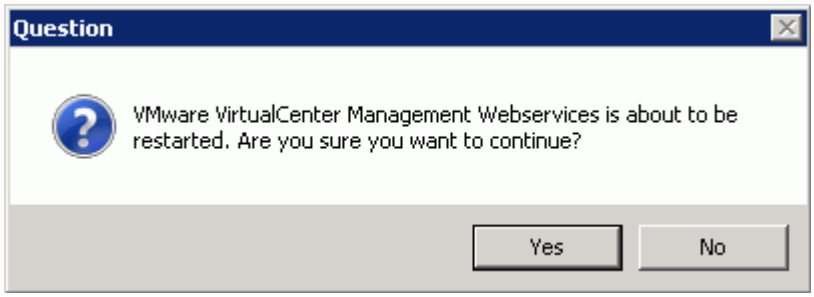
Figure 4-6 Question dialog box



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:

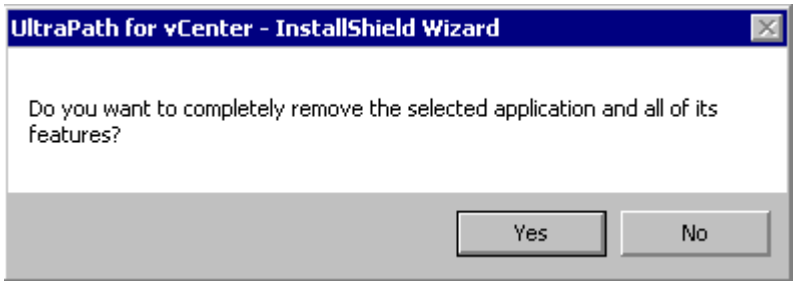
http://**vCenter IP**:8080/ultrapathplugin/pluginmgmt/unregplugin, where **vCenter IP** is the IP address of the vCenter server.

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 4-7**.

Figure 4-7 UltraPath for vCenter uninstallation information dialog box



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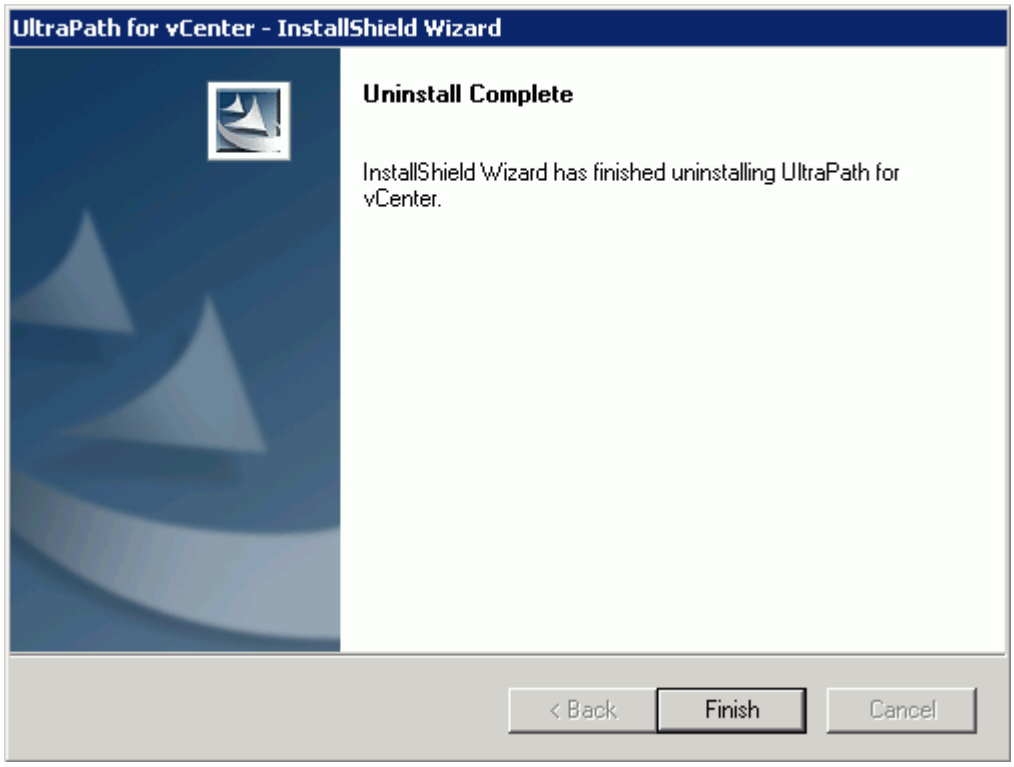
Step 7 Click **Yes** to start the uninstallation.

Step 8 After the uninstallation is complete, click **Finish**, as shown in **Figure 4-8**.

Figure 4-8 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

4.3.3.2 Uninstalling UltraPath for vCenter (for vCenter 6.0)

Uninstallation methods for vCenter 6.0 running on different host operating systems are different. This section describes how to uninstall UltraPath for vCenter on Windows and Linux operating systems (VCSA 6.0).

4.3.3.2.1 Uninstalling UltraPath for vCenter (for vCenter 6.0 deployed on Windows)

This section describes the procedure for uninstalling UltraPath for vCenter.

Prerequisites

The maintenance terminal is communicating properly with the vCenter server.

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Procedure

Step 1 Run a web browser on the maintenance terminal.

Step 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.

Step 3 Under **Properties**, click **content**.

The **ServiceContent** page is displayed.

Step 4 Under **Properties**, click **ExtensionManager**.

The **ManagedObjectReference:ExtensionManager** page is displayed.

Step 5 Under **Methods**, click **UnregisterExtension**.

The **void UnregisterExtension** page under **ManagedObjectReference:ExtensionManager** is displayed.

Step 6 For **VALUE** of **Parameters**, enter the name of the UltraPath for vCenter plug-in **com.storage.issp.ultrapathplugin**.

Step 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.

Step 8 Log in to the vCenter server and delete the **com.storage.issp.ultrapathplugin-1.x.x** folder of UltraPath for vCenter plug-in under the vCenter server installation directory: **ProgramData\VMware\vCenterServer\cfg\vsphere-client\vc-packages\vsphere-client-serenity**. The uninstallation of the UltraPath for vCenter plug-in is complete.

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

4.3.3.2.2 Uninstalling UltraPath for vCenter (Applicable to vCenter 6.0 on VCSA 6.0)

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

Prerequisites

The maintenance terminal is communicating properly with the vCenter server.

Procedure

Step 1 Run a web browser on the maintenance terminal.

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Step 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.

Step 3 Under **Properties**, click **content**.

The **ServiceContent** page is displayed.

Step 4 Under **Properties**, click **ExtensionManager**.

The **ManagedObjectReference:ExtensionManager** page is displayed.

Step 5 Under **Methods**, click **UnregisterExtension**.

The **void UnregisterExtension** page under **ManagedObjectReference:ExtensionManager** is displayed.

Step 6 For **VALUE** of **Parameters**, enter the name of the UltraPath for vCenter plug-in **com.storage.issp.ultrapathplugin**.

Step 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.

Step 8 Log in to the vCenter server and delete the **com.storage.issp.ultrapathplugin-1.x.x** folder of UltraPath for vCenter plug-in under the vCenter server installation directory: **/etc/vmware/vsphere-client/vc-packages/vsphere-client-serenity/**. The uninstallation of the UltraPath for vCenter plug-in is complete.

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

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5 FAQs

About This Chapter

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

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5.1 How to Setting System Logs?

Question

How to setting system logs?

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 setting system logs, refer to the following section

5.1.1 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.

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

----End

5.1.2 Setting syslog on the vCLI

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

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

5.1.3 Configuring the Remote Log on the esxcli

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

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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

5.1.4 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 5-1** describes related parameters.

Table 5-1 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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5.2 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, 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, you only need to run the **esxcfg-rescan -A** command once to scan for the disk. The disk information is thereby updated.

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

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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.

5.4 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 5-1**.

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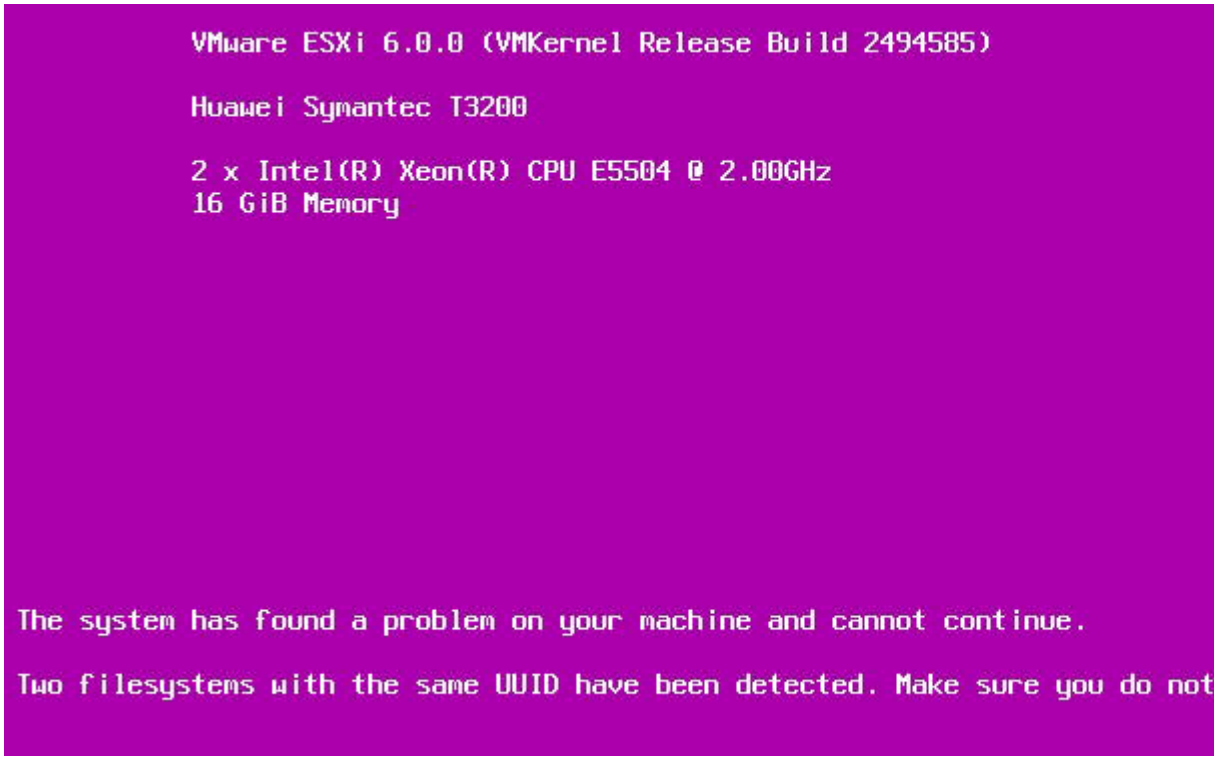
Figure 5-1 PSOD on the ESXi System



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**.

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A Commonly Used CLI Management Commands

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.

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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 vSphere 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 vSphere.

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
```

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 vSphere.

Function

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

NOTE

All UltraPath for vSphere 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**

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Usage Guidelines

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

```
~ # esxcli upadm show version
Software Version : 8.06.010
Driver   Version : 8.06.010
```

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:

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

A.1.3 Command Conventions

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

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

NOTE

If the name of the disk array or LUN is in Chinese and the encoding format of the login tool is incorrect, garbled characters are displayed after the multipathing command is executed. Set the encoding format of the login tool.

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 vSphere

Function

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

Format

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

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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 vSphere 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.

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   : 8.06.010
Driver   Version   : 8.06.010
```

- 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   : 8.06.010
Driver   Version   : 8.06.010
Product  Version   : V100R008C50
```

- 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   : 8.06.010
Driver   Version   : 8.06.010
Product  Version   : V100R008C50
```

System Response

None

A.2.2 Querying Configuration File Information

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Function

The **show upconfig** command is used to query the configuration of UltraPath for vSphere, 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**

Usage Guidelines

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

Example

- Query all configuration information about UltraPath for vSphere.

```
~ # esxcli upadm show upconfig
=========================================================
UltraPath Configuration
=========================================================
Basic Configuration
    Working Mode : load balancing within controller
    LoadBalance Mode : round-robin
    Loadbanlance io threshold : 1
    LUN Trespass : on


Advanced Configuration
    Io Retry Times : 10
```


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```
    Io Retry Delay : 0
    Faulty path check interval : 10
    Idle path check interval : 60
    Failback Delay Time : 0
    Max io retry timeout : 1800


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

APDtoPDL configuration
    APD to PDL Mode : off
    APD to PDL Timeout : 10


HyperMetro configuration
    HyperMetro Primary Array SN : Not configured
    HyperMetro WorkingMode : read write within primary array
    HyperMetro Split Size : 128MB
```

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

```
~ # esxcli upadm show upconfig -a 0
=====================================================
UltraPath Configuration
=====================================================
Working Mode : load balancing between controllers
LoadBalance Mode : round-robin
Loadbanlance io threshold : 1
LUN Trespass : on
Max io retry timeout : 1800
```

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

```
~ # esxcli upadm show upconfig -l 1
=====================================================
UltraPath Configuration
=====================================================
Working Mode : load balancing between controllers
LoadBalance Mode : round-robin
Loadbanlance io threshold : 1
LUN Trespass : on
Max io retry timeout : 1800
```

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.

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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
-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
```


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```
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        --
    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

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Parameter	Description	Default Value
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
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. ● Disable: The path is disabled.	None

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Parameter	Description	Default Value
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
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 phypath** without an ID to display all physical path IDs.	None

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Level

User **root**

Usage Guidelines

You can perform the following operations to recover an unstable path degraded and isolated by UltraPath for vSphere if the maintenance personnel have replaced the fault components and eliminated link faults. After the path is recovered, UltraPath for vSphere 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

A.2.5 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 vSphere 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

A.2.6 Setting the Status of a Physical Path

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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.2.7 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: indicates that I/Os are delivered through paths of the current working controller. ● 1: load balancing within a controller indicates that I/Os are delivered through paths of the current working controller.	1

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Level

User **root**

Usage Guidelines

NOTE

If cross-controller load balancing mode is used, UltraPath for vSphere 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.2.8 Setting a Load Balancing Mode

Function

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

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

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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.	None
-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 vSphere 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 vSphere 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 vSphere 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 vSphere 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**.

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

System Response

None

A.2.9 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.	on

Level

User **root**

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Usage Guidelines

NOTE

For an OceanStor storage system with asymmetric active-active controllers, UltraPath for Linux switches the working controller of a LUN when switching links, ensuring that I/Os are directly delivered to the working controller. However, when multiple hosts (for example, an active-active host cluster) access the same LUN of an OceanStor S5000 series storage system, the hosts may contend for the working controller and result in frequent working controller trespass (or "ping pong" trespass). Ping-pong trespass severely decreases performance. To prevent this problem, you are advised to disable the working controller trespass function in this case.

Example

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

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

System Response

None

A.2.10 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.	600

Level

User **root**

Usage Guidelines

NOTE

To prevent intermittent communication interruption between links and service instability, UltraPath for vSphere does not immediately implement failback upon detecting the recovery of a faulty path. Instead, UltraPath for vSphere 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.

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Example

Set failback delay to 600 seconds.

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

System Response

None

A.2.11 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. Then 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.

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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
    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.2.12 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**

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Usage Guidelines

None

Example

Clear I/O count information.

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

System Response

None

A.2.13 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. Then you can run **show io_latency** 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**

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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.2.14 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*

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Parameters

Parameter	Description	Default Value
-t *time*	I/O latency threshold The value ranges from 0 to 120000, expressed in milliseconds.	20

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.2.15 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

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Example

Query the I/O latency threshold.

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

System Response

None

A.2.16 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.
```


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System Response

None

A.2.17 Checking a Physical Path's Status

Function

The **start pathcheck** command is used to check the working status of a specified physical path.

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.2.18 Setting a Time Window for I/O Timeout Isolation

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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*

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.2.19 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.2.20 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.2.21 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.

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```
~ # esxcli upadm set iedtime -t 300
Succeeded in executing the command.
```

System Response

None

A.2.22 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.2.23 Setting the minimum number of I/Os for the I/O discrete error isolation mechanism

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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.2.24 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.2.25 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.2.26 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

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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.2.27 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.2.28 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.2.29 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.

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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.2.30 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.2.31 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.2.32 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

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Example

This example shows how to set the recovery time of a latency-sensitive path to 600 seconds.

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

System Response

None

A.2.33 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.
```


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System Response

None

A.2.34 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.2.35 Setting I/O Retry Timeout

Function

The **set maxioretrytimeout** command is used to set the timeout period for I/O retry on UltraPath for vSphere.

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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 vSphere. 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 vSphere 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 vSphere to 1800 seconds.

```
~ # esxcli upadm set maxioretrytimeout -t 1800
Succeeded in executing the command.
```


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System Response

None

A.2.36 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.

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```
~ # esxcli upadm set lbiothreshold -n 1
Succeeded in executing the command.
```

System Response

None

A.2.37 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 vSphere. 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**

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Usage Guidelines

NOTE

UltraPath for vSphere 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 vSphere prefers the local VIS node for delivering I/Os. The remote VIS node is used only if the local node experiences a path fault.

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.2.38 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**

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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**.
```
~ # 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.2.39 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**

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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 vSphere 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 vSphere.
- 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.
```

System Response

None

A.2.40 Checking the Status of UltraPath for vSphere

Function

The **check status** command is used to check UltraPath for vSphere, 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 vSphere can be queried only after it is successfully installed.

Example

Check the status of UltraPath for vSphere.

```
~ # esxcli upadm check status
------------------------------------------------------------
Checking path status:
```


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```
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 vSphere.

A.2.41 Viewing Critical Events

Function

The **show event** command is used to view critical events about UltraPath for vSphere.

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 vSphere 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}.
```


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```
   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}.

------------------------------------------------------------------------------
------------------------------------------------------------------------------
-------------------------------------
```

System Response

None

A.2.42 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* | **-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

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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.	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

A.2.43 Converting APD to PDL

Function

The **set apdtopdl** command is used to convert APD to PDL.

Format

set apdtopdl -m *mode* **-t** *timeout*

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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.
- The conversion from APD to PDL is disabled by default. You are advised to enable this function in a vSphere cluster environment so that cluster node switchover can be implemented properly.
- If the conversion from APD to PDL is enabled in ESXi 5.5 system and is successfully triggered, the virtual LUN will be set to PDL and the system will be triggered to delete this virtual LUN.

Example

The conversion from APD to PDL is enabled, and its timeout period is set to 60 seconds.

```
~ # esxcli upadm set apdtopdl -m on -t 60
Succeeded in executing the command.
```

System Response

None

A.2.44 Exporting Performance Statistics

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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 array** 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
-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

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Parameter	Description	Default Value
-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

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.

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- 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.
```

System Response

The system generates a performance report with suffix **.CSV** in the specified path.

A.2.45 Disabling the Function of Exporting the Performance Statistics Report

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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.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 vSphere 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 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:

```
~ # excli upadm show diskarray
------------------------------------------------------------------------------
--------
 Array ID           Name                  Array SN        Vendor Name
Product Name
    0           HUAWEI S5300        210231540lZ083000004    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
```


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```
Product Name   : S5600T
Controller   0A:
       Status  : Enable
       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.3.2 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* | **-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
-v	Viewing path information about a virtual LUN. **NOTE** Parameter **-v** views details about a storage LUN only when it is used with parameter **-l**.	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

Level

User **root**

Usage Guidelines

- Run **show vlun** to query information about all common virtual LUNs mounted on the application server.

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- 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 -l** *vlun-id* **-v** to view details configuration information about a specified common virtual 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
    0     naa.630d17e100b33e3900135b9900000024   hl_luntest
630d17e100b33e3900135b9900000024     Normal  1.00GB        0A/0B
Huawei.Storage       36
    1     naa.630d17e100b33e3909eae968000000f2  hl_luntest_2
630d17e100b33e3909eae968000000f2     Normal  1.00GB        0A/0B
Huawei.Storage       242
------------------------------------------------------------------------------
------------------------------------------------------------------------------
-------------
```

- 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
    0     naa.630d17e100b33e3900135b9900000024   hl_luntest
630d17e100b33e3900135b9900000024     Normal  1.00GB        0A/0B
Huawei.Storage       36
    1     naa.630d17e100b33e3909eae968000000f2  hl_luntest_2
630d17e100b33e3909eae968000000f2     Normal  1.00GB        0A/0B
Huawei.Storage       242
------------------------------------------------------------------------------
------------------------------------------------------------------------------
-------------
```

- View details about the common virtual LUN whose ID is **1**.

```
~ # esxcli upadm show vlun -l 1
======================================================
                  VLUN#1 Information
======================================================
Disk              : naa.630d17e100b33e3909eae968000000f2
Name              : hl_luntest_2
Status            : Normal
Capacity          : 1.00GB
Driver            : Vendor-specific(DEFAULT)
Product Name      : XSG1
Vendor Name       : HUAWEI
Owning Controller : 0A
Working Controller: 0B
Num of Paths      : 2
LUN WWN           : 630d17e100b33e3909eae968000000f2
Array Name        : Huawei.Storage
Controller 0A
    Path 0 [vmhba33:C0:T2:L2]  : Normal
Controller 0B
    Path 1 [vmhba33:C0:T0:L2]  : Normal
```


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```
Dev Lun ID        : 242
=========================================================
```

- 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.630d17e100b33e3909eae968000000f2
Name              : hl_luntest_2
Status            : Normal
Capacity          : 1.00GB
Driver            : Vendor-specific(DEFAULT)
Product Name      : XSG1
Vendor Name       : HUAWEI
Owning Controller : 0A
Working Controller: 0B
Num of Paths      : 2
LUN WWN           : 630d17e100b33e3909eae968000000f2
Array Name        : Huawei.Storage
Controller 0A
    Path 0 [vmhba33:C0:T2:L2]  : Normal
Controller 0B
    Path 1 [vmhba33:C0:T0:L2]  : 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        : 242
=========================================================
```

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

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Parameter	Description	Default Value
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
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

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A.3.3 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**

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.
```


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System Response

None

A.3.4 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
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

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Parameter	Description	Default Value
-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.

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.4 UltraPath Other Commands

Introduce UltraPath other commands that are excluded in above.

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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

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

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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*

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**

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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

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

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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.
- 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

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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 vSphere 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

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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
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

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Parameter	Description	Default Value
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.
cli_operate_log.txt event_log oper_log serial_oper	/etc/cim/log/cli_operate_log.txt /etc/cim/log/event_log /etc/cim/log/oper_log /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

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.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.

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.

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.

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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.

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**.

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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 Glossary

A

AC power module	The module that transfers the external AC power supply into the power supply for internal use.
Application server	A service processing node (a computer device) in the network. Application programs of data services are run on the application server.
Asynchronous remote replication	A kind of remote replication. When the data on the primary site is updated, the data does not need to be updated on the mirroring site synchronously to finish the update. In this way, performance is not reduced due to data mirroring.

B

Backup	A periodic operation performed on the data stored in the database for the purposes of database recovery in case that the database is faulty. The backup also refers to data synchronization between active and standby boards.
Bandwidth	A range of transmission frequencies a transmission line or channel can carry in a network. In fact, the bandwidth is the difference between the highest and lowest frequencies in the transmission line or channel. The greater the bandwidth, the faster the data transfer rate.
Baud rate	The number of times per second the signal can change on a transmission line. Commonly, the transmission line uses only two signal states, making the baud rate equal to the number of bits per second that can be transferred. The underlying transmission technique may use some of the bandwidth, so it may not be the case that user data transfers at the line's specified bit rate.
Bit error	An incompatibility between a bit in a transmitted digital signal and the corresponding bit in the received digital signal.
Bit error rate	Ratio of received bits that contain errors. BER is an important index used to measure the communications quality of a network.

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Bonding	Bonding can bind multiple independent physical network ports into a logical port, which ensures the high availability of server network connections and improving network performance.
Boundary scan	A test methodology that uses shift registers in the output connections of integrated circuits. One IC often is connected to the next. A data pattern is passed through the chain and the observed returned data stream affected by the circuit conditions gives an indication of any faults present. The system is defined under IEEE standard 1149.1 and is also often known as JTAG (Joint Test Action Group).
Browser/Server	An architecture that defines the roles of browser and server, where the browser is the service request party and the server is the service provider.

C

Cache hit ratio	The ratio of directly accessed I/O from Cache to all the I/O operation during the read operation.
Cache prefetch strategy	According to the operation in which data has been read or is being read, the required data is read from a disk into the cache in advance.
Captive Screw	After the screw is loosened, screw caps and bolts are not disconnected from the main body.
Cascading	Connect the storage system to more disk enclosures through connection cables, thus expanding the capacity of the storage system.
CHAP	A method to periodically verify the identity of the peer using a 3-way handshake. During the establishment of a link, the authenticator sends a "challenge" message to the peer. The peer responds with a value calculated using a "one-way hash" function. The authenticator checks the response against its own calculation of the expected hash value. If the values match, the authentication is acknowledged. CHAP provides protection against playback attack.
Clone	A snapshot technology. The source data is completely copied to generate a data duplicate; therefore the duplicate needs the storage space as the same size as the source data. It is also called clone. In the VIS system, it is also called third-mirror break-off snapshot.
Cluster	A mechanism adopted to improve the system performance. Several devices of the same type form a cluster. The exterior of a cluster is some like a kind of equipment. In the interior of a cluster, the nodes share the load.
Coffer	A technology for ensuring data security and integrity in a storage system. It is used to store the mission-critical data of the system.
Coffer disk	Disks that build up the coffer.
Command device	A special LUN through which the host can send inband commands to storage devices.

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Constant prefetch	A cache prefetch strategy. The size of the data to be prefetched is the size as set. This strategy applies to the applications that require reading data of a fixed size in a certain order. An example is the streaming media demanded by multiple subscribers who use the same bit rate.
Controller	The core module that processes services in a storage system. It contains physical components such as system-level CPUs and memory.
Controller enclosure	An enclosure that accommodates controllers and provides storage services. It is the core component of a storage system, and generally consists of components such as controllers, power supplies, and fans.
Copyback	The process of copying the data from the hot spare disk back to the previous disk when the faulty member disk is restored or replaced by a new one.
Copying	A state of pair. The state indicates that the source LUN data is being synchronized to the target LUN.
Coordinator Point Server	A server can provide the arbitration service. The server can provide arbitration service for cluster system or HyperCluster, to avoid resource conflict access from different application servers.
Continued Mirror	After storage controller became fault, a method of data in the LUN to write mirror into other storage controller, while ensure data integrity and uninterrupted operation host services.

D

Data compression	Encoding data to take up less storage space and less bandwidth for transmission.
Data deduplication	A specialized data compression technique for eliminating coarse-grained redundant data, typically to improve storage utilization. In the deduplication process, duplicate data is deleted, leaving only one copy of the data to be stored, along with references to the unique copy of data. Deduplication is able to reduce the required storage capacity since only the unique data is stored.
Data flow	A process that involves processing the data extracted from the source system, such as filtering, integration, calculation, and summary, finding and solving data inconsistency, and deleting invalid data so that the processed data meets the requirements of the destination system for the input data.
Data migration	It is the process to cleanse and transform history data, and then load them to the new system.
Data source	A system, database, or file that can make BOs persistent. A data source can be a database instance or a database user.
Data switch	A data switch used for interconnections between controllers.

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Dirty data	The data that is stored temporarily on cache and has not been written onto disks.
Disaster recovery	A system deployment solution aiming at reducing loss in disasters. A set of disaster recovery system that is the same as the production system is deployed as a backup to store the production data when a fault occurs in the production system. The applications are switched over to the disaster recovery system before the production system recovers. After the production system recovers, the applications are switched back to the production system.
Disk array	A set of disks from one or more commonly accessible disk subsystem. These disks are combined and controlled by the control software. The control software provides the storage capacity of these disks for hosts as one or more virtual disks.
Disk Domain	A combination of disks. A disk domain consists of the same type or different types of disks. Disk domains are isolated from each other. Therefore, services carried by different disk domains do not affect each other in terms of performance and faults (if any).
Disk location	The process of locating a hard disk, that is, determining the enclosure ID and slot ID of the hard disk in the storage system.
Disk enclosure	It consists of the following parts in redundancy: expansion module, hard disk, power module, and fan module. System capacity can be expanded by cascading multiple disk enclosures.
Disk utilization	The percentage of used capacity in the total available capacity.

E

eDevLUN (external device LUN)	Logic space created by third-party storage systems.
Engine	Two controllers in one enclosure are called Engine.
Expansion	Connecting a storage system to more disk enclosures through connection cables, thus expanding the capacity of the storage system.
Expander module	A component used for expanding.

F

Failover	The automatic substitution of a functionally equivalent system component for a failed one. The term failover is most often applied to intelligent controllers connected to the same storage devices and host computers. If one of the controllers fails, failover occurs, and the survivor takes over its I/O load.

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Field replaceable unit	A unit that can function as a circuit board, part, or component of an electronic device. It can be quickly and easily removed from a personal computer or other electronic devices. If an FRU becomes faulty, users can replace it with a new one instead of sending the entire product or system for maintenance.
File Engine	The component in a unified storage systems that provides file-level service.
Firmware	The programmable software part in a hardware component. A firmware is a part of hardware, but is scalable as software.
Front-end host port	The port that connects the controller enclosure to the service side and transfers service data. There are three types of front-end host ports: SAS, FC, and iSCSI.

G

Gateway	A device that connects two network segments using different protocols. It is used to translate the data in the two network segments.
Global system for mobile communications	The second-generation mobile networking standard defined by European Telecommunications Standards Institute (ETSI). It is aimed at designing a standard for global mobile phone networks. The standard allows a subscriber to use a phone globally. GSM consists of three main parts: mobile switching subsystem (MSS), base station subsystem (BSS), and mobile station (MS).

H

Hard disk	A non-volatile storage device that stores digitally encoded data on rapidly rotating platters with magnetic surfaces. Hard disks generally offer more storage and quicker access to data than floppy disks do.
Hard disk tray	The tray that bears the hard disk.
Hard quota	The value to limit the space used in quota configuration. If the space used arrives hard quota, file operation is not allowed to continue.
Heartbeat	Heartbeats are the packets, requiring no acknowledgement, transmitted between two devices. The device can judge the validity status of the peer device. Heartbeat supports node communication, fault diagnosis, and event triggering.
Hit ratio	The ratio of directly accessed I/Os from cache to all I/Os.
Hot swap	A technology used to replace system components without shutting down the system, which improves the reliability and maintainability of a system.
HyperVault	A self-protective property of the data built in storage device.

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HyperCluster	A value-added service of storage system. The HyperCluster refers to provide storage services with two datasets on two storage array as one dataset, to achieve the applications load balancing and transferring without interruption when there is a fault.

I

I/O	Data movement process between memory and peripheral devices in the computer system. I/O is a collective name, indicating the operations reading data into the memory and writing data to other places from computer memory.
Inband management	Inband management means that the management control information of the network and the carrier service information of the user network are transferred through the same logical channel. Inband management enables users to manage storage arrays through commands. Management commands are sent through service channels, that is, I/O write and read channels. The advantages of inband management include high speed, stable transfer, and no additional management network ports required.
Initiator	A system component that can initiate an I/O operation on an I/O bus or on a network.
Intelligent prefetch	A cache prefetch strategy. The system software calculates a proper size of prefetched data. This strategy applies to a read application involving a single bit stream or to the situations where you do not know whether the data is read in a certain order. An example is reading or writing a file.
Interface module	A field replaceable module that accommodates the service or management ports.

L

Load balance	A method of adjusting the system, application components and data to averagely distribute the applied I/O or computing requests for physical resources of the system.
Load the file system in mini mode	A method of restoring the user data in an offline file system.
Logical unit	The entity is located inside the SCSI object, and can execute I/O commands. After a SCSI I/O command is sent to an object, the logic unit inside the object executes this command. Usually, each SCSI physical disk has one logic unit. A tape drive and array controller may have multiple logic units, which process different I/O commands. Each logic unit inside an array controller corresponds to a virtual disk.
Logical unit number	The number of a logical disk that the host can access.

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LUN formating	The process of writing 0 bits in the data area on the logical drive and generating related parity bits so that the logical drive can be in the ready state.
LUN mapping	The storage system maps LUNs to ASs so that the ASs can access the storage reorganization.
LUN migration	A method for the data in the LUN to migrate between different physical storage space while ensuring data integrity and uninterrupted operation host services.
LUN copy	The function of copying the original LUN data to one or multiple target LUNs.

M

Maintenance terminal	The computer that is connected through a serial port or management network port and maintains the storage system.
Management network	An entity that provides a means to transmit and process the information related to network management.
Management network port	The network port on the controller enclosure that is connected to the maintenance terminal. It is provided for the remote maintenance terminal.

N

Node	A managed device in the network. For a device with a single frame, one node stands for one device. For a device with multiple frames, one node stands for one frame of the device.

O

Out-of-band management	A management mode used during out-of-band networking. In the out-of-band management mode, the management and control information of the network and the bearer service information of the user network are transmitted through different logical channels.
Owning controller	The controller that can prior access a certain LUN.

P

Power failure protection	When the external power failure occurs, the AC PEM depends on the battery for power supply, which ensures the integrity of the dirty data in cache.
Pre-copy	When the system monitors that a member disk in a RAID group is to fail, the system copies the data on the disk to a hot spare disk in advance. This technology is called pre-copy.

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Primary backup	A kind of backup mode for file system, means that create a copy (snapshot) for filesystem.
Primary restore	A kind of restore mode for file system, means that restore a copy (snapshot) to filesystem.
Primary storage controller	The controller that plays a leading role in controlling the management is the primary storage controller. It can perform relevant management operations on the controller enclosure.
Primary/ Secondary switchover	A process for the conversion of the primary/secondary relationship.
Prior controller	For the application server LUN, prior controller means that the working controller is the owner controller of the corresponding array LUN.

Q

Quota tree	A first-level directory of file system that can be managed with quota.

R

RAID level	The application of different redundant types to a logical drive. A RAID level improves the fault tolerance or performance of the logical drive but reduces the available capacity of the logical drive. You must specify a RAID level for each logical drive.
Reconstruction	The process of restoring the data saved on a faulty member disk in a RAID group.
Redundancy	The scheme to add more than one channels, elements or parts that have the same functions with the counterparts in the system or device at a critical place. When a fault occurs, the system or device can work well, and the reliability is then improved.
Remote replication	A core technology for disaster recovery and a foundation that implements remote data synchronization and disaster recovery. This technology remotely maintains a set of data mirror through the remote data connection function of the storage devices that are separated in different places. Even when a disaster occurs, the data backup on the remote storage device is not affected. Remote replication can be divided into synchronous remote replication and asynchronous remote replication by whether the host that requires mirrors needs the confirmation information of the remote replication site.
Reverse synchronizing	The process of restoring data from the redundancy machine (RM) when the services of the production machine (PM) are recovering.
Route	The path that network traffic takes from its source to its destination. In a TCP/IP network, each IP packet is routed independently. Routes can change dynamically.

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S

Script	A collection of data statements used to perform an operation.
Secondary backup	A kind of backup mode for file system, means that backup the data of the primary file system to the remote file system on the secondary array.
Secondary restore	A kind of restore mode for file system, means that restore the data of the secondary file system to the primary file system on the secondary array.
Secondary controller	(1) A controller that backs up service and management data of the primary controller in a clustered system. When the primary controller fails, the secondary controller is upgraded to the primary controller and takes over the management and services of the controller enclosure. (2) A controller that backs up the management data of the primary controller in a block-level array. When the primary controller fails, the secondary controller is upgraded to the primary controller and takes over the management of the system.
Serial port	An input/output location (channel) that sends and receives data to and from a computer's CPU or a communications device one bit at a time. Serial ports are used for serial data communication and as interfaces with some peripheral devices, such as mice and printers.
Service data	The user and/or network information required for the normal functioning of services.
Service network port	The network port that is used to store services.
SFP optical transceiver	A component that can make data conversion between optical signals and electrical signals and that can receive and transfer data.
Simple network management protocol	A network management protocol of TCP/IP. It enables remote users to view and modify the management information of a network element. This protocol ensures the transmission of management information between any two points. The polling mechanism is adopted to provide basic function sets. According to SNMP, agents, which can be hardware as well as software, can monitor the activities of various devices on the network and report these activities to the network console workstation. Control information about each device is maintained by a management information block.
Single point of failure	A type of failure. Data transmission over a network is stopped and cannot be recovered automatically if a single point failure occurs. The point can be an interface, a board, a device, or a link.
Small computer system interface	A set of standards for physically connecting and transferring data between computers and peripheral devices. SCSI is most commonly used for hard disks and tape drives, but it can connect a wide range of other devices, including scanners, and optical drive.

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Smart tenancy	A feature of Huawei storage system. With Smart Tenancy, multiple virtual storage systems can be created in one physical storage system, which allows tenants to share the same storage system hardware resource without affecting data security and privacy of each other. This feature achieves more flexible, easy-to-manage and low-cost shared storage in a multi-protocol unified storage architecture.
Snapshot	A data backup technology through which a fully usable copy of a data object can be quickly generated. The duplicate contains the image of the data object at a point in time.
Snapshot copy	A copy of the snapshot LUN, which is also a snapshot LUN.
Soft quota	The value to alarm space usage in quota configuration. After used space arrives this value, an alarm triggered; if space used from above this value becomes lower than, the previous alarm eliminated.
Source LUN	The LUN where the original data is located.
Storage Pool Shrinking	A method of shrinking the total capacity of Storage Pool.
Storage system	An integrated system. It consists of the following parts: controller, storage array, host bus adapter, physical connection between storage units, and all control software.
Storage unit	An abstract definition of backup storage media for storing backup data. The storage unit is connected with actual storage media, used to back up data.
Streaming media	The media by which content is transmitted continuously with the streaming method in real time. Streaming media ensure high-quality playback effects at low bandwidth by integrating with the following technologies: data collection, data compression, encoding, storage, transmission, terminal playback, and network communication.
Stripe	The set of strips at corresponding locations of each member extent of a disk array which uses striped data mapping. The strips in a stripe are associated with each other in a way (e.g., relative extent block addresses) that allows membership in the stripe to be quickly and uniquely determined by a computational algorithm. Parity RAID uses stripes to map virtual disk block addresses to member extent block addresses.
Subnet	A type of smaller networks that form a larger network according to a rule, for example, according to different districts. This facilitates the management of the large network.
Subnet mask	The technique used by the IP protocol to determine which network segment packets are destined for. The subnet mask is a binary pattern that is stored in the device and is matched with the IP address.
Synchronous remote replication	A kind of remote replication. When the data on the primary site is updated, the data must be synchronously updated on the mirroring site before the update is complete. In this way, the data that is stored on both the primary and mirroring sites can be synchronized.

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T

Target	A system component that can receive SCSI I/O operation commands.
Target LUN	The LUN on which target data resides.
Tenant	A property of SmartTenancy, which represents a virtual storage system in a physical one. The private and independent logical resource of a tenant mainly includes disk domain space, LUN, file system and ports. Tenants get complete storage services, but also remain resource and network isolation with other tenants, which avoids interference.
Thin provisioning	A mechanism that offers on-demand allocation of storage space.
Thin LUN	The thin LUN is a logic disk that can be accessed by hosts. The thin LUN dynamically allocates storage resources from the thin pool according to the actual capacity requirements of users.
Timing Snapshot	To create snapshots periodically to continuously protect data.
Topology	The configuration or layout of a network formed by the connections between devices on a local area network (LAN) or between two or more LANs.
Trap	A type of SNMP message that indicates the occurrence of an event. This type of message is transmitted to the received through UDP. The transmission process is not completely reliable.

U

User datagram protocol	A TCP/IP standard protocol that allows an application program on one device to send a datagram to an application program on another. User Datagram Protocol (UDP) uses IP to deliver datagram. UDP provides application programs with the unreliable connectionless packet delivery service. There is a possibility that UDP messages will be lost, duplicated, delayed, or delivered out of order. The destination device does not confirm whether a data packet is received.
User interface	The space in which users interact with a machine.

V

Variable prefetch	A cache prefetch strategy. The size of the data to be prefetched is the multiple for prefetching multiplied by the length of a read command. This strategy applies to the applications that require reading data of variable size in a certain order or to the situations where multiple subscribers read data concurrently but no fixed prefetch size can be set, because the amount of pre-read data cannot be judged. An example is the streaming media demanded by multiple subscribers who use different bit rates.

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vStore	A property of SmartTenancy. In Huawei SmartTenancy, a tenant is called a vStore, which represents a virtual storage system.

W

Working controller	The controller that reads data from and writes data onto LUNs or file systems in a storage array.
Write back	A caching technology in which the completion of a write request is signaled as soon as the data is in cache, and actual writing to non-volatile media occurs at a later time. Write back includes an inherent risk that an application will take some action predicated on the write completion signal, and a system failure before the data is written to non-volatile media will cause media contents to be inconsistent with that subsequent action. For this reason, good write back implementations include mechanisms to preserve cache contents across system failures (including power failures) and to flush the cache at system restart time.
Write through	A caching technology in which the completion of a write request is not signaled until data is safely stored on non-volatile media. Write performance with the write through technology is approximately that of a non-cached system, but if the data written is also held in cache, subsequent read performance may be dramatically improved.

Z

Zone	A Fibre Channel switch function that is similar to the VLAN function for Ethernet switches. It logically allocates the devices including hosts and storage systems on a SAN to different zones. In this way, the devices in different zones cannot directly access each other over a Fibre Channel network, implementing device isolation on the SAN.

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E Acronyms and Abbreviations

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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