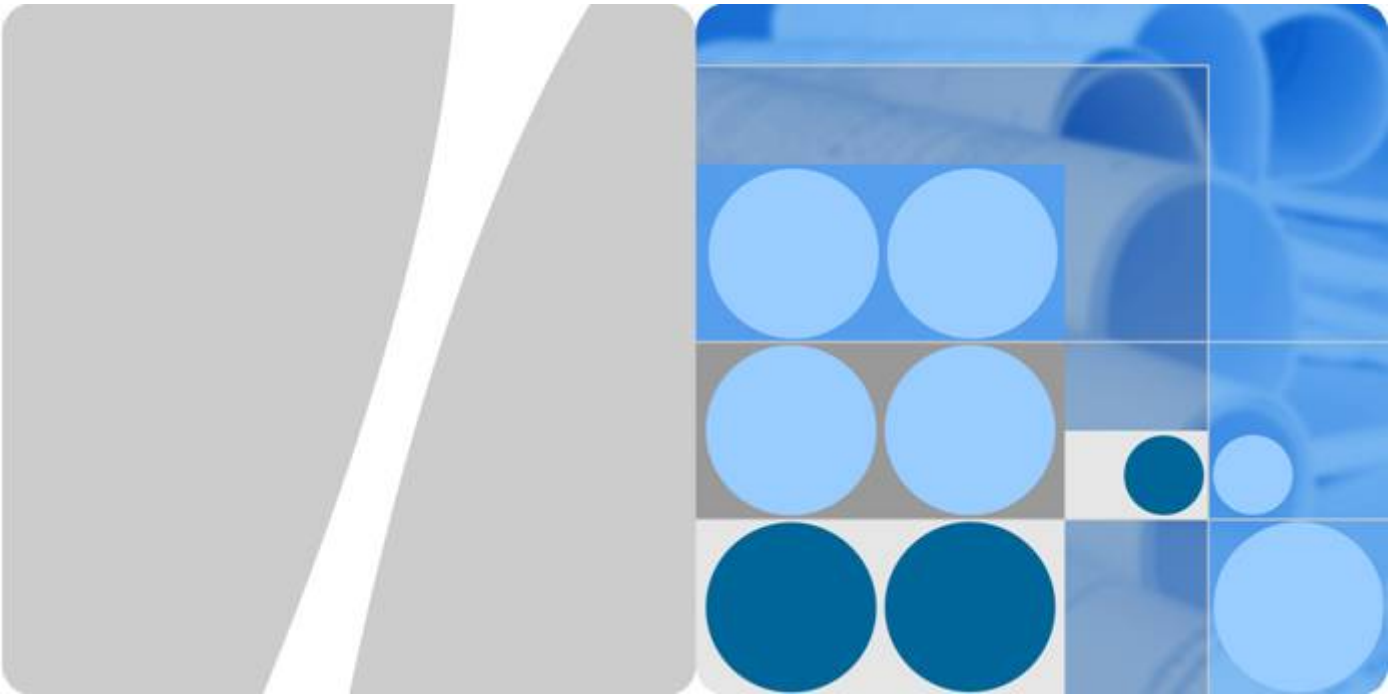

OceanStor UltraPath for Linux

21.3.0

User Guide

Issue 01

Date 2018-11-30

HUAWEI TECHNOLOGIES CO., LTD.

HUAWEI

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About This Document

Purpose

This document explains how to install and configure the UltraPath software on a Linux operating system and describes commonly used commands, alarm handling, and troubleshooting.

Intended Audience

This document is intended for:

- Technical support engineers
- Maintenance engineers

Symbol Conventions

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

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

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

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Change History

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1 Overview

About This Chapter

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

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

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

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

1.4 UltraPath Security Feature
This chapter describes UltraPath security feature.

1.1 Overview

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

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

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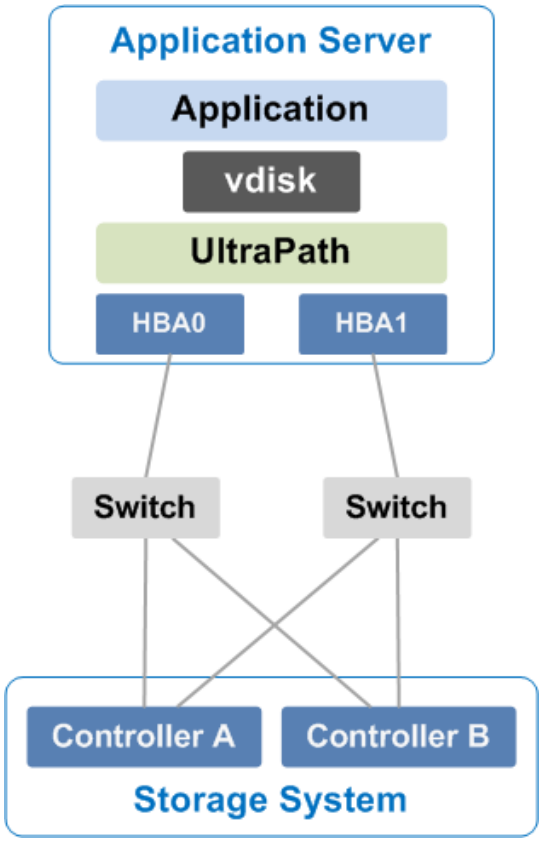
Figure 1-1 Multi-path networking



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

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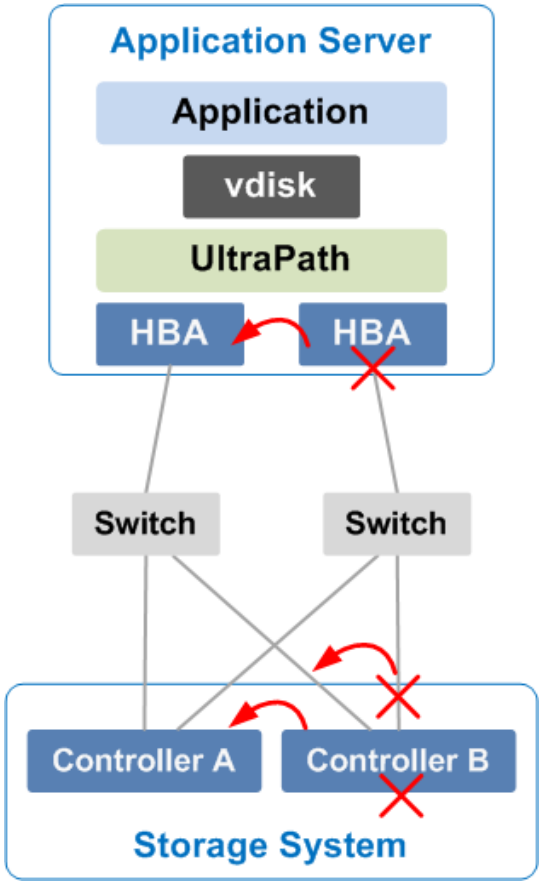
Figure 1-2 UltraPath handling path faults



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

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

1.2 Principles and Functions

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

Integrating UltraPath with Operating Systems

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

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

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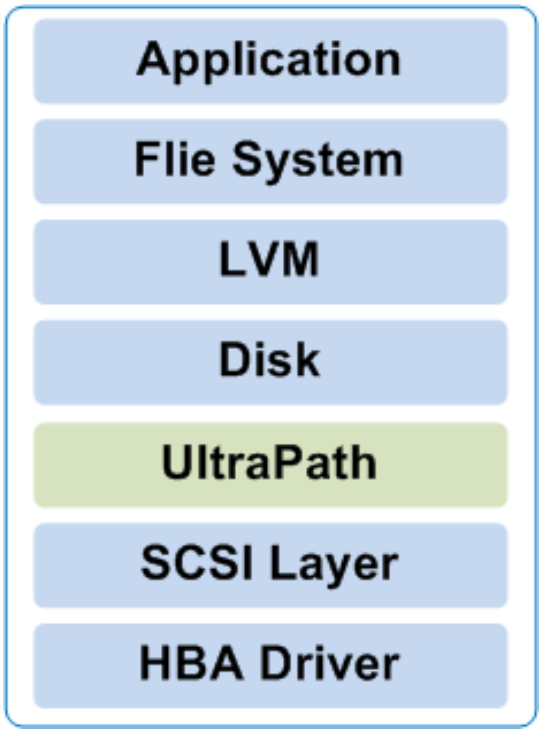
Figure 1-3 Layers where UltraPath resides in different operating systems



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

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

UltraPath Functions

- **Masking of Redundant LUNs**

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

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

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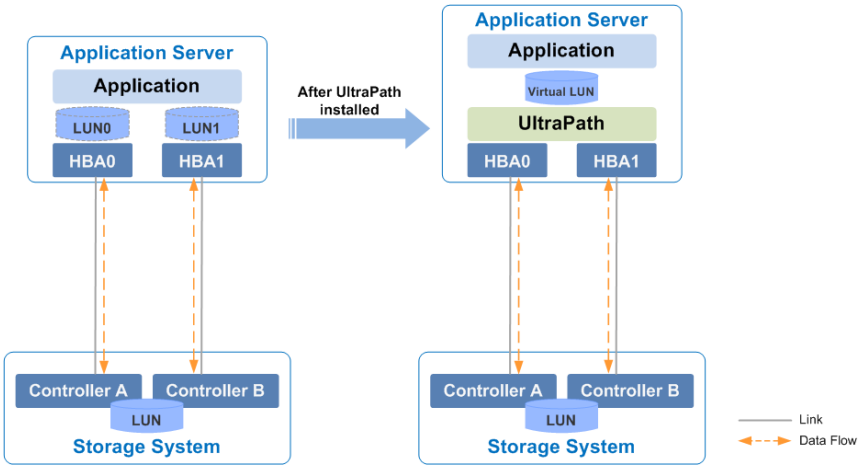
resolve this problem, the application server must identify which is the real and available LUN.

Figure 1-4 Masking the redundant LUN



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

- **Optimum Path Selection**

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

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

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

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

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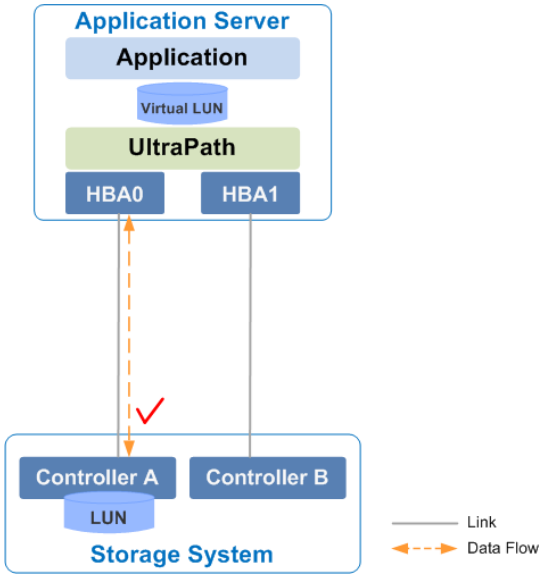
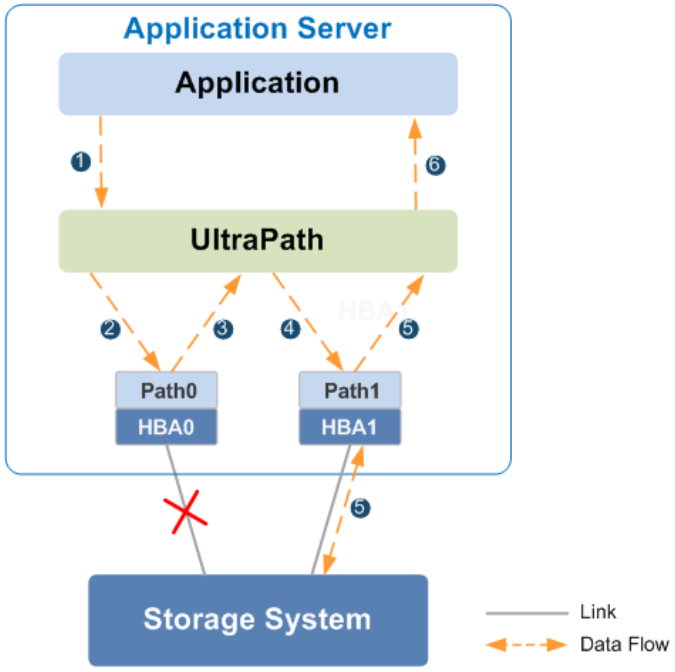
Figure 1-5 Optimum path selection by UltraPath



- **Failover and Failback**
  - Failover

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

    Figure 1-6 UltraPath failover

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

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

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

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

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

vi. UltraPath sends the message to the application server.

NOTE

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

- Failback

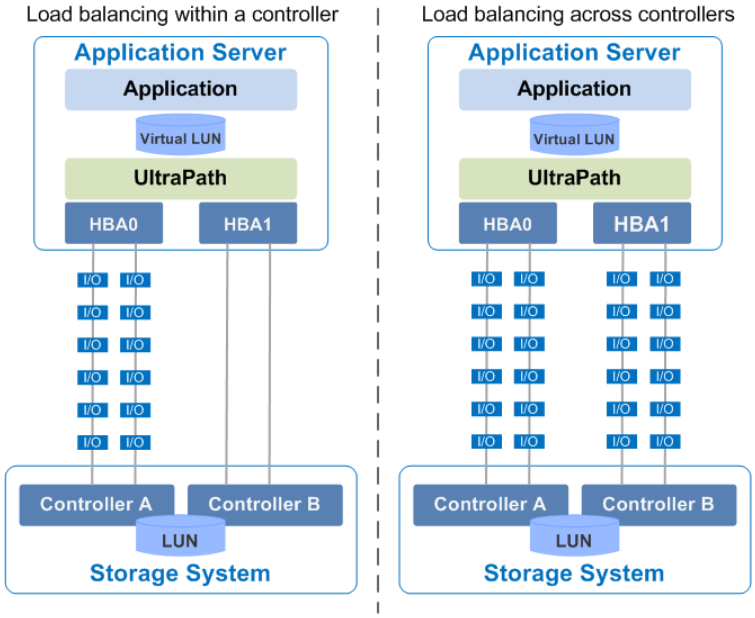
  UltraPath automatically delivers I/Os to the first path again after the path recovers from the fault. There are two methods to recover a path:

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

- **I/O Load Balancing**

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

Figure 1-7 Two I/O load balance modes



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

  The path selection algorithm provided by UltraPath is as follows:

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

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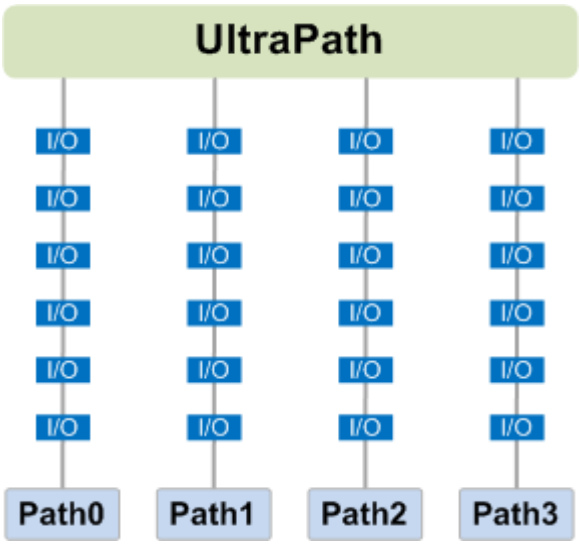
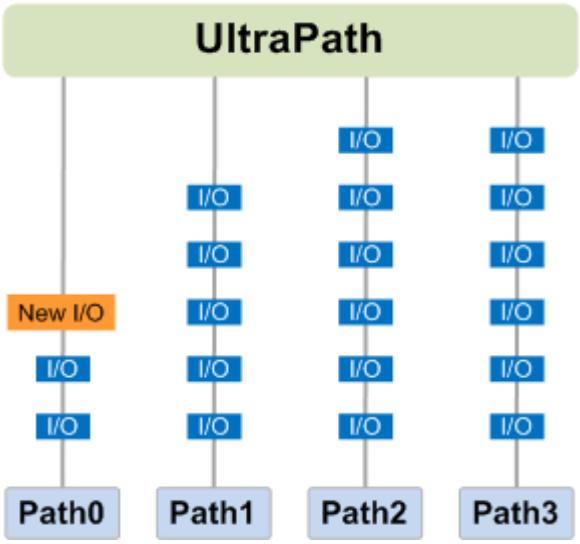
and the second set of I/Os through **path1**, and so on. Paths are used in turn to ensure that each path is fully utilized.

Figure 1-8 Round robin algorithm



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

Figure 1-9 Minimum queue depth algorithm



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

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

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- **Path test**

  UltraPath tests the following paths:

  - Faulty paths.

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

  - Idle, available paths.

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

SAN Boot Functions

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

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

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

Boot modes supported by UltraPath:

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

1.3 Typical UltraPath Applications

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

UltraPath is applicable to the following scenarios:

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

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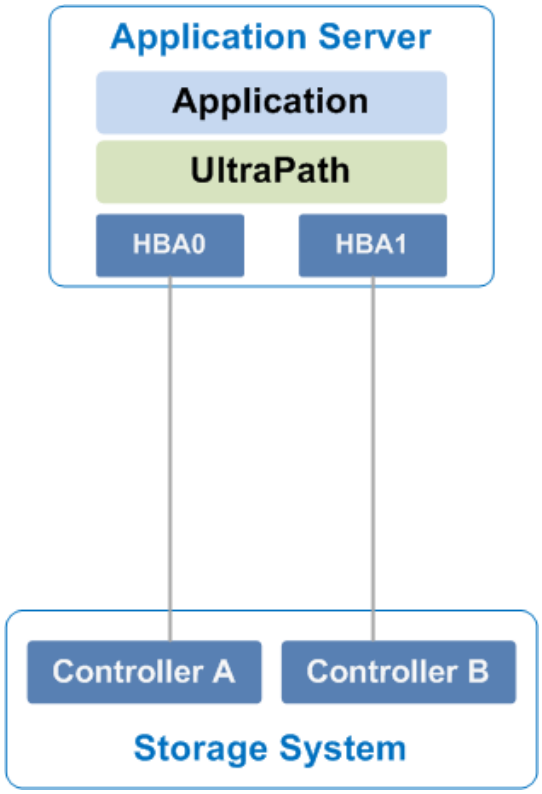
Dual-Link Direct Connection

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

Figure 1-10 UltraPath in dual-link direct connection



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

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

Dual-Link Single-Switch Interconnection

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

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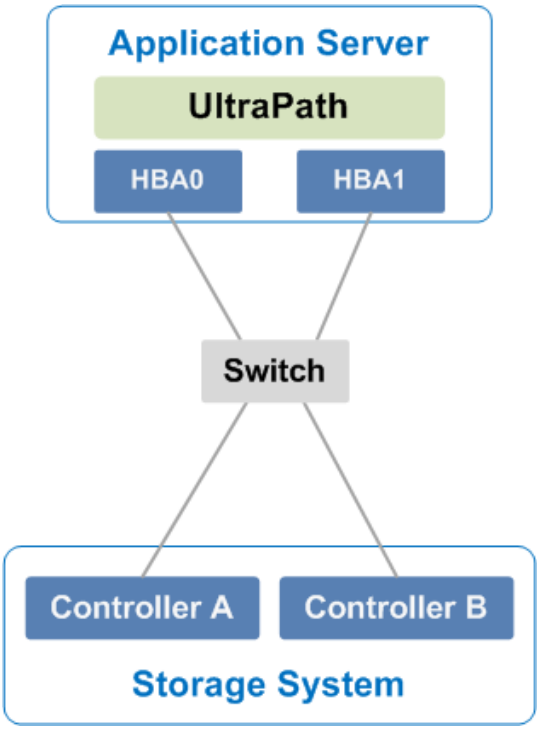
Figure 1-11 UltraPath in dual-link single-switch interconnection



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

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

Dual-Link Dual-Switch Interconnection

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

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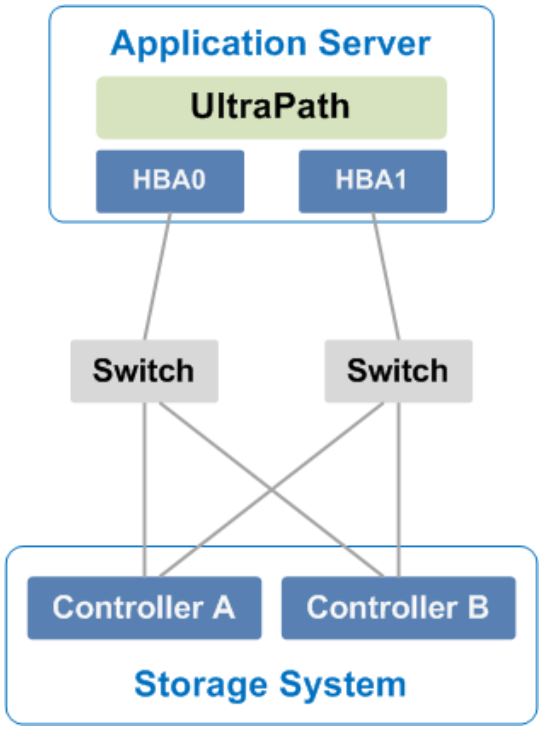
Figure 1-12 UltraPath in dual-link dual-switch interconnection



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

Dual-Link Dual-Switch Interconnection in a Cluster Environment

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

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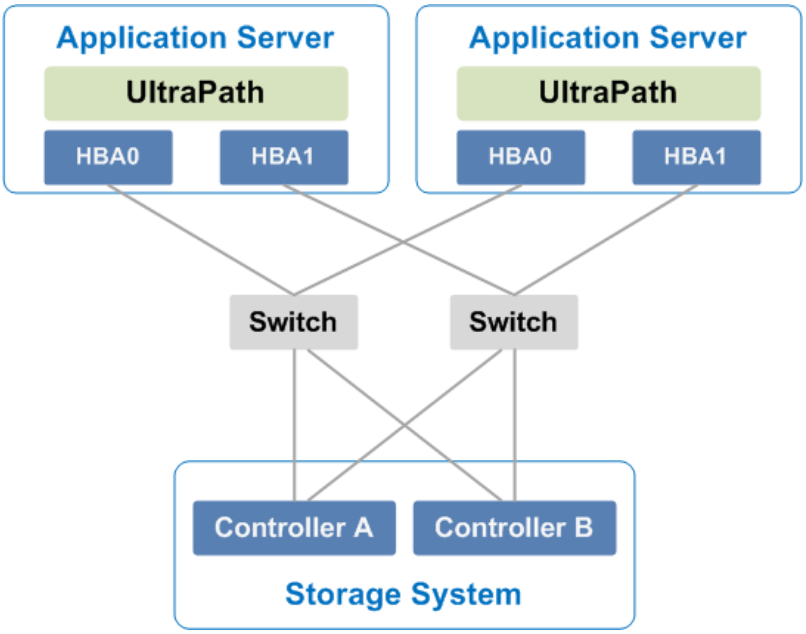
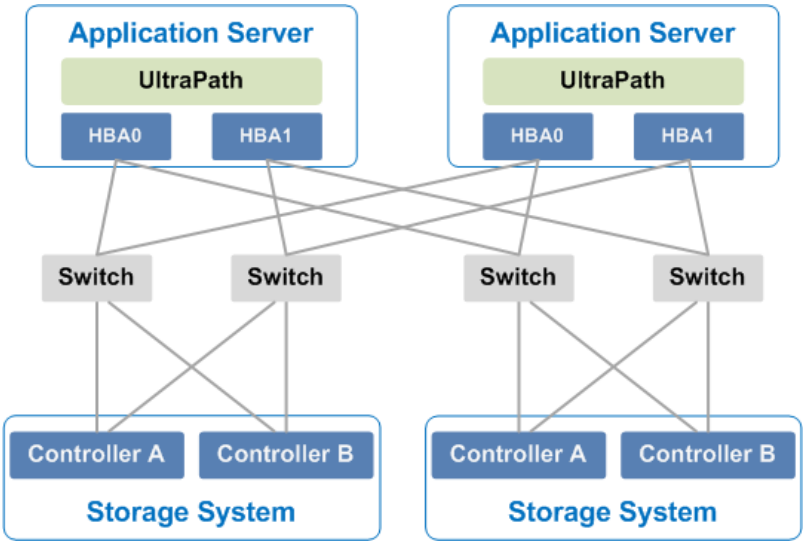
Figure 1-13 Dual-link dual-switch interconnection in a cluster environment



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

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

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



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1.4 UltraPath Security Feature

This chapter describes UltraPath security feature.

- Only user **root** can operate UltraPath.
- All non-query operations are recorded in logs. These logs can be accessed by user **root** only.
- The inputs of all users are verified to prevent unauthorized inputs.
- Interaction data of arrays are verified to prevent attacks.
- Ports are not listened and personnel data and sensitive data are not accessed.

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2 Installation

About This Chapter

Selecting and managing paths between an application server and the storage system can be realized after the UltraPath is installed.

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

2.2 Installing UltraPath
UltraPath supports two boot modes: boot from Local and boot from SAN. You can select a desired mode when using **install.sh** for installation.

2.3 Deploying UltraPath in Batch in a FusionSphere OpenStack Environment
This section describes how to deploy UltraPath in batch in a FusionSphere OpenStack environment.

2.1 Environment Requirements

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

2.1.1 Preparing Software Packages and Data

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

Software Package

Select an UltraPath software package according to the system information. **Table 2-1** lists the operating systems for UltraPath software packages (21.1.0 as an example).

Table 2-1 Operating systems for UltraPath software packages (21.1.0 as an example)

UltraPath Software Package	Operating System
OceanStor_UltraPath_XX.X.X_RHEL.zip	Red Hat, CentOS, and Oracle Linux

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UltraPath Software Package	Operating System
OceanStor_UltraPath_XX.X.X_SLES.zip	SUSE
OceanStor_UltraPath_XX.X.X_LinuxOther.zip	Red Flag Linux, LINX-TECH, EulerOS, Kylin, NeoShine, and Deepin
OceanStor_UltraPath_XX.X.X_FusionSphere.zip	UVP for FusionSphere

NOTE

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

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

Application Server Data

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

Table 2-2 Data preparations

Parameter	Description	Example
Management IP address	Used to manage application servers. Log in to the application server using this IP address to make necessary configurations for UltraPath.	Example: 192.168.100.100
User name	User name for the application server **NOTE** To install UltraPath, you must log in as user **root**.	**root**

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Parameter	Description	Example
Password	Password of the application server. **NOTE** The password must: ● Contain at least one upper-case letter, one lower-case letter, one digit, and one special character among spaces or ~!@#$%^&*()-_=+|{};:'",<.>/? ● Contain 8 to 32 characters. ● Not contain the user name or the reverse spelling of the user name.	Huawei@123

2.1.2 Preparing the Installation Environment

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

Application Servers

- **Operating System**

  Check whether the Linux version installed on the application server meets the requirements for installing UltraPath for Linux.

NOTE

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

- **Remaining Space**

  The recommended available memory of an application server is equal to or larger than 600 MB.

NOTE

For a 32-bit operating system, run the **cat /proc/meminfo** command. If the value of the **LowFree** parameter is smaller than 600 MB and the value of the **MemFree** parameter is larger than 16 GB, you are advised to replace the 32-bit operating system with a 64-bit operating system.

HBAs

UltraPath supports FCoE/Fibre Channel HBAs, IB HCAs, and iSCSI initiators. A LUN cannot be mapped to different hosts through HBAs or iSCSI initiators that are from different vendors and with different models and firmware versions.

Before installing the UltraPath, make sure that the HBA or the HCA, and its driver program have been correctly installed. If the HBA driver program supports failover, you must set its mode to **Non-Failover**.

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NOTE

- For details about how to install HBAs or the HCAs, and their drivers on application servers, contact your HBA or HCA suppliers.
- InfiniBand HCAs support 64-bit Red Hat Enterprise Linux V6.1, Red Hat Enterprise Linux V6.3, SUSE 11 SP3, and Oracle Enterprise Linux V7.4 (RHCK).
- In an IB networking scenario, hosts running UltraPath can impelment automatic file system mouting. To impelment this fucntion, a host must run 64-bit Red Hat Enterprise Linux 6.1 or Red Hat Enterprise Linux 6.3, and the host must be directly connected to the storage system.

Precautions for deploying the UltraPath on VMs

When you deploy the UltraPath on VMs, if LUNs are allocated to a VM in Raw Device Mapping (RDM) mode or **pass-through** mode, the VM does not support the UltraPath.

Storage System

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

2.1.3 (Optional) SAN Boot Environment Requirements

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

UltraPath supports the preceding two boot modes, and provides the two modes for you to select during the UltraPath installation.

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

NOTICE

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

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

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

Step 2 Install UltraPath on the operating system. For details, see **2.2.2 Installing UltraPath (Boot from SAN)**.

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

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NOTE

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

----End

2.2 Installing UltraPath

UltraPath supports two boot modes: boot from Local and boot from SAN. You can select a desired mode when using **install.sh** for installation.

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

NOTICE

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

- Virtual disks (such as sda, sdb) generated by UltraPath are disk drives assigned by the operating system and may change. You are advised to use UUID (such as file mounting scenarios) or disk drives bound by udev to avoid change of disk drive letters (such as raw disk mounting in Oracle databases).
- When the number of LUNs mapped to host exceeds 512,you are advised to use boot from SAN to install UltraPath.
- When the operating system is Euler on the SDI card or Linx secure operating system V6.0.42, UltraPath cannot be installed in boot from SAN mode. During the installation, boot type is not displayed. UltraPath is installed in boot from Local mode by default.

2.2.1 Installing the UltraPath (Boot from Local)

When the operating systems are installed on the local disks of the application server, install UltraPath in Boot from Local mode.

2.2.1.1 Silent Installation

Install UltraPath 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.

Procedure

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

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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 Upload the UltraPath software package to the application server.

Decompress the UltraPath software package on a Windows-based server and upload the package to a directory (such as /home) of the application server.

NOTE

The software package path cannot contain a space.

Step 3 Log in to the application server as user **root**, go to the software package directory (SUSE as an example), and check whether the configuration file **unattend_install.conf** for silent installation exists.

```
suse11-67:/home/SLES # ls unattend_install.conf
unattend_install.conf
suse11-67:/home/SLES #
```

Step 4 Set the configuration item of the configuration file **unattend_install.conf**. Set the value of **boot_type** to **1** and set the value of **restart** and **continue_when_dm_enable** based on onsite requirements. **Table 2-3** describes the related parameters.

Table 2-3 Parameters of the configuration item

Parameter	Description	Value
boot_type	Startup mode of UltraPath.	[Value range] ● 1: Boot from local ● 2: Boot from SAN [Default value] 1
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. **NOTE** If IB cards such as HCA, QLogic, or Emulex HBA cards are used to connect to the storage array, you are advised to set the value to n. [Default value] n

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Parameter	Description	Value
continue_when_dm_enable	Whether you want to continue installing UltraPath when DM-multipath, the OS built-in multipathing software is enabled.	[Value range] ● y: continues installing UltraPath. ● n: stops installing UltraPath. **NOTE** The **vendor id** and **product id** of UltraPath virtual disks are **up** and **updisk** respectively. If the **vendor id** and **product id** are configured in the DM-multipath blacklist, you are advised to input y. [Default value] n

Step 5 Run the **./install.sh -f unattend_install.conf** command to start silent installation.

```
suse11-67:/home/SLES # chmod +x install.sh
suse11-67:/home/SLES # ./install.sh -f unattend_install.conf
```

- The installation tool automatically checks the environment.

  ```
  complete iscsi checking.
  complete FC checking.
  Verify the UltraPath existence.
  The UltraPath is not installed.
  ```

- If built-in multipathing software DM-multipath is enabled, the following alarms are generated. The program automatically determines whether to continue the installation based on parameter **continue_when_dm_enable** in the **unattend_install.conf** configuration file.

  ```
  [WARNING] DM-multipath has been enabled and may take over virtual disks
  generated by UltraPath. As a result, virtual disks generated by UltraPath
  cannot be used directly. Check whether vendor id and product id of virtual
  disks are configured to up and updisk in the blacklist of DM-multipath.Do you
  want to continue the installation?
  <Y|N>:N
  ```

  If built-in multipathing software DM-multipath is enabled, virtual disks generated by UltraPath may be taken over by DM-multipath. As a result, you can only use **/dev/dm-x** disks generated by DM-multipath and cannot use **/dev/sdx** disks. You are advised to configure a blacklist of DM-multipath and restart the installation after making the blacklist take effect. If you have configured a blacklist, select <Y> to continue the installation. For details about DM-multipath blacklist configuration, see **4.4 How to Configure DM-multipath so that UltraPath Virtual Disks Are Not Taken Over?**.

- Modify adapters' configuration parameters.

  ```
  Modify system configuration.[file:/etc/iscsi/
  iscsid.conf,item:node.startup ,value:  automatic]
  Modify system configuration.[file:/etc/iscsi/
  iscsid.conf,item:node.session.timeo.replacement_timeout ,value:  1]
  Modify system configuration.[file:/etc/
  modprobe.conf.local,module:qla2xxx,item:qlport_down_retry,value:5]
  Modify system configuration.[file:/etc/
  modprobe.conf.local,module:lpfc,item:lpfc_nodev_tmo,value:5]
  ```

  Table 2-4 describes the configuration parameters of adapters.

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NOTE

The following adapter parameters will be automatically modified when UltraPath is installed. You do not need to manually configure them.

Table 2-4 Adapter parameters

Adapter Type	Configuration File	Parameter
Linux-iscsi	/etc/iscsi.conf	Multipath=portal ConnFailTimeout=1
open-iscsi	/etc/iscsi/iscsid.conf	node.startup = automatic node.session.timeo.replacement_timeout=1
Qlogic	SUSE: /etc/modprobe.conf.local Red Hat 4/Red Hat 5: /etc/modprobe.conf Red Hat 6/Red Hat 7: /etc/modprobe.d/nxupmodules.conf	options qla2xxx qlport_down_retry=5 options qla2xxx ql2xfailover=0
Emulex	SUSE: /etc/modprobe.conf.local Red Hat 4/Red Hat 5: /etc/modprobe.conf Red Hat 6/Red Hat 7: /etc/modprobe.d/nxupmodules.conf	Options lpfc lpfc_nodev_tmo=5

When you perform the preceding operations, the following cases lead to alarms:

- The operating system version and the kernel version do not match. As a result, the installed UltraPath software may fail to take effect.
- The version of the host adapter driver has defects. As a result, it is incompatible with the UltraPath software.

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Alarm Scenario	Information Description	Information Description
The operating system version and the kernel version do not match.	The OS version XXX does not match the kernel version. If the kernel has been updated or patched, please confirm the compatibility.	Check whether the **release** file in the **/etc/** directory has been modified. If the file is modified, restore it and install the UltraPath software again. If the file is not modified, check whether the system is upgraded.
The version of the host adapter driver has defects.	There are some defects of the iSCSI Initiator provided by SLES9 SP3. Therefore, you need to update the iSCSI Initiator.	Update the iSCSI initiator.
	The open-iscsi version is too low, Please update the iSCSI driver to the version 2.0-870.3.	Upgrade **open-iscsi** to 2.0-870.3.
	The default Qlogic driver in Red Hat AS4 and Asianux2 has a defect (Using upRescan command provided by the UltraPath.Please update it to qla2xxx-v8.02.23).	Download qla2xxx-v8.02.23 from **http://driverdownloads.qlogic.com/QLogicDriverDownloads_UI/default.aspx** (QLogic official website) and upgrade it.

- The default timeout parameter is modified using **Systemd**.

```
Modify system configuration.[file:/etc/systemd/system.conf,item:
DefaultTimeoutStartSec ,value: 600s]
```

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Table 2-5 Systemd default timeout parameter

Systemd default timeout parameter	Configuration File	Parameter
Systemd	/etc/systemd/system.conf	DefaultTimeoutStartSec=600s **NOTE** This parameter is used to set the default timeout of starting a **systemd** service unit. If the unit startup period exceeds the timeout, the system startup will be affected. The number of LUNs mapped to hosts will affect the period of starting the service unit. The value of this parameter is modifiable based on actual conditions.

- Select the desired system boot mode <1>. 1 is automatically typed and the installation continues.

```
If the operating system is installed on a local drive of the server, you are
advised
to choose boot from local; if the operating system is installed on a SAN
storage
system, you must choose boot from san. Please choose the boot type of your
system:
<1>--boot-from-Local
<2>--boot-from-SAN
please input your select:1
Unattend install configuration item 'boot_type' set to '1'. Unattend
installation will continue.
Preparing...
################################################
UltraPath
################################################
User configuration is saved successfully.
The boot service is installed successfully.
The running service is installed successfully.
**********************************Attention*********************************
***
* UltraPath would modify some parameters of HBA cards for better performace.
If *
* UltraPath is installed for the first time, you may need to update the
initrd  *
* image before system reboot to make the modification take
effect.              *
*******************************************************************************
***
*******************************************************************************
***
* UltraPath will use the system hostname for alarm generation and automatic
host*
* registration. Make sure that the system hostname is correctly
configured..    *
*******************************************************************************
***
The installation is complete. Whether to restart the system now?
<Y|N>:n
Unattend install configuration item 'restart' set to 'n'. The system will not
be restarted after the unattend installation.
suse11-67:/home/SLES #
```

  - If HCA cards of the IB type are used to connect to the storage array, run the **upLinux config ib** command to configure the IB driver service. In this way, the disks of the storage array will be reported to the host for a takeover.

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- If the QLogic or Emulex HBAs are used to connect the storage system, you are advised to run the **upLinux updateImage** command to update mirrors. In this way, modifications to the configuration of the QLogic or Emulex driver during the installation can take effect.

NOTE

The modifications to the configuration parameters of the drive can take effect only after the host is restarted.

Step 6 **Optional:** If the **restart** item in the unattend_install.conf configuration file is set to n, you can use the following two methods to enable UltraPath to take effect after the installation.

- Restart the host. (This is the typical practice.)
- Start the nxup service.

  Before starting the nxup service, the system asks you whether to process the existing disks that the UltraPath software can take over. To enable the nxup service to successfully start, you must delete these disks. Before deleting these disks, ensure that they do not have services, volume management software, clusters, file systems, and other applications.

  The operation procedure is as follows:

  Run the **service nxup start** or **/etc/init.d/nxup start** command.

NOTE

Run the **/etc/init.d/nxup start** command in the SUSE 12 series, Deepin, and some LINX-TECH operating systems.

The **service nxup start** command is used as an example.

```
#service nxup start
this kernel is 2.6.39-200.24.1.el6uek.x86_64
begin load nxup
begin scan host0
begin scan host1
begin scan host2
begin scan host3
begin scan host4
begin scan host5
begin scan host6
The device scanning is complete.
start upservice
The UltraPath starts successfully.
```

NOTICE

- After a kernel mode switchover, for example, a switchover from the default mode to xen mode, perform the following operations:
  1. Run the **upLinux updateImage** command to update images.
  2. Restart the host.
- If you cannot log in to the operating system after UltraPath is installed in boot from local mode, see **5.2 Failed to Restart the SANBOOT System After the UltraPath Is Installed by Using the boot from local Mode** to solve the problem.

----End

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Follow-up Procedure

After the installation, check whether UltraPath takes effect by referring to **4.1 How Do I Check Whether UltraPath Has Taken Effect After UltraPath Is Installed?**.

2.2.1.2 Non-Silent Installation

Install UltraPath in non-silent installation mode. In the UltraPath installation process, you must perform operations according to the prompt information.

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 Upload the UltraPath software package to an application server.

Decompress the UltraPath software package on a Windows-based server and upload the package to a directory (such as /home) of the application server.

NOTE

The software package path cannot contain a space.

Step 3 Log in to the application server as user **root**, go to the software package directory (SUSE as an example), and run installation tool install.sh to install the software.

```
linux-8beo:/home/SLES # chmod +x install.sh
linux-8beo:/home/SLES # ./install.sh
```

- The installation tool automatically checks the environment.

  ```
  complete iscsi checking.
  complete FC checking.
  Verify the UltraPath existence.
  The UltraPath is not installed.
  ```

- If built-in multipathing software DM-multipath is enabled, the following alarms are generated. A message is displayed asking whether to continue installing UltraPath.

  ```
  [WARNING] DM-multipath has been enabled and may take over virtual disks
  generated by UltraPath. As a result, virtual disks generated by UltraPath
  cannot be used directly. Check whether vendor id and product id of virtual
  disks are configured to up and updisk in the blacklist of DM-multipath.Do you
  want to continue the installation?
  <Y|N>:
  ```

  If built-in multipathing software DM-multipath is enabled, virtual disks generated by UltraPath may be taken over by DM-multipath. As a result, you can only use **/dev/dm-x** disks generated by DM-multipath and cannot use **/dev/sdx** disks. You are advised to configure a blacklist of DM-multipath and restart the installation after making the blacklist take effect. If you have configured a blacklist, select <Y> to continue the installation. For details about DM-multipath blacklist configuration, see **4.4 How to Configure DM-multipath so that UltraPath Virtual Disks Are Not Taken Over?**.

- Modify all adapter configuration parameters.

  ```
  Modify system configuration.[file:/etc/iscsi/
  iscsid.conf,item:node.startup ,value:  automatic]
  Modify system configuration.[file:/etc/iscsi/
  iscsid.conf,item:node.session.timeo.replacement_timeout ,value:  1]
  Modify system configuration.[file:/etc/
  ```

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```
modprobe.conf.local,module:qla2xxx,item:qlport_down_retry,value:5]
Modify system configuration.[file:/etc/
modprobe.conf.local,module:lpfc,item:lpfc_nodev_tmo,value:5]
```

Table 2-6 describes the adapter parameters.

NOTE

The following adapter parameters will be automatically modified during UltraPath installation. No manual configuration is required.

Table 2-6 Adapter parameters

Adapter Type	Configuration File	Parameter
Linux-iscsi	/etc/iscsi.conf	Multipath=portal ConnFailTimeout=1
open-iscsi	/etc/iscsi/iscsid.conf	node.startup = automatic node.session.timeo.replacement_timeout=1
QLogic	SUSE: /etc/modprobe.conf.local Red Hat 4/Red Hat 5: /etc/modprobe.conf Red Hat 6/Red Hat 7: /etc/modprobe.d/nxupmodules.conf	options qla2xxx qlport_down_retry=5 options qla2xxx ql2xfailover=0
Emulex	SUSE: /etc/modprobe.conf.local Red Hat 4/Red Hat 5: /etc/modprobe.conf Red Hat 6/Red Hat 7: /etc/modprobe.d/nxupmodules.conf	Options lpfc lpfc_nodev_tmo = 5

When you perform the preceding operations, the following cases generate alarms:

- The operating system version and the kernel version do not match. As a result, the installed UltraPath may fail to take effect.
- The version of the host adapter driver has defects. As a result, it is incompatible with the UltraPath.

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Alarm Scenario	Information Description	Suggestion
The operating system version and the kernel version do not match.	The OS version XXX does not match the kernel version. If the kernel has been updated or patched, please confirm the compatibility.	Check whether the **release** file in the **/etc/** directory has been modified. If yes, restore it before installing the UltraPath. If no, confirm whether a system upgrade is needed.
The version of the host adapter driver has defects.	There are some defects of the iSCSI Initiator provided by SLES9 SP3. Therefore, you need to update the iSCSI Initiator.	Update the iSCSI initiator.
	The open-iscsi version is too low, Please update the iSCSI driver to the version 2.0-870.3.	The open-iscsi version is outdated. You need to upgrade it to 2.0-870.3.
	The default QLogic driver in Red Hat AS4 and Asianux2 has a defect for using upRescan command provided by the UltraPath. Please update it to qla2xxx-v8.02.23.	Download qla2xxx-v8.02.23 from the official QLogic website: **http://driverdownloads.qlogic.com/QLogicDriverDownloads_UI/default.aspx**.

- Modify the default timeout parameter in the system that uses **Systemd**.

```
Modify system configuration.[file:/etc/systemd/system.conf,item:
DefaultTimeoutStartSec ,value: 600s]
```

Table 2-7 Default **Systemd** Timeout Parameter

Default Systemd Timeout Parameter	Configuration File	Parameter
Systemd	/etc/systemd/system.conf	DefaultTimeoutStartSec=600s **NOTE** This parameter is used to set the default timeout of starting a **systemd** service unit. If the unit startup period exceeds the timeout, the system startup will be affected. The number of LUNs mapped to hosts will affect the period of starting the service unit. The value of this parameter is modifiable based on actual conditions.

- Select the desired system boot mode. Select <1> to install the software.

```
If the operating system is installed on a local drive of the server, you are
advised to choose boot from local; if the operating system is installed on a
```


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```
SAN storage system, you must choose boot from san. Please choose the boot
type of your system:
<1>--boot-from-Local
<2>--boot-from-SAN
please input your select:1
Preparing...
################################################
UltraPath
################################################
User configuration is saved successfully.
The boot service is installed successfull.
The running service is installed successfully.
**********************************Attention*********************************
***
* UltraPath would modify some parameters of HBA cards for better performace.
If *
* UltraPath is installed for the first time, you may need to update the
initrd  *
* image before system reboot to make the modification take
effect.              *
**************************************************************************
***
**************************************************************************
***
* UltraPath will use the system hostname for alarm generation and automatic
host*
* registration. Make sure that the system hostname is correctly
configured..    *
**************************************************************************
***
The installation is complete. Whether to restart the system now?
<Y|N>:
```

- If the InfiniBand HCAs are used to connect the storage system, you are advised to type **N** and run the **upLinux config ib** command to configure the InfiniBand service. In this way, disk arrays connected to InfiniBand interface modules are reported to the host for takeover automatically.
- If the QLogic or Emulex HBAs are used to connect the storage system, you are advised to type **N** and run the **upLinux updateImage** command to update mirrors. In this way, modifications to the configuration of the QLogic or Emulex driver during the installation can take effect.

NOTE

The modifications to the configuration parameters of the drive can take effect only after the host is restarted.

Step 4 Enable the UltraPath to take effect in either of the following ways:

- Restart the host. (This is the typical practice.)
- Start the **nxup** service to start UltraPath.

  Before you start the **nxup** service, the system asks you whether to process the existing disks that the UltraPath can take over. To enable the **nxup** service to successfully start, you must delete these disks. Before deleting these disks, ensure that they do not have services, volume management software, clusters, file systems, and other applications.

  The operations are as follows:

  Run **service nxup start** or **/etc/init.d/nxup start**.

NOTE

Run the **/etc/init.d/nxup start** command in the SUSE 12 series, Deepin, and some LINX-TECH operating systems.

The following uses **service nxup start** as an example.

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```
#service nxup start
this kernel is 2.6.39-200.24.1.el6uek.x86_64
begin load nxup
begin scan host0
begin scan host1
begin scan host2
begin scan host3
begin scan host4
begin scan host5
begin scan host6
The device scanning is complete.
start upservice
The UltraPath starts successfully.
```

NOTICE

- After switching the kernel mode, for example from **default** mode to **xen** mode, perform the following operations:
  1. Run the **upLinux updateImage** command to update the mirror.
  2. Restart the host.
- If you have incorrectly selected the boot from local mode on a SANBOOT system, the operating system cannot be loaded after you install the UltraPath. In this case, see **5.2 Failed to Restart the SANBOOT System After the UltraPath Is Installed by Using the boot from local Mode** to rectify the fault.

----End

Follow-up Procedure

After the installation, check whether UltraPath takes effect by referring to **4.1 How Do I Check Whether UltraPath Has Taken Effect After UltraPath Is Installed?**.

2.2.2 Installing UltraPath (Boot from SAN)

When the operating systems are installed on SAN storage devices, install UltraPath in Boot from SAN mode.

2.2.2.1 Silent Installation

Install UltraPath 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

The rocky system does not support silent installation if the SAN Boot mode is used.

Procedure

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

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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 Upload the UltraPath software package to the application server.

Decompress the UltraPath software package on a Windows-based server and upload the package to a directory (such as /home) of the application server.

NOTE

The software package path cannot contain a space.

Step 3 Log in to the application server as user **root**, go to the software package directory (SUSE as an example), and check whether the configuration file **unattend_install.conf** for silent installation exists.

```
suse11-67:/home/SLES # ls unattend_install.conf
unattend_install.conf
suse11-67:/home/SLES #
```

Step 4 Set the configuration item of the configuration file **unattend_install.conf**. Set the value of **boot_type** to **2** and set the value of **restart** and **continue_when_dm_enable** based on onsite requirements. **Table 2-8** describes the related parameters.

Table 2-8 Parameters of the configuration item

Parameter	Description	Value
boot_type	Startup mode of UltraPath.	[Value range] ● 1: Boot from local ● 2: Boot from SAN [Default value] 1
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. **NOTE** If IB cards such as HCA cards are used to connect to the storage array, you are advised to set the value to n. [Default value] n

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Parameter	Description	Value
continue_when_dm_enable	Whether you want to continue installing UltraPath when DM-multipath, the OS built-in multipathing software is enabled.	[Value range] ● y: continues installing UltraPath. ● n: stops installing UltraPath. **NOTE** The **vendor id** and **product id** of UltraPath virtual disks are **up** and **updisk** respectively. If the **vendor id** and **product id** are configured in the DM-multipath blacklist, you are advised to input y. [Default value] n

Step 5 Run the **./install.sh -f unattend_install.conf** command to start silent installation.

```
linux-8beo:/home/SLES # chmod +x install.sh
linux-8beo:/home/SLES # ./install.sh -f unattend_install.conf
```

- The installation tool automatically checks the environment.

```
complete iscsi checking.
complete FC checking.
Verify the UltraPath existence.
The UltraPath is not installed.
```

- If built-in multipathing software DM-multipath is enabled, the following alarms are generated. The program automatically determines whether to continue the installation based on parameter **continue_when_dm_enable** in the **unattend_install.conf** configuration file.

```
[WARNING] DM-multipath has been enabled and may take over virtual disks
generated by UltraPath. As a result, virtual disks generated by UltraPath
cannot be used directly. Check whether vendor id and product id of virtual
disks are configured to up and updisk in the blacklist of DM-multipath.Do you
want to continue the installation?
<Y|N>:N
```

  If built-in multipathing software DM-multipath is enabled, virtual disks generated by UltraPath may be taken over by DM-multipath. As a result, you can only use **/dev/dm-x** disks generated by DM-multipath and cannot use **/dev/sdx** disks. You are advised to configure a blacklist of DM-multipath and restart the installation after making the blacklist take effect. If you have configured a blacklist, select <Y> to continue the installation. For details about DM-multipath blacklist configuration, see **4.4 How to Configure DM-multipath so that UltraPath Virtual Disks Are Not Taken Over?**.

- Modify adapters' configuration parameters.

```
Modify system configuration.[file:/etc/iscsi/
iscsid.conf,item:node.startup ,value:  automatic]
Modify system configuration.[file:/etc/iscsi/
iscsid.conf,item:node.session.timeo.replacement_timeout ,value:  1]
Modify system configuration.[file:/etc/
modprobe.conf.local,module:qla2xxx,item:qlport_down_retry,value:5]
Modify system configuration.[file:/etc/
modprobe.conf.local,module:lpfc,item:lpfc_nodev_tmo,value:5]
```

  Table 2-9describes the configuration parameters of adapters.

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NOTE

The following adapter parameters will be automatically modified when UltraPath is installed. You do not need to manually configure them.

Table 2-9 Adapter parameters

Adapter Type	Configuration File	Parameter
Linux-iscsi	/etc/iscsi.conf	Multipath=portal ConnFailTimeout=1
open-iscsi	/etc/iscsi/iscsid.conf	node.startup = automatic node.session.timeo.replacement_timeout=1
Qlogic	SUSE: /etc/modprobe.conf.local Red Hat 4/Red Hat 5: /etc/modprobe.conf Red Hat 6/Red Hat 7: /etc/modprobe.d/nxupmodules.conf	options qla2xxx qlport_down_retry=5 options qla2xxx ql2xfailover=0
Emulex	SUSE: /etc/modprobe.conf.local Red Hat 4/Red Hat 5: /etc/modprobe.conf Red Hat 6/Red Hat 7: /etc/modprobe.d/nxupmodules.conf	Options lpfc lpfc_nodev_tmo=5

When you perform the preceding operations, the following cases lead to alarms:

- The operating system version and the kernel version do not match. As a result, the installed UltraPath software may fail to take effect.
- The version of the host adapter driver has defects. As a result, it is incompatible with the UltraPath software.

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Alarm Scenario	Information Description	Information Description
The operating system version and the kernel version do not match.	The OS version XXX does not match the kernel version. If the kernel has been updated or patched, please confirm the compatibility.	Check whether the **release** file in the **/etc/** directory has been modified. If the file is modified, restore it and install the UltraPath software again. If the file is not modified, check whether the system is upgraded.
The version of the host adapter driver has defects.	There are some defects of the iSCSI Initiator provided by SLES9 SP3. Therefore, you need to update the iSCSI Initiator.	Update the iSCSI initiator.
	The open-iscsi version is too low, Please update the iSCSI driver to the version 2.0-870.3.	Upgrade **open-iscsi** to 2.0-870.3.
	The default Qlogic driver in Red Hat AS4 and Asianux2 has a defect (Using upRescan command provided by the UltraPath.Please update it to qla2xxx-v8.02.23).	Download qla2xxx-v8.02.23 from **http://driverdownloads.qlogic.com/QLogicDriverDownloads_UI/default.aspx** (QLogic official website) and upgrade it.

- The default timeout parameter is modified using **Systemd**.
  ```
  Modify system configuration.[file:/etc/systemd/system.conf,item:
  DefaultTimeoutStartSec ,value: 600s]
  ```

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Table 2-10 Systemd default timeout parameter

Systemd default timeout parameter	Configuration File	Parameter
Systemd	/etc/systemd/system.conf	DefaultTimeoutStartSec=600s **NOTE** This parameter is used to set the default timeout of starting a **systemd** service unit. If the unit startup period exceeds the timeout, the system startup will be affected. The number of LUNs mapped to hosts will affect the period of starting the service unit. The value of this parameter is modifiable based on actual conditions.

- Select the desired system boot mode <2>. 2 is automatically typed and the installation continues.

```
If the operating system is installed on a local drive of the server, you are
advised
to choose boot from local; if the operating system is installed on a SAN
storage
system, you must choose boot from san. Please choose the boot type of your
system:
<1>--boot-from-Local
<2>--boot-from-SAN
please input your select:2
Unattend install configuration item 'boot_type' set to '2'. Unattend
installation will continue.
Preparing...
################################################
UltraPath
################################################
User configuration is saved successfully.
The UltraPath start items are added successfully.
The mirror is updated successfully.
append UltraPath title to bootloader successfully.[/boot/grub/menu.lst]
The running service is installed successfully.
**************************************************************************
***
* UltraPath will use the system hostname for alarm generation and automatic
host*
* registration. Make sure that the system hostname is correctly
configured..    *
**************************************************************************
***
The installation is complete. Whether to restart the system now?
<Y|N>:n
Unattend install configuration item 'restart' set to 'n'. The system will not
be restarted after the unattend installation.
suse11-67:/home/SLES #
```

  If HCA cards of the IB type are used to connect to the storage array, run the **upLinux config ib** command to configure the IB driver service. In this way, the disks of the storage array will be reported to the host for a takeover.

- After the UltraPath software is installed in this mode, a multipath image and a link that points to the image are generated in the **/boot** directory.

```
# cd /boot
# ls
System.map-X.X.XX.XX-X.XX.X-smp    message
backup_mbr                   nxup-X.X.XX.XX-X.XX.X-smp.img  ultrapath-
X.X.XX.XX-X.XX.X-smp.img
```

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- If your operating system supports multiple boot modes, select a mode that takes effect as instructed by the UltraPath software. Modify the **/boot/grub/menu.lst**, **/etc/ elilo.conf**, or **/etc/ lilo.conf** configuration file. Add the UltraPath option and configure it as a default item. For example:

```
# cat /boot/grub/menu.lst
default 2
timeout 8
...
title Linux with ultrapath
    root (hd0,2)
      kernel /boot/vmlinuz-X.X.XX.XX-X.XX.X-smp root=/dev/sda2..
    initrd /boot/ultrapath-X.X.XX.XX-X.XX.X-smp.img.
```

Step 6 **Optional:** If the **restart** item in the unattend_install.conf configuration file is set to n, restrat the host to enable UltraPath to take effect after the installation.

NOTICE

If you cannot log in to the operating system after UltraPath is installed in boot from local mode, see **5.2** to solve the problem.

----End

Follow-up Procedure

After the installation, check whether UltraPath takes effect by referring to **4.1 How Do I Check Whether UltraPath Has Taken Effect After UltraPath Is Installed?**.

2.2.2.2 Non-Silent Installation

Install UltraPath in non-silent installation mode. In the UltraPath installation process, you must perform operations according to the prompt information.

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 Upload the UltraPath software package to an application server.

Decompress the UltraPath software package on a Windows-based server and upload the package to a directory (such as /home) of the application server.

NOTE

The software package path cannot contain a space.

Step 3 Log in to the application server as user **root**, go to the software package directory (SUSE as an example), and run installation tool install.sh to install the software.

```
linux-8beo:/home/SLES # chmod +x install.sh
linux-8beo:/home/SLES # ./install.sh
```

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- The installation tool automatically checks the environment.

```
complete iscsi checking.
complete FC checking.
Verify the UltraPath existence.
The UltraPath is not installed.
```

- If built-in multipathing software DM-multipath is enabled, the following alarms are generated. A message is displayed asking whether to continue installing UltraPath.

```
[WARNING] DM-multipath has been enabled and may take over virtual disks
generated by UltraPath. As a result, virtual disks generated by UltraPath
cannot be used directly. Check whether vendor id and product id of virtual
disks are configured to up and updisk in the blacklist of DM-multipath.Do you
want to continue the installation?
<Y|N>:
```

  - If built-in multipathing software DM-multipath is enabled, virtual disks generated by UltraPath may be taken over by DM-multipath. As a result, you can only use **/dev/dm-x** disks generated by DM-multipath and cannot use **/dev/sdx** disks. You are advised to configure a blacklist of DM-multipath and restart the installation after making the blacklist take effect. If you have configured a blacklist, select <Y> to continue the installation. For details about DM-multipath blacklist configuration, see **4.4 How to Configure DM-multipath so that UltraPath Virtual Disks Are Not Taken Over?**.

- Modify all adapter configuration parameters.

```
Modify system configuration.[file:/etc/iscsi/
iscsid.conf,item:node.startup ,value:  automatic]
Modify system configuration.[file:/etc/iscsi/
iscsid.conf,item:node.session.timeo.replacement_timeout ,value:  1]
Modify system configuration.[file:/etc/
modprobe.conf.local,module:qla2xxx,item:qlport_down_retry,value:5]
Modify system configuration.[file:/etc/
modprobe.conf.local,module:lpfc,item:lpfc_nodev_tmo,value:5]
```

Table 2-11 describes the adapter parameters.

NOTE

The following adapter parameters will be automatically modified during UltraPath installation. No manual configuration is required.

Table 2-11 Adapter parameters

Adapter Type	Configuration File	Suggestion
Linux-iscsi	/etc/iscsi.conf	Multipath=portal ConnFailTimeout=1
open-iscsi	/etc/iscsi/iscsid.conf	node.startup = automatic node.session.timeo.replacement_timeout=1
Qlogic	SUSE: /etc/modprobe.conf.local Red Hat 4/Red Hat 5: /etc/modprobe.conf Red Hat 6/Red Hat 7: /etc/modprobe.d/nxupmodules.conf	options qla2xxx qlport_down_retry=5 options qla2xxx ql2xfailover=0

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Adapter Type	Configuration File	Suggestion
Emulex	SUSE: /etc/modprobe.conf.local Red Hat 4/Red Hat 5: /etc/modprobe.conf Red Hat 6/Red Hat 7: /etc/modprobe.d/nxupmodules.conf	Options lpfc lpfc_nodev_tmo = 5

When you perform the preceding operations, the following cases generate alarms:

- The operating system version and the kernel version do not match. As a result, the installed UltraPath may fail to take effect.
- The version of the host adapter driver has defects. As a result, it is incompatible with the UltraPath.

Alarm Scenario	Information Description	Information Description
The operating system version and the kernel version do not match.	The OS version XXX does not match the kernel version. If the kernel has been updated or patched, please confirm the compatibility.	Check whether the **release** file in the **/etc/** directory has been modified. If yes, restore it before installing the UltraPath. If no, confirm whether a system upgrade is needed.
The version of the host adapter driver has defects.	There are some defects of the iSCSI Initiator provided by SLES9 SP3. Therefore, you need to update the iSCSI Initiator.	Update the iSCSI initiator.
	The open-iscsi version is too low. Please update the iSCSI driver to the version 2.0-870.3.	The open-iscsi version is outdated. You need to upgrade it to 2.0-870.3.
	The default QLogic driver in Red Hat AS4 and Asianux2 has a defect for using upRescan command provided by the UltraPath. Please update it to qla2xxx-v8.02.23.	Download qla2xxx-v8.02.23 from the official QLogic website: **http://driverdownloads.qlogic.com/QLogicDriverDownloads_UI/default.aspx**.

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- Modify the default timeout parameter in the system that uses **Systemd**.

```
Modify system configuration.[file:/etc/systemd/system.conf,item:
DefaultTimeoutStartSec ,value: 600s]
```

Table 2-12 Default **Systemd** Timeout Parameter

Default Systemd Timeout Parameter	Configuration File	Parameter
Systemd	/etc/systemd/system.conf	DefaultTimeoutStartSec=600s **NOTE** This parameter is used to set the default timeout of starting a **systemd** service unit. If the unit startup period exceeds the timeout, the system startup will be affected. The number of LUNs mapped to hosts will affect the period of starting the service unit. The value of this parameter is modifiable based on actual conditions.

- Select the desired operating system boot mode. In this scenario, select <2> to perform a SANBOOT installation.

```
If the operating system is installed on a local drive of the server, you are
advised to choose boot from local; if the operating system is installed on a
SAN storage system, you must choose boot from san. Please choose the boot
type of your system:
<1>--boot-from-Local
<2>--boot-from-SAN
please input your select:2
Preparing...
################################################
UltraPath
################################################
User configuration is saved successfully.
The boot service is installed successfull.
The running service is installed successfully.
**********************************Attention*********************************
***
* UltraPath would modify some parameters of HBA cards for better performace.
If *
* UltraPath is installed for the first time, you may need to update the
initrd  *
* image before system reboot to make the modification take
effect.              *
********************************************************************************
***
********************************************************************************
***
* UltraPath will use the system hostname for alarm generation and automatic
host*
* registration. Make sure that the system hostname is correctly
configured..    *
********************************************************************************
***
The installation is complete. Whether to restart the system now?
<Y|N>:
```

If the InfiniBand HCAs are used to connect the storage system, you are advised to type **N** and run the **upLinux config ib** command to configure the InfiniBand service. In this way, disk arrays connected to InfiniBand interface modules are reported to the host for takeover automatically.

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- After the installation, a multipathing mirror and a link to the mirror are generated in the **/boot** directory.

```
# cd /boot
# ls
System.map-X.X.XX.XX-X.XX.X-smp    message
backup_mbr                  nxup-X.X.XX.XX-X.XX.X-smp.img  ultrapath-
X.X.XX.XX-X.XX.X-smp.img
```

- If the operating system has multiple loading modes, read the message of the UltraPath and select the currently effective loading mode to boot the system. An UltraPath-related option will be added to the boot configuration file (for example, **/boot/grub/menu.lst**, **etc/elilo.conf**, or **/etc/lilo.conf**). Keep the default value of the option. The following shows an example:

```
# cat /boot/grub/menu.lst
default 2
timeout 8
...
title Linux with ultrapath
    root (hd0,2)
      kernel /boot/vmlinuz-X.X.XX.XX-X.XX.X-smp root=/dev/sda2..
    initrd /boot/ultrapath-X.X.XX.XX-X.XX.X-smp.img.
```

Step 4 After installing the UltraPath, restart the host.

NOTICE

If you have incorrectly selected the boot from local mode on a SANBOOT system, the operating system cannot be loaded after you install the UltraPath. In this case, refer to **5.2 Failed to Restart the SANBOOT System After the UltraPath Is Installed by Using the boot from local Mode** to rectify the fault.

----End

Follow-up Procedure

After the installation, check whether UltraPath takes effect by referring to **4.1 How Do I Check Whether UltraPath Has Taken Effect After UltraPath Is Installed?**.

2.3 Deploying UltraPath in Batch in a FusionSphere OpenStack Environment

This section describes how to deploy UltraPath in batch in a FusionSphere OpenStack environment.

Procedure

Step 1 Select an UltraPath software package applicable to FusionSphere products. **Table 2-13** lists the operating systems for UltraPath software packages (V100R008 as an example).

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Table 2-13 UltraPath software packages applicable to FusionSphere products (V100R008 as an example)

UltraPath Software Package	Operating System
OceanStor UltraPath V100R008CXXSPCXXX_FusionSphere.zip	UVP

Step 2 Use a digital signature verification tool to verify integrity of the software package.

NOTE

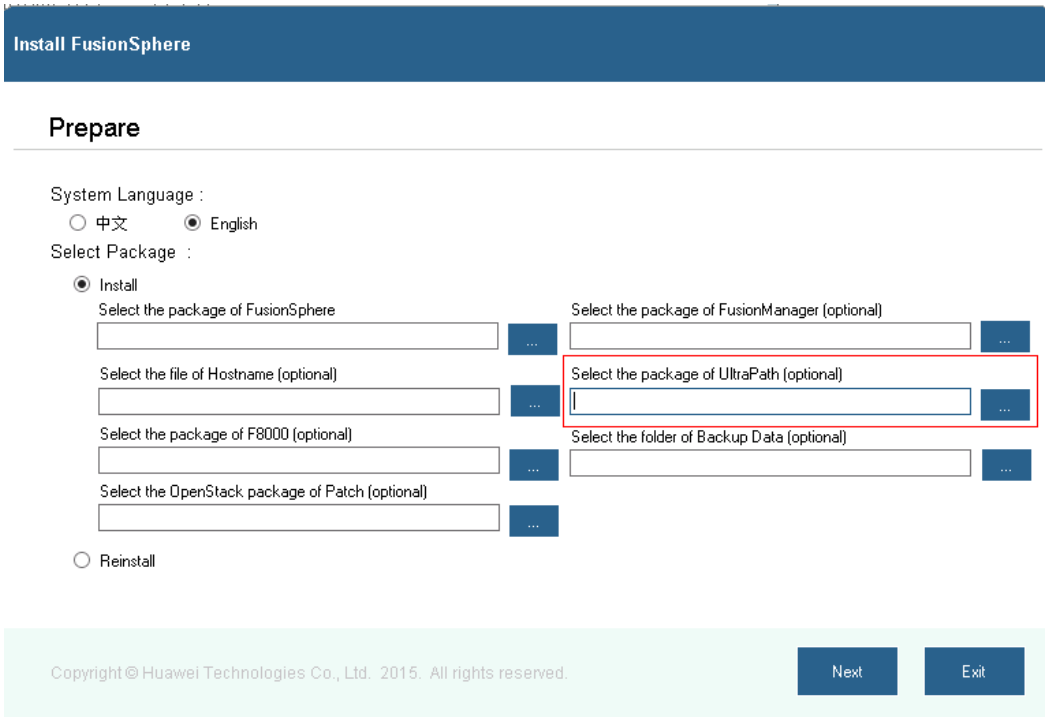
Download the digital signature verification tool from **http://support.huawei.com/enterprise/** to verify integrity of the software package. If the verification fails, contact technical support engineers to obtain the correct and secure software package.

Step 3 Import the UltraPath installation package on the FusionSphere installation tool interface.

NOTE

- The UltraPath installation package is saved in the FusionSphere OpenStack directory of the UltraPath software package.
- If you want to know details about how to install FusionSphere OpenStack, see the *FusionSphere Installation Guide (NFV)* specific to your software version.

For example, if FusionSphere OpenStack V100R006C00 is used, select and import ULTRAPATH_V100R008C50_FSO6U0.tar.gz on the installation tool interface (in the red square in the following figure).



----End

3 Management

About This Chapter

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

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

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

3.3 Upgrading the Operating System Kernel (UltraPath Is Not Reinstalled)
After UltraPath is installed successfully, upgrade the operating system kernel. You do not need to reinstall UltraPath.

3.4 Uninstalling the UltraPath
Due to service adjustment, UltraPath must be uninstalled. Perform the operations as instructed in this section. Correctly uninstalling UltraPath can effectively avoid the impact on service running.

3.1 Routine Maintenance

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

3.1.1 Querying Storage System Information

This section introduces how to query information about the storage system that connects to the application server.

Context

Run the **show array** command to query information about a specified or all storage systems connected to the application server.

Procedure

Step 1 Log in to the CLI as user **root**.

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Step 2 Run the **upadmin** command to go to the CLI of UltraPath.

Step 3 Run the **show array** [**id**=*ID1,ID2,...* [**verbose**]] command to query information about all or specific storage systems connected to an application server. The parameters are describes as follows:

Keyword and Parameter	Description	Default Value
id=*ID1,ID2,...*	ID of a storage system. You can run **show array** without an ID to display 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
verbose	Viewing details configuration information about a specified storage system. **NOTE** Parameter **verbose** can display details configuration information about a specified storage system only when it is used with parameter **id**.	None

The following example shows how to view information about a storage system whose ID is **1**.

```
UltraPath CLI #10 >show array id=1
=======================================================
                  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:
                Path0: Normal
=======================================================
```

For details about the **show array** command, see **A.4.2 Querying Storage System Information**.

----End

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3.1.2 Querying Physical Path Information

This section introduces how to query the working status of physical paths.

Context

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

Procedure

Step 1 Log in to the CLI as user **root**.

Step 2 Run the **upadmin** command to go to the CLI of UltraPath.

Step 3 Run the **show path** [**id**=*ID1,ID2,...* | **array_id**=*ID*] command to view the working status of all or specific physical paths. The parameters are describes as follows:

Keyword and Parameter	Description	Default Value
id=*ID1,ID2,...*	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
array_id=*ID*	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None

The following example shows how to query the working status of a physical path whose ID is **0**.

```
UltraPath CLI #0 >show path id=0
=======================================
           Path#0 Information
=======================================
Initiator Port  :  2100001b32053e20
Array Name      :  Huawei.Storage48
Controller      :  0B
Target Port     :  20184846fb8ca15f
Path State      :  Normal
Check State     :  --
Port Type       :  FC
I/O Retry count :  0
Path Fault count:  0
Latency-Low(ms) :  0
Latency-High(ms):  2
Latency-avg(ms) :  0
Port ID         :  --
=======================================
```

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For details about the **show path** command, see **A.3.3 Querying Physical Path Information**.

----End

3.1.3 Viewing Virtual LUN Information

This section introduces how to query the virtual LUNs mapped from the storage system to the application server.

Context

Run the **show vlun** command to query information about a specified LUN or all LUNs mapped from a storage system to an application server.

Procedure

Step 1 Log in to the CLI as user **root**.

Step 2 Run the **upadmin** command to go to the CLI of UltraPath.

Step 3 Run the **show vlun** { **id**=*ID1,ID2,...* | **disk**=*diskname* } [**type**={ *all* | *hypermetro* | *migration* }] [**verbose**] or **show vlun** [**array_id**=*ID1,ID2...*] [**type**={ *all* | *hypermetro* | *migration* }] command to query information about the virtual LUNs mapped from the storage system to the application server. The parameters are describes as follows:

Keyword and Parameter	Description	Default Value
id=*ID1,ID2...*	ID of a virtual LUN. You can run **show vlun** without an ID 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
array_id=*ID1,ID2,...*	ID of a storage system. You can run **show array** without an ID 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

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Keyword and Parameter	Description	Default Value
disk=*diskname*	Drive letter name of a virtual LUN. **NOTE** ● You can run this command to view information about only one virtual LUN at a time. ● This command cannot be used to query information about virtual LUNs whose drive letter names are **deleted** or **unknown**.	None
verbose	Viewing details configuration information about a virtual LUN. **NOTE** Parameter **verbose** can be used to view detailed information about a specified virtual LUN only when it is used together with either parameter **id** or **disk**.	None
type={ *all* | *hypermetro* | *migration* }	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 nodename, where: ● all: all the virtual LUNs ● hypermetro: virtual HyperMetro LUNs ● migration: virtual migration LUNs	None

Step 4 The following example shows how to query information about a virtual LUN whose ID is **1**.

```
UltraPath CLI #2 >show vlun id=1
=====================================================
                  VLUN#1 Information
=====================================================
Disk              : sdc
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
```

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```
Num of Paths      : 1
LUN WWN           : 630d17e100b33e3909eae968000000f2
Array Name        : Huawei.Storage
Controller 0B
Path 0 [1:0:0:2] (up-1)  : Normal
Dev Lun ID        : 242
Manual IO Suspension  : Off
----------------------------------------------------------
```

For details about the **show vlun** command, see **A.4.3 Viewing Virtual LUN Information**.

----End

3.1.4 Querying Performance Statistics

UltraPath can obtain real-time performance data from the system. When performance decreases, the exported performance data can help you locate faults. This section introduces how to view and export performance data.

Context

Run the **show iostat**command to display and export the performance statistics (IOPS, bandwidth and response time) about storage systems and virtual LUNs.

Procedure

Step 1 Log in to the CLI as user **root**.

Step 2 Run the **upadmin** command to go to the CLI of UltraPath.

Step 3 Run the **show iostat** command to query and export the IOPS and bandwidth statistics of a storage system or a virtual LUN. The parameters are describes as follows:

Parameter	Description	Default Value
array_id=*ID1,ID2,...*	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

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Parameter	Description	Default Value
vlun_id=*ID1,ID2,...*	Specifies IDs of virtual LUNs. You can run **show vlun type**=*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
type={ *all* | *hypermetro* | *migration* }	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
interval=*time*	Specifies an interval for performance statistics collection. The value ranges from 1 to 60, expressed in seconds.	1
file_name=*file_name*	Specifies the saving path and name of the performance statistics report. **NOTE** You are not required to specify the saving path but must specify the name of the performance report. The system automatically adds suffix **.CSV** to the name. If a saving path is not specified, the report is saved in the **perf_log** file folder of the UltraPath log directory.	/opt/UltraPath/log/perf_log/

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Parameter	Description	Default Value
archive_time=*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
duration=*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

The following example queries the performance data about virtual LUN **0** and export the data to the default path.

```
UltraPath CLI #1 >show iostat vlun_id=0 file_name=perfLogFile
================================================================================
===
                            IO Performance Information
================================================================================
===
                     IOPS                        KB/S                  response
time(ms)
             Total |Read    |Write Total |Read    |Write Total |Read    |Write
VLUN 0       9389    |9389    |0       38457 |38457 |0       0       |0       |0
Controller 0A
Path 1      :9389    |9389    |0       38457 |38457 |0       0       |0     |0
Controller 0B
Path 0      :0       |0       |0       0       |0       |0       0       |0       |
0
================================================================================
===
```

For details about the **show iostat** command, see **A.3.46 Querying and Exporting Performance Statistics**.

----End

3.1.5 Viewing Critical Events

Critical events are logs that record the UltraPath running. When UltraPath becomes faulty, you can view critical events to locate and analyze the fault. This section introduces how to view critical events.

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Context

Run the **show event** command to view critical events about UltraPath.

Procedure

Step 1 Log in to the CLI as user **root**.

Step 2 Run the **upadmin** command to go to the CLI of UltraPath.

Step 3 Run the **show event** [**count**=*number*] command to view critical events that record UltraPath running. The parameters are describes as follows:

Keyword and Parameter	Description	Default Value
count=*number*	Printing number of critical events. The value ranges from 1 to 10,000.	1000

The following example shows how to view critical events about UltraPath.

```
UltraPath CLI #1 >show event
================================================================================
=================
================================================================================
  SN           Array              Type         Time
Serverity                 Description
  1    210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:47:902655 info Add
a path to disk: LUN name {fan0000}, Host Lun ID {1}.
 .....
4793 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:47:289423 info Add a
path to disk: LUN name {LUNV}, Host Lun ID {0}.
4794 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:46:776981 info Add a
path to disk: LUN name {fan0003}, Host Lun ID {4}.
4795 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:46:248418 info Add a
path to disk: LUN name {fan0002}, Host Lun ID {3}.
4796 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:45:752700 info Add a
path to disk: LUN name {fan0001}, Host Lun ID {2}.
4797 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:45:164166 info Add a
path to disk: LUN name {fan0000}, Host Lun ID {1}.
4798 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:44:607698 info Add a
path to disk: LUN name {LUNV}, Host Lun ID {0}.
4799 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:44:094826 info Add a
path to disk: LUN name {fan0003}, Host Lun ID {4}.
4800 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:43:397182 info Add a
path to disk: LUN name {fan0002}, Host Lun ID {3}.
4801 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:42:802060 info Add a
path to disk: LUN name {fan0001}, Host Lun ID {2}.
4802 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:42:321424 info Add a
path to disk: LUN name {fan0000}, Host Lun ID {1}.
4803 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:41:704031 info Add a
path to disk: LUN name {LUNV}, Host Lun ID {0}.
4804 210235G6ED10D8000006  Create virtual disk 2013-11-27 08:21:41:195517 info
Successfully create virtual disk: LUN name {fan0003}, Host Lun ID {4}.
--------------------------------------------------------------------------------
-----------------
--------------------------------------------------------------------------------
-----------------
------
```

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For details about the **show event** command, see **A.3.44 Viewing Critical Events**.

----End

3.2 Upgrading UltraPath

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

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

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

3.3 Upgrading the Operating System Kernel (UltraPath Is Not Reinstalled)

After UltraPath is installed successfully, upgrade the operating system kernel. You do not need to reinstall UltraPath.

Prerequisites

- After the kernel is upgraded, you do not need to reinstall the following operating systems.

Operating System	Version
SUSE	SUSE 10 SPX series, SUSE 11 SPX series, and SUSE 12 SPX series
Oracle	Oracle 5.X series, Oracle 6.X series, and Oracle 7.X series
RHEL	RHEL 5.X series, RHEL 6.X series, and RHEL 7.X series
CentOS	CentOS 5.X series, CentOS 6.X series, and CentOS 7.X series

- The operating systems do not support cross–large version kernel upgrade (for example, SUSE 10 SP1 is upgraded to SUSE 10 SP2, SUSE 10 SP1 to SUSE 11 SP1, RHEL 5.X to RHEL 6.X, or Oracle 5.X to Oracle 6.X).
- Before upgrade the kernel or a kernel patch, ensure that the kernel or kernel path is compatible with UltraPath. For details about the compatibility, contact Huawei technical support.
- The kernel of the Oracle operating system must be a standard kernel version supported by UltraPath.

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Procedure

Step 1 Upgrade the kernel of the operating system. Do not restart the operating system.

Step 2 Run the **cat /etc/UltraPath.packages.info** command to check the **t140s_solutionType** field.

```
[root@localhost RHEL]# cat /etc/UltraPath.packages.info
g10s_OSVersion=RHEL7
g10s_kernelType=normal
g30s_isSanBoot=0
t140s_solutionType=service
f20_solution=createSolution
g10s_sysbit=x86_64
t290s_runServType=redhatService
##########first install####end#####20160225033249########
```

- If the value of the **t140s_solutionType** parameter is **service**, UltraPath is installed in boot from local mode. go to **Step 6**.
- If the value of the **t140s_solutionType** parameter is **mkinitrd**, UltraPath is installed in boot from SAN mode. go to **Step 3**.

Step 3 **Optional:** Run the **upLinux updateForNewKernel** command.

- If the following output is displayed, go to **Step 6**.

```
[root@localhost RHEL]# upLinux updateForNewKernel
The new kernel is 2.6.32-220.el6.x86_64.
The running service is deleted successfully.
The UltraPath startup guide items are deleted successfully.
remove nxup from dracut.
The UltraPath files are deleted successfully.
User configuration is saved successfully.
append nxup to dracut.
The mirror is updated successfully.
append UltraPath title to bootloader successfully.[/boot/grub/menu.lst]
The running service is installed successfully.
The system kernel is updated successfully in UltraPath. Please reboot.
```

- If the following output is displayed, open a new window, log in to the application server as user root, and perform **Step 4**.

```
[root@localhost RHEL]# upLinux updateForNewKernel
********************************************************************************
*****************
*
Notice                                                *
********************************************************************************
*****************
*UltraPath detects that the default startup item of BootLoader do not point
to the upgraded *
*new
kernel.
          *
*The BootLoader type is grub.
*<Step> Edit /boot/grub/menu.lst and make the entry that contains the
initramfs image without *
*the ultraPath modules as the default
entry.                                                        *
*For more information, see the UltraPath User
Guide.                                              *
*Chapter in [Upgrading Kernel Without Re-Installing
UltraPath]                                    *
********************************************************************************
*****************
Whether to go on?
<Y|N>:
```

Step 4 **Optional:** Manually modify the BootLoader startup item of the operating system.

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NOTE

Select the startup modification mode according to **The BootLoader type is grub** in the preceding command output. For example, **The BootLoader type is grub** indicates that the operating system is started in grub mode.

- Start the operating system in grub mode.

  a. Run the **vi** command to open /boot/grub/menu.lst.

  NOTE

  In the command output, each **title** item corresponds to an operating system kernel and the location of each **title** item is related to the value of **default**. For example, the value of **default** that corresponds to the first **title** item is 0 and the value of **default** that corresponds to the second **title** item is 1.

```
Linux-coder:~ # vi /boot/grub/menu.lst
# Modified by YaST2. Last modification on Thu Mar  3 09:01:44 CST 2016
default 0
timeout 8
##YaST - generic_mbr
gfxmenu (hd0,1)/boot/message
##YaST - activate

###Don't change this comment - YaST2 identifier: Original name: linux###
title Xen -- SUSE Linux Enterprise Server 11 SP1 - 2.6.32.12-0.7
    root (hd0,1)
    kernel /boot/vmlinuz-2.6.32.12-0.7-xen root=/dev/disk/by-id/ata-
QEMU_HARDDISK_QM00001-part2 resume=/dev/disk/by-id/ata-QEMU_HARDDISK_QM00001-part1
splash=silent crashkernel=256M-:128M showopts vga=0x314
    initrd /boot/initrd-2.6.32.12-0.7-xen

###Don't change this comment - YaST2 identifier: Original name: linux###
title SUSE Linux Enterprise Server 11 SP1 - 2.6.32.12-0.7
    root (hd0,1)
    kernel /boot/vmlinuz-2.6.32.12-0.7-default root=/dev/disk/by-id/ata-
QEMU_HARDDISK_QM00001-part2 resume=/dev/disk/by-id/ata-QEMU_HARDDISK_QM00001-part1
splash=silent crashkernel=256M-:128M showopts vga=0x314 ide_core.noprobe=0.0
    initrd /boot/initrd-2.6.32.12-0.7-default

###Don't change this comment - YaST2 identifier: Original name: failsafe###
title Failsafe -- SUSE Linux Enterprise Server 11 SP1 - 2.6.32.12-0.7
    root (hd0,1)
    kernel /boot/vmlinuz-2.6.32.12-0.7-default root=/dev/disk/by-id/ata-
QEMU_HARDDISK_QM00001-part2 showopts ide=nodma apm=off noresume edd=off
powersaved=off nohz=off highres=off processor.max_cstate=1 nomodeset x11failsafe
vga=0x314
    initrd /boot/initrd-2.6.32.12-0.7-default
```

  b. Modify the value of **default**. The new kernel (**title SUSE Linux Enterprise Server 11 SP1 - 2.6.32.12-0.7**) is used as an example.

  NOTE

  title SUSE Linux Enterprise Server 11 SP1 - 2.6.32.12-0.7 is the second **title** item. The value of **default** is **1**.

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```
Linux-coder:~ # vi /boot/grub/menu.lst
# Modified by YaST2. Last modification on Thu Mar  3 09:01:44 CST 2016
default 1
timeout 8
##YaST - generic_mbr
gfxmenu (hd0,1)/boot/message
##YaST - activate

###Don't change this comment - YaST2 identifier: Original name: linux###
title Xen -- SUSE Linux Enterprise Server 11 SP1 - 2.6.32.12-0.7
    root (hd0,1)
    kernel /boot/vmlinuz-2.6.32.12-0.7-xen root=/dev/disk/by-id/ata-
QEMU_HARDDISK_QM00001-part2 resume=/dev/disk/by-id/ata-QEMU_HARDDISK_QM00001-part1
splash=silent crashkernel=256M-:128M showopts vga=0x314
    initrd /boot/initrd-2.6.32.12-0.7-xen

###Don't change this comment - YaST2 identifier: Original name: linux###
title SUSE Linux Enterprise Server 11 SP1 - 2.6.32.12-0.7
    root (hd0,1)
    kernel /boot/vmlinuz-2.6.32.12-0.7-default root=/dev/disk/by-id/ata-
QEMU_HARDDISK_QM00001-part2 resume=/dev/disk/by-id/ata-QEMU_HARDDISK_QM00001-part1
splash=silent crashkernel=256M-:128M showopts vga=0x314 ide_core.noprobe=0.0
    initrd /boot/initrd-2.6.32.12-0.7-default

###Don't change this comment - YaST2 identifier: Original name: failsafe###
title Failsafe -- SUSE Linux Enterprise Server 11 SP1 - 2.6.32.12-0.7
    root (hd0,1)
    kernel /boot/vmlinuz-2.6.32.12-0.7-default root=/dev/disk/by-id/ata-
QEMU_HARDDISK_QM00001-part2 showopts ide=nodma apm=off noresume edd=off
powersaved=off nohz=off highres=off processor.max_cstate=1 nomodeset x11failsafe
vga=0x314
    initrd /boot/initrd-2.6.32.12-0.7-default
```

c. Type **:wq** and press **Enter** to save the modification and exit.

- Start the operating system in grub2 mode.

  a. Run the **vi** command to open /boot/grub2/grub.cfg.

  NOTE

  Each **menuentry** item corresponds to an operating system kernel.

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```
[root@localhost ~]# vi /boot/grub2/grub.cfg
...
menuentry 'Red Hat Enterprise Linux Server, with Linux 3.10.0-123.el7.x86_64' --
class red --class gnu-linux --class gnu --class os --unrestricted
$menuentry_id_option 'gnulinux-3.10.0-123.el7.x86_64-advanced-1670818d-dfab-4ab6-
8e62-4bd80d3f51fd' {
    load_video
    set gfxpayload=keep
    insmod gzio
    insmod part_msdos
    insmod xfs
    set root='hd0,msdos1'
    if [ x$feature_platform_search_hint = xy ]; then
      search --no-floppy --fs-uuid --set=root --hint-bios=hd0,msdos1 --hint-
efi=hd0,msdos1 --hint-baremetal=ahci0,msdos1 --hint='hd0,msdos1'  844afc06-cd4d-
48e8-bedd-40dcc4b75f77
    else
      search --no-floppy --fs-uuid --set=root 844afc06-cd4d-48e8-bedd-40dcc4b75f77
    fi
    linux16 /vmlinuz-3.10.0-123.el7.x86_64 root=UUID=1670818d-dfab-4ab6-8e62-
4bd80d3f51fd ro rd.lvm.lv=rhel/root crashkernel=auto  rd.lvm.lv=rhel/swap
vconsole.font=latarcyrheb-sun16 vconsole.keymap=us rhgb quiet
    initrd16 /initramfs-3.10.0-123.el7.x86_64.img
}
menuentry 'Red Hat Enterprise Linux Server, with Linux 0-rescue-
0a835e632e914232b163662a1afbd387' --class red --class gnu-linux --class gnu --class
os --unrestricted $menuentry_id_option 'gnulinux-0-rescue-
0a835e632e914232b163662a1afbd387-advanced-1670818d-dfab-4ab6-8e62-4bd80d3f51fd' {
    load_video
    insmod gzio
    insmod part_msdos
    insmod xfs
    set root='hd0,msdos1'
    if [ x$feature_platform_search_hint = xy ]; then
      search --no-floppy --fs-uuid --set=root --hint-bios=hd0,msdos1 --hint-
efi=hd0,msdos1 --hint-baremetal=ahci0,msdos1 --hint='hd0,msdos1'  844afc06-cd4d-
48e8-bedd-40dcc4b75f77
```

b. Run the **grub2-set-default** '*new kernel version*' command. The new kernel (**Red Hat Enterprise Linux Server, with Linux 3.10.0-123.el7.x86_64**) is used as an example.

```
[root@localhost ~]# grub2-set-default 'Red Hat Enterprise Linux Server,
with Linux 3.10.0-123.el7.x86_64'
```

- Start the operating system in grub2-efi mode.

  a.
  - For SUSE 12 SPX series, Run the **vi** command to open /boot/grub2/grub.cfg.
  - For RHEL7.X series and Oracle7.X series, Run the **vi** command to open /boot/efi/EFI/redhat/grub.cfg.
  - For CentOS7.X series, Run the **vi** command to open /boot/efi/EFI/centos/grub.cfg.

  NOTE

  Each **menuentry** item corresponds to an operating system kernel.

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```
[root@localhost ~]# vi /boot/[illegible]
...
menuentry 'Red Hat Enterprise Linux Server, with Linux 3.10.0-123.el7.x86_64' --
class red --class gnu-linux --class gnu --class os --unrestricted
$menuentry_id_option 'gnulinux-3.10.0-123.el7.x86_64-advanced-1670818d-dfab-4ab6-
8e62-4bd80d3f51fd' {
    load_video
    set gfxpayload=keep
    insmod gzio
    insmod part_msdos
    insmod xfs
    set root='hd0,msdos1'
    if [ x$feature_platform_search_hint = xy ]; then
      search --no-floppy --fs-uuid --set=root --hint-bios=hd0,msdos1 --hint-
efi=hd0,msdos1 --hint-baremetal=ahci0,msdos1 --hint='hd0,msdos1'  844afc06-cd4d-
48e8-bedd-40dcc4b75f77
    else
      search --no-floppy --fs-uuid --set=root 844afc06-cd4d-48e8-bedd-40dcc4b75f77
    fi
    linux16 /vmlinuz-3.10.0-123.el7.x86_64 root=UUID=1670818d-dfab-4ab6-8e62-
4bd80d3f51fd ro rd.lvm.lv=rhel/root crashkernel=auto  rd.lvm.lv=rhel/swap
vconsole.font=latarcyrheb-sun16 vconsole.keymap=us rhgb quiet
    initrd16 /initramfs-3.10.0-123.el7.x86_64.img
}
menuentry 'Red Hat Enterprise Linux Server, with Linux 0-rescue-
0a835e632e914232b163662a1afbd387' --class red --class gnu-linux --class gnu --class
os --unrestricted $menuentry_id_option 'gnulinux-0-rescue-
0a835e632e914232b163662a1afbd387-advanced-1670818d-dfab-4ab6-8e62-4bd80d3f51fd' {
    load_video
    insmod gzio
    insmod part_msdos
    insmod xfs
    set root='hd0,msdos1'
    if [ x$feature_platform_search_hint = xy ]; then
      search --no-floppy --fs-uuid --set=root --hint-bios=hd0,msdos1 --hint-
efi=hd0,msdos1 --hint-baremetal=ahci0,msdos1 --hint='hd0,msdos1'  844afc06-cd4d-
48e8-bedd-40dcc4b75f77
```

b. Run the **grub2-set-default** '*new kernel version*' command. The new kernel (**Red Hat Enterprise Linux Server, with Linux 3.10.0-123.el7.x86_64**) is used as an example.

```
[root@localhost ~]# grub2-set-default 'Red Hat Enterprise Linux Server,
with Linux 3.10.0-123.el7.x86_64'
```

- Start the operating system in lilo mode.

  a. Run the **vi** command to open /etc/lilo.conf.

  NOTE

  Each **label** item corresponds to an operating system kernel.

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```
suse10sp3-85:~ # vi /etc/lilo.conf
# Modified by YaST2. Last modification on Tue Jul 14 01:24:14 CST 2015
menu-scheme = Wb:kw:Wb:Wb
timeout = 80
lba32
change-rules
reset
read-only
default= Failsafe_--
message = /boot/message
boot = /dev/sda2
image = /boot/vmlinuz-2.6.16.60-0.54.5-smp
###Don't change this comment - YaST2 identifier: Original name: linux###
   label = SUSE_Linux
   append = "resume=/dev/sda1 splash=silent showopts"
   initrd = /boot/initrd-2.6.16.60-0.54.5-smp
   root = /dev/sda2
image = /boot/vmlinuz-2.6.16.60-0.54.5-smp
###Don't change this comment - YaST2 identifier: Original name: failsafe###
   label = Failsafe_--
   append = "showopts ide=nodma apm=off acpi=off noresume nosmp noapic maxcpus=0
edd=off 3 crashkernel=128M@16M"
   initrd = /boot/initrd-2.6.16.60-0.54.5-smp
   root = /dev/sda2
```

b. Modify the value of **default** to the default value of the new kernel. The new kernel (**SUSE_Linux**) is used as an example.

```
# Modified by YaST2. Last modification on Tue Jul 14 01:24:14 CST 2015
menu-scheme = Wb:kw:Wb:Wb
timeout = 80
lba32
change-rules
reset
read-only
default=SUSE_Linux
message = /boot/message
boot = /dev/sda2
image = /boot/vmlinuz-2.6.16.60-0.54.5-smp
###Don't change this comment - YaST2 identifier: Original name: linux###
   label = SUSE_Linux
   append = "resume=/dev/sda1 splash=silent showopts"
   initrd = /boot/initrd-2.6.16.60-0.54.5-smp
   root = /dev/sda2
image = /boot/vmlinuz-2.6.16.60-0.54.5-smp
###Don't change this comment - YaST2 identifier: Original name: failsafe###
   label = Failsafe_--
   append = "showopts ide=nodma apm=off acpi=off noresume nosmp noapic maxcpus=0
edd=off 3 crashkernel=128M@16M"
   initrd = /boot/initrd-2.6.16.60-0.54.5-smp
   root = /dev/sda2
```

c. Type **:wq** and press **Enter** to save the modification and exit.

- Start the operating system in elilo mode.
  a. Run the **vi** command to open /etc/elilo.conf.
  b. For details about other operations, see step 2 and step 3 in "Start the operating system in lilo mode."
- Start the operating system in egrub mode.

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a. Run the **vi** command to /etc/grub.conf.

b. For details about other operations, see step 2 and step 3 in "Start the operating system in grub mode."

Step 5 In the command output of **Step 3**, type **y**, as shown in the following:

```
[root@localhost RHEL]# upLinux updateForNewKernel
*******************************************************************************
***************
*
Notice                                                  *
*******************************************************************************
***************
*UltraPath detects that the default startup item of BootLoader do not point to
the upgraded     *
*new
kernel.
         *
*The BootLoader type is grub.
*<Step> Edit /boot/grub/menu.lst and make the entry that contains the initramfs
image without *
*the ultraPath modules as the default
entry.                                                    *
*For more information, see the UltraPath User
Guide.                                                 *
*Chapter in [Upgrading Kernel Without Re-Installing
UltraPath]                                        *
*******************************************************************************
***************
Whether to go on?
<Y|N>:y
```

Step 6 Restart the operating system.

----End

3.4 Uninstalling the UltraPath

Due to service adjustment, UltraPath must be uninstalled. Perform the operations as instructed in this section. Correctly uninstalling UltraPath can effectively avoid the impact on service running.

Procedure

Step 1 Run **rpm -e** *UltraPath* or **dpkg -r** *UltraPath* to uninstall the UltraPath software. The following uses **rpm -e** *UltraPath* as an example.

```
#rpm -e UltraPath
The running service is deleted successfully.
The boot service is removed successfully.
The UltraPath files are deleted successfully.
UltraPath driver package has been successfully removed from your system.
Restart the system.
```

Step 2 Run the **reboot** command to reboot the system.

```
#reboot
```

----End

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4 FAQs

About This Chapter

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

4.1 How Do I Check Whether UltraPath Has Taken Effect After UltraPath Is Installed?
This section describes how to check whether UltraPath has taken effect after UltraPath is installed.

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

4.3 How can I configure the fstab file in the deepin 15 operating system to enable file systems on a storage device to be automatically mounted to the operating system?

4.4 How to Configure DM-multipath so that UltraPath Virtual Disks Are Not Taken Over?

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

4.1 How Do I Check Whether UltraPath Has Taken Effect After UltraPath Is Installed?

This section describes how to check whether UltraPath has taken effect after UltraPath is installed.

4.1.1 Checking the Installation of the UltraPath RPM Software Package

To check whether the RPM software package of UltraPath is successfully installed, perform the following steps:

Procedure

Step 1 Run the **rpm -qa | grep UltraPath** command.

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Step 2 Check the command output. If **UltraPath** is displayed in the command output, the UltraPath RPM software package is successfully installed.

A command output example with **UltraPath** displayed is as follows:

```
linux-cvqm:/ # rpm -qa | grep UltraPath
UltraPath-21.05.003-2.x86_64
linux-cvqm:/ #
```

----End

4.1.2 Checking the Loading of the UltraPath Kernel Module

To check whether the UltraPath kernel module is successfully loaded, perform the following steps:

Procedure

Step 1 Run the **lsmod | grep nxup** command.

Step 2 Check the command output. If **nxup** and **nxupext_a** are displayed in the command output, the UltraPath kernel module is successfully loaded.

A command output example with **nxup** and **nxupext_a** displayed is as follows:

```
linux:/ # lsmod | grep nxup
nxupext_a 4008975 0
nxup 477464 1 nxupext_a
```

----End

4.1.3 Checking the UltraPath upservice Process

To check whether the **upservice** process is started successfully, perform the following steps:

Procedure

Step 1 Run the **ps -ef** | **grep upservice** | **grep -v grep** command.

Step 2 Check the command output. If **upservice** is displayed in the command output, the UltraPath upservice process is started successfully..

A command output example with **upservice** displayed is as follows:

```
linux-cvqm:/ # ps -ef | grep upservice | grep -v grep
root     16801     1  0 08:51 ?        00:00:05 /UltraPath/install/otherTools/
upservice
linux-cvqm:/ #
```

----End

4.1.4 Checking the UltraPath Version

To check whether the UltraPath version is correct, perform the following steps:

Procedure

Step 1 Run the **upadmin show version** command.

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Step 2 Check the command output. If the value of **Software Version** in the command output is the same as that of **Driver Version**, the UltraPath version is correct.

A command output example where the value of **Software Version** in the command output is the same as that of **Driver Version** is as follows:

```
linux-cvqm:/ # upadmin show version
Software Version : 21.05.003
Driver Version : 21.05.003
linux-cvqm:/ #
```

----End

4.1.5 Checking Related Configurations

After UltraPath is installed, the check items vary according to the installation mode.

- If UltraPath is installed in boot from SAN mode, refer to **4.1.5.3 Checking Configurations of the UltraPath nxup Service** to complete the check.
- If UltraPath is installed in boot from Local mode, perform the following steps to check whether the current operating system supports the systemd mechanism to manage system services and perform the corresponding UltraPath validity check based on the check result. After the UltraPath validity check is complete, refer to **4.1.5.3 Checking Configurations of the UltraPath nxup Service** to complete the nxup service configuration check. The mainstream Linux operating systems that support the systemd mechanism are as follows: RHEL7 series, SLES12 series, and Oracle Linux 7 series.

Procedure

1. Run the **systemctl --version** command.
2. If no error information is displayed in the command output, the system supports the systemd mechanism.

   A command output example where no error information is displayed is as follows:

   ```
   linux-cvqm:/ # systemctl --version
   systemd 228
   +PAM -AUDIT +SELINUX -IMA +APPARMOR -SMACK +SYSVINIT +UTMP +LIBCRYPTSETUP
   +GCRYPT -GNUTLS +ACL +XZ -LZ4 +SECCOMP +BLKID -ELFUTILS +KMOD -IDN
   linux-cvqm:/ #
   ```

4.1.5.1 Checking the Validity of UltraPath If the Operating System Supports the Systemd Mechanism

To check whether the configuration file of UltraPath takes effect if the operating system supports the systemd mechanism, perform the following steps:

Prerequisites

UltraPath is installed in boot from Local mode.

Procedure

Step 1 Check whether the following system directories and corresponding files exist. If yes, the UltraPath systemd service takes effect.

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System Directory	File
/etc/systemd/system/sysinit.target.wants	systemd-nxup.service
/usr/lib/systemd/system	systemd-nxup.service
/usr/lib/systemd/system/sysinit.target.wants	systemd-nxup.service
/usr/lib/systemd/system	nxup.service **NOTE** In some operating systems, this file does not exist. In that case, the actual information prevails.

Step 2 Run the **systemctl status nxup.service** command. If the command output contains the information in the red boxes in the following figure, the UltraPath configuration file takes effect.

NOTE

The command output varies according to the Linux operating system.

Figure 4-1 Example of the command output

```
[root@localhost sbin]# systemctl status nxup.service
? . nxup.service - SYSV: hwnxup
   Loaded: loaded (/etc/rc.d/init.d/nxup; bad; vendor preset: disabled)
   Active: active (exited) since Mon 2018-07-30 22:25:58 CST; 19h ago
     Docs: man:systemd-sysv-generator(8)

Jul 30 22:25:54 localhost.localdomain nxup[7972]: begin scan host1
Jul 30 22:25:54 localhost.localdomain nxup[7972]: begin scan host2
Jul 30 22:25:54 localhost.localdomain nxup[7972]: begin scan host3
Jul 30 22:25:55 localhost.localdomain nxup[7972]: begin scan host4
Jul 30 22:25:55 localhost.localdomain nxup[7972]: begin scan host6
Jul 30 22:25:55 localhost.localdomain nxup[7972]: begin scan host7
Jul 30 22:25:57 localhost.localdomain nxup[7972]: The device scanning is complete.
Jul 30 22:25:57 localhost.localdomain nxup[7972]: start upservice
Jul 30 22:25:58 localhost.localdomain nxup[7972]: The UltraPath starts successfully.
Jul 30 22:25:58 localhost.localdomain systemd[1]: Started SYSV: hwnxup.
[root@localhost sbin]#
```

----End

4.1.5.2 Checking the Validity of UltraPath If the Operating System Does Not Support the Systemd Mechanism

To check whether the configuration file of UltraPath takes effect if the operating system does not support the systemd mechanism, perform the following steps:

Prerequisites

UltraPath is installed in boot from Local mode.

Procedure

Step 1 Run the **ls /etc/rc.d/rc3.d/ | grep nxup** command. If **nxup** is displayed in the command output, the UltraPath service is configured successfully.

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Step 2 Run the **ls /etc/rc.d/rc5.d/ | grep nxup** command. If **nxup** is displayed in the command output, the UltraPath service is configured successfully.

Step 3 Run the **chkconfig --list | grep nxup** command. If the command output contains the information in the red boxes in the following figure, the UltraPath service is configured successfully.

```
linux-uoxn:~ # chkconfig --list | grep nxup
nxup                    0:off  1:off  2:off  3:on   4:off  5:on   6:off
linux-uoxn:~ #
```

----End

4.1.5.3 Checking Configurations of the UltraPath nxup Service

To check whether the UltraPath nxup service is successfully configured, perform the following steps:

Procedure

Step 1 Run the **ls /etc/init.d/ | grep nxup** command.

Step 2 Check the command output. If **nxup** is displayed in the command output, the UltraPath nxup service is successfully configured.

A command output example with nxup displayed is as follows:

```
linux-cvqm:/ # ls /etc/init.d/ | grep nxup
nxup
linux-cvqm:/ #
```

----End

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

Question

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

Answer

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

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

Solution

1. Before removing the LUN mappings on the array, ask the administrator to stop the services running on the disk, namely, the LUN.
2. Delete the LUN mapping view on the GUI management page (ISM or DeviceManager) of the array.

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3. Run **upRescan** command of UltraPath to rescan disks.
4. Add the LUN mapping view on the GUI management page (ISM or DeviceManager) of the array.
5. Run **upRescan** command of UltraPath to scan and detect disks.
6. Contact the administrator to start services.

4.3 How can I configure the fstab file in the deepin 15 operating system to enable file systems on a storage device to be automatically mounted to the operating system?

Question

How can I configure the fstab file in the deepin 15 operating system to enable file systems on a storage device to be automatically mounted to the operating system?

Answer

When configuring automatic file system mounting so that the file systems on a storage system can be automatically mounted to the operating system, use the nofail option in /etc/fstab. An example is as follows:

```
/dev/disk/by-uuid/15f80c92-4be8-4e4f-8d8c-bce1db64141c  /mnt/sdx  ext3  nofail 0
2
```

4.4 How to Configure DM-multipath so that UltraPath Virtual Disks Are Not Taken Over?

Question

How to configure DM-multipath so that UltraPath virtual disks are not taken over?

Answer

You can add shielding information of UltraPath virtual disks to the */etc/multipath.conf* configuration file in DM-Multipath.

1. Run the vi command to edit the **/etc/multipath.conf** file:
   - Add the **blacklist {}** configuration item to add the shielding information of UltraPath virtual disks.
   - If the **blacklist {}** configuration item already exists, add the **device** configuration information to this configuration item.

     Save the modification and close the configuration file. Detailed configurations are as follows:

     ```
     defaults {
                    user_friendly_names yes
                    find_multipaths yes
     ```

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```
}

blacklist {
                  device {
                        vendor    "up"
                        product "updisk"
                  }
      }
```

NOTICE

You cannot omit the space between **blacklist** and **{**.

2. Reload the configuration file.

   Run the **service multipathd reload** command to reload the configuration file and make it take effect.

NOTE

Operations vary on different versions of Linux operating systems. If this command does not work, you can try the following commands: **service multipath-tools reload**, **/etc/init.d/multipathd reload** , **/etc/init.d/multipath-tools reload**, or **reconfigure** after entering the multipathd service CLI by running **multipathd –k**.

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

Question

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

Answer

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

NOTICE

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

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5 Troubleshooting Common Faults

About This Chapter

Faults may occur during the installation, configuration, and use of the UltraPath for windows. This chapter helps you troubleshoot common faults.

5.1 Preventing Ping-Pong Effect
Ping-Pong Effect indicates that in the cluster networking the trespass of LUN working controller goes ceaseless.

5.2 Failed to Restart the SANBOOT System After the UltraPath Is Installed by Using the boot from local Mode

5.3 Service I/Os Stop for a Long Time

5.1 Preventing Ping-Pong Effect

Ping-Pong Effect indicates that in the cluster networking the trespass of LUN working controller goes ceaseless.

Symptom

For S5000 series and S2600 series Storage System, in the double switch cluster networking, after disconnecting a node to array controller's cable. The trespass of LUN working controller goes ceaseless, thus causes to performance influence.

Possible Causes

By default, the UltraPath opens the trespass between operating and owning controllers of the LUN. That is, when all the paths of the prior controller are faulty, the UltraPath sends the I/O to the owning controller, and use the owning controller of the LUN to replace the working controller. But in some cluster networking. For example, the cluster networking that uses load balancing: Two application severs are connected to two controllers of a storage system respectively and can access the same LUN, as shown in **Figure 5-1**.

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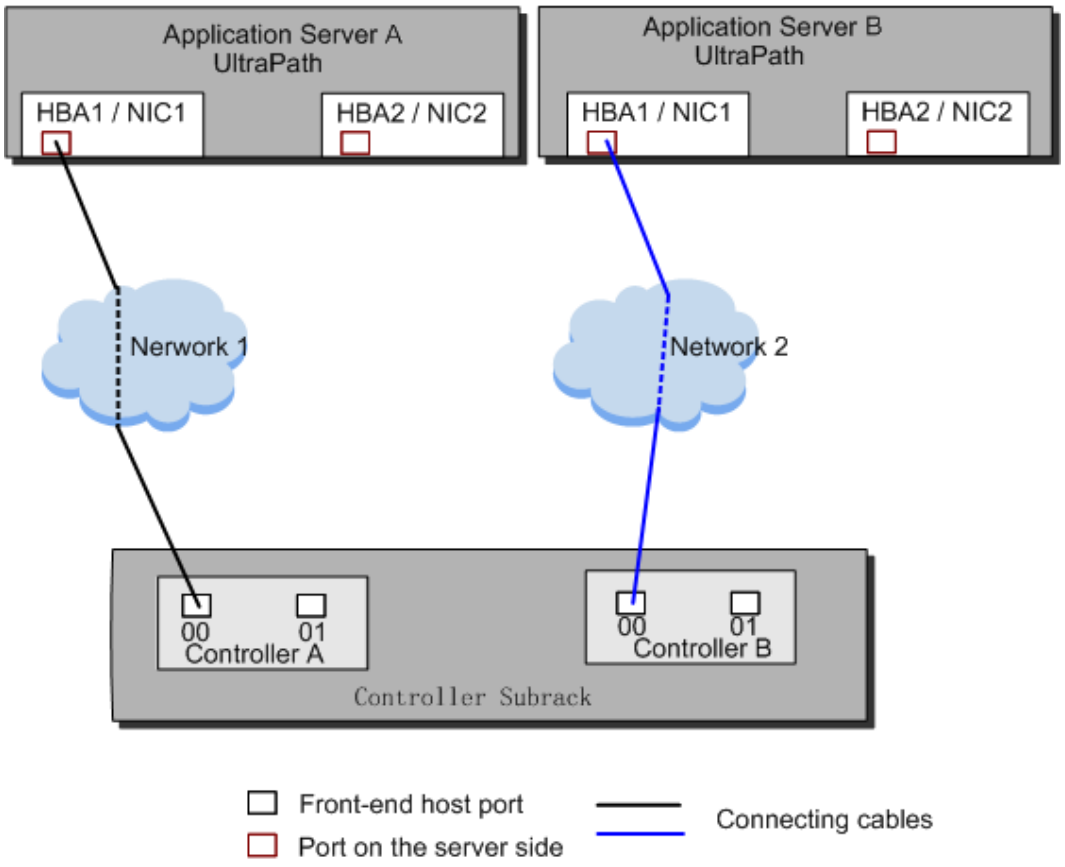
Figure 5-1 Cluster networking that uses load balancing



In this cluster networking, the UltraPath on AS A tries to use controller A as the working controller of the LUN, whereas the UltraPath on AS B tries to use controller B as the working controller of the LUN. As a result, the trespass of working controller goes ceaseless between controller A and controller B.

Procedure

- Method One: Restore the disconnecting cables as soon as possible and ensure that there is cable each node to each controller of array.
- Method Two: Disable the trespass between operating and owning controllers of the LUN. Please see **A.3.10 Setting the Working Controller Trespass Policy for a LUN**.

5.2 Failed to Restart the SANBOOT System After the UltraPath Is Installed by Using the boot from local Mode

Symptom

After the **boot from local** command is executed to install the UltraPath, the operating system fails to be restarted.

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Possible Causes

The root file system is installed on a disk mapped by the storage array. The **boot from local** mode is used to install the UltraPath. During the startup of the operating system, the HBA is loaded prior to the UltraPath. When the UltraPath is loaded, the disk where the root file system is installed is deleted so that the UltraPath can take over the array disks. Therefore, the operating system fails to be restarted.

Procedure

- Restart the operating system. When the startup menu is displayed, press **e** to edit the startup parameters and enter **NoUltraPath**. The UltraPath is not loaded during the startup, as shown in **Figure 5-2**.

  Figure 5-2 Startup Menu

- After the operating system is started successfully, uninstall the current UltraPath and install the UltraPath by **boot from SAN** mode.

5.3 Service I/Os Stop for a Long Time

Symptom

The **boot-from-local** mode is executed to install the UltraPath. During the service running process, a cable is removed. Upper-layer service I/Os stop for a long time, or the database is restarted.

Possible Causes

When the **boot-from-local** mode is executed to install the UltraPath for the first time, and the Fibre Channel is used, the Qlogic or Emulex driver parameters are modified. If the modification does not take effect, the driver retries the failed I/Os in the path where a cable is removed. After a timeout, I/Os return. As for the upper-layer services, I/Os stop for a long time.

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Procedure

Step 1 Run the **upLinux updateImage** command to update images.

Step 2 Restart the host.

----End

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A Commonly Used CLI Management Commands

About This Chapter

The commonly used CLI management commands of UltraPath include basic operation commands, UltraPath management commands, and LUN management commands. General CLI commands used in operating systems are provided in this document as well.

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

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

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

A.1 CLI Use Guidance

This chapter explains how to use the CLI and provides some useful tips.

A.1.1 Command Conventions

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

Table A-1 lists the format conventions.

Table A-1 Command conventions

Convention	Description
Boldface	The keywords of a command line are in **boldface**. This part should stay unchanged and need to be entered as it is.
Italic	Command arguments are in *italics*. This part needs to be replaced with an actual value.

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Convention	Description
[ ]	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.1.2 Shortcut Keys

Use UltraPath command line interface (CLI) shortcut keys for improved operation efficiency.

UltraPath CLI provides many shortcut keys. **Table 6-2** lists functions of shortcut keys.

Table A-2 Function of Shortcut Keys

Shortcut Keys	Description
Up arrow key (↑)	Inserts a previously executed command line.
Down arrow key (↓)	Inserts a subsequently executed command line.
Left arrow key (←)	Moves the cursor one character to the left.
Right arrow key (→)	Moves the cursor one character to the right.
Back space (←)	Deletes one character on the left of the cursor.
Delete	Deletes one character on the right of the cursor.
Insert	Switch over between the insertion and overwrite modes. ● Insertion mode (default): inserts one character to the right of the cursor. ● Overwrite mode: overwrites one character to the right of the cursor.
Tab	Associating Command Lines
Enter	Triggers command execution.

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Shortcut Keys	Description
Ctrl+C	● If a command is being executed, stop the current command. ● If no command is being executed, stop and exit from UltraPath CLI.

A.1.3 Command Line Completion

In the UltraPath command line interface (CLI), you can press the **Tab** to complete a command line in stages.

NOTE

Run **upadmin** to log in to UltraPath CLI. You can only use UltraPath commands to supplement functions after login.

- Press **Tab** once to display the available starting segments of a command line.
```
UltraPath CLI #1 >//Press Tab.
add                             check
clear                           del
genprkey                        set
show                            start
stop                            upRescan
```
- After the starting segment is determined and completed, press **Tab** once to display the available adjacent segments of the starting segment.
```
UltraPath CLI #2 >show//Press Tab.
alarmenable                     array
event                           io_count
io_latency                      io_latency_threshold
iostat                          path
path_reliability_enable         supportarraylist
upconfig                        version
vlun                            workerstate
```
- When part of a segment has been typed and its intact form can be determined by the CLI, pressing **Tab** once completes the segment while displaying available adjacent segments.
```
UltraPath CLI #3 >show vl//Press Tab.
UltraPath CLI #3 >show vlun
```
- When an executable command is input, you can press **Tab** to query all executable parameters of the command. The system also prompts you that this command can be executed.
```
UltraPath CLI #1 >show vlun//Press Tab.
[array_id=?]                    [id=?]                          [type=?]
Command is executable now.
```

A.2 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 management module.

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A.2.1 Logging in to the CLI

Function

If you need to manage the UltraPath or query its status, run the **upadmin** command to log in to the CLI.

Format

upadmin

Parameters

None

Level

User **root**

Usage Guidelines

The following uses **show version** as an example to show how to use **upadmin** commands.

- Log in to the CLI and show the version of UltraPath.
```
# upadmin
UltraPath CLI #0 >show version
Software Version : XX.XX.XXX
Driver Version : XX.XX.XXX
```
- Run the **upadmin show version** command to view the version of UltraPath.
```
# upadmin show version
Software Version : XX.XX.XXX
Driver Version : XX.XX.XXX
```

Example

Log in to the UltraPath CLI.

```
# upadmin
UltraPath CLI #0 >
```

System Response

None

A.2.2 Exiting the CLI

Function

The **quit** command is used to exit the UltraPath CLI.

Format

quit

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Parameters

None

Level

User **root**

Usage Guidelines

None

Example

Run the **quit** command to exit the CLI.

```
UltraPath CLI #3 >quit
~ #
```

System Response

None

A.2.3 Help

Function

The **help** command is used to query all UltraPath commands and their formats and details.

Format

help

?

Parameters

None

Level

User **root**

Usage Guidelines

After logging in to the UltraPath CLI, you can run the **help** command to query UltraPath CLI commands.

Example

Run **help** to query all UltraPath commands. The following figure shows some commands.

```
UltraPath CLI #0 >help
Usage: [OPTION]
help [command] [subcommand]            --  Print help message.
```

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```
? [command] [subcommand]                --  Print help message.
quit                                    --  Quit UltraPath command line.
show version                            --  Print version.
... ...
```

System Response

None

A.3 System Management Commands

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

A.3.1 Querying the Version of UltraPath

Function

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

Format

show version [**verbose**]

Parameters

Parameter	Description	Default Value
verbose	Used to query the UltraPath version information.	None

Level

User **root**

Usage Guidelines

The version of UltraPath 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.

Example

- Run the **show version** command to query the information about UltraPath version and driver version.

```
UltraPath CLI #0 >show version
Software Version : XX.XX.XXX
Driver Version : XX.XX.XXX
```

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

```
UltraPath CLI #0 >show version verbose
Software Version : XX.XX.XXX
Driver Version : XX.XX.XXX
Product  Version : XX.X.X
```

System Response

None

A.3.2 Querying Configuration File Information

Function

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

Format

show upconfig [**array_id**=*ID* | **vlun_id**=*ID*]

Parameters

Keyword and Parameter	Description	Default Value
array_id=*ID*	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None
vlun_id=*ID*	ID of a virtual LUN. You can run **show vlun type**=*all* to display all virtual LUN IDs.	None

Level

User **root**

Usage Guidelines

- Run **show upconfig** to display all configuration information about UltraPath.
- Run **show upconfig array_id**=*ID* to check UltraPath configuration information about a specified storage system.
- Run the **show upconfig vlun_id**=*ID* command to check UltraPath configuration information about a specified virtual LUN.

Example

- Query all configuration information about UltraPath.

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```
UltraPath CLI #2 >show upconfig
=====================================================
UltraPath Configuration
=====================================================
Basic Configuration
    Working Mode : load balancing between controllers
    LoadBalance Mode : min-queue-depth
    Loadbanlance io threshold : 100
    LUN Trespass : off

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

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

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

- Query UltraPath configuration information about a specified storage system.

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

- Query UltraPath configuration information about a specified virtual LUN.

  The virtual LUN whose ID is **1** is a common virtual LUN. The virtual LUN whose ID is **2** is a virtual HyperMetro LUN.

```
UltraPath CLI #0 >show upconfig vlun_id=1
=====================================================
UltraPath Configuration
=====================================================
Working Mode : load balancing within controller
LoadBalance Mode : min-queue-depth
Loadbanlance io threshold : 1
LUN Trespass : on
Io Suspension Time : 60
Max io retry timeout : 1800
UltraPath CLI #3 >show upconfig vlun_id=2
```

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

System Response

None

A.3.3 Querying Physical Path Information

Function

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

Format

show path [**id**=*ID1,ID2,...* | **array_id**=*ID*]

Parameters

Keyword and Parameter	Description	Default Value
id=*ID1,ID2,...*	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
array_id=*ID*	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None

Level

User **root**

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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 array_id**=*ID* command to check the working status of a specified storage system's physical paths.
- Run the **show path id**=*ID1,ID2,...* command to check the working status of a specified physical path.

Example

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

```
UltraPath CLI #0 >show path
-------------------------------------------------------------------------------
-----------------------------------------
 Path ID Initiator Port      Array Name     Controller    Target Port
Path State  Check State  Port Type  Port ID
    0     2100001b32053e20  Huawei.Storage48      0B      20184846fb8ca15f
Normal        --          FC         --
    1     2100001b32053e20  Huawei.Storage48      0A      200b4846fb8ca15f
Normal        --          FC         --
    4     2100001b32055f20  Huawei.Storage48      0B      20194846fb8ca15f
Normal        --          FC         --
    5     2100001b32055f20  Huawei.Storage48      0A      20084846fb8ca15f
Normal        --          FC         --
-------------------------------------------------------------------------------
-----------------------------------------
-------------------------------------------------------------------------------
-----------------------------------------
 Path ID Initiator Port      Array Name     Controller    Target Port
Path State  Check State  Port Type  Port ID
    2     2100001b32053e20  Huawei.Storage46      0B      24103400a30d9c5f
Normal        --          FC         --
    3     2100001b32053e20  Huawei.Storage46      0A      24003400a30d9c5f
Normal        --          FC         --
    6     2100001b32055f20  Huawei.Storage46      0B      24113400a30d9c5f
Normal        --          FC         --
    7     2100001b32055f20  Huawei.Storage46      0A      24013400a30d9c5f
Normal        --          FC         --
-------------------------------------------------------------------------------
-----------------------------------------
```

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

```
UltraPath CLI #0 >show path array_id=0
-------------------------------------------------------------------------------
-----------------------------------------
 Path ID Initiator Port      Array Name     Controller    Target Port
Path State  Check State  Port Type  Port ID
    0     2100001b32053e20  Huawei.Storage48      0B      20184846fb8ca15f
Normal        --          FC         --
    1     2100001b32053e20  Huawei.Storage48      0A      200b4846fb8ca15f
Normal        --          FC         --
    4     2100001b32055f20  Huawei.Storage48      0B      20194846fb8ca15f
Normal        --          FC         --
    5     2100001b32055f20  Huawei.Storage48      0A      20084846fb8ca15f
Normal        --          FC         --
-------------------------------------------------------------------------------
-----------------------------------------
```

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

```
UltraPath CLI #0 >show path id=0
=======================================
          Path#0 Information
```


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```
=======================================
Initiator Port  :  2100001b32053e20
Array Name      :  Huawei.Storage48
Controller      :  0B
Target Port     :  20184846fb8ca15f
Path State      :  Normal
Check State     :  --
Port Type       :  FC
I/O Retry count :  0
Path Fault count:  0
Latency-Low(ms) :  0
Latency-High(ms):  2
Latency-avg(ms) :  0
Port ID         :  --
=======================================
```

System Response

The following table explains some parameters in the command output:

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

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

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

A.3.4 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 path_id=*ID*

Parameters

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

Level

User **root**

Usage Guidelines

NOTE

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

Run the **set phypathnormal path_id**=*ID* command to restore specified degraded physical paths.

Example

Restore the working status of the path whose ID is **1** to normal.

```
UltraPath CLI #2 >set phypathnormal path_id=1
Please check whether the fault has been rectified. If the fault persists and you
forcibly recover the path, the performance may be decreased.
Are you sure you want to continue? [y,n]: y
```


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```
Succeeded in executing the command.
```

System Response

None

A.3.5 Setting the Status of a Physical Path

Function

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

Format

set pathstate={ *enable* | *disable* } **path_id**=*ID*

Parameters

Keyword and Parameter	Description	Default Value
{ *enable* | *disable* }	Enabling or disabling a physical path. The value is either enable or disable. ● enable: enables a physical path. ● disable: disables a physical path.	enable
path_id=*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

NOTICE

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

- Only OceanStor 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.

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- When you replace an HBA, run the **set pathstate**=*disable* **path_id**=*ID* 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**=*enable* **path_id**=*ID* command to enable the physical path mentioned earlier.

Example

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

```
UltraPath CLI #3 >set pathstate=enable path_id=0
Succeeded in executing the command.
```

System Response

None

A.3.6 Clearing Statistics About Physical Paths

Function

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

Format

clear path_statistic [**path_id**=*ID1,ID2,...* | **array_id**=*ID1,ID2,...*]

Parameters

Parameter	Description	Default Value
path_id=*ID1,ID2,...*	ID of a physical path. You can run **show path** without parameters to obtain all physical path IDs. **NOTE** You can clear statistics about eight physical paths at most at a time. To clear statistics about multiple physical paths, use comma (,) to separate the path IDs.	None

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Parameter	Description	Default Value
array_id=*ID1,ID2,...*	Storage array ID. You can run the **show array** command without parameters to obtain IDs of storage arrays. **NOTE** You can clear statistics about physical paths of eight storage arrays at most at a time. To clear statistics about physical paths of multiple storage arrays, use comma (,) to separate the storage array IDs.	None

Level

User **root**

Usage Guidelines

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

NOTE

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

- Run **clear path_statistic path_id**=*ID1,ID2,...* to clear statistics about specific physical paths.
- Run **clear path_statistic array_id**=*ID1,ID2,...* to clear statistics about physical paths of specific storage arrays.

Example

- Clear statistics about all physical paths.
```
UltraPath CLI #0 >clear path_statistic
Statistics of all paths cleared successfully.
```
- Clear statistics about the physical path whose ID is **0**.
```
UltraPath CLI #0 >clear path_statistic path_id=0
Statistics of all specified paths cleared successfully.
```
- Clear statistics about physical paths of storage array whose ID is **0**
```
UltraPath CLI #0 >clear path_statistic array_id=0
Statistics of all specified arrays cleared successfully.
```

A.3.7 Setting a Controller's Paths

Function

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

Format

set tpgstate={ *enable* | *disable* } **array_id**=*ID* **tpg_id**=< *A* | *B* | *ID* >

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Parameters

Keyword and Parameter	Description	Default Value
enable | *disable*	Enabling or disabling a controller's path. Possible values are enable or disable. ● enable: enables a controller's paths. ● disable: disables a controller's paths.	enable
array_id=*ID*	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None
tpg_id=< *A* | *B* | *ID* >	ID of a controller.	None

Level

User **root**

Usage Guidelines

NOTICE

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

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

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 smoothly switches I/Os over to other controller's paths, preventing I/O latency caused by failback.

Example

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

```
UltraPath CLI #12 >set tpgstate=enable array_id=0 tpg_id=0A
Succeeded in executing the command.
```

System Response

None

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A.3.8 Setting Working Mode for UltraPath

Function

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

Format

set workingmode={*0*|*1*} [**array_id**=*ID* | **vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* }]

Parameters

Keyword and Parameter	Description	Default Value
workingmode={*0*|*1*}	Load balancing mode of UltraPath. The value can be **0** or **1**. ● 0: cross-controller load balancing mode. That is, I/Os are delivered through paths of all controllers. ● 1: intra-controller load balancing mode. That is, I/Os are delivered through paths of the current working controller.	1
array_id=*ID*	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None
vlun_id={ *ID* | *ID1,ID2...* | *ID1-ID2* }	ID of a virtual LUN. You can run **show vlun type**=*all* to display all virtual LUN IDs.	None

Level

User **root**

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Usage Guidelines

NOTE

If cross-controller load balancing mode is used, UltraPath 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**=*{0|1}* to set working mode for all storage systems.
- Run **set workingmode**=*{0|1}* **array_id**=*ID* to set a working mode for a specified storage system.
- **set workingmode**=*{0|1}* **vlun_id**=*{ ID | ID1,ID2... | ID1-ID2 }* to set a working mode for a specified virtual LUN.

NOTE

- **vlun_id**=*ID*: ID of a single virtual LUN.
- **vlun_id**=*ID1,ID2...*: IDs of multiple virtual LUNs which are not necessarily related.
- **vlun_id**=*ID1–ID2*: IDs of all the virtual LUNs from ID1 to ID2.

Example

- Set the working mode of the storage system whose ID is **0** to **Cross-controller load balancing**.

```
UltraPath CLI #2 >set workingmode=0 array_id=0

The current configuration will overwrite the configuration of all VLUNs in
this array.
Are you sure you want to continue? [y,n]: y

Succeeded in executing the command.
```

- Set the working mode of the LUN whose ID is **0** to **Cross-controller load balancing**.

```
UltraPath CLI #3 >set workingmode=0 vlun_id=0
Succeeded in executing the command.
```

System Response

None

A.3.9 Setting a Load Balancing Mode

Function

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

Format

set loadbalancemode=*{ round-robin | min-queue-depth | min-task }* [**array_id**=*ID* | **vlun_id**=*{ ID | ID1,ID2... | ID1-ID2 }*]

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Parameters

Keyword and Parameter	Description	Default Value
round-robin | *min-queue-depth* | *min-task* }	Load balancing mode. ● round-robin: round-robin load balancing ● min-queuedepth: minimum queue depth load balancing ● min-task: minimum task load balancing	min-queue-depth
array_id=*ID*	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None
vlun_id={ *ID* | *ID1,ID2...* | *ID1-ID2* }	ID of a virtual LUN. You can run **show vlun type**=*all* to display all virtual LUN IDs.	None

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** *round-robin* command to set the load balancing mode to **round-robin**. When an application server delivers I/Os to a storage system, UltraPath 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** *min-queue-depth* command to set the load balancing policy to **min-queuedepth**. In this mode, UltraPath 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** *min-task* command to set the load balancing policy to **min-task**. In this mode, UltraPath calculates the number of waiting I/Os on each path and the data block size of each I/O in real time. Then UltraPath delivers new I/Os to the path with the lightest load.
- Run **set loadbalancemode**={ *round-robin* \| *min-queue-depth* \| *min-task* } **array_id**=*ID* to set a load balancing mode for a specified storage system.

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- Run **set loadbalancemode**={ *round-robin* | *min-queue-depth* | *min-task* } **vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* } to set a load balancing mode for a specified virtual LUN.

NOTE

- **vlun_id**=*ID*: ID of a single virtual LUN.
- **vlun_id**=*ID1,ID2...*: IDs of multiple virtual LUNs which are not necessarily related.
- **vlun_id**=*ID1–ID2*: IDs of all the virtual LUNs from ID1 to ID2.

Example

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

```
UltraPath CLI #3 >set loadbalancemode=round-robin array_id=0
The current configuration will overwrite the configuration of all VLUNs in this
array.
Are you sure you want to continue? [y,n]: y
Succeeded in executing the command.
```

System Response

None

A.3.10 Setting the Working Controller Trespass Policy for a LUN

Function

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

Format

set luntrespass={ *on* | *off* } [**array_id**=*ID* | **vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* }]

Parameters

Keyword and Parameter	Description	Default Value
on | *off*	Working controller trespass policy of a LUN. The value is either **on** or **off**. ● on: Enables working controller trespass for a LUN. ● off: Disables working controller trespass for a LUN.	off
array_id= ID	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None

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Keyword and Parameter	Description	Default Value
vlun_id={ *ID* | *ID1,ID2...* | *ID1-ID2* }	ID of a virtual LUN. You can run **show vlun type**=*all* to display all virtual LUN IDs.	None

Level

User **root**

Usage Guidelines

- Run the **set luntrespass**={ *on* | *off* } command to set all storage system LUN switches.
- Run **set luntrespass**={ *on* | *off* } **array_id**=*ID* to set the LUN switches of a specified storage system.
- Run **set luntrespass**={ *on* | *off* } **vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* } to set the LUN switches of a specified virtual LUN.

NOTE

- **vlun_id**=*ID*: ID of a single virtual LUN.
- **vlun_id**=*ID1,ID2...*: IDs of multiple virtual LUNs which are not necessarily related.
- **vlun_id**=*ID1–ID2*: IDs of all the virtual LUNs from ID1 to ID2.

Example

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

```
UltraPath CLI #3 >set luntrespass=on array_id=0
The current configuration will overwrite the configuration of all VLUNs in this
array.
Are you sure you want to continue? [y,n]: y
Succeeded in executing the command.
```

System Response

None

A.3.11 Setting Failback Delay

Function

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

Format

set failbackdelaytime=*time*

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Parameters

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

Level

User **root**

Usage Guidelines

None

Example

Set failback delay to 600 seconds.

```
UltraPath CLI #2 >set failbackdelaytime=600
Succeeded in executing the command.
```

System Response

None

A.3.12 Querying I/O Count Information

Function

The **show io_count** 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 io_count [**vlun_id**=*ID1*,*ID2*,...]

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Parameters

Parameter	Description	Default Value
vlun_id=*ID1*,*ID2*,...	ID of a virtual LUN If you run **show vlun** without specifying any parameters, all virtual LUN IDs can be obtained. You can run **show io_count** 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 io_count** to obtain the I/O count information of all virtual LUNs.
- Run **show io_count vlun_id**=*ID1*,*ID2*,... to query the I/O count information on logical paths of the specified virtual LUNs.

Example

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

```
UltraPath CLI #3 >show io_count
-------------------------------------------------------------------------------
--------------------
 Vlun ID    Disk Name    Error I/O Count  Queue I/O Count  Error Command
Count  Queue Command Count
    2     AIX198Lun_001         2                0
4                    0
    3     AIX198Lun_002         0                0
0                    0
-------------------------------------------------------------------------------
--------------------
```

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

```
UltraPath CLI #3 >show io_count vlun_id=2
-------------------------------------------------------------------------------
---------------------------
 Vlun ID    Disk Name    Path ID  Error I/O Count  Queue I/O Count  Error
Command Count  Queue Command Count
    2     AIX198Lun_001     0            1                0
2                    0
    2     AIX198Lun_001     1            1                0
2                    0
-------------------------------------------------------------------------------
---------------------------
```


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System Response

None

A.3.13 Clearing I/O Count Information

Function

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

Format

clear io_count

Parameters

None

Level

User **root**

Usage Guidelines

None

Example

Clear I/O count information.

```
UltraPath CLI #3 >clear io_count
Succeeded in executing the command.
```

System Response

None

A.3.14 Querying I/O Latency Information

Function

The **show io_latency** 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 io_latency [**vlun_id**=*ID1*,*ID2*,...]

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Parameters

Parameter	Description	Default Value
vlun_id=*ID1*,*ID2*,...	ID of a virtual LUN If you run **show vlun** without specifying any parameters, all virtual LUN IDs can be obtained. You can run **show 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**

Usage Guidelines

- Run **show io_latency** to obtain the I/O latency information of all virtual LUNs.
- Run **show io_latency vlun_id**=*ID1*,*ID2*,... 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.

```
UltraPath CLI #3 >show io_latency
-------------------------------------------------------------------------------
----
 Vlun ID    Disk Name    Latest I/O Latency  Max I/O Latency  Average I/O
Latency
    2     AIX198Lun_001          0                10
0
    3     AIX198Lun_002          0                100
0
-------------------------------------------------------------------------------
----
```

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

```
UltraPath CLI #3 >show io_latency vlun_id=2
-------------------------------------------------------------------------------
-----------
 Vlun ID    Disk Name    Path ID  Latest I/O Latency  Max I/O Latency
Average I/O Latency
    2     AIX198Lun_001     0             0
10                  0
    2     AIX198Lun_001     1             0
10                  0
-------------------------------------------------------------------------------
-----------
```


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System Response

None

A.3.15 Setting I/O Latency Threshold

Function

The **set io_latency_threshold** 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 io_latency_threshold=*time*

Parameters

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

Level

User **root**

Usage Guidelines

None

Example

Set the I/O latency threshold to 30 milliseconds.

```
UltraPath CLI #3 >set io_latency_threshold=30
Succeeded in executing the command.
```

System Response

None

A.3.16 Querying I/O Latency Threshold

Function

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

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Format

show io_latency_threshold

Parameters

None

Level

User **root**

Usage Guidelines

None

Example

Query the I/O latency threshold.

```
UltraPath CLI #3 >show io_latency_threshold
io_latency_threshold : 20
```

System Response

None

A.3.17 Setting I/O Retry Times and Interval

Function

The **set ioretry** command is used to set the number of I/O retries and an I/O retry interval.

Format

set ioretry=*number* **ioretrydelay**=*time*

Parameters

Keyword and Parameter	Description	Default Value
ioretry=*number*	Number of I/O retry times. The value ranges from 0 to 60.	10
ioretrydelay=*time*	Interval of I/O retry. The value ranges from 0 to 10, expressed in seconds.	0

Level

User **root**

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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.

```
UltraPath CLI #8 >set ioretry=3 ioretrydelay=10
Succeeded in executing the command.
```

System Response

None

A.3.18 Setting the I/O Suspension Time

Function

The **set iosuspensiontime** command is used to set the I/O suspension time.

Format

set iosuspensiontime=*time* [**array_id**=*ID* | **vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* }]

Parameters

Keyword and Parameter	Description	Default Value
iosuspensiontime=*time*	I/O suspension time. The value ranges from 0 to 2,592,000, expressed in seconds.	60
array_id=*ID*	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None
vlun_id={ *ID* | *ID1,ID2...* | *ID1-ID2* }	ID of a virtual LUN. You can run **show vlun type**=*all* to display all virtual LUN IDs.	None

Level

User **root**

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Usage Guidelines

- Run**set iosuspensiontime**=*time* to set the I/O suspension time for all storage systems.
- Run**set iosuspensiontime**=*time* **array_id**=*ID* to set the I/O suspension time for a specified storage system.
- Run**set iosuspensiontime**=*time* **vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* } to set the I/O suspension time for a specified virtual LUN.

NOTE

- **vlun_id**=*ID*: ID of a single virtual LUN.
- **vlun_id**=*ID1,ID2...*: IDs of multiple virtual LUNs which are not necessarily related.
- **vlun_id**=*ID1–ID2*: IDs of all the virtual LUNs from ID1 to ID2.

Example

On the CLI, run **upadmin** to go to the command management page. Then set the I/O suspension time of all storage systems to 60 seconds.

```
UltraPath CLI #8 >set iosuspensiontime=60
Succeeded in executing the command.
```

System Response

None

A.3.19 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 path_id=*ID1,ID2,...*

Parameters

Keyword and Parameter	Description	Default Value
path_id=*ID1,ID2,...*	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

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**.

```
UltraPath CLI #1 >start pathcheck path_id=0
The path check will last about 3 minutes and will consume some bandwidth
resources.
Are you sure you want to continue? [y,n]: y
Check path command send on all pathes successfully, use "show path"command to
investigate the check result.
```

System Response

None

A.3.20 Setting a Time Window for I/O Timeout Isolation

Function

The **set tod_time** command is used to set a time window for path degradation and isolation upon an I/O timeout.

Format

set tod_time=*time*

Parameters

Keyword and Parameter	Description	Default Value
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

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Example

Set the time window for path degradation and isolation upon an I/O timeout to 600 seconds.

```
UltraPath CLI #1 >set tod_time=600
Succeeded in executing the command.
```

System Response

None

A.3.21 Setting a Timeout Threshold for Path Degradation and Isolation

Function

The **set tod_threshold** command is used to set a timeout threshold for path degradation and isolation.

Format

set tod_threshold=*number*

Parameters

Keyword and Parameter	Description	Default Value
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.

```
UltraPath CLI #1 >set tod_threshold=3
Succeeded in executing the command.
```

System Response

None

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A.3.22 Setting the Recovery Time of a Degraded Path

Function

The **set tod_recovery_time** command is used to set the recovery time of a degraded path.

Format

set tod_recovery_time=*time*

Parameters

Keyword and Parameter	Description	Default Value
time	Recovery timeout of a degraded path. The value ranges from 1,800 to 2,592,000, expressed in seconds.	1800

Level

User **root**

Usage Guidelines

None

Example

Set the recovery time of a degraded path to 1800 seconds.

```
UltraPath CLI #1 >set tod_recovery_time=1800
Succeeded in executing the command.
```

System Response

None

A.3.23 Setting a Time Window for Calculating Discrete I/O Errors

Function

The **set ied_time** command is used to set a time window for calculating discrete I/O errors.

Format

set ied_time=*time*

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Parameters

Keyword and Parameter	Description	Default Value
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.

```
UltraPath CLI #1 >set ied_time=300
Succeeded in executing the command.
```

System Response

None

A.3.24 Setting a Rate Threshold for Discrete I/O Error Isolation

Function

The **set ied_threshold** command is used to set a rate threshold for discrete I/O error isolation.

Format

set ied_threshold=*ratio*

Parameters

Keyword and Parameter	Description	Default Value
ratio	Rate threshold for discrete I/O error isolation. The value ranges from 0% to 100%.	20

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Level

User **root**

Usage Guidelines

None

Example

Set the rate threshold for discrete I/O error isolation to 20%.

```
UltraPath CLI #1 >set ied_threshold=20
Succeeded in executing the command.
```

System Response

None

A.3.25 Setting the minimum number of I/Os for the I/O discrete error isolation mechanism

Function

The **set ied_min_io** command is used to set the minimum number of I/Os for the I/O discrete error isolation mechanism.

Format

set ied_min_io=number

Parameters

Keyword and Parameter	Description	Default Value
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

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Example

Set the minimum number of I/Os for the I/O discrete error isolation mechanism to 5000.

```
UltraPath CLI #1 >set ied_min_io=5000
Succeeded in executing the command.
```

System Response

None

A.3.26 Setting the Recovery Time of a Path with Discrete I/O Errors

Function

The **set ied_recovery_time** command is used to set the recovery time of a path with discrete I/O errors.

Format

set ied_recovery_time=*time*

Parameters

Keyword and Parameter	Description	Default Value
time	Recovery time of a path with discrete I/O errors. The value ranges from 1,800 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.

```
UltraPath CLI #1 >set ied_recovery_time=1800
Succeeded in executing the command.
```

System Response

None

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A.3.27 Setting a Time Window for Collecting Intermittent Path Errors

Function

The **set ifd_time** command is used to set the recovery time of a path with intermittent I/O errors.

Format

set ifd_time=*time*

Parameters

Keyword and Parameter	Description	Default Value
time	Time window for collecting intermittent path errors. The value ranges from 60 to 2,592,000, expressed in seconds.	1800

Level

User **root**

Usage Guidelines

None

Example

Set the time window for collecting intermittent path errors to 1800 seconds.

```
UltraPath CLI #1 >set ifd_time=1800
Succeeded in executing the command.
```

System Response

None

A.3.28 Setting an Intermittent Path Error Threshold for Path Isolation

Function

The **set ifd_threshold** command is used to set an intermittent path error threshold for path isolation.

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Format

set ifd_threshold=*number*

Parameters

Keyword and Parameter	Description	Default Value
number	Intermittent path error threshold for path isolation. The value ranges from 0 to 65,535.	3

Level

User **root**

Usage Guidelines

None

Example

Set the intermittent path error threshold for path isolation to 3.

```
UltraPath CLI #1 >set ifd_threshold=3
Succeeded in executing the command.
```

System Response

None

A.3.29 Setting the Recovery Time of a Path with Intermittent Errors

Function

The **set ifd_recovery_time** command is used to set the recovery time of a path with intermittent errors.

Format

set ifd_recovery_time=*time*

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Parameters

Keyword and Parameter	Description	Default Value
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.

```
UltraPath CLI #1 >set ifd_recovery_time=3600
Succeeded in executing the command.
```

System Response

None

A.3.30 Setting a Time Window for Determining a High-latency Path

Function

The **set hld_time** command is used to set a time window for determining a high-latency path.

Format

set hld_time=*time*

Parameters

Keyword and Parameter	Description	Default Value
time	Time window for determining a high-latency path. The value ranges from 60 to 18,000, expressed in seconds.	300

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Level

User **root**

Usage Guidelines

None

Example

Set the time window for determining a high-latency path to 300 seconds.

```
UltraPath CLI #1 >set hld_time=300
Succeeded in executing the command.
```

System Response

None

A.3.31 Setting a Latency Threshold for High-latency Path Isolation

Function

The **set hld_threshold** command is used to set a latency threshold for high-latency path isolation.

Format

set hld_threshold=*time*

Parameters

Keyword and Parameter	Description	Default Value
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

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Example

Set the latency threshold for high-latency path isolation to 1000 ms.

```
UltraPath CLI #1 >set hld_threshold=100
Succeeded in executing the command.
```

System Response

None

A.3.32 Setting the Recover Time of a High-latency Path

Function

The **set hld_recovery_time** command is used to set the recovery time of a high-latency path.

Format

set hld_recovery_time=*time*

Parameters

Keyword and Parameter	Description	Default Value
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.

```
UltraPath CLI #1 >set hld_recovery_time=3600
Succeeded in executing the command.
```

System Response

None

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A.3.33 Setting the Threshold of Switching a Latency-sensitive Path

Function

set sdd_threshold is used to set the threshold of switching a latency-sensitive path.

Format

set sdd_threshold=*time*

Parameters

Parameter	Description	Default Value
time	Threshold of switching a latency-sensitive path The value ranges from 100 to 60,000, expressed in milliseconds.	30000

Level

User **root**

Usage Guidelines

None

Example

This example shows how to set the threshold of switching a latency-sensitive path to 1000 milliseconds.

```
UltraPath CLI #1 >set sdd_threshold=1000
Succeeded in executing the command.
```

System Response

None

A.3.34 Setting the Recovery Time of a Latency-sensitive Path

Function

set sdd_recovery_time is used to set the recovery time of a latency-sensitive path.

Format

set sdd_recovery_time=*time*

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Parameters

Parameter	Description	Default Value
time	Recovery time of a latency-sensitive path The value ranges from 1 to 2,592,000, expressed in seconds.	120

Level

User **root**

Usage Guidelines

None

Example

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

```
UltraPath CLI #1 >set sdd_recovery_time=600
Succeeded in executing the command.
```

System Response

None

A.3.35 Setting an Interval for Routine Detection of Faulty Paths

Function

The **set faulty_path_check_interval** command is used to set an interval for rountine detection of faulty paths.

Format

set faulty_path_check_interval=*time*

Parameters

Keyword and Parameter	Description	Default Value
time	Interval for routine inspection of faulty paths. The value ranges from 1 to 2,592,000, expressed in seconds.	10

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Level

User **root**

Usage Guidelines

None

Example

Set the interval for routine detection of faulty paths to 10 seconds.

```
UltraPath CLI #1 >set faulty_path_check_interval=10
Succeeded in executing the command.
```

System Response

None

A.3.36 Setting an Interval for Routine Inspection of Idle Paths

Function

The **set idle_path_check_interval** command is used to set an interval for rountine inspection of idle paths.

Format

set idle_path_check_interval=*time*

Parameters

Keyword and Parameter	Description	Default Value
time	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.

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```
UltraPath CLI #1 >set idle_path_check_interval=60
Succeeded in executing the command.
```

System Response

None

A.3.37 Setting I/O Retry Timeout

Function

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

Format

set max_io_retry_timeout=*time* [**array_id**=*ID* | **vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* }]

Parameters

Keyword and Parameter	Description	Default Value
time	Timeout period for I/O retry on UltraPath. The value ranges from 1 to 2,592,000, expressed in seconds.	1800
array_id=*ID*	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None
vlun_id={ *ID* | *ID1,ID2...* | *ID1-ID2* }	ID of a virtual LUN. You can run **show vlun type**=*all* to display all virtual LUN IDs.	None

Level

User **root**

Usage Guidelines

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 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.

- Run **set max_io_retry_timeout**=*time* to set the I/O retry timeout of all storage systems.

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- Run **set max_io_retry_timeout**=*time* **array_id**=*ID* to set the I/O retry timeout of a specified storage system.
- Run **set max_io_retry_timeout**=*time* **vlun_id**=*{ ID | ID1,ID2... | ID1-ID2 }* to set the I/O retry timeout of a specified virtual LUN.

NOTE

- **vlun_id**=*ID*: ID of a single virtual LUN.
- **vlun_id**=*ID1,ID2...*: IDs of multiple virtual LUNs which are not necessarily related.
- **vlun_id**=*ID1–ID2*: IDs of all the virtual LUNs from ID1 to ID2.

Example

Set the timeout period for I/O retry on UltraPath to 1800 seconds.

```
UltraPath CLI #1 >set max_io_retry_timeout=1800
Succeeded in executing the command.
```

System Response

None

A.3.38 Setting the Number of Consecutive I/Os on a Path

Function

The **set lb_io_threshold** command is used to set the number of consecutive I/Os on a path in load balancing mode.

Format

set lb_io_threshold= number [**array_id**=*ID* | **vlun_id**=*{ ID | ID1,ID2... | ID1-ID2 }*]

Parameters

Keyword and Parameter	Description	Default Value
number	Number of consecutive I/Os on a path. The value ranges from 1 to 10,000.	100
array_id=*ID*	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None
vlun_id=*{ ID | ID1,ID2... | ID1-ID2 }*	ID of a virtual LUN. You can run **show vlun type**=*all* to display all virtual LUN IDs.	None

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Level

User **root**

Usage Guidelines

- Run **set lb_io_threshold**=*number* to set the number of consecutive I/Os on a path in load balancing mode for all storage systems.
- Run **set lb_io_threshold**=*number* **array_id**=*ID* to set the number of consecutive I/Os on a path in load balancing mode for a specified storage system.
- Run **set lb_io_threshold**=*number* **vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* } to set the number of consecutive I/Os on a path in load balancing mode for a specified virtual LUN.

NOTE

- **vlun_id**=*ID*: ID of a single virtual LUN
- **vlun_id**=*ID1,ID2...*: IDs of multiple virtual LUNs which are not necessarily related
- **vlun_id**=*ID1–ID2*: IDs of all the virtual LUNs from ID1 to ID2

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 number of consecutive I/Os causes path blockage for short periods of time. Therefore, set an appropriate value based on the service I/O model to improve performance.

Example

Set the number of consecutive I/Os on a path in load balancing mode to 1.

```
UltraPath CLI #1 >set lb_io_threshold=1
Succeeded in executing the command.
```

System Response

None

A.3.39 Setting the Remote Controller of a VIS Storage System

Function

The **set remote_controller** command is used to set the remote controller of a VIS storage system so that host I/Os are delivered preferentially from the local VIS node, therefore shortening latency.

Format

set remote_controller array_id=*ID* **tpg_id**=*ID1,ID2…* [*remote* | *local*]

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Parameters

Keyword and Parameter	Description	Default Value
array_id=*ID*	ID of a storage system allocated by UltraPath. You can run **show array** without an ID to display all storage system IDs.	None
tpg_id=*ID1,ID2…*	ID of a controller. **NOTE** You can specify multiple controllers at the same time.	None
remote | *local*	Status of a remote controller. The value can be **local** or **remote**. ● local: local controller ● remote: remote controller	remote

Level

User **root**

Usage Guidelines

NOTE

UltraPath 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 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.

```
UltraPath CLI #1 >set remote_controller array_id=0 tpg_id=0 local
Succeeded in executing the command.
```

System Response

None

A.3.40 Clearing Configuration Information

Function

The **clear upconfig** command is used to clear the configuration information about a virtual LUN or storage system to recover them to default factory settings.

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Format

clear upconfig={ **array_id**=*ID* | **vlun_id**=*ID* }

Parameters

Keyword and Parameter	Description	Default Value
array_id=*ID*	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None
vlun_id=*ID*	ID of a virtual LUN. You can run **show vlun type**=*all* to display all virtual LUN IDs.	None

Level

User **root**

Usage Guidelines

- Run **clear upconfig array_id**=*ID* to clear the configuration information about a specified storage system.
- Run **clear upconfig vlun_id**=*ID* to clear the configuration information about a specified virtual LUN.

Example

- Clear the configuration information about the storage system whose ID is **0**.
```
UltraPath CLI #1 >clear upconfig array_id=0
Succeeded in executing the command.
```
- Clear the configuration information about the virtual LUN whose ID is **1**.
```
UltraPath CLI #1 >clear upconfig vlun_id=1
Succeeded in executing the command.
```

System Response

None

A.3.41 Deleting Obsolete Physical Path Information

Function

The **clear obsolete_path** command is used to delete obsolete physical path information.

Format

clear obsolete_path path_id=*ID*

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Parameters

Keyword and Parameter	Description	Default Value
path_id=*ID*	ID of a physical path. You can run **show path** without an ID to display all physical path IDs.	None

Level

User **root**

Usage Guidelines

NOTE

- If a storage system administrator changes the path network (for example, changes the Fibre Channel port connected to the storage system), some paths managed by UltraPath may enter faulty state, interfering the administrator's detection of faulty paths. In this case, run the command to delete the paths from UltraPath.
- 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**.

```
UltraPath CLI #1 >clear obsolete_path path_id=1
Succeeded in executing the command.
```

System Response

None

A.3.42 Setting the Pending Delete Period of Obsolete Path Information

Function

The **set obsolete_path_clear_delaytime** command is used to set the pending delete period of information about obsolete paths.

Format

set obsolete_path_clear_delaytime=*time*

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Parameters

Parameter	Description	Default Value
time	● The pending delete period of information about obsolete paths. ● The value ranges from 7,200 to 2,592,000, expressed in seconds.	28,800

Level

User **root**

Usage Guidelines

NOTE

- When the network is faulty (for example, the optical fiber link is interrupted), some paths managed by UltraPath will be set to faulty state automatically. If the storage system administrator has not adjusted the pending delete period, the system will delete information about the paths in faulty state automatically eight hours later.
- If the storage system administrator wants to reserve the path information for fault analysis or clear the path information earlier to reduce interference, the administrator can use this command to adjust the pending delete period.

Example

Setting the pending delete period of obsolete path information to 7200s.

```
UltraPath CLI #1 >set obsolete_path_clear_delaytime=7200
Succeeded in executing the command.
```

System Response

None

A.3.43 Checking the Status of UltraPath

Function

The **check status** command is used to check the status of UltraPath, view information about hosts, paths, and HBAs, and trigger a joint takeover check.

Format

check status

Parameters

None

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Level

User **root**

Usage Guidelines

The configuration of the UltraPath can be queried only after it is successfully installed.

Example

Check the status of UltraPath.

```
UltraPath CLI #1 >check status
------------------------------------------------------------
Checking path status:
Pass
------------------------------------------------------------
Checking envirment and config:
Pass
------------------------------------------------------------
Checking HBA Information:
[WARNING] iscsi is not installed.
complete FC checking.
Host Adapters from different supported vendors co-exists on your system.
------------------------------------------------------------
```

System Response

None

A.3.44 Viewing Critical Events

Function

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

Format

show event [**count**=*number*]

Parameters

Keyword and Parameter	Description	Default Value
count=*number*	Printing number of critical events. The value ranges from 1 to 10,000.	1000

Level

User **root**

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Usage Guidelines

None

Example

View critical events of UltraPath that occurred on the current day.

```
UltraPath CLI #1 >show event
================================================================================
================
================================================================================
  SN           Array              Type         Time
Serverity                 Description
  1  210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:47:902655 info Add a
path to disk: LUN name {fan0000}, Host Lun ID {1}.
 .....
4793 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:47:289423 info Add a
path to disk: LUN name {LUNV}, Host Lun ID {0}.
4794 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:46:776981 info Add a
path to disk: LUN name {fan0003}, Host Lun ID {4}.
4795 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:46:248418 info Add a
path to disk: LUN name {fan0002}, Host Lun ID {3}.
4796 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:45:752700 info Add a
path to disk: LUN name {fan0001}, Host Lun ID {2}.
4797 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:45:164166 info Add a
path to disk: LUN name {fan0000}, Host Lun ID {1}.
4798 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:44:607698 info Add a
path to disk: LUN name {LUNV}, Host Lun ID {0}.
4799 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:44:094826 info Add a
path to disk: LUN name {fan0003}, Host Lun ID {4}.
4800 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:43:397182 info Add a
path to disk: LUN name {fan0002}, Host Lun ID {3}.
4801 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:42:802060 info Add a
path to disk: LUN name {fan0001}, Host Lun ID {2}.
4802 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:42:321424 info Add a
path to disk: LUN name {fan0000}, Host Lun ID {1}.
4803 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:41:704031 info Add a
path to disk: LUN name {LUNV}, Host Lun ID {0}.
4804 210235G6ED10D8000006  Create virtual disk 2013-11-27 08:21:41:195517 info
Successfully create virtual disk: LUN name {fan0003}, Host Lun ID {4}.
--------------------------------------------------------------------------------
----------------
--------------------------------------------------------------------------------
----------------
------
```

System Response

None

A.3.45 Manually Updating a 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=[**array_id**=*ID* | **vlun_id**=*ID*]

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Parameters

Keyword and Parameter	Description	Default Value
array_id=*ID*	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None
vlun_id=*ID*	ID of a virtual LUN. You can run **show vlun type**=*all* 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

Manually update the working controller.

```
UltraPath CLI #1 >start rebalancelun
Succeeded in executing the command.
```

System Response

None

A.3.46 Querying and Exporting Performance Statistics

Function

The **show iostat** command is used to display and export the performance statistics (IOPS, bandwidth and response time) about storage systems and virtual LUNs.

Format

Run the following command to query and export performance statistics of specified arrays:

show iostat array_id=*ID1,ID2,...* [**interval**=*time*] [**file_name**=*file_name* [**archive_time**=*archive_time*] [**duration**=*duration*]]

Run the following command to query and export performance statistics of specified virtual LUNs:

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show iostat vlun_id=*ID1,ID2,...* [**type**={ *all* | *hypermetro* | *migration* }] [**interval**=*time*] [**file_name**=*file_name* [**archive_time**=*archive_time*] [**duration**=*duration*]]

Parameters

Parameter	Description	Default Value
array_id=*ID1,ID2,...*	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
vlun_id=*ID1,ID2,...*	Specifies IDs of virtual LUNs. You can run **show vlun type**=*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
type={ *all* | *hypermetro* | *migration* }	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
interval=*time*	Specifies an interval for performance statistics collection. The value ranges from 1 to 60, expressed in seconds.	1

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Parameter	Description	Default Value
file_name=*file_name*	Specifies the saving path and name of the performance statistics report. **NOTE** You are not required to specify the saving path but must specify the name of the performance report. The system automatically adds suffix **.CSV** to the name. If a saving path is not specified, the report is saved in the **perf_log** file folder of the UltraPath log directory.	/opt/UltraPath/log/perf_log/
archive_time=*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
duration=*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

Level

User **root**

Usage Guidelines

- When performance statistics is being collected, you can press **Ctrl+C** to end the collection.
- 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.

Example

- View performance statistics of the storage system whose ID is **0** at an interval of **30** seconds.

```
UltraPath CLI #3 >show iostat array_id=0 interval=30
================================================================================
=======
                              IO Performance
Information
================================================================================
=======
                     IOPS                        KB/S                  response
time(ms)
             Total |Read    |Write Total |Read    |Write Total |Read    |Write
Array 0      0       |0       |0     0       |0       |0       0       |
0       |0
Controller 1
Phypath 0  :0        |0       |0       0       |0       |0       0       |
0       |0
Phypath 1  :0        |0       |0       0       |0       |0       0       |
0       |0

================================================================================
=======
```

- View performance statistics of the virtual LUNs whose IDs are **0**, **1**, **2**, and **3** at an interval of **30** seconds.

```
UltraPath CLI #4 >show iostat vlun_id=0,1,2,3 interval=30
================================================================================
=======
                              IO Performance
Information
================================================================================
=======
                     IOPS                        KB/S                  response
time(ms)
             Total |Read    |Write Total |Read    |Write Total |Read    |Write
VLUN 0       0       |0       |0       0       |0       |0       0       |
0       |0
Controller 0B
Path 0     :0        |0       |0       0       |0       |0       0       |
0       |0
Path 1     :0        |0       |0       0       |0       |0       0       |
0       |0
================================================================================
=======
VLUN 1       0       |0       |0       0       |0       |0       0       |
0       |0
Controller 0B
Path 0     :0        |0       |0       0       |0       |0       0       |
0       |0
================================================================================
=======
VLUN 2       0       |0       |0       0       |0       |0       0       |
0       |0
Controller 0B
Path 0     :0        |0       |0       0       |0       |0       0       |
0       |0
================================================================================
=======
VLUN 3       0       |0       |0       0       |0       |0       0       |
0       |0
Controller 0B
Path 0     :0        |0       |0       0       |0       |0       0       |
0       |0
```


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```
================================================================================
=======
```

- Query performance statistics about HyperMetro virtual LUN **4**.

```
UltraPath CLI #4 >show iostat vlun_id=4 type=hypermetro
================================================================================
=======
                              IO Performance
Information
================================================================================
=======
                      IOPS                        KB/S                  response
time(ms)
            Total |Read    |Write Total |Read    |Write Total |Read    |Write
VLUN 4      0       |0       |0       0       |0       |0       0       |
0       |0
Lun  Array 210235G6GSZ0C5000004
Controller 0A
Path 1     :0       |0       |0       0       |0       |0       0       |
0       |0
Controller 0B
Path 0     :0       |0       |0       0       |0       |0       0       |
0       |0
Lun  Array 210235G6GSZ0C2000008
Controller 0A
Path 2     :0       |0       |0       0       |0       |0       0       |
0       |0
Controller 0B
Path 3     :0       |0       |0       0       |0       |0       0       |
0       |0
================================================================================
=======
```

- Query performance statistics about virtual LUN **0** and export the data to the default path.

```
UltraPath CLI #1 >show iostat vlun_id=0 file_name=perfLogFile
================================================================================
=======
                              IO Performance Information
================================================================================
=======
                      IOPS                        KB/S                  response
time(ms)
            Total |Read    |Write Total |Read    |Write Total |Read    |Write
VLUN 0      9389    |9389    |0       38457 |38457 |0       0       |0       |
0
Controller 0A
Path 1     :9389    |9389    |0       38457 |38457 |0       0       |0       |
0
Controller 0B
Path 0     :0       |0       |0       0       |0       |0       0       |
0       |0
================================================================================
=======
```

- Query performance statistics about virtual LUN **0** and export the data to the specified path. Specify the statistics interval to 5s and duration to 1000s.

```
UltraPath CLI #1 >show iostat vlun_id=0 file_name="/home/perfLog/perfLogFile"
archive_time=5 duration=1000
================================================================================
=======
                              IO Performance Information
================================================================================
=======
                      IOPS                        KB/S                  response
time(ms)
            Total |Read    |Write Total |Read    |Write Total |Read    |Write
VLUN 0      9559    |9559    |0       39153 |39153 |0       0       |0       |
0
Controller 0A
Path 1     :9559    |9559    |0       39153 |39153 |0       0       |0       |
```

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```
0
Controller 0B
Path 0     :0       |0       |0       0       |0       |0       0       |
0       |0
================================================================================
=======
```

System Response

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

A.3.47 Enabling and Disabling the Performance Data Record Function

Function

set performance_record is used to enable and disable the performance data record function.

Format

set performance_record=*{ on | off }* [**duration**=*time*]

Parameters

Parameter	Description	Default Value
{ on | off }	Performance data record function The value can be **on** or **off**. ● on: Enable the performance data record function. ● off: Disable the performance data record function. The performance data file is saved in the UltraPath log directory and is named **perf_record.log**.	off
duration=*time*	Time during which the performance data record function works The value ranges from 0 to 8,760, expressed in hours. **0** indicates that the performance data record function works permanently.	0

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Level

User **root**

Usage Guidelines

- You are not required to specify **duration** when disabling the performance data record function.
- When the size of the performance data file reaches 30 MB, the system automatically dumps it to the **perf_record** directory which is under the UltraPath **log** directory.
- If the performance data record function is enabled before UltraPath is uninstalled, configuration files are not deleted. The performance data record function is enabled automatically after UltraPath is re-installed.

Example

- Enable the performance data record function and set **duration** to 24 hours.
```
UltraPath CLI #0 >set performance_record=on duration=24
Succeeded in executing the command.
```
- Disable the performance data record function.
```
UltraPath CLI #0 >set performance_record=off
Succeeded in executing the command.
```

System Response

None

A.4 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 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.4.1 Commands for Configuring and Managing HyperMetro

This topic describes how to configure the HyperMetro working mode and manage HyperMetro.

A.4.1.1 Setting the HyperMetro Working Mode

Function

The **set hypermetro workingmode** command is used to set the HyperMetro working mode.

Format

set hypermetro workingmode={ *priority* | *balance* } **primary_array_id**=*ID* [**vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* }]

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set hypermetro workingmode={ *priority* | *balance* } [**primary_array_id**=*ID* | **primary_array_sn**=*SN*] [**vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* }] (Only applies to UVP systems.)

Parameters

Parameter	Description	Default Value
workingmode={ *priority* | *balance* }	HyperMetro working mode. Possible values are priority and balance, where: ● priority: primary array mode ● balance: load balance mode	priority **NOTE** In default configurations, namely manual configuration has not been performed, the system compares the array SNs and selects the largest numbered array as the preferred one.
primary_array_id=*ID*	ID of the primary array. You can run **show array** 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
primary_array_sn=*SN*	SN of the primary array. Run **show array** to obtain the SN of the primary array or obtain the SN on the array. **NOTE** ● Only applies to UVP systems. ● The array SN contains 20 characters.	None
vlun_id={ *ID* | *ID1,ID2...* | *ID1-ID2* }	ID of an virtual HyperMetro LUN. Run the **show vlun type**=*hypermetro* command to obtain the IDs of the virtual HyperMetro LUNs.	None

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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 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.
- 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.
- Run the **set hypermetro workingmode**={ *priority* | *balance* } **primary_array_id** command to set the HyperMetro working mode for all storage systems.
- Run the **set hypermetro workingmode**={ *priority* | *balance* } **primary_array_id**=*ID* **vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* } command to set the HyperMetro working mode of a specific virtual LUN.

NOTE

- **vlun_id**=*ID*: ID of a single virtual LUN.
- **vlun_id**=*ID1,ID2...*: IDs of multiple virtual LUNs which are not necessarily related.
- **vlun_id**=*ID1–ID2*: IDs of all the virtual LUNs from ID1 to ID2.

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.

```
UltraPath CLI #2 >set hypermetro workingmode=priority primary_array_id=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.

```
UltraPath CLI #3 > set hypermetro workingmode=priority primary_array_id=0
vlun_id=0
Succeeded in executing the command.
```

System Response

None

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A.4.1.2 Setting the Size of a HyperMetro Fragment

Function

The **set hypermetro split_size** command is used to set the fragment size when HyperMetro cross-array load balancing is applied.

Format

set hypermetro split_size=*size* [**vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* }]

Parameters

Parameter	Description	Default Value
split_size=*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
vlun_id={ *ID* | *ID1,ID2...* | *ID1-ID2* }	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

- Run the **set hypermetro split_size**=*size* command to set the HyperMetro fragment size for all storage systems.
- Run the **set hypermetro split_size**=*size* **vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* } command to set the HyperMetro fragment size of the virtual LUNs.

NOTE

- **vlun_id**=*ID*: ID of a single virtual LUN.
- **vlun_id**=*ID1,ID2...*: IDs of multiple virtual LUNs which are not necessarily related.
- **vlun_id**=*ID1–ID2*: IDs of all the virtual LUNs from ID1 to ID2.

Example

- Set the HyperMetro fragment size to 128 MB for all storage systems.

```
UltraPath CLI #2 >set hypermetro split_size=128M
Succeeded in executing the command.
```

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- Set the HyperMetro fragment size of the virtual LUNs whose ID is **0** to 128 MB.

```
UltraPath CLI #3 >set hypermetro split_size=128M vlun_id=0
Succeeded in executing the command.
```

System Response

None

A.4.1.3 Setting Load Balance Mode for a HyperMetro System

Function

You can run the **set hypermetro loadbalancemode** command to set load balance mode for HyperMetro configured across arrays.

Format

set hypermetro loadbalancemode={ *split-size* | *round-robin* }

[**vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* }]

Parameters

Parameter	Description	Default Value
loadbalancemode ={ *split-size* | *round-robin* }	Load balance mode for a HyperMetro system Its value can be **split-size** or **round-robin**. Parameter descriptions are as follows: ● split-size: splitting mode across arrays. ● round-robin: round-robin mode across arrays. **NOTE** ● Load balance mode of a HyperMetro storage system only takes effect when the HyperMetro working mode is set to balance.	split-size
vlun_id={ *ID* | *ID1,ID2 ...* | *ID1–ID2*}	Specifies the ID of a virtual HyperMetro LUN. Run the **show vlun type** =*hypermetro* command to obtain ID information about HyperMetro virtual LUNs.	None

Level

root user

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Usage Guidelines

- Descriptions about load balance mode for a HyperMetro system are as follows:
  - If split-size mode is selected, UltraPath delivers I/Os to a specific storage array based on the start addresses of I/Os, the size of slices that are set, and the preferred storage array. If the fragment size is 128 MB, the I/Os with start addresses from 0 MB to 128 MB are delivered to the preferred storage array, and the I/Os with start addresses from 128 MB to 256 MB are delivered to the non-preferred storage array.
  - If round-robin mode is selected, UltraPath delivers I/Os to two storage systems in turn.
- Run the **set hypermetro loadbalancemode**={ *split-size* | *round-robin* } command to set the HyperMetro working mode for all storage systems.
- Run the **set hypermetro loadbalancemode**={ *split-size* | *round-robin* } **vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* } command to set the HyperMetro working mode of a specific virtual LUN.

NOTE

- **vlun_id**=*ID*: ID of a single virtual LUN.
- **vlun_id**=*ID1,ID2...*: IDs of multiple virtual LUNs which are not necessarily related.
- **vlun_id**=*ID1–ID2*: IDs of all the virtual LUNs from ID1 to ID2.

Example

- Set HyperMetro load balance mode of all storage systems to **split-size**.
```
UltraPath CLI #2 >set hypermetro loadbalancemode=split-size
Succeeded in executing the command
```
- Set HyperMetro load balance mode of virtual LUNs with an ID of **0** to **split-size**.
```
UltraPath CLI #3 > set hypermetro loadbalancemode=split-size vlun_id=0
Succeeded in executing the command.
```

System Response

None

A.4.2 Querying Storage System Information

Function

The **show array** command is used to query information about a specified or all storage systems connected to the application server.

Format

show array [**id**=*ID1,ID2,...* [**verbose**]]

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Parameters

Keyword and Parameter	Description	Default Value
id=*ID1,ID2,...*	ID of a storage system. You can run **show array** without an ID to display 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
verbose	Viewing details configuration information about a specified storage system. **NOTE** Parameter **verbose** can display details configuration information about a specified storage system only when it is used with parameter **id**.	None

Level

User **root**

Usage Guidelines

- Run **show array** to view information about all storage systems connected to the application server.
- Run **show array id**=*ID1,ID2...* to view information about a specified storage system.
- Run **show array id**=*ID1,ID2...* **verbose** to view details configuration information about the storage system.

Example

- Run the following command to query information about all storage systems connected to the application server:

```
UltraPath CLI #9 >show array
------------------------------------------------------------------------------
--------
 Array ID           Name                   Array SN        Vendor Name
Product Name
    0               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**:

```
UltraPath CLI #10 >show array id=1
=======================================================
                  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:
                Path0: Normal
=======================================================
```

- Run the following command to view details configuration information about the storage system whose ID is **0**.

```
UltraPath CLI #2 >show array id=0 verbose
=======================================================
                  Array#0 Information
=======================================================
Name           : HUAWEIS5500T
Array SN       : 210235G6GRZ0C4000008
Vendor Name    : HUASY
Product Name : S5500T
Controller 0A
       Status  : Enable
       LunCount: 2
       PathInfo:
                Path0: Normal
Working Mode : load balancing within controller
LUN Trespass : on
LoadBalance Mode          : min-queue-depth
Loadbanlance io threshold : 1
Io Suspension Time        : 60
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

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Parameter	Description	Default Value
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.4.3 Viewing Virtual LUN Information

Function

The **show vlun** command is used to query information about a specified LUN or all LUNs mapped from a storage system to an application server.

Format

show vlun { **id**=*ID1,ID2,...* | **disk**=*diskname* } [**type**={ *all* | *hypermetro* | *migration* }] [**verbose**]

show vlun [**array_id**=*ID1,ID2...*] [**type**={ *all* | *hypermetro* | *migration* }]

Parameters

Keyword and Parameter	Description	Default Value
id=*ID1,ID2...*	ID of a virtual LUN. You can run **show vlun** without an ID to obtain all virtual LUN IDs. **NOTE** You can query a maximum of eight virtual LUNs' performance statistics at a time. Use comas (,) to separate virtual LUN IDs.	None

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Keyword and Parameter	Description	Default Value
array_id=*ID1,ID2,...*	ID of a storage system. You can run **show array** without an ID 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
disk=*diskname*	Drive letter name of a virtual LUN. **NOTE** ● You can run this command to view information about only one virtual LUN at a time. ● This command cannot be used to query information about virtual LUNs whose drive letter names are **deleted** or **unknown**.	None
verbose	Viewing details configuration information about a virtual LUN. **NOTE** Parameter **verbose** can be used to view detailed information about a specified virtual LUN only when it is used together with either parameter **id** or **disk**.	None
type={ *all* | *hypermetro* | *migration* }	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 nodename, where: ● all: all the virtual LUNs ● hypermetro: virtual HyperMetro LUNs ● migration: virtual migration LUNs	None

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Level

User **root**

Usage Guidelines

- Run **show vlun** to query information about all common virtual LUNs mounted on the application server.
- Run **show vlun array_id**=*ID1,ID2,...* to view common virtual LUN information about a specified storage system.
- Run **show vlun id**=*ID1,ID2...* to view information about a specified common virtual LUN.
- Run **show vlun disk=***diskname* to view information about a specified virtual LUN.
- Run **show vlun id**=*ID1,ID2...* **verbose** to view details configuration information about a common virtual LUN.
- Run **show vlun disk**=*diskname* **verbose** to view details configuration information about a common virtual LUN.
- Run **show vlun type**=*all* to query information about all virtual LUNs mounted on the application server.
- Run **show vlun array_id**=*ID1,ID2,...* **type**=*all* to view all virtual LUN information about a specified storage system.
- Run **show vlun disk=***diskname* **type**=*all* to view information about a specified virtual LUN.
- Run **show vlun type**=*hypermetro* to query information about all virtual HyperMetro LUNs mounted on the application server.
- Run **show vlun id**=*ID1,ID2...* **type**=*all* to view information about a specified virtual LUN.
- Run **show vlun id**=*ID1,ID2...* **type**=*hypermetro* to view information about a specified virtual HyperMetro LUN.
- Run **show vlun disk=***diskname* **type**=*hypermetro* to view information about a specified virtual HyperMetro LUN.

Example

- View information about all common virtual LUNs.

```
UltraPath CLI #0 >show vlun
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
---------
 Vlun ID  Disk    Name                 Lun WWN               Status
Capacity  Ctrl(Own/Work)       Array Name       Dev Lun ID  No. of
Paths(Available/Total)
    0     sdb test_0000  648435a10077515b1a08cd150000000a  Normal
1.00GB       0B/0B       Huawei.Storage219.70      10
4/4
    1     sdc test_0001  648435a10077515b1a08cd540000002a  Normal
1.00GB       0A/0A       Huawei.Storage219.70      42
4/4
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
---------
```

- View common virtual LUN information about the storage system whose ID is **0**.

```
UltraPath CLI #1 >show vlun array_id=0
-------------------------------------------------------------------------------
```

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```
------------------------------------------------------------------------------
---------
 Vlun ID  Disk    Name                 Lun WWN               Status
Capacity  Ctrl(Own/Work)       Array Name       Dev Lun ID  No. of
Paths(Available/Total)
    0     sdb test_0000  648435a10077515b1a08cd150000000a  Normal
1.00GB       0B/0B       Huawei.Storage219.70      10
4/4
    1     sdc test_0001  648435a10077515b1a08cd540000002a  Normal
1.00GB       0A/0A       Huawei.Storage219.70      42
4/4
------------------------------------------------------------------------------
------------------------------------------------------------------------------
---------
```

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

```
UltraPath CLI #2 >show vlun id=1
=======================================================
                  VLUN#1 Information
=======================================================
Disk                  : sdc
Name                  : test_0001
Status                : Normal
Capacity            : 1.00GB
Driver                : Vendor-specific(DEFAULT)
Product Name          : XSG1
Vendor Name           : HUAWEI
Owning Controller     : 0A
Working Controller    : 0A
Num of Paths          : 4
LUN WWN               : 648435a10077515b1a08cd540000002a
Array Name            : Huawei.Storage219.70
Controller 0A
Path 4 [1:0:4:2] (up-5)  : Normal
Path 10 [4:0:4:2] (up-13)  : Normal
Controller 0B
Path 0 [1:0:0:2] (up-1)  : Normal
Path 8 [4:0:2:2] (up-9)  : Normal
Dev Lun ID            : 42
Manual IO Suspension  : Off
-------------------------------------------------------
```

- View information about the virtual LUN whose drive letter name is **sdc**.

```
UltraPath CLI #2 >show vlun disk=sdc
=======================================================
                  VLUN#1 Information
=======================================================
Disk                  : sdc
Name                  : test_0001
Status                : Normal
Capacity            : 1.00GB
Driver                : Vendor-specific(DEFAULT)
Product Name          : XSG1
Vendor Name           : HUAWEI
Owning Controller     : 0A
Working Controller    : 0A
Num of Paths          : 4
LUN WWN               : 648435a10077515b1a08cd540000002a
Array Name            : Huawei.Storage219.70
Controller 0A
Path 4 [1:0:4:2] (up-5)  : Normal
Path 10 [4:0:4:2] (up-13)  : Normal
Controller 0B
Path 0 [1:0:0:2] (up-1)  : Normal
Path 8 [4:0:2:2] (up-9)  : Normal
Dev Lun ID            : 42
Manual IO Suspension  : Off
-------------------------------------------------------
```

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- View details configuration information about a common virtual LUN whose drive letter name is **sdc**.

```
UltraPath CLI #3 >show vlun disk=sdc verbose
=====================================================
                  VLUN#1 Information
=====================================================
Disk                  : sdc
Name                  : test_0001
Status                : Normal
Capacity              : 1.00GB
Driver                : Vendor-specific(DEFAULT)
Product Name          : XSG1
Vendor Name           : HUAWEI
Owning Controller     : 0A
Working Controller    : 0A
Num of Paths          : 4
LUN WWN               : 648435a10077515b1a08cd540000002a
Array Name            : Huawei.Storage219.70
Controller 0A
Path 4 [1:0:4:2] (up-5)  : Normal
Path 10 [4:0:4:2] (up-13)  : Normal
Controller 0B
Path 0 [1:0:0:2] (up-1)  : Normal
Path 8 [4:0:2:2] (up-9)  : Normal
Working Mode      : load balancing within controller
LUN Trespass      : on
LoadBalance Mode  : round-robin
Loadbanlance io threshold : 1
Io Suspension Time        : 0
Max io retry timeout      : 1800
Dev Lun ID            : 42
Manual IO Suspension  : Off
-----------------------------------------------------
```

- View details configuration information about a common virtual LUN whose ID is **1**.

```
UltraPath CLI #3 >show vlun id=1 verbose
=====================================================
                  VLUN#1 Information
=====================================================
Disk                  : sdc
Name                  : test_0001
Status                : Normal
Capacity              : 1.00GB
Driver                : Vendor-specific(DEFAULT)
Product Name          : XSG1
Vendor Name           : HUAWEI
Owning Controller     : 0A
Working Controller    : 0A
Num of Paths          : 4
LUN WWN               : 648435a10077515b1a08cd540000002a
Array Name            : Huawei.Storage219.70
Controller 0A
Path 4 [1:0:4:2] (up-5)  : Normal
Path 10 [4:0:4:2] (up-13)  : Normal
Controller 0B
Path 0 [1:0:0:2] (up-1)  : Normal
Path 8 [4:0:2:2] (up-9)  : Normal
Working Mode      : load balancing within controller
LUN Trespass      : on
LoadBalance Mode  : round-robin
Loadbanlance io threshold : 1
Io Suspension Time        : 0
Max io retry timeout      : 1800
Dev Lun ID            : 42
Manual IO Suspension  : Off
-----------------------------------------------------
```

- View information about all virtual LUNs.

```
UltraPath CLI #4 >show vlun type=all
-------------------------------------------------------------------------------
```

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```
------------------------------------------------------------------------------
---------
 Vlun ID  Disk    Name                 Lun WWN               Status
Capacity  Ctrl(Own/Work)       Array Name       Dev Lun ID  No. of
Paths(Available/Total)
    0     sdb test_0000  648435a10077515b1a08cd150000000a  Normal
1.00GB       0B/0B       Huawei.Storage219.70      10
4/4
    1     sdc test_0001  648435a10077515b1a08cd540000002a  Normal
1.00GB       0A/0A       Huawei.Storage219.70      42
4/4
    2     sdd    Lun_003 648435a10077515b322ca22400000024  Normal
3.00GB       0A/0A       Huawei.Storage219.70      36
4/4
    2     sdd    Lun_011 648435a10077515b322ca22400000024  Normal
3.00GB       0A/0A       Huawei.Storage219.72      13
4/4
------------------------------------------------------------------------------
------------------------------------------------------------------------------
---------
```

- View all virtual LUN information about the storage system whose ID is **0**.

```
UltraPath CLI #5 >show vlun array_id=0 type=all
------------------------------------------------------------------------------
------------------------------------------------------------------------------
---------
 Vlun ID  Disk    Name                 Lun WWN               Status
Capacity  Ctrl(Own/Work)       Array Name       Dev Lun ID  No. of
Paths(Available/Total)
    0     sdb test_0000  648435a10077515b1a08cd150000000a  Normal
1.00GB       0B/0B       Huawei.Storage219.70      10
4/4
    1     sdc test_0001  648435a10077515b1a08cd540000002a  Normal
1.00GB       0A/0A       Huawei.Storage219.70      42
4/4
    2   sdd    Lun_003 648435a10077515b322ca22400000024  Normal 3.00GB
0A/0A       Huawei.Storage219.70      36                   4/4
------------------------------------------------------------------------------
------------------------------------------------------------------------------
---------
```

- View information about the virtual LUN whose drive letter name is **sdb**.

```
UltraPath CLI #7 >show vlun disk=sdb type=all
======================================================
                  VLUN#0 Information
======================================================
Disk                   : sdb
Name                   : test_0000
Status                 : Normal
Capacity               : 1.00GB
Driver                 : Vendor-specific(DEFAULT)
Product Name           : XSG1
Vendor Name            : HUAWEI
Owning Controller      : 0B
Working Controller     : 0B
Num of Paths           : 4
LUN WWN                : 648435a10077515b1a08cd150000000a
Array Name             : Huawei.Storage219.70
Controller 0A
Path 4 [1:0:4:1] (up-4)  : Normal
Path 10 [4:0:4:1] (up-12)  : Normal
Controller 0B
Path 0 [1:0:0:1] (up-0)  : Normal
Path 8 [4:0:2:1] (up-8)  : Normal
Dev Lun ID             : 10
Manual IO Suspension   : Off
------------------------------------------------------
```

- View information about all virtual HyperMetro LUNs.

```
UltraPath CLI #6 >show vlun type=hypermetro
------------------------------------------------------------------------------
```

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```
------------------------------------------------------------------------------
---------
 Vlun ID  Disk    Name                 Lun WWN               Status
Capacity  Ctrl(Own/Work)       Array Name       Dev Lun ID  No. of
Paths(Available/Total)
    2     sdd    Lun_003 648435a10077515b322ca22400000024  Normal
3.00GB       0A/0A       Huawei.Storage219.70      36
4/4
    2     sdd    Lun_011 648435a10077515b322ca22400000024  Normal
3.00GB       0A/0A       Huawei.Storage219.72      13
4/4
------------------------------------------------------------------------------
------------------------------------------------------------------------------
---------
```

- View details about the virtual LUN whose ID is **0**.

```
UltraPath CLI #7 >show vlun id=0 type=all
=======================================================
                  VLUN#0 Information
=======================================================
Disk                  : sdb
Name                  : test_0000
Status                : Normal
Capacity              : 1.00GB
Driver                : Vendor-specific(DEFAULT)
Product Name          : XSG1
Vendor Name           : HUAWEI
Owning Controller     : 0B
Working Controller    : 0B
Num of Paths          : 4
LUN WWN               : 648435a10077515b1a08cd150000000a
Array Name            : Huawei.Storage219.70
Controller 0A
Path 4 [1:0:4:1] (up-4)  : Normal
Path 10 [4:0:4:1] (up-12)  : Normal
Controller 0B
Path 0 [1:0:0:1] (up-0)  : Normal
Path 8 [4:0:2:1] (up-8)  : Normal
Dev Lun ID            : 10
Manual IO Suspension  : Off
-------------------------------------------------------
```

- View details about the virtual HyperMetro LUN whose ID is **2**.

```
UltraPath CLI #8 >show vlun id=2 type=hypermetro
=======================================================
                  VLUN#2 Information
=======================================================
Disk                      : sdd
Manual IO Suspension      : Off
Aggregation Type          : Hyper Metro
Aggregation Specific Attribution
    WorkingMode             : read write within primary array
    Primary Array SN        : 2102350SHY10G6000008
Aggregation Member#0 Infomation
    Name              : Lun_003
    Status            : Normal
    Capacity          : 3.00GB
    Aggregation Specific Attribution : N/A
    LUN WWN           : 648435a10077515b322ca22400000024
    Array Name        : Huawei.Storage219.70
    Array SN          : 2102350SHY10G6000008
    Driver            : Vendor-specific(DEFAULT)
    Product Name      : XSG1
    Vendor Name       : HUAWEI
    Owning Controller : 0A
    Working Controller: 0A
    Num of Paths      : 4
    Controller 0A
    Path 4 [1:0:4:3] (up-6)  : Normal
    Path 10 [4:0:4:3] (up-14)  : Normal
```

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```
    Controller 0B
    Path 0 [1:0:0:3] (up-2)  : Normal
    Path 8 [4:0:2:3] (up-10)  : Normal
Aggregation Member#1 Infomation
    Name              : Lun_011
    Status            : Normal
  Capacity          : 3.00GB
    Aggregation Specific Attribution : N/A
    LUN WWN           : 648435a10077515b322ca22400000024
    Array Name        : Huawei.Storage219.72
    Array SN          : 2102350SHY10G6000010
    Driver            : Vendor-specific(DEFAULT)
    Product Name      : XSG1
    Vendor Name       : HUAWEI
    Owning Controller : 0A
    Working Controller: 0A
    Num of Paths      : 4
    Controller 0A
    Path 5 [1:0:5:1] (up-7)  : Normal
    Path 9 [4:0:3:1] (up-11)  : Normal
    Controller 0B
    Path 3 [1:0:3:1] (up-3)  : Normal
    Path 11 [4:0:5:1] (up-15)  : Normal
------------------------------------------------------
```

- View details about the virtual HyperMetro LUN whose drive letter name is **sdd**.

```
UltraPath CLI #8 >show vlun disk=sdd type=hypermetro
======================================================
                  VLUN#2 Information
======================================================
Disk                      : sdd
Manual IO Suspension      : Off
Aggregation Type          : Hyper Metro
Aggregation Specific Attribution
    WorkingMode             : read write within primary array
    Primary Array SN        : 2102350SHY10G6000008
Aggregation Member#0 Infomation
    Name              : Lun_003
    Status            : Normal
    Capacity          : 3.00GB
    Aggregation Specific Attribution : N/A
    LUN WWN           : 648435a10077515b322ca22400000024
    Array Name        : Huawei.Storage219.70
    Array SN          : 2102350SHY10G6000008
    Driver            : Vendor-specific(DEFAULT)
    Product Name      : XSG1
    Vendor Name       : HUAWEI
    Owning Controller : 0A
    Working Controller: 0A
    Num of Paths      : 4
    Controller 0A
    Path 4 [1:0:4:3] (up-6)  : Normal
    Path 10 [4:0:4:3] (up-14)  : Normal
    Controller 0B
    Path 0 [1:0:0:3] (up-2)  : Normal
    Path 8 [4:0:2:3] (up-10)  : Normal
Aggregation Member#1 Infomation
    Name              : Lun_011
    Status            : Normal
  Capacity          : 3.00GB
    Aggregation Specific Attribution : N/A
    LUN WWN           : 648435a10077515b322ca22400000024
    Array Name        : Huawei.Storage219.72
    Array SN          : 2102350SHY10G6000010
    Driver            : Vendor-specific(DEFAULT)
    Product Name      : XSG1
    Vendor Name       : HUAWEI
    Owning Controller : 0A
    Working Controller: 0A
    Num of Paths      : 4
```

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```
    Controller 0A
    Path 5 [1:0:5:1] (up-7)  : Normal
    Path 9 [4:0:3:1] (up-11)  : Normal
    Controller 0B
    Path 3 [1:0:3:1] (up-3)  : Normal
    Path 11 [4:0:5:1] (up-15)  : Normal
----------------------------------------------------
```

System Response

The following table explains some parameters in the command output:

Parameter	Description	Default Value
Disk	Name of the disk that corresponds to the virtual LUN on an host.	None
Name	Name of the virtual LUN **NOTE** The name is specified when the LUN is created on its storage array.	None
Status	Status of the virtual LUN. Possible values are as follows: ● Normal: The virtual LUN is normal. ● Fault: The virtual LUN is faulty. ● Degraded: The virtual LUN is degraded. ● Unavailable: The virtual LUN is unavailable. **NOTE** ● If the LUN on the array is in **Fault** state while the virtual LUN on the host is in **Available** state (viewed by using UltraPath), the virtual LUN can be accessed by the host. ● If you remap a LUN from the storage array to a host but do not rescan LUNs on the host, the mapping between the LUN on the storage array and the virtual LUN changes and the status of the virtual LUN is **Unavailable**.	None
Capacity	Capacity of the virtual LUN	None
Product Name	Model of the storage system	None

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Parameter	Description	Default Value
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
Manual IO Suspension	Manual I/O suspension time of the virtual LUN.	None
Aggregation Type	Type of the aggregation LUN. Possible values are as follows: ● Hyper Metro: virtual HyperMetro LUNs ● Migration: virtual migration LUNs.	None
Aggregation Specific Attribution	Attribution of the aggregation LUN. For virtual HyperMetro LUNs: ● WorkingMode: working mode for virtual HyperMetro LUNs. ● Primary Array SN: SN of the primary array. For migration virtual LUNs: ● IO Direction: switch I/O to the target array or source array. ● Rollback: enable or disable automatic I/O switchback.	None

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Parameter	Description	Default Value
No. of Paths(Available/ Total)	Number of available logical paths of virtual LUNs/Total number of logical paths of virtual LUNs. **NOTE** ● **Available**: Indicates number of available logical paths of virtual LUNs. ● **Total**: Indicates total number of logical paths of virtual LUNs.	None

A.4.4 Configuring I/O Switchover

Function

The **start migration** is used to switch over I/Os to the target array or the source array.

Format

start migration vlun_id=*ID* **direction**={ *source* | *target* } **rollback**={ *enable* | *disable* }

Parameters

Parameter	Description	Default Value
vlun_id=*ID*	ID of a virtual LUN. Run the **show vlun** command to obtain the ID of a virtual LUN.	None
direction={ *source* | *target* }	Switch I/O to the target array or source array. Possible values are source and target, where: ● source: switch I/O to the source array. ● target: switch I/O to the target array.	None

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Parameter	Description	Default Value
rollback={ *enable* | *disable* }	Enable or disable automatic I/O switchback. Possible values are enable or disable, where: ● enable: automatic I/O switchback is enabled. If an online migration fails, I/Os can be switched back to the source array. **NOTE** This value can be used only when **direction** equals *target*. ● disable: automatic I/O switchback is disabled. If an online migration fails, I/Os cannot be switched back to the source array.	None

Level

User **root**

Usage Guidelines

None

Example

Switch over the I/Os of the LUN whose ID is **0** to the target array and enable automatic switchback.

```
UltraPath CLI #3 >start migration vlun_id=0 direction=target rollback=enable
Succeeded in executing the command.
```

System Response

None

A.4.5 Suspending I/Os of a Virtual LUN

Function

The **start iosuspension** command is used to suspend I/Os of a specific LUN.

Format

start iosuspension vlun_id=*ID* **timeout**=*time*

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Parameters

Parameter	Description	Default Value
vlun_id=*ID*	ID of a virtual LUN. Run the **show vlun** command to obtain the ID of a virtual LUN.	None
timeout=*time*	I/O suspension timeout period. The value ranges from 1 to 2,592,000, expressed in seconds. You are advised to set the value to 20 seconds.	None

Level

User **root**

Usage Guidelines

start iosuspension is a blocking command. It runs only when all I/Os of a specific LUN return to UltraPath.

Example

Set the I/O suspension time of the LUN whose ID is **0** to 20 seconds.

```
UltraPath CLI #3 >start iosuspension vlun_id=0 timeout=20
Succeeded in executing the command.
```

System Response

None

A.4.6 Stopping I/O Suspension of a Virtual LUN

Function

The **start iosuspension** command is used to stop I/O suspension of the a specific LUN.

Format

stop iosuspension vlun_id=*ID*

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Parameters

Parameter	Description	Default Value
vlun_id=*ID*	IDs of the virtual LUNs. Run the **show vlun** command to obtain the ID of a virtual LUN.	None

Level

User **root**

Usage Guidelines

None

Example

Stop I/O suspension of the virtual LUN whose ID is **0**.

```
UltraPath CLI #3 >stop iosuspension vlun_id=0
Succeeded in executing the command.
```

System Response

None

A.5 Other UltraPath Commands

This section describes UltraPath commands that are not included in the preceding command categories.

Except the CLI management commands of upadmin, UltraPath V100R008 and later versions support some common **upadm** commands as well as all the commands in the upadmin environment, as shown in **Table 6-3**. For details about these commands, see **A.5.33 Common upadm Commands**.

Table A-3 upadm commands

Command name	Command Function
upadm help	Displaying the brief help information of upadm
upadm show path	Displaying the path information
upTools -*S*	
upadm show array	Display the information about all storage systems managed by the UltraPath
upTools -*a*	

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Command name	Command Function
upadm show option	Display the current value of each parameter of the UltraPath
upadm show version	Display the UltraPath version
upTools -*V*	
upadm show connectarray	Display the information about all storage systems connected to the server
upadm show lun array=array_id {dev=*lun_id***}**	Display the information about the specified storage system managed by the UltraPath
upadm show iostat array=array_id {*lun=lun_id interval=seconds*}	Display the I/O performance statistics
upadm start hotscan	Identify the LUN dynamically
upadm start updateimage	Update the system configuration
upadm set lbcontroller={*on* | *off*}	Set whether to enable load balancing between controllers
upadm set failover={*on* | *off*}	Set whether to enable the switchover between operating and owning controllers of the LUN
upadm set failback_interval=seconds	Set the failback latency
upadm set iopolicy	Set the load balancing algorithm
upadm set holdio={*0* | *1*} [**timeout**=*seconds*]	Set the type and time-out period of the I/O hang function for the current application server

A.5.1 Updating the System Image File

Function

Updates the system image file.

Format

upLinux updateImage

Parameters

None

Level

User **root**

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Usage Guidelines

After this parameter is used, a new system image file is generated in the **/boot** directory. When the UltraPath is installed using the SAN Boot method, you must first update the system image file before you save the changes to the parameters of UltraPath. When the UltraPath is installed using the boot from Local method first time, you must run this command to make the HBA parameters setting effect.

Example

None

System Response

None

A.5.2 Upgrading the Operating System Kernel (UltraPath Is Not Reinstalled)

Function

The **upLinux updateForNewKernel** command applies to scenarios where the operating system kernel is upgraded in boot from SAN mode and UltraPath is not reinstalled.

Format

upLinux updateForNewKernel

Parameters

None

Level

User root

Usage Guidelines

After the command is executed, the kernel will be obtained from the default BootLoader startup item in system boot mode. UltraPath loads its kernel module to the system kernel that is obtained, generates a new system image, and modifies the system startup item. The modifications take effect after the operating system is restarted.

Example

```
[root@localhost RHEL]# upLinux updateForNewKernel
The new kernel is 2.6.32-220.el6.x86_64.
The running service is deleted successfully.
The UltraPath startup guide items are deleted successfully.
remove nxup from dracut.
The UltraPath files are deleted successfully.
User configuration is saved successfully.
append nxup to dracut.
The mirror is updated successfully.
append UltraPath title to bootloader successfully.[/boot/grub/menu.lst]
```

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```
The running service is installed successfully.
The system kernel is updated successfully in UltraPath. Please reboot.
```

System Response

None

A.5.3 Updating LUN Information

The Linux operating system cannot automatically detects mapping changes made on the storage side. To help users manage storage deices more easily and efficiently, the UltraPath provides the **upRescan** command for users to update LUN information.

Function

The **upRescan** command is used to update LUN information.

Format

upRescan

Parameters

None

Level

User **root**

Usage Guidelines

Updating LUN information includes the following aspects:

- Increasing or reducing LUN mappings
- Changing LUN mappings
- Increasing or reducing the number of paths
- Increasing or reducing disk arrays

NOTE

The **hot_add** command is an **upRescan** link that is compatible with the old version's command used to scan for LUNs.

Example

Run the **upRescan** command.

```
#upRescan
Begin deleting non-existent luns.
Begin deleting Luns which have been changed.
Begin scan [host3]
Begin scan [host4]
rescan compelete.
```

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System Response

None

A.5.4 Generating a Random Number

Function

The **genprkey** command is used to generate a random 19-digit number.

Format

genprkey

Parameters

None

Level

User **root**

Usage Guidelines

Run the command once when UltraPath is being installed. The random 19-digit number will be written to the configuration file to make the UltraPath work in a SCSI-2 cluster environment.

Example

Run the **upadmin** command to log in to the CLI. Then run the **genprkey** command to generate a random 19-digit number.

```
UltraPath CLI #1 >genprkey
1688015227050849615
```

System Response

None

A.5.5 Query the Timeout Period of a SCSI Device

Function

The **upLinux show scsi_timeout** command is used to query the timeout period of a SCSI device that is taken over by UltraPath.

Format

upLinux show scsi_timeout

Parameters

None

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Level

User **root**

Usage Guidelines

After the command is executed, the timeout period of a SCSI device that is taken over by UltraPath will be read and displayed. If the timeout period of the SCSI device is different from that in the udev file of UltraPath, the device information will be displayed.

NOTE

SUSE 9 and Red Hat 4 do not support the command.

Example

Run the **upLinux show scsi_timeout** command.

```
#upLinux show scsi_timeout
scsi timeout:30
```

System Response

None

A.5.6 Modify the Timeout Period of a SCSI Device

Function

The **upLinux set scsi_timeout** command is used to modify the timeout period of a SCSI device that is taken over by UltraPath.

Format

upLinux set scsi_timeout=*num*

Parameters

Parameter	Description	Default Value
num	Timeout period that has been set. It is expressed in seconds.The value ranges from 1 to 600.	30

Level

User **root**

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Usage Guidelines

After the command is executed, the timeout period in the udev file of UltraPath will be modified and the value of this parameter will be synchronized to the SCSI device that is taken over by UltraPath.

NOTE

- If third-party udev rules are used to modify the timeout period of the SCSI device, the command cannot be used to modify the timeout period of the SCSI device that is taken over by UltraPath.
- SUSE 9 and Red Hat 4 do not support the command.

Example

Run the **upLinux set scsi_timeout** command.

```
#upLinux set scsi_timeout=30
Succeeded in changing the value of the timeout parameter in the 99-
ultrapath.rules to 30.
Succeeded in modifying the timeout parameter of the SCSI devices managed by
UltraPath.
```

System Response

None

A.5.7 Configuring Automatic Startup of InfiniBand Drivers

Function

The **upLinux config ib** command is used to configure automatic startup of InfiniBand drivers.

Format

upLinux config ib

Parameters

None

Level

User **root**

Usage Guidelines

- This command can be executed only on the 64-bit Red Hat Enterprise Linux V6.1, Red Hat Enterprise Linux V6.3, and SUSE 11SP3 operating systems.
- This command only supports a direct-connection network between a host with InfiniBand HCAs and the storage system.
- Running this command adds the subnet management (**opensm**) and link management (**run_srp_daemon**) configurations of InfiniBand drivers to host system services and automatically reports disk arrays connected to InfiniBand interface modules to the host for takeover.

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Example

Configure automatic startup of InfiniBand drivers.

```
# upLinux config ib
Warning: This command can only be used in direct connection mode, verify the
networking environment before running this command. Do you want to go?
<Y|N>:y
Config ib successfully.
```

System Response

None

A.5.8 Querying InfiniBand Driver Configurations

Function

The **upLinux show ib_config** command is used to query InfiniBand driver configurations.

Format

upLinux show ib_config

Parameters

None

Level

User **root**

Usage Guidelines

- This command can be executed only on the 64-bit Red Hat Enterprise Linux V6.1, Red Hat Enterprise Linux V6.3, and SUSE 11SP3 operating systems.
- You can run this command to query whether automatic startup of InfiniBand drivers has been added to system services and whether the subnet management (**opensm**) and link management (**run_srp_daemon**) have been configured for each port on the InfiniBand interface module. If subnet management and link management are configured for the InfiniBand ports, **normal** is displayed. Otherwise, **abnormal** is displayed.

Example

Query InfiniBand driver configurations.

```
# upLinux show ib_config
UltraPath IB service is configured.
IB port information:
mlx4_0:port1  normal
mlx4_0:port2  normal
```

System Response

None

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A.5.9 Clearing InfiniBand Driver Configurations

Function

The **upLinux unconfig ib** command is used to clear InfiniBand driver configurations.

Format

upLinux unconfig ib

Parameters

None

Level

User **root**

Usage Guidelines

- This command can be executed only on the 64-bit Red Hat Enterprise Linux V6.1, Red Hat Enterprise Linux V6.3, and SUSE 11SP3 operating systems.
- You can run this command to clear the subnet management (**opensm**) and link management (**run_srp_daemon**) from system services, and cancel automatic startup configurations of InfiniBand drivers.

Example

Clear InfiniBand driver configurations.

```
# upLinux unconfig ib
Warning: The operation will clear up the configuration of ib. Do you want to go
on?
<Y|N>:y
Unconfig ib successfully.
Warning: The operation will stop opensm and run_srp_daemon of all ib ports. Do
you want to go on?
<Y|N>:y
Stop opensm and run_srp_daemon successfully.
```

System Response

None

A.5.10 Timeout Parameter Settings upon a Link Interruption Failure

Function

upLinux set linkdown_tmo is used to set the timeout interval for the HBA to return the **linkdown** error code after a link is down.

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Format

upLinux set linkdown_tmo=*timeout*

Parameters

Parameter	Description	Default Value
timeout	Timeout interval The value ranges from 1 to 60, expressed in seconds.	None

Level

User **root**

Usage Guidelines

- If this parameter is modified, the time required by the system to delete disks upon a link interruption failure is changed. A smaller value indicates that less time is required for deleting disks.
- This command modifies driver parameters and applies to all storage device links on the host.

Example

This example shows how to set link interruption timeout to 5 seconds.

```
# upLinux set linkdown_tmo=5
Warning: This command will modify the driver's parameters, which affects the time
taken to delete a disk when a link is down. This modification also has an impact
on all storage ports that connect to the host. Are you sure you want to modify
the parameters?
<Y|N>:y
The linkdown tmo is set to 5.
```

System Response

None

A.5.11 Querying Timeout Parameter Settings upon a Link Interruption Failure

Function

upLinux show linkdown_tmo is used to query timeout interval upon a link interruption failure.

Format

upLinux show linkdown_tmo

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Parameters

None

Level

User **root**

Usage Guidelines

None

Example

This command shows how to query timeout interval upon a link interruption failure.

```
# upLinux show linkdown_tmo
linkdown tmo:5.
```

System Response

None

A.5.12 Clearing Timeout Parameter Settings upon a Link Interruption Failure

Function

upLinux unset linkdown_tmo is used to clear timeout parameter settings upon a link interruption failure.

Format

upLinux unset linkdown_tmo

Parameters

None

Level

User **root**

Usage Guidelines

This command clears timeout parameter settings upon a link interruption failure and restores the parameter to the value before modification.

Example

This example shows how to to clear timeout parameter settings upon a link interruption failure.

```
# upLinux unset linkdown_tmo
```

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```
Unset the linkdown tmo successfully.
```

System Response

None

A.5.13 Updating the Status of Virtual LUNs

Function

Updates the status of virtual LUNs to check for the changes of LUN mappings. **hot_add** is a symbolic link file of **upRescan**. This command provides the same function as the **upRescan** command does.

Format

hot_add [**-m** | **-q** | **-f** | **-force** | **-s** | **-su**]

Parameters

Keyword and Parameter	Description	Default Value
-m	Delete Luns which had not been managed by UltraPath without mutual information.	None
-q	Delete Luns which had not been managed by UltraPath with mutual information.	None
-f	Delete no-mapped virtual disks.	None
-force	Delete virtual disks that do not have physical paths.	None
-s	Show interaction information to confirm whether you want to delete the LUNs not managed by UltraPath. The parameter is used when the UltraPath module is not loaded.	None
-su	Do not delete the LUNs that have been managed by UltraPath and trigger the reporting of newly mapped LUNs.	None

Level

User **root**

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Usage Guidelines

The LUN information needs to be updated under the following conditions:

- LUN mappings have been added or deleted.
- LUN mappings have been changed.
- Paths have been added or deleted.
- Storage arrays have been added or deleted.

Example

None

System Response

None

A.5.14 Showing Array Models Supported by the UltraPath

Function

The **show supportarraylist** command is used to show all disk array models supported by the UltraPath.

Format

show supportarraylist

Parameters

None

Level

User **root**

Usage Guidelines

None

Example

Show all disk array models supported by the UltraPath.

```
UltraPath CLI #0 >show supportarraylist
Vendor Product
------------------------------
HUAWEI S6800E
HUAWEI V1500
HUAWEI V1500N
HUAWEI V1800
HUAWEI S2100
HUAWEI S2300
HUAWEI S2300E
HUAWEI S2600
```


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```
HUAWEI S2900
HUAWEI S5300
HUAWEI S5100
HUAWEI S5500
HUAWEI S5600
HUAWEI S8000-I
HUAWEI V1600N
HUAWEI S3900
HUAWEI S6900
HUAWEI S2200T
HUAWEI S2600T
HUAWEI S5500T
HUAWEI S5600T
HUAWEI S5800T
HUAWEI S6800T
HUAWEI S3900-M200
HUAWEI S3900-M300
HUAWEI S5900-M100
HUAWEI S5900-M200
HUAWEI S6900-M100
HUAWEI Dorado2100
HUAWEI Dorado5100
HUASY    S2600T
HUASY    S3900
HUASY    S5300
HUASY    S2200T
HUASY    S6900
HUASY    S5500T
HUASY    S5600T
HUASY    S5800T
HUASY    S6800T
HUASY    S3900-M200
HUASY    S3900-M300
HUASY    S5900-M100
HUASY    S5900-M200
HUASY    S6900-M100
HUASY    S8000-I
HUASY    Dorado2100
HUASY    Dorado5100
HUAWEI VIS6000
HS       VIS6000
HUAWEI VIS6000T
HS       VIS6000T
HS       V1500
HS       V1500N
HS       V1800
HS       S2100
HS       S2300
HS       S2300E
HS       S2600
HS       S2600T
HS       S5100
HS       S5300
HS       S5500
HS       S5600
HS     S6800E
HS       V1600N
HS       S8000-I
HS       S8000
HUAWEI S8000
HUAWEI Dorado2100 G2
HUAWEI HVS85T
HUAWEI HVS88T
HUAWEI XSG1
Marstor  XSG1
UDsafe XSG1
SanM     XSG1
AnyStor  XSG1
SUGON    XSG1
```

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```
NETPOSA  XSG1
------------------------------
```

System Response

None

A.5.15 Adding a Disk Array Model Supported by the UltraPath

Function

The **add supportarraylist** command is used to add a disk array model supported by the UltraPath.

Format

add supportarraylist vendor=<*vendor_id*> **product**=<*product_id*>
[**driver**=<*driver_type*>]

Parameters

Keyword and Parameter	Description	Default Value
vendor=<*vendor_id*>	Vendor ID of a disk array. **NOTE** The ID contains a maximum of 8 characters. The space at the beginning and end of the ID are omitted. It is recommended that double quotation marks ("") are used to mark a vendor ID. If a vendor ID contains spaces, it must be marked with double quotation marks. The number of characters is a value ranging from 32 to 126 (32 ≤ ASCII code ≤ 126). The following characters are not supported: #^&=|\;><,"	None

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Keyword and Parameter	Description	Default Value
product=<*product_id*>	Product ID of a disk array. **NOTE** The ID contains a maximum of 16 characters. The space at the beginning and end of the ID are omitted. It is recommended that double quotation marks ("") are used to mark a vendor ID. If a vendor ID contains spaces, it must be marked with double quotation marks. The number of characters is a value ranging from 32 to 126 (32 ≤ ASCII code ≤ 126). The following characters are not supported: #^&=|\;><,"	None
driver=<*driver_type*>	Driver type of a disk array. The value is **default**. **NOTE** It is recommended that double quotation marks ("") are used to mark the driver type of a disk array.	None

Level

User **root**

Usage Guidelines

Run this command when the related disk array is mapped to the host. If you want the UltraPath to manage an LUN mapped to the host after this command is executed, map the LUN to the host again after deleting the mapping.

NOTE

This command is inapplicable to UVP SAN Boot scenarios.

Example

Add a disk array model supported by the UltraPath.

```
UltraPath CLI #0 >add supportarraylist vendor="HUAWEI" product="S2600T"
driver="default"
Execute this command may affect the stability of the application you're running
or even result in more serious consequences.
You will add the array's information: vendor="HUAWEI" product="S2600T"
driver="default".
Are you sure still want to execute it [y,n]: y
Command executed successfully.
```

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System Response

None

A.5.16 Deleting a Disk Array Model Supported by the UltraPath

Function

The **del supportarraylist** command is used to delete a disk array model supported by the UltraPath.

Format

del supportarraylist vendor=<*vendor_id*> **product**=<*product_id*>

Parameters

Keyword and Parameter	Description	Default Value
vendor=<*vendor_id*>	Vendor ID of a disk array. **NOTE** The ID contains a maximum of 8 characters. The space at the beginning and end of the ID are omitted. It is recommended that double quotation marks ("") are used to mark a vendor ID. If a vendor ID contains spaces, it must be marked with double quotation marks. The number of characters is a value ranging from 32 to 126 (32 ≤ ASCII code ≤ 126). The following characters are not supported: #^&=|\;><,"	None
product=<*product_id*>	Product ID of a disk array. **NOTE** The ID contains a maximum of 16 characters. The space at the beginning and end of the ID are omitted. It is recommended that double quotation marks ("") are used to mark a vendor ID. If a vendor ID contains spaces, it must be marked with double quotation marks. The number of characters is a value ranging from 32 to 126 (32 ≤ ASCII code ≤ 126). The following characters are not supported: #^&=|\;><,"	None

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Level

User **root**

Usage Guidelines

- In Linux, a mapped disk array model can be deleted.
- Run this command when the related disk array is mapped to the host. If you want the UltraPath not to manage an LUN mapped to the host after this command is executed, delete the mapping. If you want to enable another multipathing software or host to take over an LUN, map the LUN to the host again.

NOTE

This command is inapplicable to UVP SAN Boot scenarios.

Example

Delete a disk array model supported by the UltraPath.

```
# upadmin del supportarraylist vendor="HUAWEI" product="S2600T"
Execute this command may affect the stability of the application you're running
or even result in more serious consequences.
You will delete the array's information: vendor="HUAWEI" product="S2600T".
Are you sure still want to execute it [y,n]: y
Command executed successfully.
```

System Response

None

A.5.17 Performing Read Operations on Security

Function

Security reads disks.

Format

updd if=*xx,xx*

Parameters

Keyword and Parameter	Description	Default Value
if=*xx,xx*	Indicates the name of a virtual disk.	None

Level

User **root**

Usage Guidelines

None

Example

Perform read operations on **/dev/sdc**. Enter **updd if=/dev/sdc**.

After data is read for a certain period, press **Ctrl+C** to terminate the **updd** command.

```
# updd if=/dev/sdc
1146081+0 records in.
1146080+0 records out.
```

System Response

None

A.5.18 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_mem_size**=*xxx*] [**ndu_used_cpu_percent**=*yyy*] [**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_mem_size	Set the minimum system memory for an non-disruptive upgrade. The unit is MB.	200
ndu_used_cpu_percent	Set the maximum CPU usage for an non-disruptive upgrade. The value ranges from 0 to 100.	80
ndu_free_disk_space	Set the minimum system disk capacity for an non-disruptive upgrade. The unit is MB.	200

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Level

User **root**

Usage Guidelines

Run the command to execute a non-disruptive upgrade of UltraPath.

Example

None

System Response

None

A.5.19 Disabling the Host Restart Notification Function

Function

Disables the host restart notification function.

Format

stop_up_restart_warn

Parameters

None

Level

User **root**

Usage Guidelines

None

Example

None

System Response

None

A.5.20 Viewing the Status of the Host Alarm Push Switch

Function

show alarmenable is used to view the status of the host alarm push switch.

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Format

show alarmenable

Parameters

None

Level

User **root**

Usage Guidelines

None

Example

View the alarm push switch for UltraPath:

```
UltraPath CLI #0 >show alarmenable
alarmenable: on
```

System Response

None

A.5.21 Setting the Switch of Host Alarm Push

Function

set alarmenable is used to set the switch of host alarm push.

Format

set alarmenable={ *on* | *off* }

Parameters

Parameter	Description	Default Value
alarmenable={ *on* | *off* }	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

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Level

User **root**

Usage Guidelines

- When the alarm push switch is enabled, UltraPath will detect the single-controller connectivity, link down, and link degrade, and send the link status to the storage system through alarms.
- When the alarm push switch is disabled, the alarms reported by UltraPath to arrays cannot be cleared on the arrays. Therefore, disable the switch cautiously.

Example

Disable the alarm push switch for UltraPath:

```
UltraPath CLI #0 >set alarmenable=off
If you close alarm enable, the host would not push alarm to the array, and the
alarm in array will not be cleared.
Are you sure you want to continue? [y,n]: y
Succeeded in executing the command.
Please clear the alarm in the array manually, thanks.
```

System Response

None

A.5.22 Viewing the Status of the UltraPath Link Degrade Switch

Function

show path_reliability_enable is used to view the status of the UltraPath link degrade switch.

Format

show path_reliability_enable

Parameters

None

Level

User **root**

Usage Guidelines

None

Example

View the status of the UltraPath link degrade switch:

```
UltraPath CLI #0 >show  path_reliability_enable
path reliabilityenable: on
```


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System Response

None

A.5.23 Setting the Switch for UltraPath Link Degrade

Function

set path_reliability_enable is used to set the switch for UltraPath link degrade.

Format

set path_reliability_enable={ *on* | *off* }

Parameters

Parameter	Description	Default Value
path_reliability_enable={ *on* | *off* }	Link degrade 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:

```
UltraPath CLI #0 >set path_reliability_enable=off
If you close reliability enable, this would abandon the path reliability check
and may infect the performance.
Are you sure you want to continue? [y,n]: y
Succeeded in executing the command.
```

System Response

None

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A.5.24 Cancelling I/O Suspension of the Disk

Function

The **set stop_iosuspension** command is used to cancel I/O suspension of the disk that corresponds to specific **scsi_disk**.

Format

set stop_iosuspension *disk_id*

Parameters

Keyword and Parameter	Description	Default Value
disk_id	ID of a physical disk	None

Level

User **root**

Usage Guidelines

This command is used to cancel I/O suspension of a specific disk only when disks are deleted within UltraPath. In other scenarios, running this command may disable the I/O suspension function. Therefore, run this command cautiously.

Example

Run the command to cancel I/O suspension of the disk that corresponds to **scsi_disk**.

```
UltraPath CLI #0 >set stop_iosuspension 3
UltraPath CLI #0 >
```

System Response

None

A.5.25 Clearing Inactive Drivers in Online Upgrade Process

Function

The **ouc** command is used to clear drivers that do not take effect during an online upgrade.

Format

ouc -r

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Parameters

Parameter	Description	Default Value
-r	Clear drivers that do not take effect during an online upgrade.	None

Level

User **root**

Usage Guidelines

Use CLI to switch to the **/UltraPath/install/otherTools** directory where UltraPath for Linux is installed 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.5.26 Preparing the UVP SAN Boot Environment

Function

The **fs_sanboot_env_update** command is used to prepare the UVP SAN Boot environment.

Format

fs_sanboot_env_update

Parameters

None

Level

User **root**

Usage Guidelines

In UVP SAN Boot scenarios, after UltraPath is installed, you can run this command to prepare the environment for UltraPath to support SAN Boot.

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Example

None

System Response

None

A.5.27 Viewing the Running Status of the UltraPath Working Thread

Function

The **show workerstate** command is used to view the running status of the UltraPath working thread.

Format

show workerstate

Parameters

None

Level

User **root**

Usage Guidelines

This command is used to show the status of the UltraPath working thread. Administrators can view last refresh time and present time to determine whether the working thread is blocked and calculated the block duration.

Example

View the status of the UltraPath working thread.

```
UltraPath CLI #0 > 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
```

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```
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
present time	Current system time, that is, execution time of the command.	None

A.5.28 Configuring I/O Suspension Support Policy (Applicable to UVP Cluster Scenarios)

Function

set suspendioforcluster is used to set whether to support I/O suspension in UVP cluster scenarios.

NOTE

This command only applies to a cluster in reservation mode.

Format

set suspendioforcluster={*on*|*off*} [**array_id**=*ID* | **vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* }]

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Parameters

Parameter	Description	Default Value
suspendioforcluster={*on*|*off*}	I/O suspension support policy in cluster scenarios The value can be **on** or **off**. ● on: supports I/O suspension in cluster scenarios. ● off: does not support I/O suspension in cluster scenarios.	off
array_id=*ID*	Storage system ID Run the **show array** command without parameters to obtain IDs of storage arrays.	None
vlun_id={ *ID* | *ID1,ID2...* | *ID1-ID2* }	ID of a virtual LUN Run the **show vlun type**=*all* command to query the ID information about all virtual LUNs.	None

Level

User **root**

Usage Guidelines

- Run **set suspendioforcluster**={*on*|*off*} to set the I/O suspension support policy in all cluster scenarios of storage systems.
- Run **set suspendioforcluster**={*on*|*off*} **array_id**=*ID* to set the I/O suspension support policy in a specified cluster scenario of storage systems.
- Run **set suspendioforcluster**={*on*|*off*} **vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* } to set the I/O suspension support policy in a specified virtual LUN cluster scenario.

NOTE

- **vlun_id**=*ID*: ID of a single virtual LUN.
- **vlun_id**=*ID1,ID2...*: IDs of multiple virtual LUNs which are not necessarily related.
- **vlun_id**=*ID1–ID2*: IDs of all the virtual LUNs from ID1 to ID2.

- Run **A.3.2 Querying Configuration File Information** to check the I/O suspension support policy in a cluster scenario.

Example

Set the storage system with an ID of **0** to support I/O suspension in a cluster scenario.

```
UltraPath CLI #3 >set suspendioforcluster=on array_id=0
```


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```
The current configuration will overwrite the configuration of all VLUNs in this
array.
Are you sure you want to continue? [y,n]: y
Succeeded in executing the command.
```

System Response

None

A.5.29 Configuring Disk or Partition Aliases

This section describes the commands used to configure the alias of a specific disk or to batch configure disk aliases.

A.5.29.1 Configuring the Alias of a Specific Disk or Partition

Function

The **upLinux setDiskAlias** command is used to configure the alias of a specific disk or partition.

Format

upLinux setDiskAlias src_name=*name* **dest_alias**=*name* [**owner**=*user* **group**=*group* **method**={*SYMLINK*|*NAME*}]

Parameters

Parameter	Description	Default Value
src_name=*name*	Name of the original disk drive or disk partition. It can include uppercase letters, lowercase letters, digits, underscores, and hyphens.	None
dest_alias=*name*	Disk alias. A maximum of 32 characters are supported. It can include uppercase letters, lowercase letters, digits, underscores, and hyphens. The prefix cannot be started with **sd**.	None
owner=*user*	User name. This is an optional parameter identifying the alias rule, which allows certain users to access the disk device. If the parameter is not set, the default value of the operating system is used.	None

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Parameter	Description	Default Value
group=*group*	User group name. This is an optional parameter identifying the alias rule, which allows certain user groups to access the disk device. If the parameter is not set, the default value of the operating system is used.	None
method={*SYMLINK*|*NAME*}	Method of creating an alias. **SYMLINK** indicates creating a link drive letter device that points to the original disk. **NAME** indicates creating a new alias device. This is an optional parameter. When it is not set, **SYMLINK** is used by default. **NOTE** RHEL7.X series, CentOS7.X series, Oracle7.X series, SUSE12SPX operating systems do not support the **NAME** method.	SYMLINK

Level

root user

Usage Guidelines

- The following table lists the operating systems supported by this command.

Operating System	Version
SUSE	SUSE11SPX series, SUSE12SPX series
Oracle	Oracle6.X series, Oracle7.X series
RHEL	RHEL6.X series, RHEL7.X series
CentOS	CentOS6.X series, CentOS7.X

- This command is used to generate a disk alias based on the system's udev rule. If the udev rule file has been damaged or an udev rule has been configured for the disk using another method, the command may not be effective.

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NOTE

- To create an alias for a disk partition, you need to create disk partitions for the original drive device and then run this command to bind the alias of the partition.
- After the command is executed, the generated disk or partition aliases are stored in the **/dev/ultrapath** directory.

Example

1. **test** is configured as the alias of the **sdb** disk. The user's access permission is **root**, the user group's access permission is **disk**. The method of creating the alias is **SYMLINK**.
```
[root@localhost /]# upLinux setDiskAlias src_name=sdb dest_alias=test
owner=root group=disk method=SYMLINK
Succeeded in executing the command.
```
2. **test1** is configured as the alias of the **sdb1** disk. The user's access permission is **root**, the user group's access permission is **disk**. The method of creating the alias is **NAME**.
```
[root@localhost /]# upLinux setDiskAlias src_name=sdb1 dest_alias=test1
owner=root group=disk method=NAME
Succeeded in executing the command.
```

System Response

None

A.5.29.2 Batch Configuring Disk Aliases

Function

The **upLinux setGlobalDiskAlias** command is used to batch configure disk aliases.

Format

upLinux setGlobalDiskAlias alias_prefix=*name* [**owner**=*user* **group**=*group* **method**={*SYMLINK*|*NAME*}]

Parameters

Parameter	Description	Default Value
alias_prefix=*name*	Disk alias prefix. A prefix can contain up to 22 characters, which can be uppercase letters, lowercase letters, digits, underscores, and hyphens. A prefix cannot be started with **sd**.	None

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Parameter	Description	Default Value
owner=*user*	User name. This is an optional parameter identifying the alias rule, which allows certain users to access the disk device. If the parameter is not set, the default value of the operating system is used.	None
group=*group*	User group name. This is an optional parameter identifying the alias rule, which allows certain user groups to access the disk device. If the parameter is not set, the default value of the operating system is used.	None
method={*SYMLINK*|*NAME*}	Method of creating an alias. **SYMLINK** indicates creating a link drive letter device that points to the original disk. **NAME** indicates creating a new alias device. This is an optional parameter. When it is not set, **SYMLINK** is used by default. **NOTE** RHEL7.X series, CentOS7.X series, Oracle7.X series, SUSE12SPX operating systems do not support the **NAME** method.	SYMLINK

Level

root user

Usage Guidelines

- The following table lists the operating systems supported by this command.

Operating System	Version
SUSE	SUSE11SPX series, SUSE12SPX series
Oracle	Oracle6.X series, Oracle7.X series
RHEL	RHEL6.X series, RHEL7.X series

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Operating System	Version
CentOS	CentOS6.X series, CentOS7.X

- This command is used to generate a disk alias based on the system's udev rule. If the udev rule file has been damaged or an udev rule has been configured for the disk using another method, the command may not be effective.

NOTE

- This command cannot be used to create an alias for a disk partition.
- This command cannot be used to batch configure disks that already have aliases.
- After the command is executed, the generated disk aliases are stored in the **/dev/ultrapath** directory.

Example

test is used as the prefix to batch configure the aliases of all the UltraPath-related disks. The user's access permission is **root**, the user group's access permission is **disk**. The method of creating aliases is **SYMLINK**.

```
[root@localhost /]# upLinux setGlobalDiskAlias alias_prefix=test owner=root
group=disk method=SYMLINK
Alias "test0" has been configured for disk "sdb".
Alias "test1" has been configured for disk "sdc".
Alias "test2" has been configured for disk "sdd".
Alias "test3" has been configured for disk "sde".
Alias "test4" has been configured for disk "sdf".
Alias "test5" has been configured for disk "sdg".
Alias "test6" has been configured for disk "sdh".
Succeeded in executing the command. All alias configurations succeeded.
```

System Response

None

A.5.30 Deleting the Aliases of Disks and Partitions

This section introduces commands used to delete the alias of a specific disk or to batch delete disk aliases.

A.5.30.1 Deleting the Alias of a Specific Disk or Partition

Function

The **upLinux unsetDiskAlias alias**=*name* command is used to delete the alias of a specific disk or partition.

Format

upLinux unsetDiskAlias alias=*name*

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Parameters

Parameter	Description	Default Value
alias=*name*	Disk alias. A maximum of 32 characters are supported. It can include uppercase letters, lowercase letters, digits, underscores, and hyphens. The prefix cannot be started with **sd**.	None

Level

root user

Usage Guidelines

- The following table lists the operating systems supported by this command.

Operating System	Version
SUSE	SUSE11SPX series, SUSE12SPX series
Oracle	Oracle6.X series, Oracle7.X series
RHEL	RHEL6.X series, RHEL7.X series
CentOS	CentOS6.X series, CentOS7.X

- This command is used to generate a disk alias based on the system's udev rule. If the udev rule file has been damaged or an udev rule has been configured for the disk using another method, the command may not be effective.

Example

Deleting the bound disk whose alias is **test**

```
[root@localhost /]# upLinux unsetDiskAlias alias=test
[WARNING] This operation will delete the device "test" using the disk alias.
Please ensure that the device will not be used any more.
Do you want to continue?
<Y|N>:y
Succeeded in executing the command.
```

System Response

None

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A.5.30.2 Batch Deleting Aliases of All Disks and Partitions

Function

The **upLinux unsetGlobalDiskAlias** command is used to delete the aliases of all bound disks and partitions.

Format

upLinux unsetGlobalDiskAlias

Parameters

None

Level

root user

Usage Guidelines

- The following table lists the operating systems supported by this command.

Operating System	Version
SUSE	SUSE11SPX series, SUSE12SPX series
Oracle	Oracle6.X series, Oracle7.X series
RHEL	RHEL6.X series, RHEL7.X series
CentOS	CentOS6.X series, CentOS7.X

- This command is used to generate a disk alias based on the system's udev rule. If the udev rule file has been damaged or an udev rule has been configured for the disk using another method, the command may not be effective.

Example

Deleting the aliases of all bound disks and partitions

```
[root@localhost /]# upLinux unsetGlobalDiskAlias
test0
test1
test2
test3
test4
test5
test6
[WARNING] This operation will delete all the devices using the disk aliases.
Please ensure that the devices will not be used any more.
Do you want to continue?
<Y|N>:y
Succeeded in executing the command.
```

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System Response

None

A.5.31 Checking Aliases of All Disks and Partitions

Function

The **upLinux showDiskAlias** command is used to check the aliases of all disks and partitions.

Format

upLinux showDiskAlias

Parameters

None

Level

root user

Usage Guidelines

- The following table lists the operating systems supported by this command.

Operating System	Version
SUSE	SUSE11SPX series, SUSE12SPX series
Oracle	Oracle6.X series, Oracle7.X series
RHEL	RHEL6.X series, RHEL7.X series
CentOS	CentOS6.X series, CentOS7.X

- This command is used to generate a disk alias based on the system's udev rule. If the udev rule file has been damaged or an udev rule has been configured for the disk using another method, the command may not be effective.

Example

Checking the aliases of all disks.

```
[root@localhost ~]# upLinux showDiskAlias
-------------------------------------------------------------------------------
    ID     Alias                    Lun WWN                    Disk     Type
    0      test0        60022a11000b84902bcf19ef00000001        sdb      SYMLINK
    1      test1      60022a11000b84906c91b1b6000000f3        sdc      SYMLINK
    2      test2        60022a11000b849001c5a013000000f9        sdd      SYMLINK
    3      test3        60022a11000b84905a1d4aa4000000ea        sde      SYMLINK
    4      test4        60022a11000b84905a1d4adb000000eb        sdf      SYMLINK
    5      test5        60022a11000b84905a1d4a67000000e9        sdg      SYMLINK
    6      test6        60022a11000b84905a1d4a30000000e8        sdh      SYMLINK
-------------------------------------------------------------------------------
```


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System Response

None

A.5.32 Deleting Invalid Alias Configurations

Function

The **upLinux unsetDiskAlias** command is used to delete invalid alias configurations.

Format

upLinux unsetDiskAlias

Parameters

None

Level

root user

Usage Guidelines

- The following table lists the operating systems supported by this command.

Operating System	Version
SUSE	SUSE11SPX series, SUSE12SPX series
Oracle	Oracle6.X series, Oracle7.X series
RHEL	RHEL6.X series, RHEL7.X series
CentOS	CentOS6.X series, CentOS7.X

- This command is used to generate a disk alias based on the system's udev rule. If the udev rule file has been damaged or an udev rule has been configured for the disk using another method, the command may not be effective.

Example

Deleting invalid alias configurations.

```
[root@localhost RHEL]# upLinux unsetDiskAlias
Succeeded in executing the command.
```

System Response

None

A.5.33 Common upadm Commands

This part introduces common **upadm** commands supported by UltraPath.

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A.5.33.1 Displaying the Brief Help Information of upadm

Function

You can run the **upadm help** command to query what parameters can be used by the **upadm** command.

Format

upadm help

Parameters

None

Level

User **root**

Usage Guidelines

None

Example

Display the brief help information.

```
[root@localhost ~]# upadm help
Usage: upadm [OPTION]
help
chkconfig
show  path
      array
      connectarray
      option
      version
      lun array=array_id [dev=lun_id]
      iostat array=array_id [lun=lun_id interval=seconds]
start hotscan
      updateimage
set lbcontroller={on | off}
      failover={on | off}
      failback_interval=seconds
      iopolicy={round_robin | least_io | least_block}
      iosuspensiontime=seconds
      holdio={0 | 1} [timeout=seconds]
[root@localhost ~]#
```

System Response

None

A.5.33.2 Displaying the Path Information

Function

The **upadm show** *path* command is used to display the path information.

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The command for the earlier version is:**upTools -S**.

Format

upadm show *path*

Parameters

None

Level

User **root**

Usage Guidelines

None

Example

Display the controller status and path information.

```
# upadm show path
------------------------------
Array ID : 0
Module Name : HUAWEI_S5100
ControllerA State : normal
Path State : H1C0T0L000 Up
             H1C0T0L001 Up
ControllerB State : normal
Path State : H2C0T0L000 Up
             H2C0T0L001 Up
------------------------------
```

System Response

After the command is executed, the fields listed in **Table A-4** are displayed.

Table A-4 Fields displayed by the **upadm show** *path* command

Field	Description
Array ID	ID of the storage system.
Module Name	Name of the storage system.

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Field	Description
ControllerX State	Status of the controller: ● offline: The controller is offline. ● normal: The controller runs normally. ● abnormal: The controller runs abnormally. ● not_exist: The controller is absent. ● unknown: The status of the controller is unknown. **NOTE** ● In the common networking, the value of **X** can be A (referring to controller A) or B (referring to controller B). ● In the virtual intelligent storage (VIS) mutli-node cluster networking, the value of **X** is an integer that ranges from 0 to 7, which refers to the node ID of the VIS.
Path State	Status of the path: ● Up: The path is normal. ● Down: The path is faulty.

A.5.33.3 Displaying the Information About All Storage Systems Managed by the UltraPath

Function

The **upadm show** *array* command is used to display the information about all storage systems managed by the UltraPath.

The command for the earlier version is:**upTools -a**.

Format

upadm show *array*

Parameters

Keyword and Parameter	Description	Default Value
array	storage system.	None

Level

User **root**

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Usage Guidelines

None

Example

```
[root@localhost ~]# upadm show array
Hostname    = localhost.localdomain
Domainname  = (none)
Time        = 02/07/2018 10:35:35
------------------------------------------------------------
Array managed by UltraPath.
------------------------------------------------------------
Array ID           WWN                          Module Name
 0          2102350SHY10G6000004                Storage-8Ctrl
------------------------------------------------------------
[root@localhost ~]#
```

System Response

After the command is executed, the fields listed in **Table A-5** are displayed.

Table A-5 Fields displayed by the **upadm show** *array* command

Field	Description
Hostname	Name of the AS.
Domainname	Domain name of the AS.
Time	Greenwich time.
Array managed by UltraPath.	Storage system managed by the UltraPath for Linux.
Array ID	ID of the storage system.
WWN	World wide name (WWN) of the storage system.
ModuleName	Name of the storage system.

A.5.33.4 Displaying the Current Value of Each Parameter of the UltraPath

Function

The **upadm show** *option* command is used to display the current value of each parameter of the UltraPath.

Format

upadm show *option*

Parameters

None

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Level

User **root**

Usage Guidelines

None

Example

Displaying the Current Value of Each Parameter of the UltraPath.

```
[root@localhost ~]# upadm show option
failback_interval = 600
iopolicy = least_io
lbcontroller = off
failover = on
holdio = 1, timeout = 60
[root@localhost ~]#
```

System Response

After the command is executed, the fields listed in **Table A-6** are displayed.

Table A-6 Fields displayed by the **upadm show** *option* command

Field	Description
failback_interval	Latency in seconds required for a LUN to be switched back to its owning controller after the controller recovers to its normal state. The value ranges from 0 to 36000.
iopolicy	Load balancing algorithm: ● round_robin: round robin algorithm. ● least_io: shortest path algorithm. ● least_block: smallest block algorithm.
lbcontroller	Load balancing status between controllers: ● on: Load balancing is enabled. ● off: Load balancing is disabled.
failover	Status of the switchover between the operating and owning controllers of the LUN. ● on: Switchover is enabled. ● off: Switchover is disabled.
holdio	I/O hang function. ● 0: Disabled. ● 1: Enabled. ● timeout: time in seconds for an I/O suspension to be timed out.

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A.5.33.5 Displaying the UltraPath Version

Function

The **upadm show** *version* command is used to display the UltraPath version.

The command for the earlier version is:**upTools -V**.

Format

upadm show *version*

Parameters

None

Level

User **root**

Usage Guidelines

None

Example

```
[root@localhost ~]# upadm show version
Version: V200R001
UltraPath for Linux: 21.02.045
[root@localhost ~]#
```

System Response

The actual version may be different.

A.5.33.6 Displaying the Information About All Storage Systems Connected to the Server

Function

The **upadm show** *connectarray* command is used to display the information about all storage systems connected to the server.

Format

upadm show *connectarray*

Parameters

None

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Level

User **root**

Usage Guidelines

None

Example

```
[root@localhost ~]# upadm show connectarray
Array connected by this Host.
-----------------------------------------------------
Array ID           WWN         Module Name
 0      2102350SHY10G6000004 Storage-8Ctrl
-----------------------------------------------------
-----------------------------------------------------
iSCSI Array:
-----------------------------------------------------
Index              WWN               iSCSI IP
 1)     210020f17c1abaa9      8.47.219.46 (non-flash)
                             8.47.220.46 (non-flash)
                               8.47.219.47 (non-flash)
-----------------------------------------------------
[root@localhost ~]#
```

System Response

After the command is executed, the fields listed in **Table A-7** are displayed.

Table A-7 Fields displayed by the **upadm show** *connectarray* comman

Field	Description
Array ID	ID of the storage system that is connected through the FC port.
WWN	WWN of the storage system.
Module Name	Name of the storage system.
iSCSI Array	Storage system that is connected through the iSCSI port.
Index	Index.
iSCSI IP	IP address of the server that is connected through the iSCSI port.

NOTE

When the OS is SUSE Linux Enterprise Server 9.0 SP3, the host port is the iSCSI port, the connection is only physical, and no LUN is added, the information about all the storage systems that are connected to the AS is displayed in **iSCSI Array.**

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A.5.33.7 Displaying the Information About the Specified Storage System Managed by the UltraPath

Function

The **upadm show lun array**=*array_id* {**dev**=*lun_id*} command is used to display the information about the specified storage system managed by the UltraPath.

Format

upadm show lun array=*array_id* {**dev**=*lun_id*}

Parameters

Keyword and Parameter	Description	Default Value
array_id	Description	None
lun_id	ID of the storage system. ID of the host LUN on the storage system. Here, the host refers to **HOST** displayed on the ISM/OSM interface and is a virtual host. The host corresponds to the physical AS only when a port is added to **HOST**.	None

NOTE

- ISM:Integrated Storage Manager
- OSM:OceanStor Storage Manager

Level

User **root**

Usage Guidelines

- *array_id* can be obtained by running the **upadm show** *array* command.
- *lun_id* can be obtained by logging in to the ISM/OSM.

Example

- Query the information about the storage system whose ID is 0.

```
[root@localhost ~]# upadm show lun array=0
Hostname    = localhost.localdomain
Domainname  = (none)
Time        = 02/07/2018 10:36:52
Array Module Information:
-------------------------
      ModuleName: Storage-8Ctrl                              SingleController:
```

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```
N
              SN: 2102350SHY10G6000004


Controller '3A' Status:
-----------------------
ControllerFailed: N                                      ControllerPresent:
Y
 NumberOfPaths: 2                                            ServiceMode: -

    Path #0
    ---------
 ProcDirectory: none                                         PathPresent: Y
       PathState: OPTIMAL
hostId: 3, targetId: 0, channelId: 0

    Path #1
    ---------
 ProcDirectory: none                                         PathPresent: Y
       PathState: OPTIMAL
hostId: 4, targetId: 0, channelId: 0

Controller '3B' Status:
-----------------------
ControllerFailed: N                                      ControllerPresent:
Y
 NumberOfPaths: 1                                            ServiceMode: -

    Path #2
    ---------
 ProcDirectory: none                                         PathPresent: Y
       PathState: OPTIMAL
hostId: 5, targetId: 0, channelId: 0
Information of Lun0 - WWN: 620f17c1001abaa922ea447e00000727    LUN Name:
ziyan0000
    ----------------
       LunObject: present                                CurrentOwningPath:
1B
        DevState: OPTIMAL                                   BootOwningPath:
-
 ReportedPresent: Y                                          PreferredPath:
1B
 ReportedMissing: -                                       FailoverInProgress:
-

    Controller '3A' Path
    --------------------
 NumLunObjects: 2                                         RoundRobinIndex: 0
        Path #0: LunPathDevice: present
                        IoCount: 0
                       DevState: OPTIMAL
        Path #1: LunPathDevice: present
                        IoCount: 0
                       DevState: OPTIMAL
    Controller '3B' Path
    --------------------
...
    Controller '3A' Path
    --------------------
 NumLunObjects: 2                                         RoundRobinIndex: 0
        Path #0: LunPathDevice: present
                        IoCount: 0
                       DevState: OPTIMAL
        Path #1: LunPathDevice: present
                        IoCount: 0
                       DevState: OPTIMAL
    Controller '3B' Path
    --------------------
 NumLunObjects: 1                                         RoundRobinIndex: 0
```

```
        Path #2: LunPathDevice: present
                       IoCount: 0
                      DevState: OPTIMAL
Information of Lun7 - WWN: 620f17c1001abaa922ea45ef0000072e    LUN Name:
ziyan0007
    ----------------
       LunObject: present                                CurrentOwningPath:
1B
        DevState: OPTIMAL                                   BootOwningPath:
-
 ReportedPresent: Y                                          PreferredPath:
1B
 ReportedMissing: -                                       FailoverInProgress:
-
    Controller '3A' Path
    --------------------
 NumLunObjects: 2                                          RoundRobinIndex: 0
        Path #0: LunPathDevice: present
                       IoCount: 0
                      DevState: OPTIMAL
        Path #1: LunPathDevice: present
                       IoCount: 0
                      DevState: OPTIMAL
    Controller '3B' Path
    --------------------
 NumLunObjects: 1                                          RoundRobinIndex: 0
        Path #2: LunPathDevice: present
                       IoCount: 0
                      DevState: OPTIMAL
[root@localhost ~]#
```

- Query the information about the storage system whose ID is 0 and LUN ID is 0.

```
[root@localhost ~]# upadm show lun array=0 dev=0
Information of Lun0 - WWN: 620f17c1001abaa922ea447e00000727    LUN Name:
ziyan0000
    ----------------
       LunObject: present                                CurrentOwningPath:
1B
        DevState: OPTIMAL                                   BootOwningPath:
-
 ReportedPresent: Y                                          PreferredPath:
1B
 ReportedMissing: -                                       FailoverInProgress:
-

    Controller '3A' Path
    --------------------
 NumLunObjects: 2                                          RoundRobinIndex: 0
        Path #0: LunPathDevice: present
                       IoCount: 0
                      DevState: OPTIMAL
        Path #1: LunPathDevice: present
                       IoCount: 0
                      DevState: OPTIMAL
    Controller '3B' Path
    --------------------
 NumLunObjects: 1                                          RoundRobinIndex: 0
        Path #2: LunPathDevice: present
                       IoCount: 0
                      DevState: OPTIMAL
[root@localhost ~]#
```

System Response

After the command is executed, the fields listed in **Table A-8** are displayed.

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Table A-8 Fields displayed by the **upadm show lun array**=*array_id* {**dev**=*lun_id*}

Field	Description
Hostname	Name of the AS.
Domainname	Domain name of the AS.
Time	Greenwich time.
Array Module Information: The following is the information about the storage system.	
ModuleName	Name of the storage system.
SingleController	Whether the connection between the controller on the storage system and the AS is the single connection. ● Y: single connection. ● N: dual-connection or multi-connection. **NOTE** ● Single connection indicates that the AS is connected to one controller on the storage system, and only this controller provides service to the AS. ● Dual-connection indicates that the AS is connected to two controllers on the storage system, and both controllers provide service to the AS. ● Multi-connection indicates that the AS and the storage system are connected by the VIS multinode cluster method.
SN	SN of the storage system.
Controller 'X' Status:The following is the information about the current controller on the storage system.	
ControllerFailed	Whether all the paths between the AS and the controller are failed. ● Y: failed. ● N: normal.
ControllerPresent	Whether the controller is present. ● Y: present. ● N: absent.
NumberOfPaths	Number of paths between the controller and the AS.

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Field	Description
ServiceMode	Status of the controller. ● Y: abnormal. ● N: normal. **NOTE** The failover and failback functions provided by the UltraPath for Linux are enabled only when the controller runs normally.
The following is the information about the path between the controller and the storage system.	
ProcDirectory	Whether the information that the multiple paths are established is displayed successfully in the **Proc** directory. ● present: successful. ● Null: failed.
PathPresent	Whether the path between the AS and the controller is available. ● Y: available. ● N: unavailable.
PathState	Status of the path: ● OPTIMAL: The path is in the optimal state. ● OPTIMAL_NEED_CHECK: Requires to check whether the path is in the optimal state. ● OPTIMAL_CHECKING: Checking whether the path is in the optimal state. ● FAILED: The path is in the failed state. ● FAILED_NEED_CHECK: Requires to check whether the path is in the failed state. ● FAILED_CHECKING: Checking whether the path is in the failed state.
hostId	HBA port ID.
targetId	Port ID of the storage system.
channelId	This field is not used currently and is reserved for later versions.
Lun Information: The following is the information about all the LUNs that are mapped from the storage system to the AS.	
WWN	WWN of the LUN.
LUN Name	Name of the LUN.

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Field	Description
LunObject	This field is not used currently and is reserved for later versions.
CurrentOwningPath	Controller through which the AS passes when accessing the LUN.
BootOwningPath	Current operating controller of the LUN during the system booting. The value can be A or B, or an integer that ranges from 0 to 7. A or B refers to controller A or B. The integer that ranges from 0 to 7 indicates the node ID of the VIS. Controller A is the left controller on the controller enclosure, and controller B is the right one.
ReportedPresent	Whether the LUN is detected by the AS. ● Y: The LUN is detected by the AS. ● N: The LUN is not detected by the AS.
PreferredPath	Owning controller of the LUN. **NOTE** Owning controller of the LUN: the controller to which the LUN belongs when LUNs are divided in the storage system.
ReportedMissing	Whether the LUN is not detected by the AS. ● Y: The LUN is not detected by the AS. ● N: The LUN is detected by the AS.
FailoverInProgress	Whether failover is being implemented on the LUN. ● Y: Yes. ● N: No.
NumLunObjects	Number of paths between the controller and the LUN.
RoundRobinIndex	ID of the controller path on which I/O is sent in turn.
LunPathDevice	Whether the device specified by the LUN path exists. ● present: The specified device exists. ● none: The specified device does not exist.
IoCount	Number of successful I/Os on this path.

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Field	Description
DevState	Status of the LUN. ● OPTIMAL: The LUN is in the optimal state. ● OPTIMAL_NEED_CHECK: Requires to check whether the LUN is in the optimal state. ● OPTIMAL_CHECKING: Checking whether the LUN is in the optimal state. ● FAILED: The LUN is in the failed state. ● FAILED_NEED_CHECK: Requires to check whether the LUN is in the failed state. ● FAILED_CHECKING: Checking whether the LUN is in the failed state.

A.5.33.8 Displaying the I/O Performance Statistics

Function

The **upadm show iostat array**=*array_id* {**lun**=*lun_id* **interval**=*seconds*} command is used to display the I/O performance statistics.

Format

upadm show iostat array=*array_id* {**lun**=*lun_id* **interval**=*seconds*}

Parameters

Parameter type	Keyword and Parameter	Description
Mandatory Parameter	array	ID of the storage system
Optional Parameter	lun	ID of the LUN. When this parameter is not set, I/O statistics will be made on all LUNs by default.
	interval	Interval for refreshing statistics (unit: seconds). The value is 1 second by default.

Level

User **root**

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Usage Guidelines

After enabling the I/O performance statistics, users need to run this command again when the following conditions are met:

- A new device is created.
- The controller is not connected to application servers, but recovered during the I/O performance statistics.
- The controller is faulty, but recovered during the I/O performance statistics.

Example

Check the I/O performance statistics of LUN 0 in storage system 0 at the interval of 10 seconds.

```
[root@localhost ~]# upadm show iostat array=0 lun=0 interval=10
LUN  0:          Total(IOPS | Blk/s) Read(IOPS | Blk/s) Write(IOPS | Blk/s)
avg:                     0 | 0              0 | 0                0 | 0
real_time:               0 | 0              0 | 0                0 | 0
Controller_3A
path0:                   0 | 0              0 | 0                0 | 0
path1:                   0 | 0              0 | 0                0 | 0
Controller_3B
path2:                   0 | 0              0 | 0                0 | 0
[root@localhost ~]#
```

System Response

After the command is executed, the fields listed in **Table A-9** are displayed.

Table A-9 Fields displayed by the **upadm show iostat array**=*array_id* {**lun**=*lun_id* **interval**=*seconds*}

Field	Description
IOPS	Number of I/Os per second.
Blk/s	Data amount per second (unit: block). Each data block is 512 bytes.
avg	Average I/O performance in the period from the time when the execution of the I/O statistics command begins to the current time.
real_time	Real-time I/O performance.
pathx	Real-time I/O performance data on each path. **NOTE** The value range of pathx is path0 to path3.

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A.5.33.9 Dynamically Identifying the LUN

Function

The **upadm start** *hotscan* command is used to identify the LUN dynamically.

Format

upadm start *hotscan*

Parameters

Keyword and Parameter	Description	Default Value
hotscan	dynamically identifying the LUN.	None

Level

User **root**

Usage Guidelines

Before running the **upadm start** *hotscan* command, ensure that 300 MB space remains on the local disk on the AS. In the following situations, you need to run the **upadm start** *hotscan* command to dynamically identify the LUN.

- For the AS that uses the FC HBA and the SAS HBA, when a LUN is mapped, deleted, or failed, run the **upadm start** *hotscan* command to dynamically identify the LUN without restarting the server.
- For the AS that uses the iSCSI initiator in SLES 9.0 SP4, SLES 10 or later versions, SLES11, RedHat Enterprise Linux AS4 update 4, Red Flag DC Server release 5.0 (Trinity) SP2, Aasianux3 SP1, or RedHat Enterprise Linux 5 or later versions, when a LUN is mapped, deleted, or failed, run the **upadm start** *hotscan* command to dynamically identify the LUN without restarting the server.
- For the AS that uses the iSCSI initiator in SLES 9.0 SP3, when a LUN mapping is added to or deleted from the storage system, run the **rciscsi reload** command first and then the **upadm start** *hotscan* command on the AS to dynamically identify the LUN without restarting the server.
- For the AS that uses the iSCSI initiator in SLES 9.0 SP3, when a LUN mapping is changed on the storage system (for example, the mapping from LUN 0 on the device to LUN 0 on the host is deleted, and LUN 1 on the device is mapped to LUN 0 on the host), run the **rciscsi reload** command first and then the **upadm start** *hotscan* command on the AS without restarting the server. This operation, however, will interrupt services running on the AS.
- When the LUN name is changed, run the **upadm start** *hotscan* command, and the new LUN name is displayed.

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NOTE

- Before reading data from/writing data to the storage system on the AS, run the **upadm start** *hotscan* command first; otherwise, data loss occurs. Ensure that the LUN is not in the **busy** state when you run the **upadm start** *hotscan* command. When the LUN is being used by another program, you cannot delete the LUN by running the **upadm start** *hotscan* command.
- Importing the system configuration file, adding/deleting mapping, or recovering the failed LUN on the storage system may affect the system configuration. Therefore, it is recommended to run the **upadm start** *hotscan* command on the AS to prevent the error.

Example

Identify the loaded LUN.

```
[root@localhost ~]# upadm start hotscan
Begin to delete LUNs whose mappings do not exist
Begin to delete LUNs whose mappings are changed.
begin scan host0
begin scan host1
begin scan host2
begin scan host3
begin scan host4
begin scan host5
The device scanning is complete.
[root@localhost ~]#
```

System Response

None

A.5.33.10 Updating the System Configuration

Function

The **upadm start** *updateimage* command is used to update the system configuration.

Format

upadm start *updateimage*

Parameters

None

Level

User **root**

Usage Guidelines

If you have modified the system configuration by running the **upadm set** command, you need to run the **upadm start** *updateimage* command to update the configuration so that the modification takes effect after the system is restarted.

Example

```
[root@localhost ~]# upadm start updateimage
```

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```
You will update the system mirrors. Do you want to continue?
<Y|N>:y
Update the kernel mirror.
The mirror is updated successfully.
[root@localhost ~]#
```

System Response

None

A.5.33.11 Setting Whether to Enable Load Balancing Between Controllers

Function

The **upadm set lbcontroller**={*on* | *off*}command is used to set whether to enable load balancing between controllers.

Format

upadm set lbcontroller={*on* | *off*}

Parameters

- on: enable.
- off: disable.

Level

User **root**

Usage Guidelines

The default load balancing methods for multiple paths are:

1. Determine the prior controller of the LUN first, and then perform load balancing among the multiple paths inside the prior controller.
2. Set **lbcontroller** to **on**, and then load balancing will be performed on all paths of all controllers.
3. The **upadm set lbcontroller**={*on* | *off*} command takes effect immediately, but the configuration is not saved when the system is restarted. To save the configuration, run the **upadm start** *updateimage* command.

Example

Enable load balancing between controllers.

```
[root@localhost ~]# upadm set lbcontroller=on
[root@localhost ~]#
```

System Response

None

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A.5.33.12 Setting Whether to Enable the Switchover Between Operating and Owning Controllers of the LUN

Function

The **upadm set failover**={*on* | *off*} command is used to enable the switchover between operating and owning controllers of the LUN.

Format

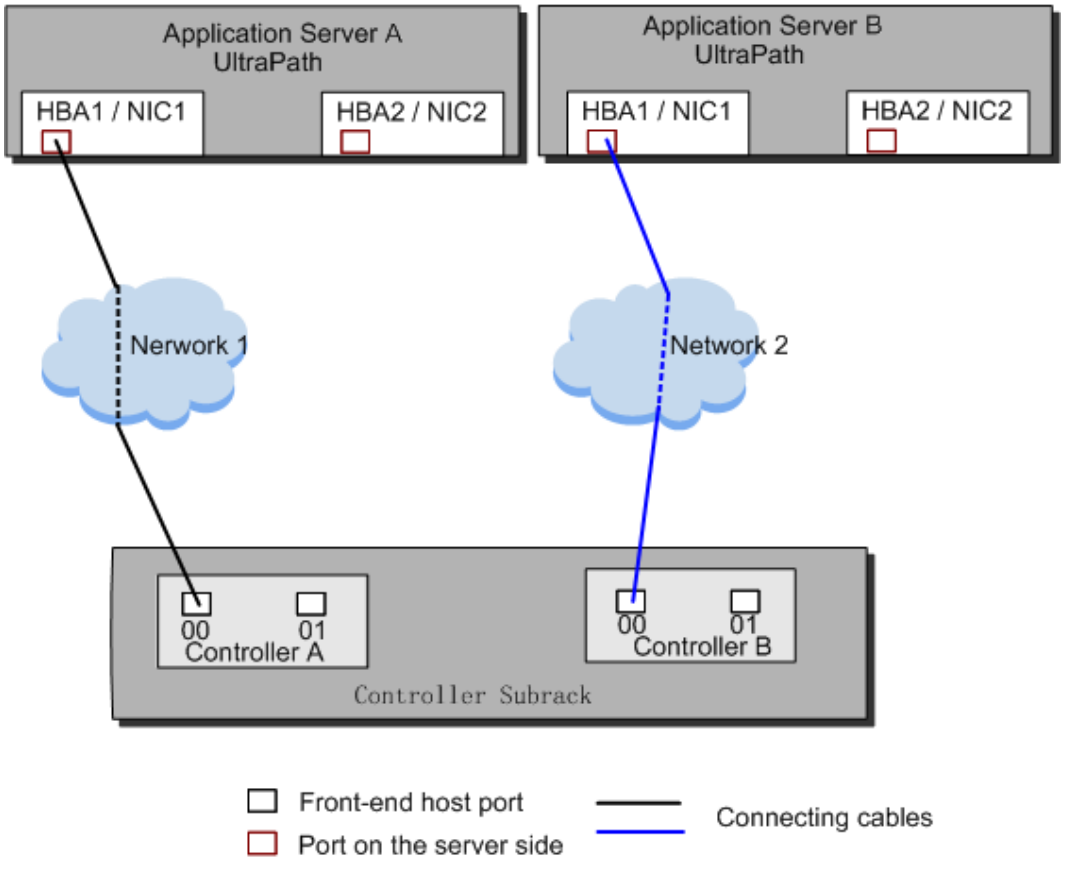
upadm set failover={*on* | *off*}

Parameters

By default, the UltraPath for Linux closes the switchover between operating and owning controllers of the LUN. That is, when all the paths of the prior controller are faulty, the UltraPath for Linux sends the I/O to the owning controller, but doesn't use the owning controller of the LUN to replace the operating controller.

It prevents the following situation. For example, the cluster networking that uses load balancing: Two application severs are connected to two controllers of a storage system respectively and can access the same LUN, as shown in **Figure A-1**.

Figure A-1 Cluster networking that uses load balancing



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In this cluster networking, the UltraPath for Linux on AS A tries to use controller A as the operating controller of the LUN, whereas the UltraPath for Linux on AS B tries to use controller B as the operating controller of the LUN. As a result, the switchover of operating controller goes ceaseless between controller A and controller B. To stop the switchover, set **Failover** to **off**.

Level

User **root**

Usage Guidelines

The command takes effect immediately, but the configuration is not saved when the system is restarted. To save the configuration, run the **upadm start** *updateimage* command.

Example

Enable the switchover between operating and owning controllers of the LUN.

```
[root@localhost ~]# upadm set failover=on
[root@localhost ~]#
```

System Response

None

A.5.33.13 Set the Failback Latency

Function

The **upadm set failback_interval**=*seconds* command is used to set the failback latency.

Format

upadm set failback_interval=*seconds*

Parameters

Keyword and Parameter	Description	Default Value
failback_interval	Latency in seconds required for a LUN to be switched back to its owning controller after the controller recovers to its normal state. The value ranges from 1 to 36000.	None

Level

User **root**

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Usage Guidelines

The command takes effect immediately, but the configuration is not saved when the system is restarted. To save the configuration, run the **upadm start** *updateimage* command.

Example

Set the scanning interval of failback to 600 seconds.

```
[root@localhost ~]# upadm set failback_interval=600
[root@localhost ~]#
```

System Response

None

A.5.33.14 Setting the Load Balancing Algorithm

Function

The **upadm set iopolicy**={*round_robin* | *least_io* | *least_block*} command is used to set the load balancing algorithm.

Format

upadm set iopolicy={*round_robin* | *least_io* | *least_block*}

Parameters

Keyword and Parameter	Description	Default Value
round_robin	round robin algorithm.	None

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Keyword and Parameter	Description	Default Value
least_io	shortest path algorithm. With two or more paths between the AS and the storage system, the UltraPath for Linux that uses the round robin algorithm will not consider the current I/O quantity on each path of the controller, but sends I/O directly by following the round robin algorithm. That is, if two paths exist between the AS and the storage system, the UltraPath for Linux selects one path to send the I/O first, the second path at the second time, and the first path again at the third time, which circulates continuously. The UltraPath for Linux that uses the shortest path algorithm, however, takes the I/O quantity on each path into consideration and selects the path that has the least I/O to send the I/O.	None
least_block	least I/O load algorithm The least I/O load algorithm is the advanced version of the shortest path algorithm. The UltraPath for Linux that uses the least I/O load algorithm calculates both the I/O quantity and the data amount accessed by each I/O and selects the path that has the least I/O load to send the I/O.	None

Level

User **root**

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Usage Guidelines

The command takes effect immediately, but the configuration is not saved when the system is restarted. To save the configuration, run the **upadm start** *updateimage* command.

Example

Set the load balancing algorithm to round robin algorithm.

```
[root@localhost ~]# upadm set iopolicy=round_robin
[root@localhost ~]#
```

System Response

None

A.5.33.15 Set the I/O Hang Function

Function

The **upadm set holdio**={*0* | *1* } [**timeout**=*seconds*] command is used to set the type and time-out period of the I/O hang function for the current application server.

Format

upadm set holdio={*0* | *1* } [**timeout**=*seconds*]

Parameters

Keyword and Parameter	Description	Default Value
0	Disabled.	None
1	Enabled.	None
seconds	The time-out period of the I/O hang function counted in seconds.	None

Level

User **root**

Usage Guidelines

The command takes effect immediately after its execution. If you want the set parameters to remain effective after a system restart, run **upadm start** *updateimage*.

Example

- Enable I/O suspension for 60s.

  ```
  [root@localhost ~]# upadm set holdio=1 timeout=60
  [root@localhost ~]#
  ```


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- Disable I/O suspension.

```
[root@localhost ~]# upadm set holdio=0
[root@localhost ~]#
```

System Response

None

B Files Related to the UltraPath

After UltraPath is correctly installed on a Linux operating system, UltraPath adds or modifies certain files in the following table to ensure proper operation. Files to be added or modified vary depending on the operating system. Do not modify or delete these files unnecessarily.

Files Added to the UltraPath

Name	File path	Description
nxup.ko nxupext_a.ko nxupext_b.ko	/lib/modules/xxx/kernel/drivers/scsi or /UltraPath/install/kernelModules/xxx	UltraPath driver file
up.conf user_cfg.xml	/etc/up.conf /etc/user_cfg.xml	UltraPath configuration file
upadmin	/usr/sbin/upadmin	UltraPath R8 CLI tool
upadm	/usr/sbin/upadm	CLI tool compatible with UltraPath R3
UltraPath	/opt/UltraPath	UltraPath backup and log directory
ultrapath-*.img	/boot/ ultrapath-*.img	Start image file generated when the UltraPath uses the boot from SAN method for installation
nxup-*.img	/boot/nxup-*.img	Soft link that points to /boot/ultrapath-*.img
UltraPath	/UltraPath	Installation file directory of the UltraPath
nxup	/etc/init.d/nxup	Script for starting the UltraPath service

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Name	File path	Description
up.conf.save_R8 user_cfg.xml.old	/etc/up.conf.save_R8/etc/ user_cfg.xml.old	Backup configuration file after UltraPath uninstallation
UltraPath.packages.info	/etc/UltraPath.packages.info	UltraPath installation information file
upRescan	/sbin/upRescan	UltraPath R8 LUN-scanning file
hot_add	/usr/sbin/hot_add	UltraPath R3 LUN-scanning file
upLinux	/usr/sbin/upLinux	UltraPath R8 restricted commands
upTools	/usr/sbin/upTools	UltraPath R3 CLI tool
56-nxup.rules	/etc/udev/rules.d/56-nxup.rules	udev rule file generated after the UltraPath is installed
up.hostinfo	/etc/up.hostinfo	UltraPath host information file
systemd-nxup.service	/etc/systemd/system/ sysinit.target.wants or /lib/ systemd/system	Script for starting the UltraPath system service when systemd startup mode is used
systemd-nxup.service	/usr/lib/systemd/system	Soft link that points to the script for starting the UltraPath system service when systemd startup mode is used
systemd-nxup.service	/usr/lib/systemd/system/ sysinit.target.wants or /lib/ systemd/system/ sysinit.target.wants/	Soft link that points to the script for starting the UltraPath system service when systemd startup mode is used
nxup.service	/usr/lib/systemd/system or /lib/systemd/system	Script for starting the UltraPath service when systemd startup mode is used
nxup.service	/etc/systemd/system	Soft link that points to the script for starting the UltraPath service when systemd startup mode is used

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Name	File path	Description
nxup.service	/etc/systemd/system/multi-user.target.wants	Soft link that points to the script for starting the UltraPath service when systemd startup mode is used
nxupBoot	/usr/sbin	Script for executing the UltraPath system service when systemd startup mode is used
nxupServBoot	/usr/sbin	Script for executing the UltraPath system service when systemd startup mode is used
stop_up_restart_warn	/sbin/stop_up_restart_warn	Script for stopping the warning restart service of the UltraPath
boot.010LoadNxup	/etc/init.d/boot.010LoadNxup	Script for starting the UltraPath system service
90nxup	/usr/lib/dracut/modules.d/90nxup or /usr/share/dracut/modules.d/90nxup	Configuration directory for the UltraPath to start the mirroring function in Red Hat 6 or Red Hat 7
99-ultrapath.rules	/etc/udev/rules.d/99-ultrapath.rules	The rule file for the link timeout configuration
99-ultrapath-alias.rules	/etc/udev/rules.d/99-ultrapath-alias.rules	udev rule file saving the UltraPath alias configuration

File Modified by the UltraPath

When the **boot fromSAN** command is used to install the UltraPath, you may need to modify the following file.

1. Modify the **/boot/grub/menu.lst**, **/etc/ elilo.conf**, or **/etc/ lilo.conf** configuration file. Add the UltraPath option and configure it as a default item. The following is an example:
   ```
   *cat /boot/grub/menu.lst
   default 2
   timeout 8
   ...
   title Linux with ultrapath
   root (hd0,2)
   kernel /boot/vmlinuz-X.X.XX.XX-X.XX.X-smp root=/dev/sda2..
   initrd /boot/ultrapath-X.X.XX.XX-X.XX.X-smp.img.
   ```
2. Modify the **/etc/sysconfig/kernel** configuration file. Add the UltraPath configuration parameters. The following is an example:
   ```
   Cat /etc/sysconfig/kernel
   ...
   ###UltraPath-t180s-kernel begin,don't change this!###
   ```

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```
if [ `echo "${initrd_image}" | grep -E -c "(/nxup|/ultrapath)"` -ne 0 ]
then
    INITRD_MODULES="${INITRD_MODULES} "
    INITRD_MODULES=" ${INITRD_MODULES} "
    INITRD_MODULES="${INITRD_MODULES// nxupext_a / }"
    INITRD_MODULES="${INITRD_MODULES// nxup / }"
    INITRD_MODULES="${INITRD_MODULES// scsi_mod / }"
    INITRD_MODULES="${INITRD_MODULES// sd_mod / }"
    INITRD_MODULES="${INITRD_MODULES// sg / }"
    INITRD_MODULES="scsi_mod sd_mod sg nxup nxupext_a ${INITRD_MODULES}"
    INITRD_MODULES=$(echo ${INITRD_MODULES})
    echo "UltraPath--[INITRD_MODULES=${INITRD_MODULES}]"
fi
###UltraPath-t180s-kernel end,don't change this!###
...
```

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C How to Obtain Help

About This Chapter

If a problem persists in routine maintenance or troubleshooting, contact Huawei for technical support.

C.1 Preparations for Contacting Huawei

To better solve the problem, you need to collect troubleshooting information and make debugging preparations before contacting Huawei.

C.1.1 Collecting Troubleshooting Information

You need to collect troubleshooting information before troubleshoot.

You need to collect the following information:

- Name and address of the customer
- Contact person and telephone number
- Time when the fault occurred
- Description of the fault phenomena
- Device type and software version
- Measures taken after the fault occurs and the relevant results
- Troubleshooting level and required solution deadline

C.1.2 Making Debugging Preparations

When you contact Huawei for help, the technical support engineer of Huawei might help you do certain operations to collect information about the fault or rectify the fault directly.

Before contacting Huawei for help, you need to prepare the boards, port modules, screwdrivers, screws, cables for serial ports, network cables, and other required materials.

C.2 How to Use the Document

Huawei provides guide documents shipped with the device. The guide documents can be used to handle the common problems occurring in daily maintenance or troubleshooting.

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To better solve the problems, use the documents before you contact Huawei for technical support.

C.3 How to Obtain Help from Website

Huawei provides users with timely and efficient technical support through the regional offices, secondary technical support system, telephone technical support, remote technical support, and on-site technical support.

Contents of the Huawei technical support system are as follows:

- Huawei headquarters technical support department
- Regional office technical support center
- Customer service center
- Technical support website: **http://enterprise.huawei.com**

You can query how to contact the regional offices at **http://enterprise.huawei.com**.

C.4 Ways to Contact Huawei

Huawei Technologies Co., Ltd. provides customers with comprehensive technical support and service. For any assistance, contact our local office or company headquarters.

Huawei Technologies Co., Ltd.

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

Website: **http://support.huawei.com/enterprise/**

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D Acronyms and Abbreviations

F	
FC	Fibre Channel
FCoE	Fibre Channel over Ethernet
G	
GUI	Graphical User Interface
H	
HBA	Host Bus Adapter
i	
IB	InfiniBand
IOPS	Input/Output Operations Per Second
iSCSI	Internet Small Computer Systems Interface
ISM	Integrated Storage Management
L	
LUN	Logical Unit Number
N	
NIC	Network Interface Card
R	
RDM	Raw Device Mapping
S	

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SAS	Serial Attached SCSI
SCSI	Small Computer Systems Interface
W	
WWN	World Wide Name

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