

Huawei Storage Series Certification Courseware

HCNA-Storage

Lab Manual

Version:4.0



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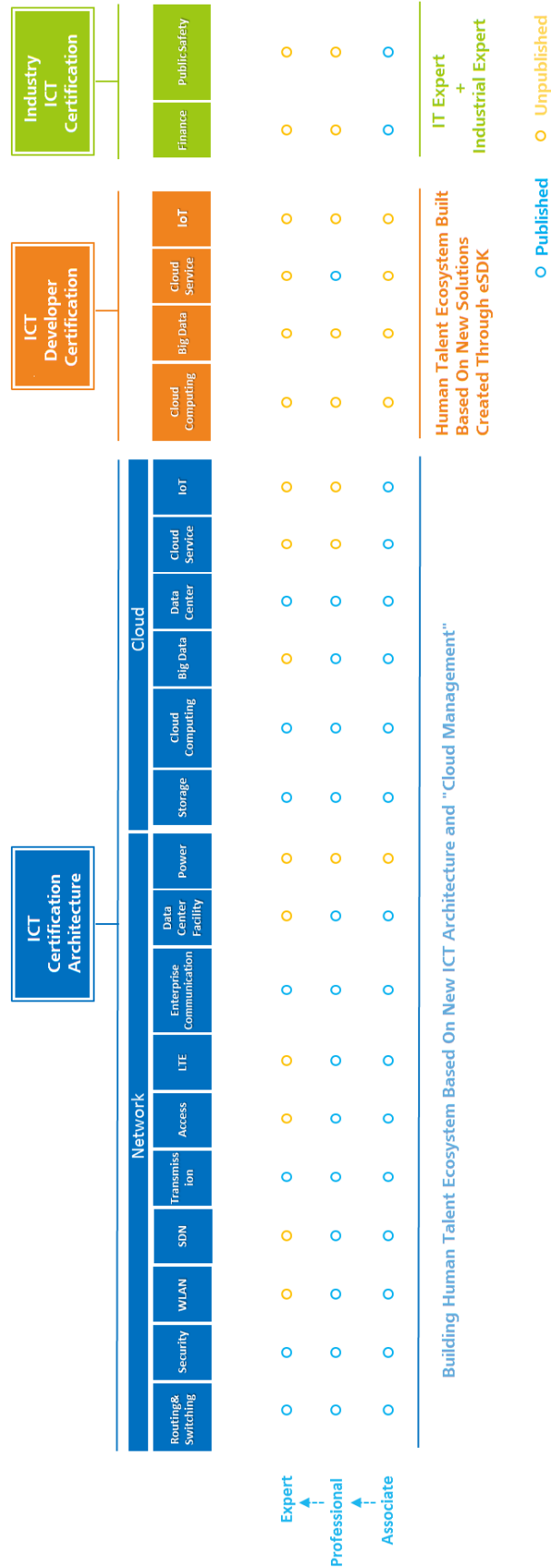
<https://t.me/learningnets>

Introduction to Huawei Certification

Relying on Huawei's strong technical strength and professional training system, Huawei certification considers different customer's needs for different levels of ICT technology and is committed to providing customers with practical and professional technical certification. According to the characteristics of ICT technology and the needs of customers at different levels, Huawei Certification provides customers with multi-direction and multi-level certification systems.

HCNA-Storage (Huawei Certified Network Associate-Storage) is mainly for network storage maintenance engineers and personnel preparing to participate in HCNA-Storage certification exams, personnel who hopes to master the basic principles of SAN and NAS storage systems and networks, and personnel who wish to master the management, deployment and maintenance capabilities of Huawei storage systems.

HCNA-Storage certification content covers topics such as advanced storage technologies and development trends, storage application technologies for AI, Big Data and cloud computing, ICT architecture, storage system architecture, introduction of commonly used storage protocols, storage networking technologies, storage reliability technology, introduction to advanced features of storage, introduction to business continuity solutions, backup technologies and applications of backup solutions, disaster recovery solution technologies and its applications, basic knowledge of data centers, knowledge of storage system management in data centers, and knowledge on daily operations of data center storages etc.



Foreword

Introduction

This lab manual is an HCNA-Storage certification training material. It is intended for students who are preparing to take the HCNA-Storage exam or who want to understand the basics of storage, the basic features of OceanStor V3, and the daily maintenance operations of the storage system.

Content Description

This lab manual contains 12 Labs, it mainly introduces the basic service configurations, and common basic features configurations and common O&M tool of OceanStor V3 storage system. Upon completing the Labs, the students are able to gain the capability to complete the configurations for basic service and features and daily maintenance and operations of the storage system.

These Labs include:

- 1 Initial Installation and Configuration.
- 2 Resource Pool Configuration.
- 3 SAN Basic Service Configurations and Usage.
- 4 LUN Expansion and using SmartThin to create Thin LUN.
- 5 HyperSnap (LUN).
- 6 SmartTier.
- 7 SmartQoS.
- 8 SmartPartition.
- 9 NAS Basic Service Configurations and Usage.
- 10 SmartQuota.
- 11 HyperSnap (FS).
- 12 Daily Maintenance and Operations of Storage System.

Reader's Knowledge Background Prerequisite

This course is intended as the basic course for Huawei Network Storage Certification. For better understanding of the contents within this guide, the readers must have the following basic requirements:

- Has basic knowledge of computers, basic principles of hardware architecture and software and basic operations of software.
- Has basic operational capabilities of Windows and Linux operating systems.

Lab Environment

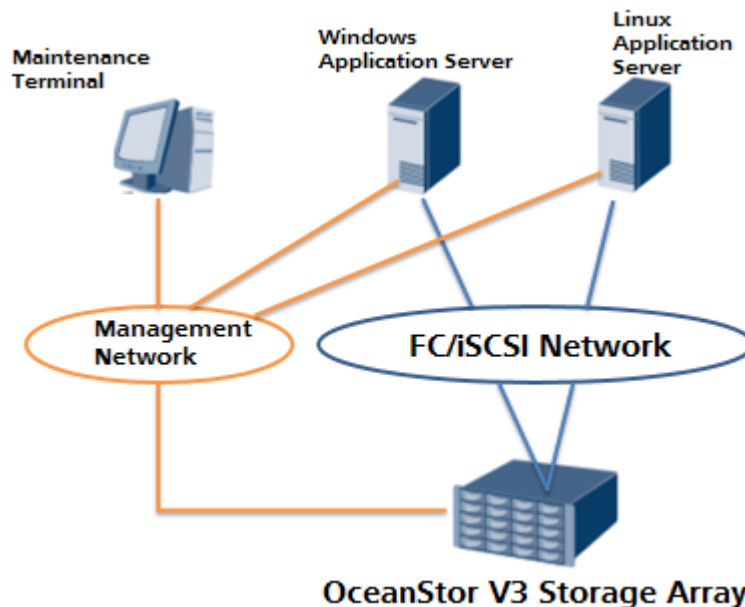
1. Physical Lab Environment: (Recommended).

Functions Description:

This lab environment uses physical devices to setup deployment environment. It allows the mapping, read and write operations between production hosts (Windows & Linux) and storage devices. E.g. ELAB environment used during Huawei Training.

Network Description:

This lab environment includes at least 1 unit of OceanStor V3 storage devices, 1 unit of Windows and 1 unit of Linux application servers (The 2 application servers can be independently installed with the Windows and Linux operating system, or can be deployed with virtualization environments using FusionCompute to virtualize multiple Windows or Linux virtual machines to meet the requirements of the lab for concurrent access scenario), the logical representation diagram of the network is as follows:



Introduction of Hardware Devices:

Device Name	Device Model	Minimum Quantity	Software Version
Storage Device	OceanStor 2600 V3 or 5300 V3 or other OceanStor V3 storage models.	1	V300R003 or other latest versions.
Maintenance Terminal	Mainstream preconfigured PC or Notebooks.	1	Installed with Windows operating system, internet browser version is above IE8 or matching, equivalent or newer versions of Firefox and Chrome

			browsers.
Application Servers	Huawei RH Series Servers such as RH2288 V3 or V5.	2	Windows 2008, Linux (such as SUSE or Redhat) or deploy FusionCompute to virtualize multiple Windows 2008 and Linux virtual machines.

Introduction of Software:

Software Name	Description	Obtaining Method
UltraPath	It is recommended to use the latest version of the storage package.	Address to obtain the software: http://support.huawei.com/enterprise/zh/cloud-storage/ultrapath-pid-8576127/software
OceanStor Toolkit	It is recommended to use the latest version of the storage package.	Address to obtain the software: http://support.huawei.com/enterprise/zh/cloud-storage/oceanstor-toolkit-pid-8576706/software
Putty	Use the current mainstream version, no obvious restrictions.	Obtain from the Internet.
IOMeter	Use the current mainstream version, no obvious restrictions.	Obtain from the Internet.

2. DeviceManager Demo (V3 Storage Simulator) Environment.

Functions Description:

To meet the requirements to learn the operations and management of Huawei storage devices, Huawei has developed the simulator for the OceanStor DeviceManager--OceanStor DeviceManager Demo. It provides the users simulated experience of the actual operating environment, which further deepens the understanding of Huawei storage systems for users.

Note:

- The simulator only simulates the configuration walkthrough of the DeviceManager on the storage side. It cannot simulate operations on the production host side and cannot provide actual read or write services.
- The simulator can cover all the configuration and operational steps of all lab experimental tasks within this lab manual, but it cannot cover the operation steps on the host side. For more specific information on the coverage, refer to the "Lab Notes" section within this lab manual.

Obtaining Method for the Software and Instruction Manual:

<http://support.huawei.com/enterprise/zh/doc/DOC1000126977>

3. Dorado V3 Simulator (eStor) Environment.

Functions Description:

Huawei OceanStor Dorado V3 is the fourth-generation all-flash storage system built for critical enterprise services. To help the storage certification students to learn about the Huawei's storage more easily, Huawei has developed the Dorado V3 simulator, named eStor. The simulator can help users to practice SAN services system management, IP-SAN services, snapshots, remote replication, HyperMetro and other functions configuration and service delivery of Dorado V3 storages, which can help students to quickly learn the usage of the storage products.

Note:

- The 2018 version of the Dorado V3 simulator can only simulate portions of the SAN services and cannot simulate the NAS service operations.
- The simulator can only cover a portion of the experimental tasks within this lab manual. For more specific information on the coverage, please refer to the "Lab Notes" section.

The list of features supported by the simulator is as follows:

- 1 Initialization Configuration of the Dorado V3 Storage Systems.
- 2 Basic Management Features of Dorado V3 Storage Systems.
- 3 Basic Service Configurations and Usage of IP-SAN.
- 4 LUN Snapshot Configurations and Usage.
- 5 LUN Remote Replication Configurations and Usage.
- 6 HyperMetro Active-Active Configurations and Usage.
- 7 SmartMigration Configurations and Usage.
- 8 SmartCompression Configurations and Usage.
- 9 SmartDeduplication Configurations and Usage.

Obtaining Method for the Software and Instruction Manual:

It has not yet been released. The release date is scheduled to be at the end of June of 2018. Please download the software and instructions manual using keyword "Dorado V3 Simulator" or "eStor" on the Huawei support official website according to your actual needs.

Lab Notes

The Comparison for all three types of Lab environment are as follows:

Lab Environment Lab Tasks	Physical Lab Environment (Recommended)	DeviceManager Demo Simulator Environment (OceanStor V3 Storage Simulator)	Dorado V3 Demo Simulator Environment (eStor)
1. Storage System Initial Setup and Configurations.	Fully meets the requirements.	Fully meets the requirements.	Fully meets the requirements.
2. Storage Resource Pool Configurations.	Fully meets the requirements.	Fully meets the requirements.	Fully meets the requirements.
3. SAN Basic Service Configurations and Usage.	Fully meets the requirements.	Supports all the Lab steps on the storage side. It does not support the host side operational steps. For example: It cannot simulate the host side mapping and checking the disk scanning results.	Supports Labs on IP-SAN basic services, does not support Lab on FC-SAN basic services.
4. LUN Expansion and Using SmartThin to Create Thin LUN.	Fully meets the requirements.	Supports all the Lab steps on the storage side. It does not support the host side operational steps. For example: It cannot simulate the host side expansion and verification.	Fully meets the requirements.
5. HyperSnap (LUN) Configuration and Usage.	Fully meets the requirements.	Supports all the Lab steps on the storage side. It does not support the host side operational steps. For example: It cannot simulate the host side snapshot read and write operations, and verifying the results of snapshot rollback.	Fully meets the requirements.
6. SmartTier Configuration and Usage.	Fully meets the requirements.	Supports all the Lab steps on the storage side. It does not support the host side operational steps. For example: It cannot simulate the host side read and write verification.	Not Supported.
7. SmartPartition Configurations and Usage.	Fully meets the requirements.	Supports all the Lab steps on the storage side. It does not support the host side operational steps. For example: It cannot simulate the host side read and write verification.	Not Supported.

8. SmartQoS Configurations and Usage.	Fully meets the requirements.	Supports all the Lab steps on the storage side. It does not support the host side operational steps. For example: It cannot simulate the host side read and write verification.	Not Supported.
9. NAS Basic Service Configuration and Usage.	Fully meets the requirements.	Supports all the Lab steps on the storage side. It does not support the host side operational steps. For example: It cannot simulate the host side operations and check on the shared file system access results.	Not Supported.
10. SmartQuota Configuration and Usage.	Fully meets the requirements.	Supports all the Lab steps on the storage side. It does not support the host side operational steps. For example: It cannot simulate the host side operations and verify the results.	Not Supported.
11. HyperSnap (FS) Configuration and Usage.	Fully meets the requirements.	Supports all the Lab steps on the storage side. It does not support the host side operational steps. For example: It cannot simulate the host side snapshot read and write operations, and verifying the results of snapshot rollback.	Not Supported.
12. Daily Operation and Maintenance of Storage System.	Fully meets the requirements.	Only satisfies the requirements to simulate the daily logs collection on the storage side. It could not actually view the collected logs, and cannot simulate the maintenance operations of the Toolkit.	Not Supported.


 **Note: The storage device in this lab manual will use the OceanStor 5300 V3 as an example. The configuration of other storage product models is similar. For specific product descriptions and operating instruction manuals, please download the corresponding product configuration and operational guide documentation from the Huawei Support website according to the product configuration in the actual environment by searching the product name and related keywords.**

Table of Contents

Foreword	3
Introduction.....	3
Content Description	3
Reader's Knowledge Background Prerequisite	3
Lab Environment	4
Lab Notes	7
Table of Contents	9
1 Initial Setup and Configuration.....	13
1.1 Lab Introduction	13
1.1.1 Lab Objective.....	13
1.1.2 Networking and Service Description	13
1.2 Lab Configuration Tasks.....	14
1.2.1 Configuration Roadmap.....	14
1.2.2 Configuration Steps	14
1.3 Results Verification	31
1.4 Configuration Reference.....	31
1.5 Questions.....	31
2 Storage Resource Pool Configuration.....	32
2.1 Lab Introduction	32
2.1.1 Lab Objective	32
2.1.2 Networking and Service Description	32
2.2 Lab Configuration Tasks.....	32
2.2.1 Configuration Roadmap.....	32
2.2.2 Configuration Steps	33
2.3 Results Verification	40
2.4 Configuration Reference	40
2.5 Questions.....	40
3 SAN Basic Service Configuration and Usage.....	41
3.1 Lab Introduction	41
3.1.1 Lab Objective.....	41
3.1.2 Networking and Service Description	41
3.2 SAN Configuration Tasks Based On Windows	43
3.2.1 Configuration Roadmap.....	43
3.2.2 IP SAN Configuration Steps Based On Windows.....	44
3.2.3 FC SAN Configuration Tasks Based on Windows	56
3.2.4 Multipathing Configuration Based on Windows Environment.....	64
3.3 SAN Configuration Tasks Based on Linux.....	75

3.3.1 Configuration Roadmap.....	75
3.3.2 IP SAN Configuration Steps Based on Linux.....	75
3.3.3 FC SAN Configuration Tasks Based on Linux.....	83
3.3.4 Multipathing Configuration Based on Linux Environment	90
3.4 Results Verification	97
3.4.1 Verification on a Windows Host	97
3.4.2 Verification on a Linux Host.....	98
3.5 Configuration Reference	98
3.6 Questions.....	98
4 LUN Expansion and Using SmartThin to Create Thin LUN.....	99
4.1 Lab Introduction	99
4.1.1 Lab Objective	99
4.1.2 Networking and Service Description	99
4.2 LUN Expansion Lab Configuration Tasks.....	99
4.2.1 Configuration Roadmap.....	99
4.2.2 Configuration Steps	99
4.3 Lab Configuration Tasks for Creating a Thin LUN	103
4.3.1 Configuration Roadmap.....	103
4.3.2 Configuration Steps	103
4.4 Results Verification	109
4.5 Configuration Reference	109
4.6 Questions.....	109
5 HyperSnap (LUN) Configuration and Usage.....	110
5.1 Lab Introduction	110
5.1.1 Lab Objective.....	110
5.1.2 Networking and Service Description	110
5.2 Lab Configuration Tasks.....	110
5.2.1 Configuration Roadmap.....	110
5.2.2 Configuration Steps	111
5.3 Results Verification	121
5.4 Configuration Reference	121
5.5 Questions.....	121
6 SmartTier Configuration and Usage	122
6.1 Lab Introduction	122
6.1.1 Lab Objective.....	122
6.1.2 Networking and Service Description	122
6.2 Lab Configuration Tasks.....	122
6.2.1 Configuration Roadmap.....	122
6.2.2 Configuration Steps	123
6.3 Results Verification	130

6.4 Configuration Reference	130
6.5 Questions.....	130
7 SmartPartition Configuration and Usage.....	131
7.1 Lab Introduction	131
7.1.1 Lab Objective.....	131
7.1.2 Networking and Service Description	131
7.2 Lab Configuration Tasks.....	131
7.2.1 Configuration Roadmap.....	131
7.2.2 Configuration Steps	132
7.3 Results Verification	143
7.4 Configuration Reference	143
7.5 Questions.....	143
8 SmartQoS Configuration and Usage.....	144
8.1 Lab Introduction	144
8.1.1 Lab Objective.....	144
8.1.2 Networking and Service Description	144
8.2 Lab Configuration Tasks.....	144
8.2.1 Configuration Roadmap.....	144
8.2.2 Configuration Steps	145
8.3 Results Verification	158
8.4 Configuration Reference	158
8.5 Questions.....	158
9 NAS Basic Service Configuration and Usage.....	159
9.1 Lab Introduction	159
9.1.1 Lab Objective.....	159
9.1.2 Networking and Service Description	159
9.2 Lab Configuration Tasks.....	160
9.2.1 Configuration Roadmap.....	160
9.2.2 Configuration Steps	160
9.3 Results Verification	175
9.3.1 Verification of the NFS Share	175
9.3.2 Verification of CIFS Share.....	177
9.4 Configuration Reference	177
9.5 Questions.....	177
10 SmartQuota Configuration and Usage.....	178
10.1 Lab Introduction	178
10.1.1 Lab Objective	178
10.1.2 Networking and Service Description	178
10.2 Lab Configuration Task	178
10.2.1 Configuration Roadmap.....	178

10.3 Configuration Steps	179
10.4 Results Verification	189
10.5 Configuration Reference	189
10.6 Questions	189
11 HyperSnap (FS) Configuration and Usage	190
11.1 Lab Introduction	190
11.1.1 Lab Objective	190
11.1.2 Networking and Service Description	190
11.2 Lab Configuration Tasks	190
11.2.1 Configuration Roadmap	190
11.2.2 Configuration Steps	191
11.3 Results Verification	196
11.4 Configuration Reference	196
11.5 Questions	196
12 Daily Maintenance of Storage System	197
12.1 Lab Introduction	197
12.1.1 Lab Objective	197
12.1.2 Networking and Service Description	197
12.2 Lab Configuration Tasks	197
12.2.1 Configuration Roadmap	197
12.2.2 Configuration Steps	198
12.3 Results Verification	206
12.4 Configuration Reference	206
12.5 Questions	207
Appendix: Answers for End of Lab Questions	208

1 Initial Setup and Configuration

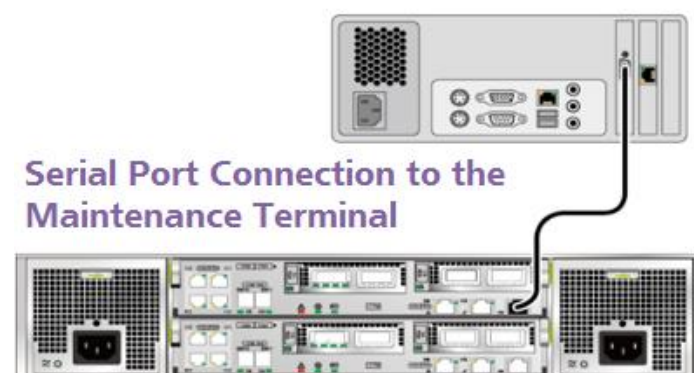
1.1 Lab Introduction

1.1.1 Lab Objective

Upon completing the lab in this chapter, the students will gain the skills to perform the initial configuration of the storage array, which mainly includes the management IP configuration (using Putty tool to login through serial port and configure the management IP of the storage array), set the device time, monitor the control enclosure, monitor the disk enclosures and perform power on and power off of device interface modules in the WebUI. This lab will use OceanStor 5300 V3 as the example.

1.1.2 Networking and Service Description

Windows PC maintenance terminal separately connects to the OceanStor V3 management port and serial port through network cable and serial cable. It uses DeviceManager and Putty to achieve basic management and monitoring functions towards the storage device.



1.2 Lab Configuration Tasks

1.2.1 Configuration Roadmap

Mainly includes the management IP configuration (using Putty tool to login through serial port and configure the management IP of the storage array), set the device time, monitor the control enclosure, monitor the disk enclosures and perform power on and power off of device interface modules in the WebUI.

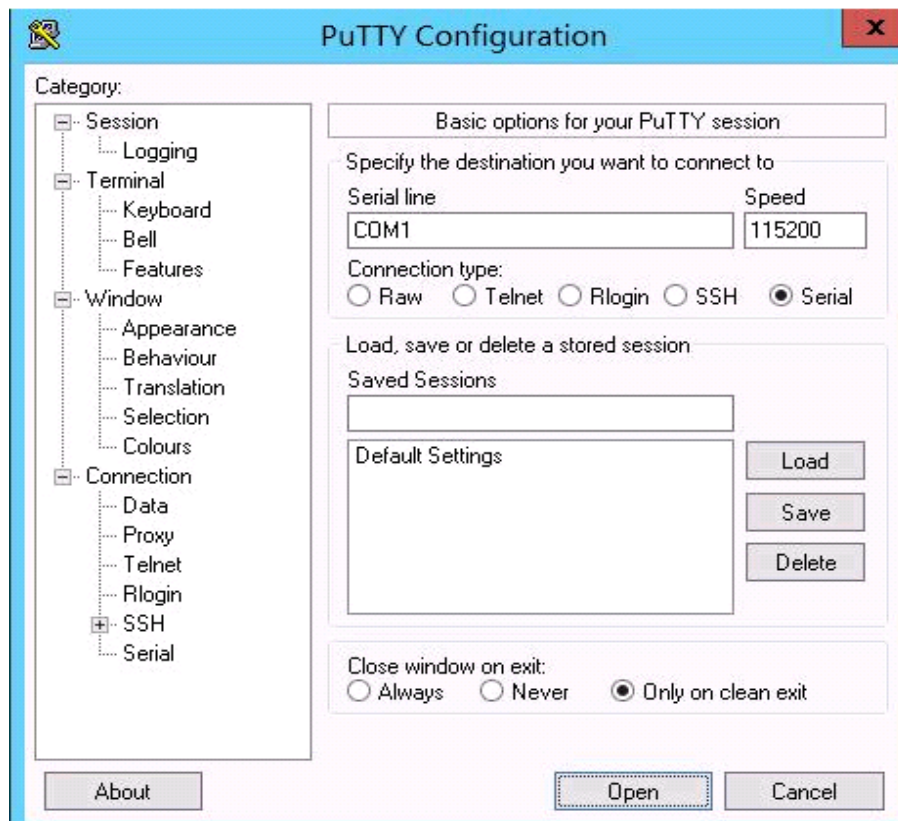
1.2.2 Configuration Steps

Step 1. Using Command Line Interface (CLI) to perform user management.

Open Putty tool.

Choose **Serial** in Connection type.

Set the Speed as **115200** as shown in the picture below:



Click **Open**.



Input username and password.

Note:

- Default username is admin, password: Admin@storage.
- Password need to be changed during first login, and needs to be changed before the password policy period ends.
- 5300 V3/ 5500 V3 height is 2U, default management port IP are 192.168.128.101 and 192.168.128.102, subnet mask is 255.255.255.0.

The following information will be displayed upon successful login:

```

Authorized users only. All activity may be monitored and reported.

WARNING: You have accessed the system.
You are required to have a personal authorisation from the system administrator
before you use this computer. Unauthorised access to or misuse of this system
is prohibited.

System Name      : xxxx
Health Status    : Normal
Running Status   : Normal
Total Capacity   : 20.241TB
SN               : xxxx
Location         :
Product Model    : xxxx
Product Version  : xxxx
    
```

Note: When logging into different devices, the displayed login page will differ.

Run **change system management_ip** command to change the management IP address.

Note: You can use “**show system management_ip**” command to view the eth_port_id.

```

admin:/>change system management_ip eth_port_id=CIE0.SMM0.MGMT0
ip_type=ipv4 address ipv4_address=192.168.128.101 mask=255.255.0.0
gateway_ipv4=192.168.128.101
WARNING: You are going to modify the network address of network port. If you enter
an unavailable network address, the OsM interface of the storage system is
inaccessible.
Suggestion: Before you perform this operation, ensure that you have entered an
available network address.

Have you read warning message carefully?(y/n)y
Command executed successfully.
    
```

After changing the management port IP address, run the **show system management_ip** command to check whether the management IP address change is successful.

Display system user:

Use **show user** command:

```
admin:/>show user
```

```
Name Level Status Type Lock Status Create Time Domain User Group
```

```
-----
admin Super_admin Online Local Unlocked XXXXXX UTC+08:00 --
=====
```

Create a new user:

Use **create user** command to create a new user.

Add the user “testuser” and set its level as admin.

```
admin:/>create user type=local user_name=testuser level=admin
Password:*****
```

Reenter password:*****
 Command executed successfully.
 Note:

User_name=?	User or user group name: Local users must start with a letter and include 6 to 32 ASCII characters, including numbers, letters, and underscores. Domain user or domain group, must include 1 to 64-bit ASCII characters, excluding double quotes.
Level=?	User or user group level: Can be "super_admin", "admin" or "guest": "super_admin": represents that a user is at super administrator level. "admin": represents that a user is at administrator level. "guest": represents that a user is at guest level.

Modifying current user password:

Use **change user_password** command to modify the current user password.

Modify the password of "testuser".

admin: />change user_password

Old password: *****

New password: *****

Reenter password: *****

Command executed successfully

Note:

The password should consists of 8 to 16 characters and is case-sensitive. The password must contain special characters including ~ ! @ # \$ % ^ & * () - _ = + \ | [{ }] ; : ' " , < . and spaces.

The password must meet the password complexity requirements:

When the password complexity is set to Normal, the password must contain any two types of uppercase and lowercase characters, numbers, and special characters.

When the password complexity is set to High, the password must contain uppercase, lowercase numbers and special characters.

The password cannot be the same as the username or the reverse order of the username.

A character cannot appear consecutively more than 3 times within the password, you may use the **change safe_strategy** command to modify the password policies and login policies.

Delete users:

Use **del user user_name** command to delete users as follows:

admin :/>delete user user_name=testuser

Modify users:

User **change user user_name** command to modify the user level.

Modify testuser as "guest" level.

admin :/> change user user_name=testuser level=guest

Note:

User_name=?	User name, run show user to obtain user name.
Level=?	The target user level to be modified, can be set as admin or guest. "admin": represents the administrator level. "guest": represents the guest level.
Action=?	Can be "reset_password" or "offline": "reset_password": the password will be changed. "offline": the user will be forcibly brought offline.

Step 2. Managing Storage Devices

Controller Chassis Management:

Use **show controller general** command to query the controller information.

Run **show controller general controller=?** to query detailed information of the controller.

```
admin :/>>show controller general
```

Controller: 0A

Health Status: Normal

Running Status: Online

CPU: Intel XXXXXX CPU XXX @ XXX GHz*2

Location: ENG0.A

Role: Master

Cache Capacity: XXX GB

CPU Usage (%): 0

Memory Usage (%): 56

Temperature (Celsius): 59

Voltage (V): 1.8

Software Version: XXXXXX

PCB Version: XXXXXX

SES Version: --

BMC Version: XXX

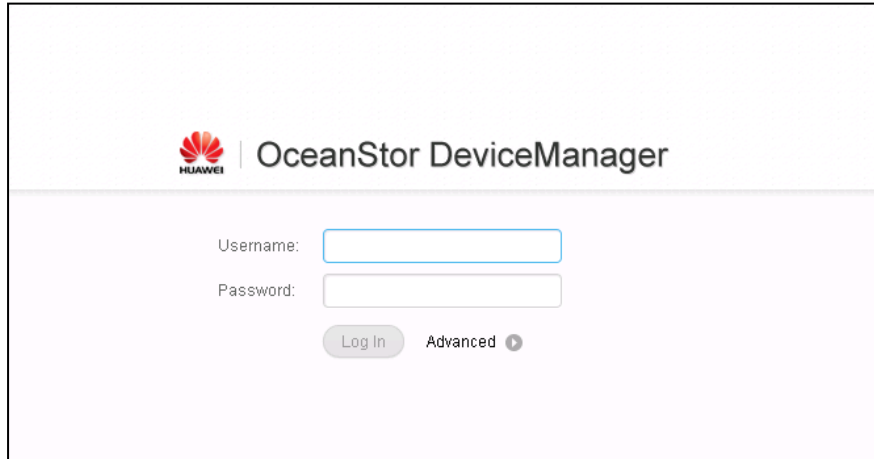
Logic Version: XXX

BIOS Version: XXX

Login into DeviceManager:

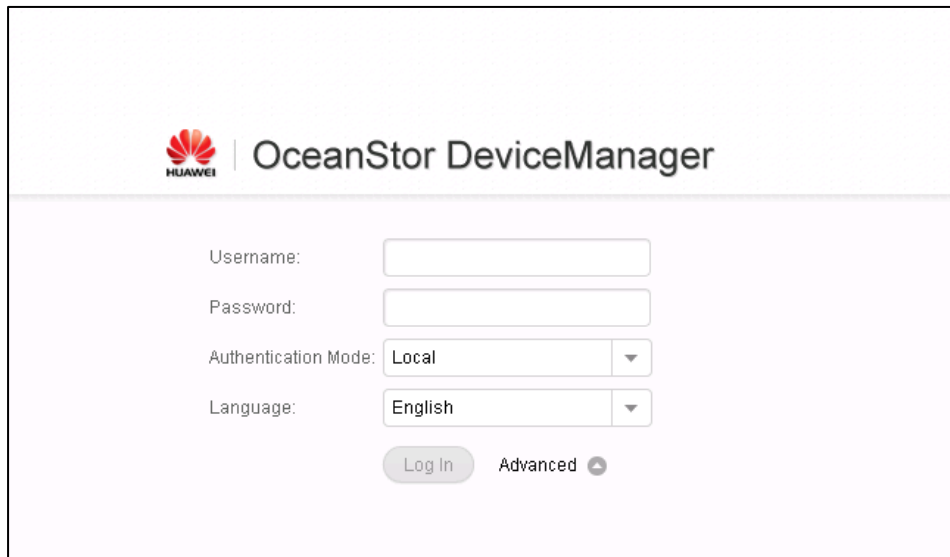
Start Internet Explorer.

In the address bar, input `https://xxx.xxx.xxx.xxx:8088`, then press **Enter**. When logging into the device, please input the actual IP address of the storage device.



Explanation: Controller A and Controller B's default management IP address are 192.168.128.101 and 192.168.128.102, and the default subnet mask is 255.255.255.0. The default management username and password are admin/Admin@storage. This lab manual uses Windows operating system as the example to show the process on logging into DeviceManager. Logging in operation through other operating systems requires corresponding adjustments.

At the login interface, click on **Advanced**, and set the authentication mode and language.



In the username and password field, key in the actual username and password of the storage device. In this lab, please key in the username **admin** and the password **Huawei@storage**.

The image shows the login page of OceanStor DeviceManager. At the top left is the Huawei logo. To its right is the text "OceanStor DeviceManager". Below this, there are four input fields: "Username:" with "admin" entered, "Password:" with a masked password of ten dots, "Authentication Mode:" with a dropdown menu set to "Local", and "Language:" with a dropdown menu set to "English". At the bottom, there are two buttons: "Log In" and "Advanced" with a right-pointing arrow.

Click "Login", and the main interface of DeviceManager will be displayed.

Step 3. Basic Configurations and Settings

Setting Device Name and Device Location:

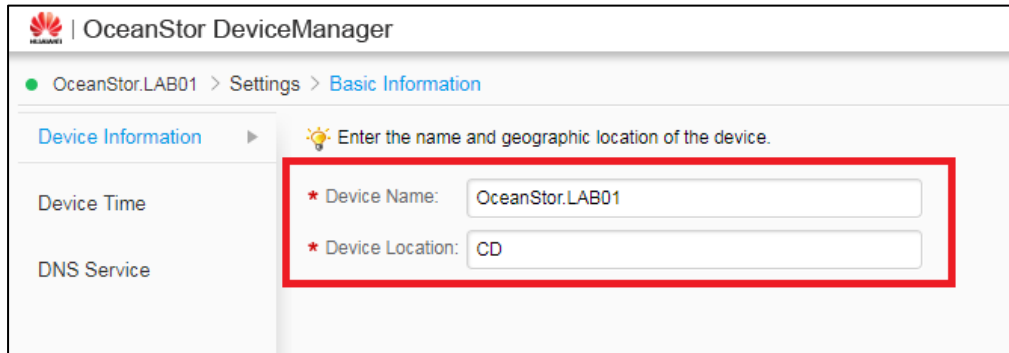
Click on the "Settings" button on the navigation bar on the right.

At the "Basic Service Settings" page, click on "Basic Information".

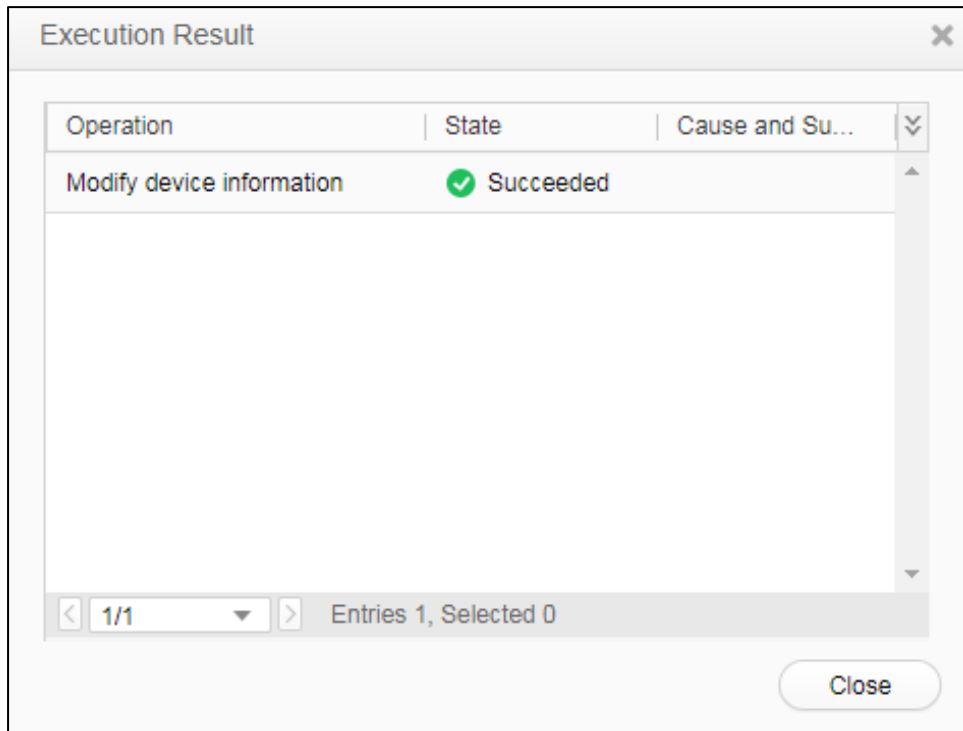
The image shows the "Basic Service Settings" page in OceanStor DeviceManager. The page has a header "Basic Service Settings" with a red box around it and a "(2)" next to it. Below the header, there are several settings cards: "Basic Information" (with a red box around it and a "(3)" next to it), "Storage Settings", "Alarm Settings", "Monitor Settings", "Permission Settings", and "License Management". At the bottom left, there is a "Value-added Service Settings" section with an "Antivirus" card. On the right side, there is a vertical navigation bar with icons for "System", "Provisioning", "VM", "Data Protection", "Monitor", and "Settings". The "Settings" icon at the bottom of the navigation bar is highlighted with a red box and a "(1)" next to it.

Select the "Basic Information" button.

Set the "Device Name" and "Device Location".



Click on “Save” button, the execution result dialog box will display the message of successful operation.

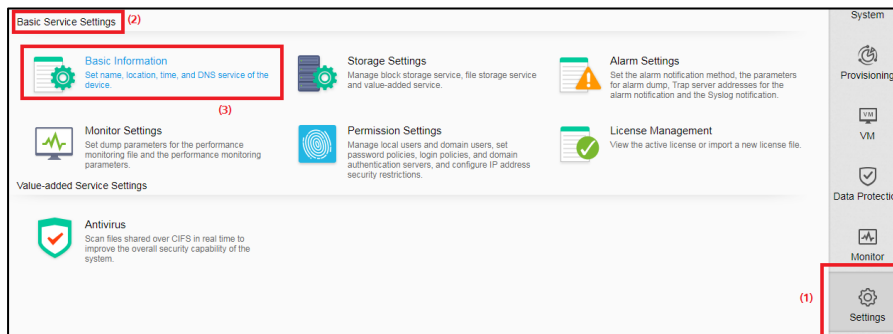


Click “Close” .

Setting the Device Time

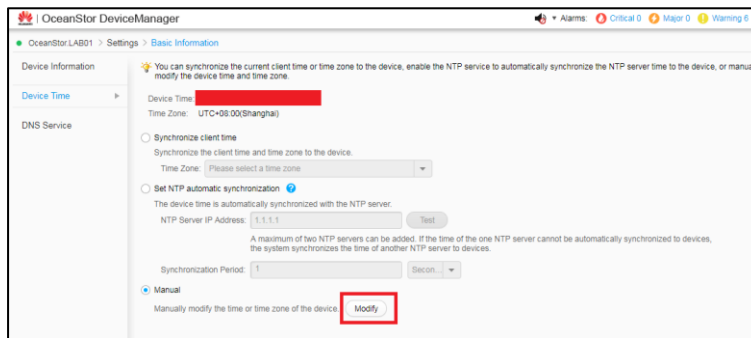
Click on the “Settings” button on the right navigation bar.

At the “Basic Service Settings” page, click on “Basic Information” .

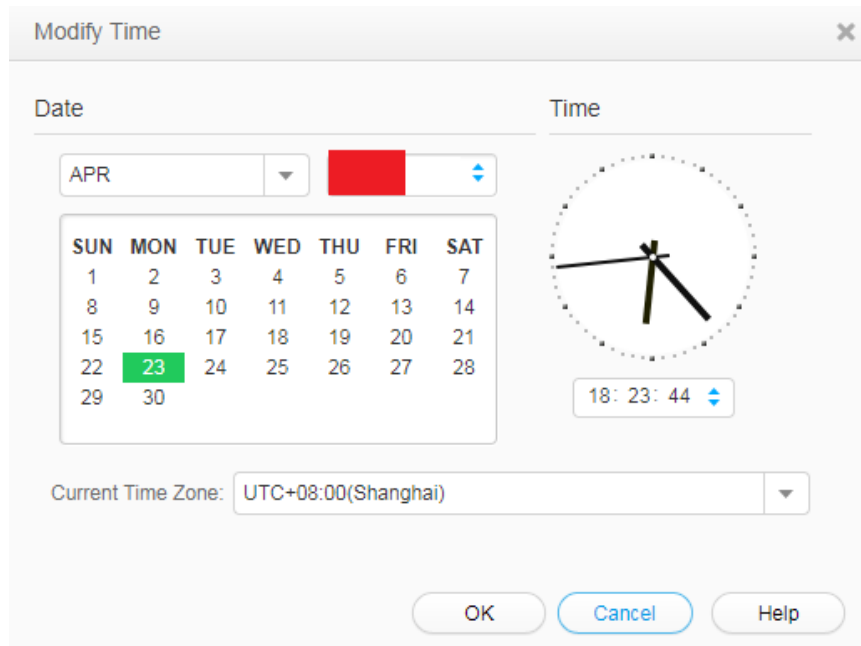


Select “Device Time” .

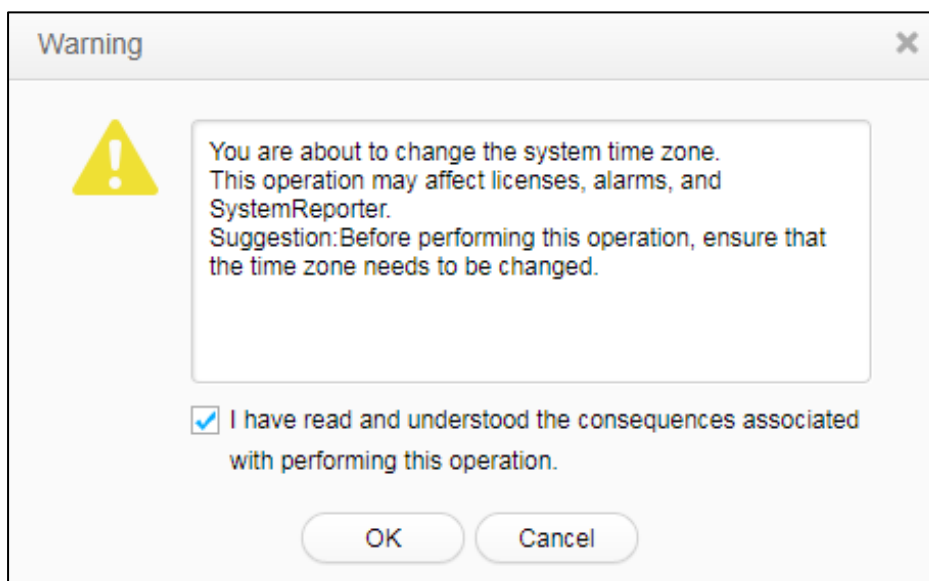
Select "Manual" and click "Modify".



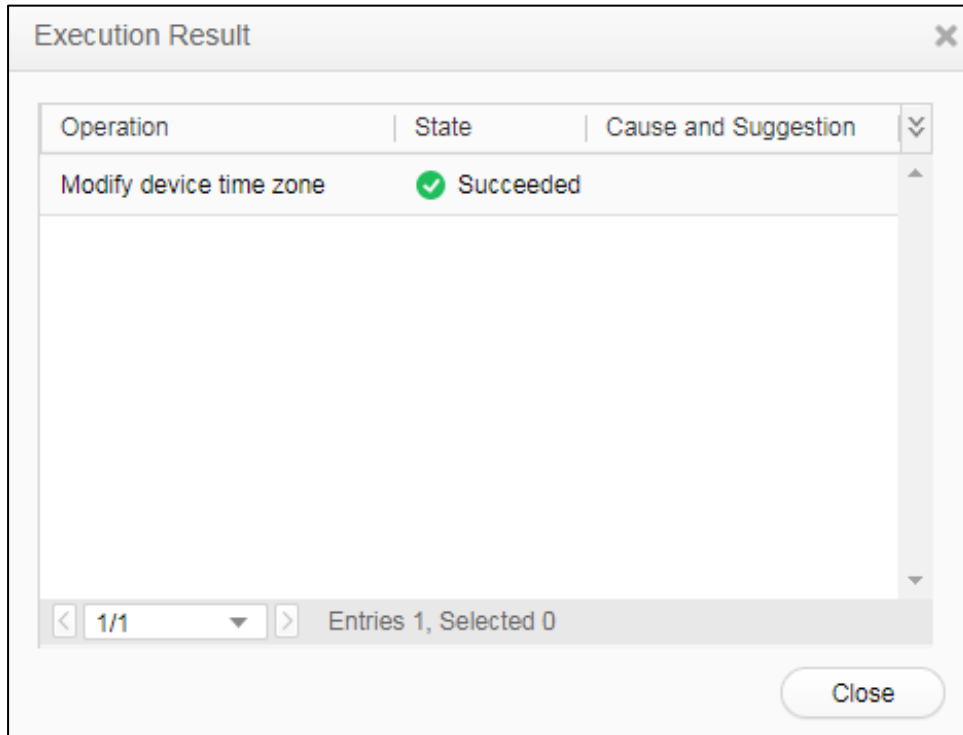
Change the time of the storage device and click "OK".



Read the information on the warning dialog box, tick on the check box and click "OK".

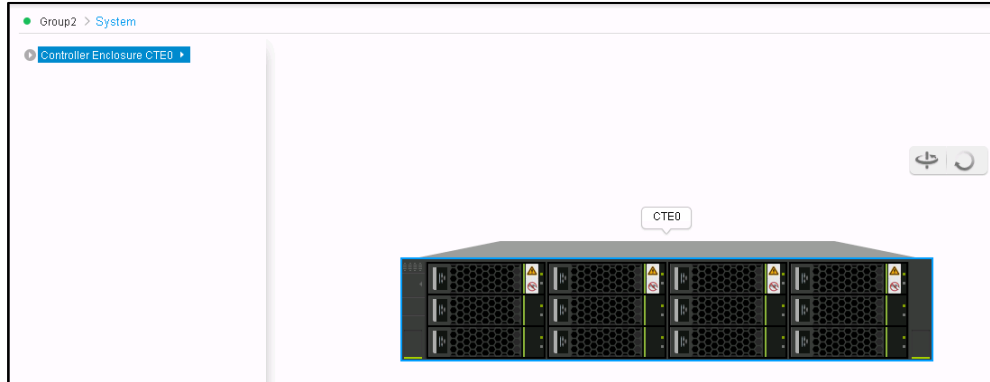


Click "Close" at the execution result dialog box.



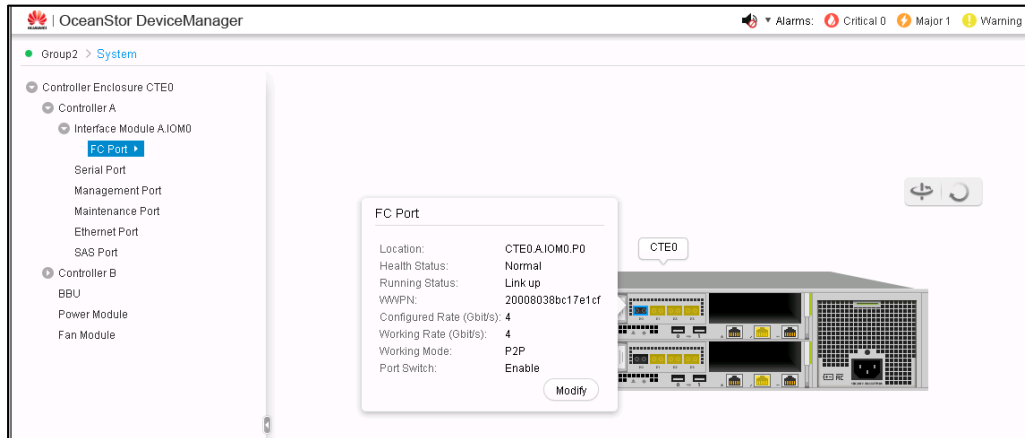
Step 4. Monitoring the Controller Enclosure

Click on "System" on the right navigation bar.

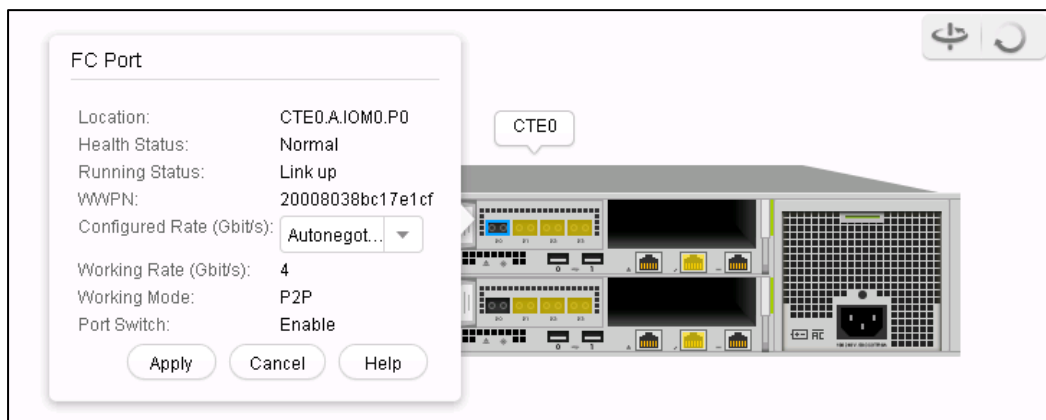


At the functions window on the left, click on the Rack and click on Controller Enclosure and click on the button to switch to the rear view of the device.

Click on the "FC Port" on the interface module of the device.



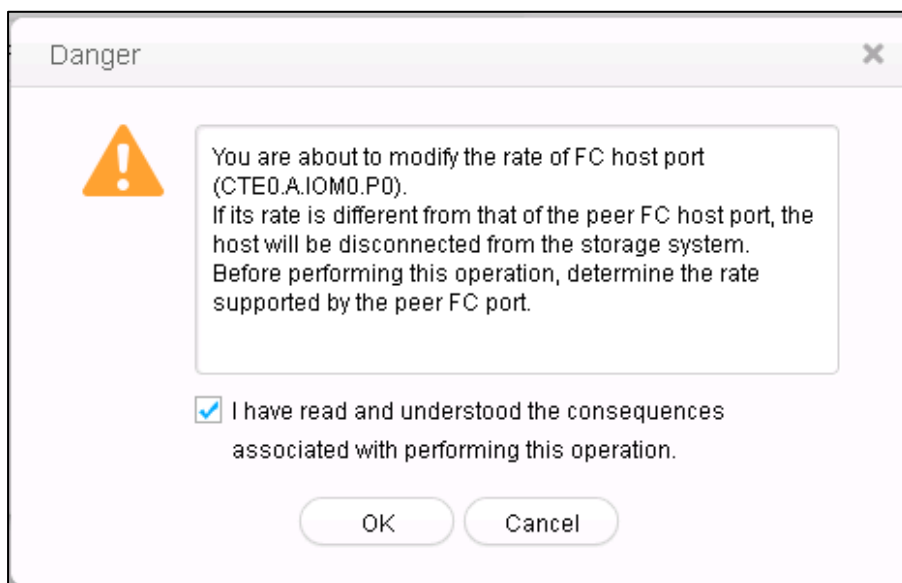
Click "Modify".



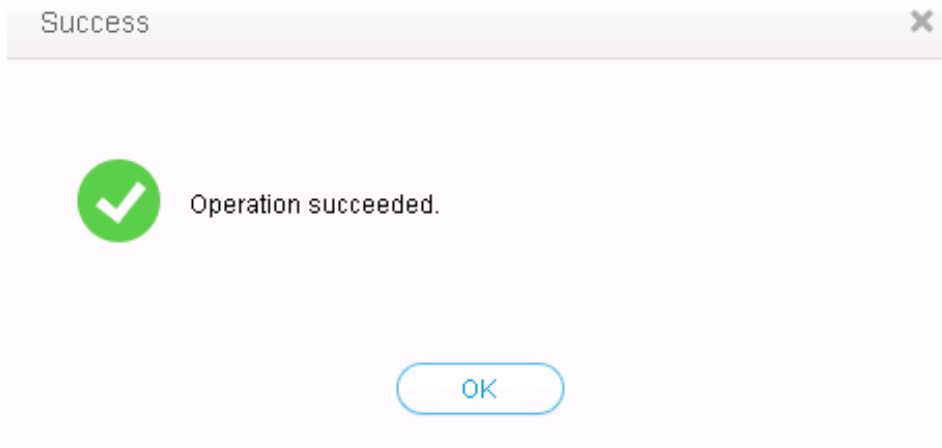
Select the data transmission rate for the FC Port at the **Configured Rate (Gbit/s)** option.

Click "Apply".

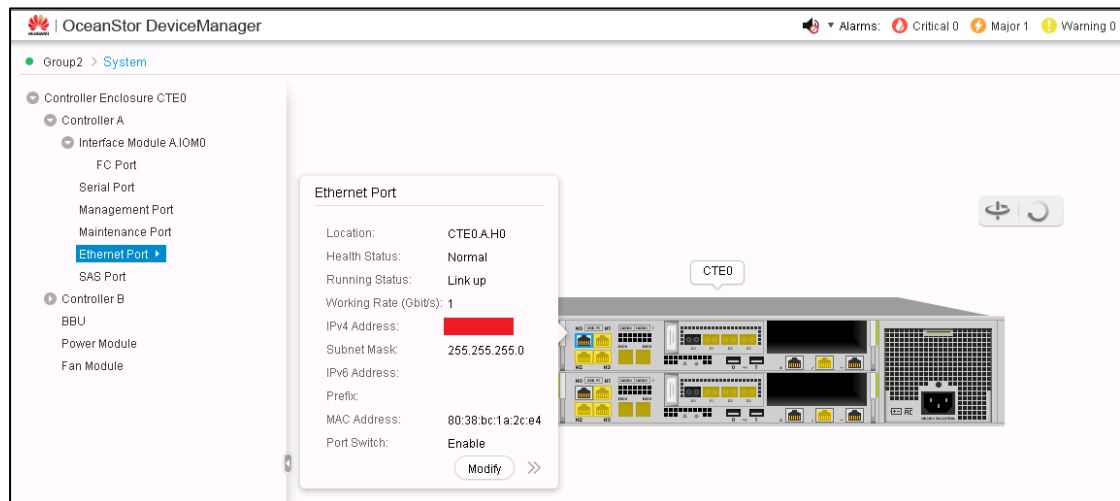
Verify the information in the danger dialog box, and choose "I have read and understood the consequences associated with performing this operation".



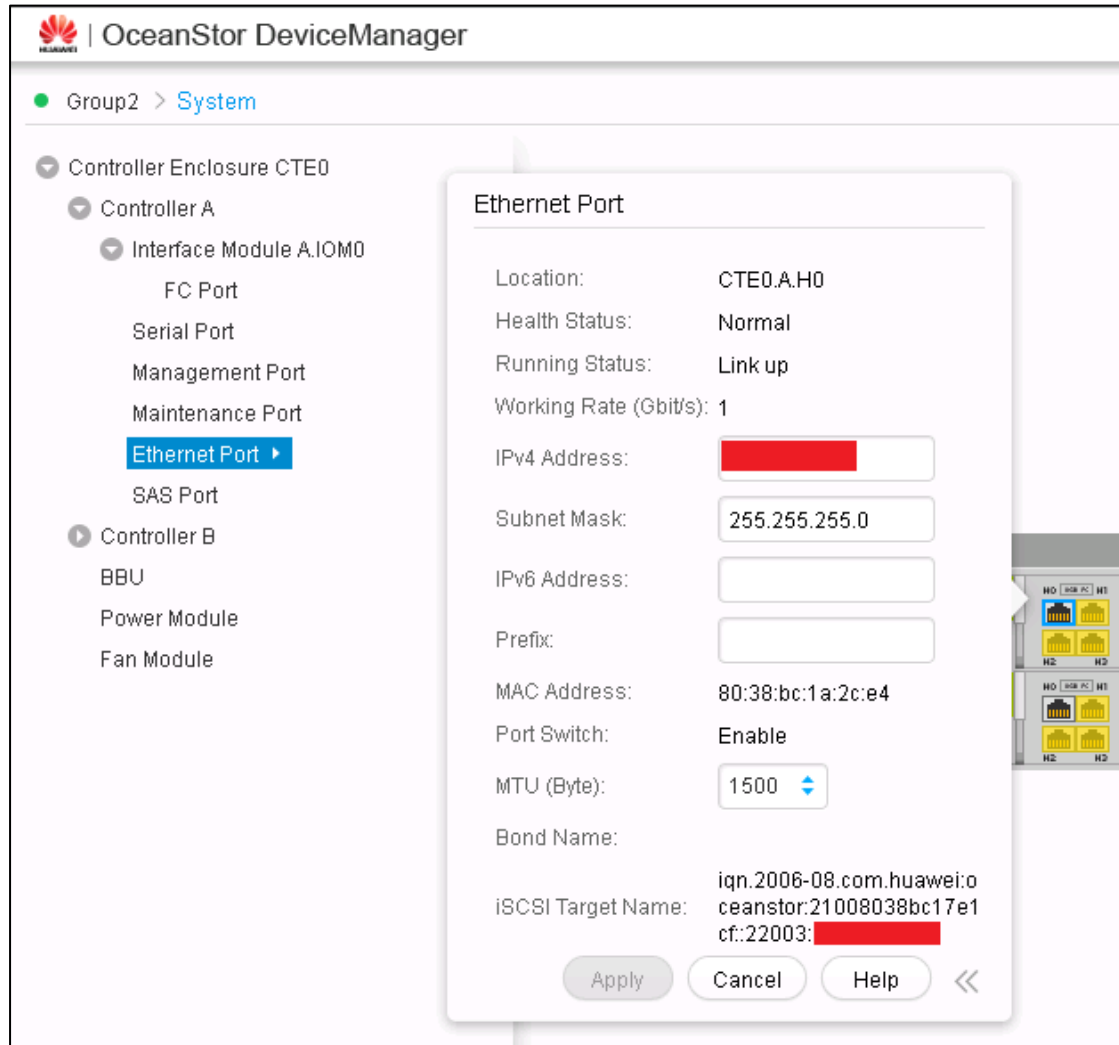
Click "OK", and the success dialog box will appear to indicate successful operation.



Click "OK" on the success dialog box.
Click on "Ethernet Port".

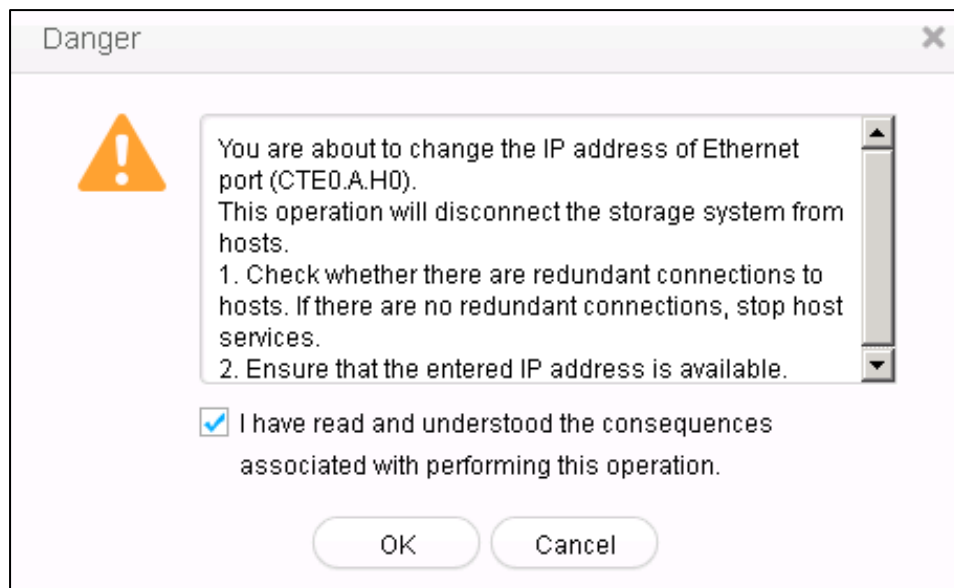


Click "Modify".
At the IPV4 address field, key in the IP address and subnet mask (The address inputted here is the service IP address, please refer to the actual networking diagram).
Leave other options at its default value.



Click "Apply".

Confirm the information in the danger dialog box, and choose "I have read and understood the consequences associated with performing this operation".



Click "OK", the operation successful information will be displayed by a dialog box.

Route management:

Click on the Ethernet Port that requires route to be added (the main reason for this operation is because the service network segment of the servers and the Ethernet network segment of the storage array is not located within the same network segment).

Click on "Route Management".

Name	Location	Health S...	Running...	MAC Add...	IPv4 Add...	IPv6 Add...	Working ...	MTU (Byte)	Bond Na...	Port Switch
H0	CTE0.A.H0	Normal	Link up	80:38:bc...	192.168....	/	1	1500		Enable
H1	CTE0.A.H1	Normal	Link down	80:38:bc...	/	/	--	1500		Enable
H2	CTE0.A.H2	Normal	Link down	80:38:bc...	/	/	--	1500	BOND1	Enable
H3	CTE0.A.H3	Normal	Link down	80:38:bc...	/	/	--	1500	BOND1	Enable

At the IP address option, choose the IP address of the Ethernet Port.

Route Management

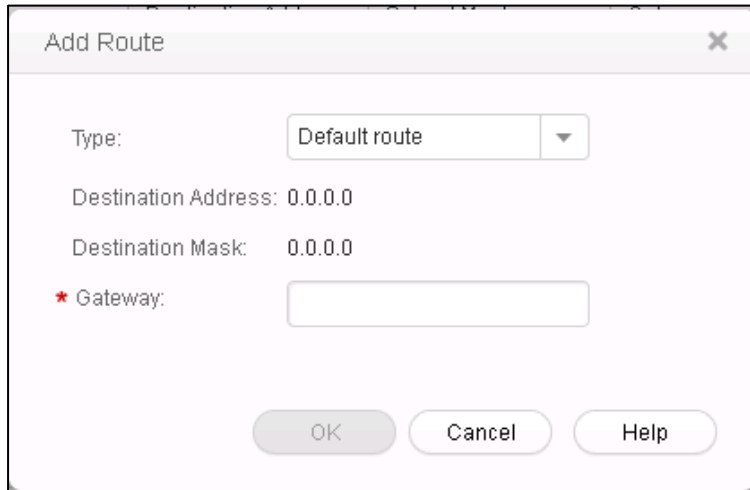
IP Address:

Type	Destination Addr...	Subnet Mask	Gateway
No data			

1/1 Entries 0, Selected 0

Add Remove Close Help

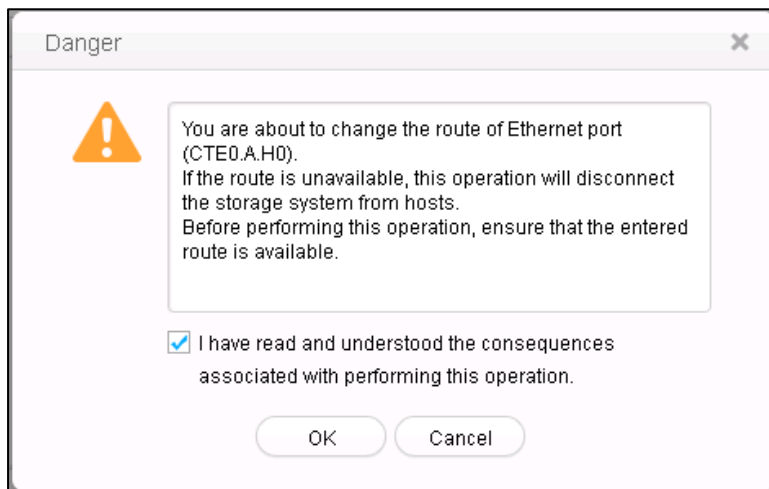
Click "Add".



At the **Type** option, choose "Default route", and key in the gateway address based on actual network situation.

Click "OK". The route information will be added to the route list.

Confirm the information in the danger dialog box and choose "I have read and understood the consequences associated with performing this operation".



Click "OK" on the successful operation dialog box and then click "Close" to exit the route management configuration window.

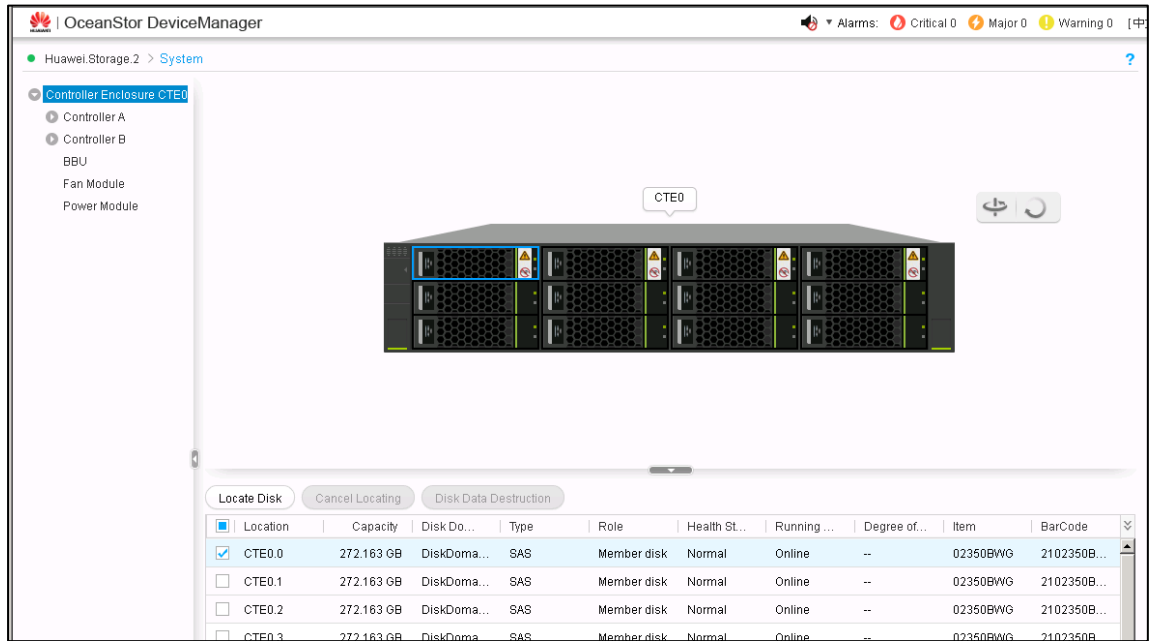
Step 5. Monitoring the Disk Enclosures

On the navigation bar on the right, click on the "System" button.

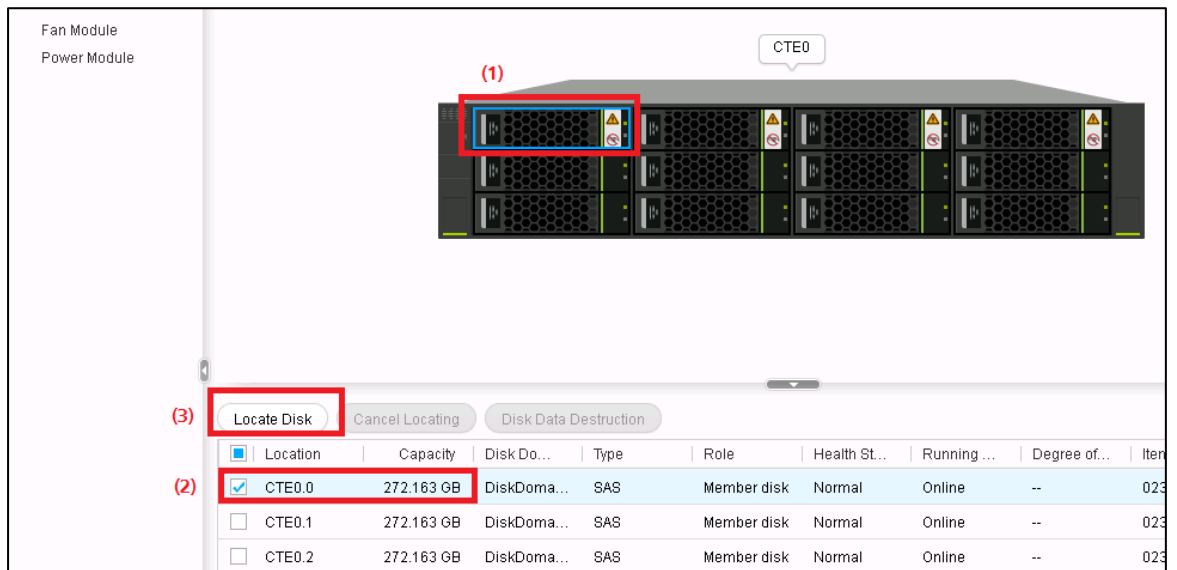
At the functions panel on the left, click on "Rack".

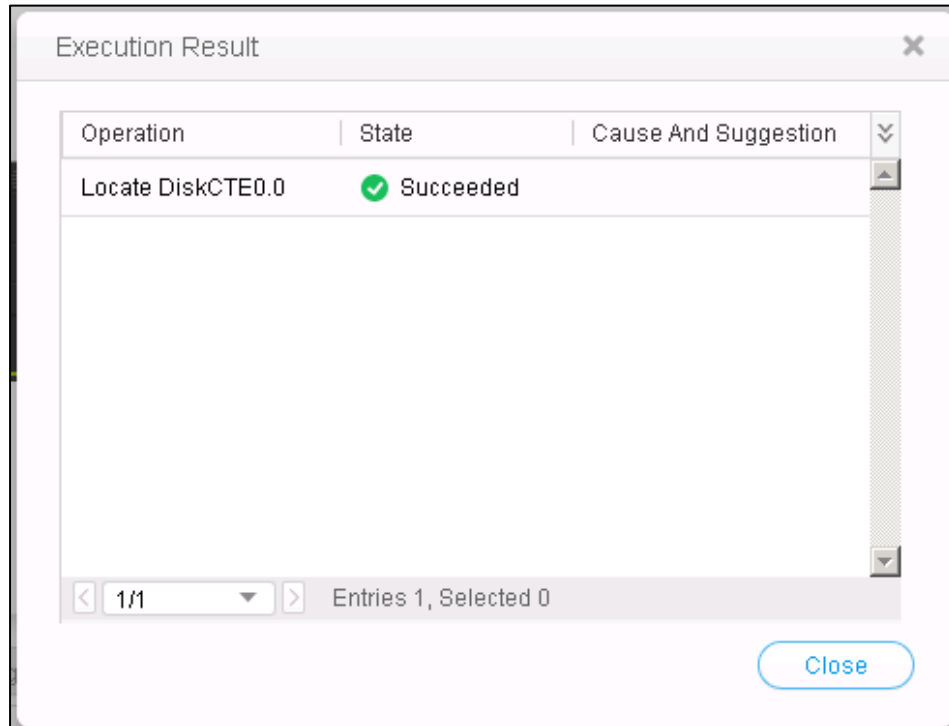
Click on "Disk Enclosure".

Click on "Hard Disk".



Choose the disk that needs to be located, then click on "Locate Disk" at the functions panel at the bottom.

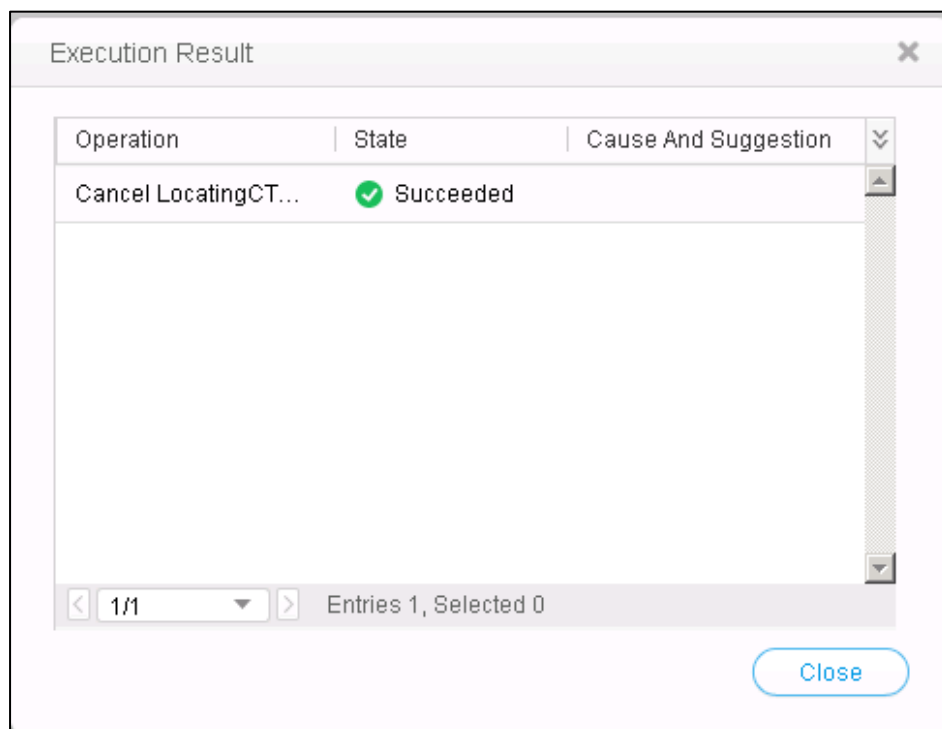




Note: After changing the new hard disk, the HDD indicator light will still be on. In this situation, cancel the disk locating operation.

Click "Close".

Choose the HDD that you want to cancel locating, and click on "Cancel Locating" at the functions panel at the bottom. The execution result dialog box will appear to indicate successful operation.




Click "Close".

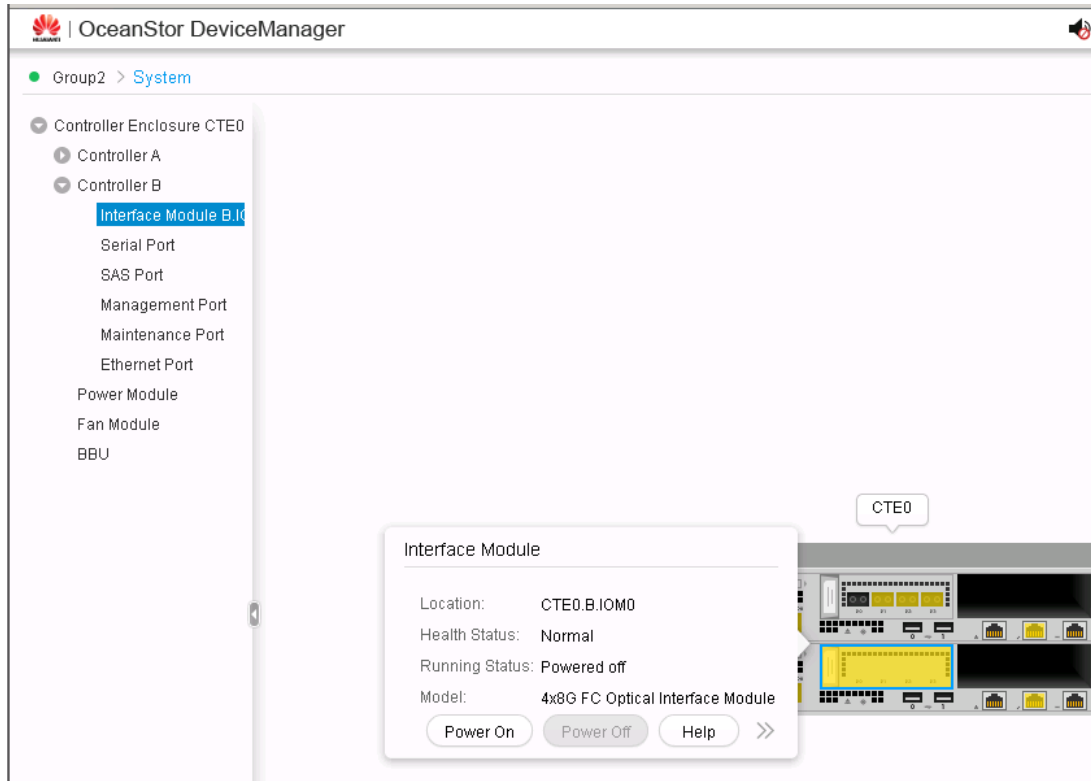
Step 6. Powering On or Off Interface Modules

At the navigation bar on the right, click on "System" button.

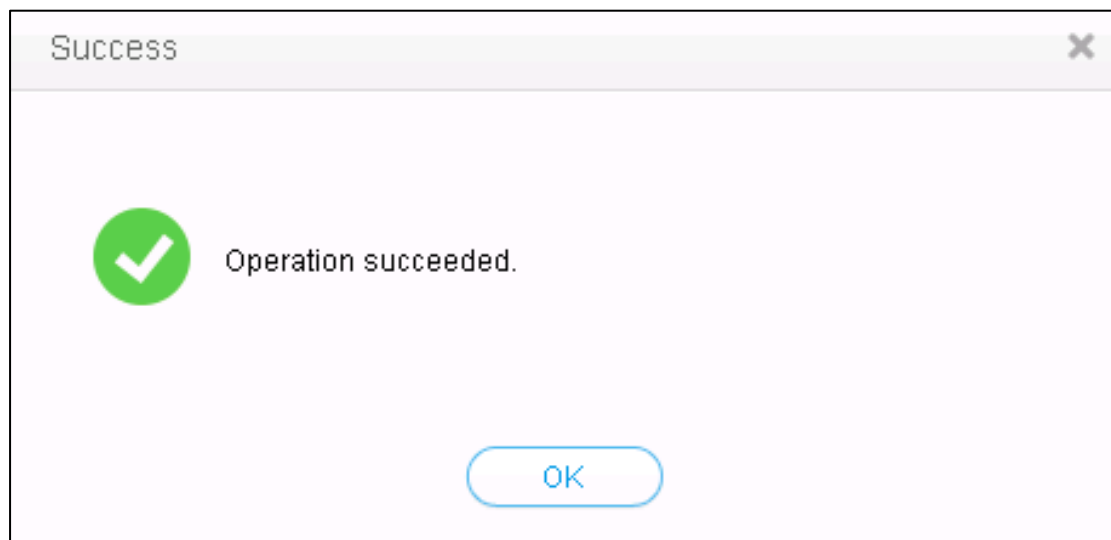
At the functions panel on the right, click on "Controller Enclosure".

Click on  to switch to rear view diagram of the device.

Click on "Interface Module".



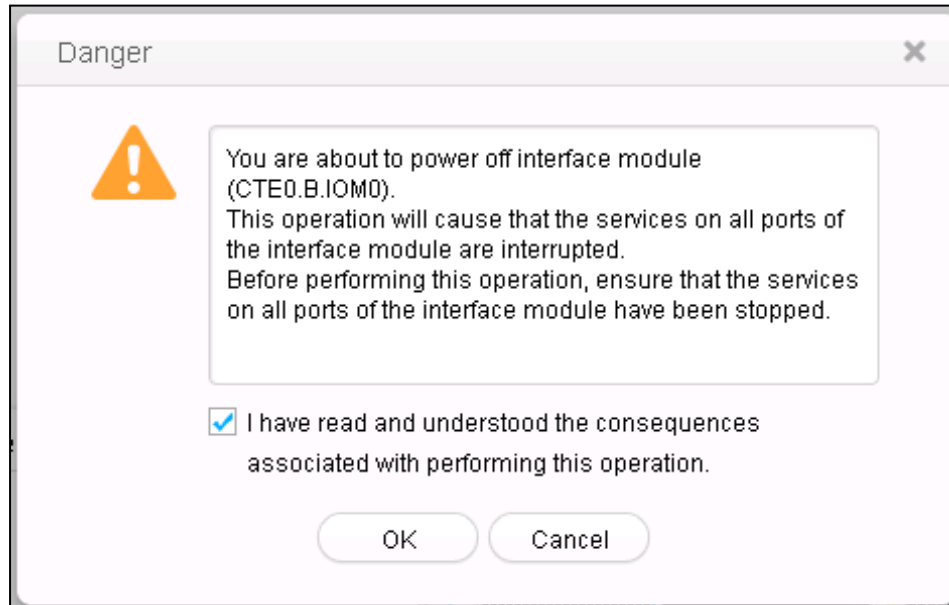
Click on "Power On", a dialog box will appear to indicate successful operation.



Click "OK". The interface module will be powered on.

Click on "Power Off"

Read the information within the danger dialog box, and choose "I have read and understood the consequences associated with performing this operation".



Click "OK" and a dialog box will appear to indicate successful operation.
Click "OK". The interface module will be powered off.

1.3 Results Verification

Please refer to the configuration steps.

1.4 Configuration Reference

Please refer to the configuration steps.

1.5 Questions

How to check the service IP of the storage and how to locate faulty HDD?

—End of Lab 1.

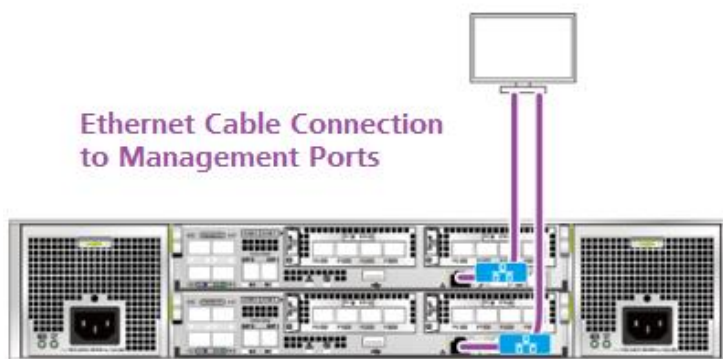
2 Storage Resource Pool Configuration

2.1 Lab Introduction

2.1.1 Lab Objective

Upon completion of the lab in this chapter, you will be able to understand the basic service configuration and functions of SAN storage products. Resource pool includes disk domain, storage pool, LUN, LUN group etc. The configuration steps of the resource pool are the prerequisite for configuring FC SAN and IP SAN. This lab will use OceanStor 5300 V3 as the example.

2.1.2 Networking and Service Description



Windows PC maintenance terminal connects to the OceanStor V3 management network through Ethernet and serial cable connections. The Windows PC maintenance terminal performs the configuration and management of OceanStor V3 through DeviceManager which is accessed from the management IP through the management network.

2.2 Lab Configuration Tasks

2.2.1 Configuration Roadmap

Understand the basic service configuration and features of SAN storage products. The lab content includes configuration of disk domain, storage pool, LUN and LUN group.

2.2.2 Configuration Steps

Step 1. Create a Disk Domain

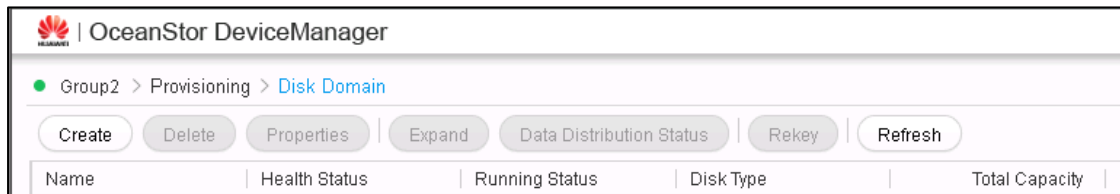
Note: The disks in slot 0 to 3 in the controller enclosure are coffer disks, which is used to save critical data, and the disk types should be unified. In non-essential scenario, it is not allowed to randomly unplug or change the order of the coffer disks, or else system data may be damaged or lost.

Login to DeviceManager.

At the navigation bar on the right, click on the "Provisioning" button.

At the "Storage Configuration and Optimization" region, click on "Disk Domain".

Click on the "Create" button.

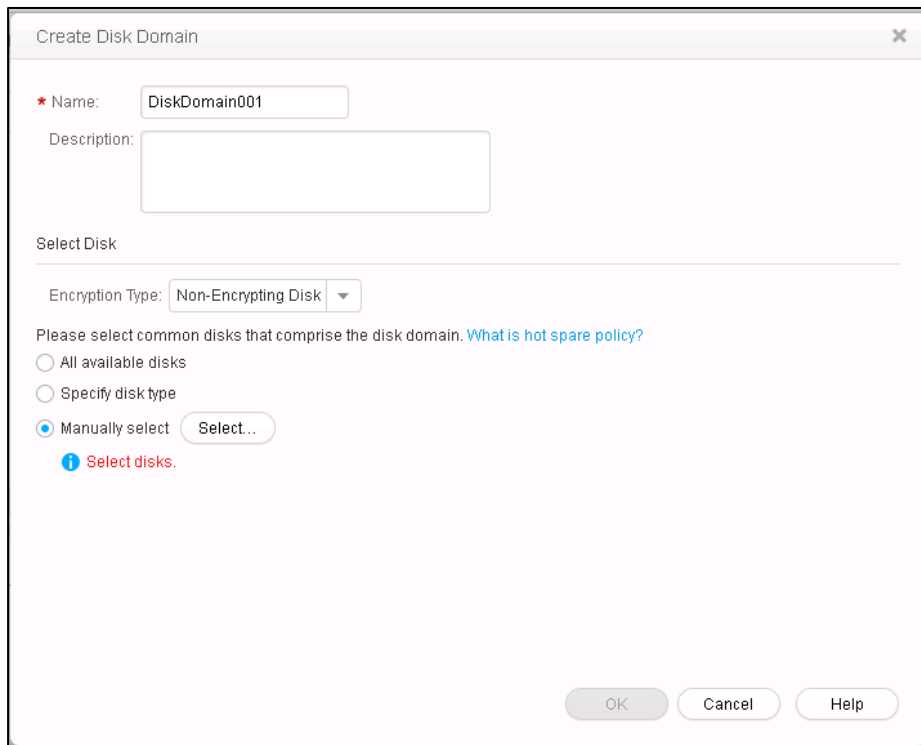


Key in the disk domain name.


At the "Description" field, key in the functions or properties of the disk domain.

At the "Select Disk" region, choose "Manually select".

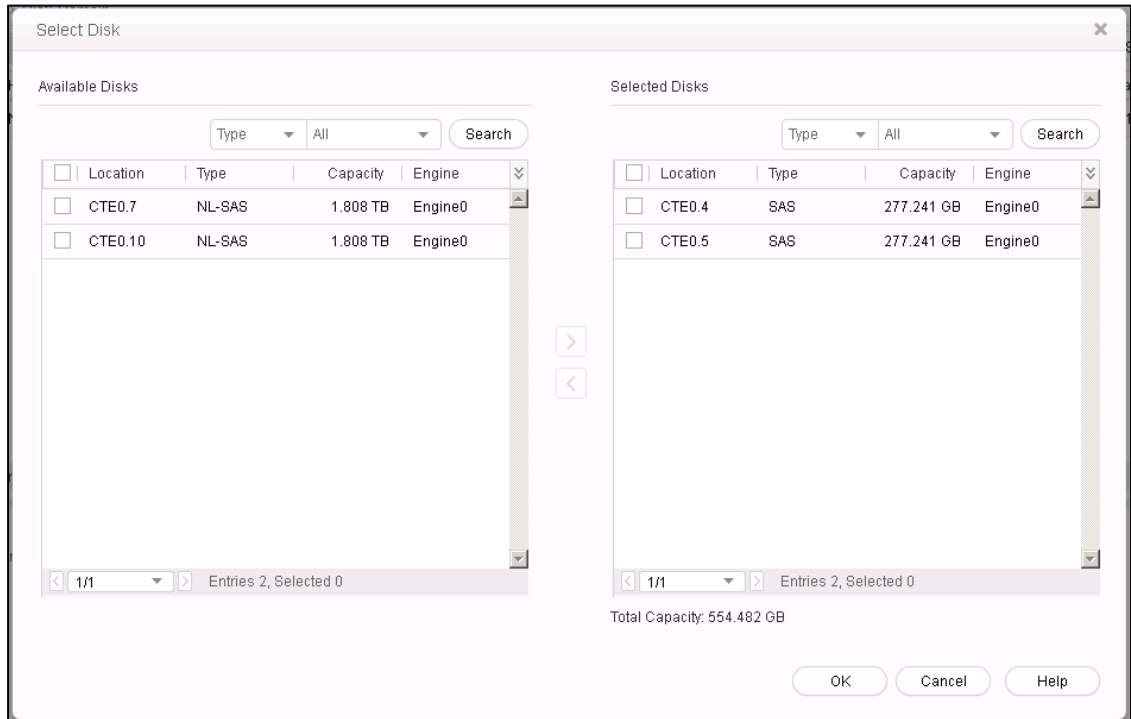
Click on "Select" button.



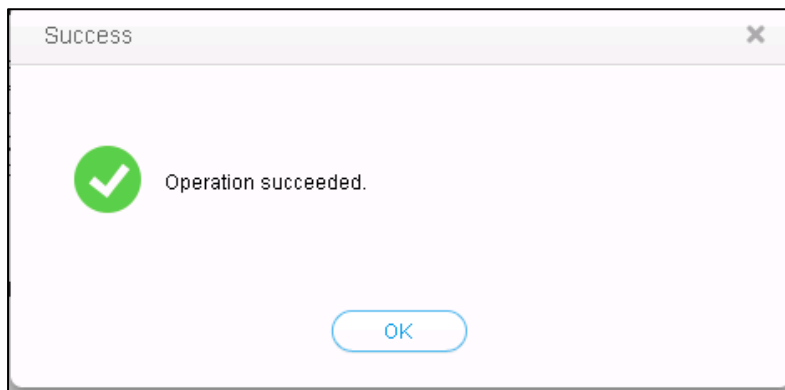
At the "Available Disks" region, choose the disks that you want to add to the disk domain.

Tick on the available disks, and click the  button.

Click "OK".



Click "OK" on the dialog box that appears to indicate successful operation.

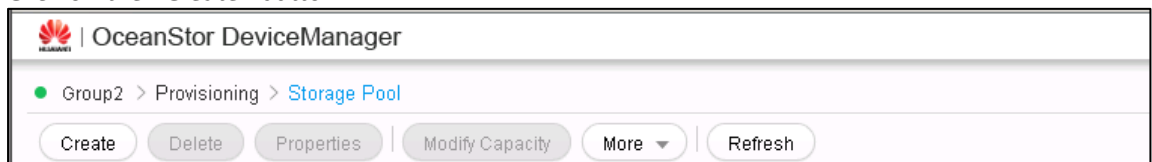


Step 2. Create a Storage Pool

At the navigation bar on the right, click on the "Provisioning" button.

At the "Storage Configuration and Optimization" region, click on "Storage Pool".

Click on the "Create" button.



Key in the name of the storage pool in the "Name" field, and key in the functions and properties of the storage pool in the "Description" field.

Choose "Block Storage Service" at the "Usage" field.

Note: "File Storage Service" is only chosen when creating NAS file sharing.

Choose the appropriate disk domain from the “Disk Domain” field.

At the “Storage Medium” region, choose the RAID policies and set the capacity for storage pool. Since only 4 SAS and 4 NL-SAS disks each are chosen when creating the disk domain in the previous configuration steps, thus when creating a single RAID, the number of disks cannot be more than 4.

Create Storage Pool

* Name:

Description:

Usage:

i Usage is unchangeable after it is configured. The storage pool is only used to create LUN.

Disk Domain:

* Storage Medium: Please select a disk type and a RAID policy for the storage pool. *?*

Performance Tier (SAS)

RAID Policy:

Available Capacity: 209.000 GB

* Capacity:

Capacity Tier (NL-SAS)

RAID Policy:

Available Capacity: 379.000 GB

* Capacity:

Total Storage Pool Capacity: 20.000 GB

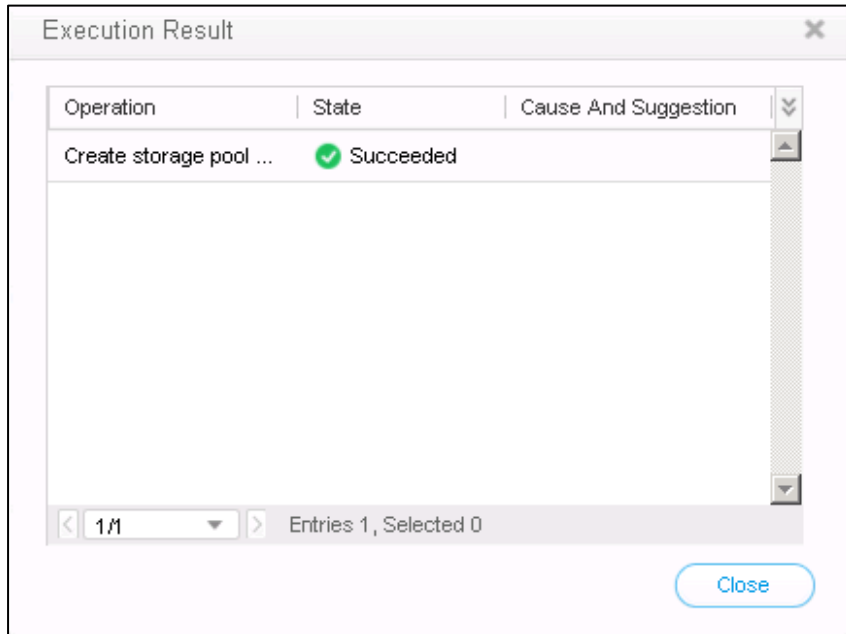
i The number of RAID data disks of different storage pool tiers must be a multiple of 1, 2, 4, or 8. After the storage pool is created, the RAID policy of a new storage tier of the storage pool can only be RAID 1(2D/4D), RAID10, RAID 3(2D+1P/4D+1P/8D+1P), RAID 5(2D+1P/4D+1P/8D+1P), RAID 50((2D+1P)×2/(4D+1P)×2/(8D+1P)×2), RAID 6(2D+2P/4D+2P/8D+2P/16D+2P).

Click on the “Advanced” button, set the “Capacity Alarm Threshold” as 80, and “Data Migration Granularity” as 4MB.

Click “OK”.

Check the completeness and accuracy of the information keyed within the storage pool creation wizard, and then click “OK”.

The execution result dialog box will appear to indicate successful operation.

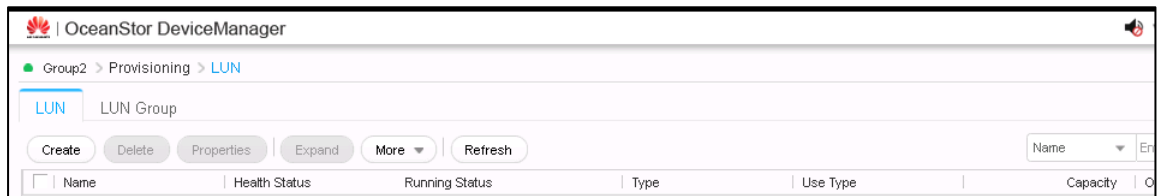


Step 3. Create a LUN

At the navigation bar on the right, click on the "Provisioning" button.

At the "Block Storage Service" region, click on "LUN".

Click on the "Create" button.



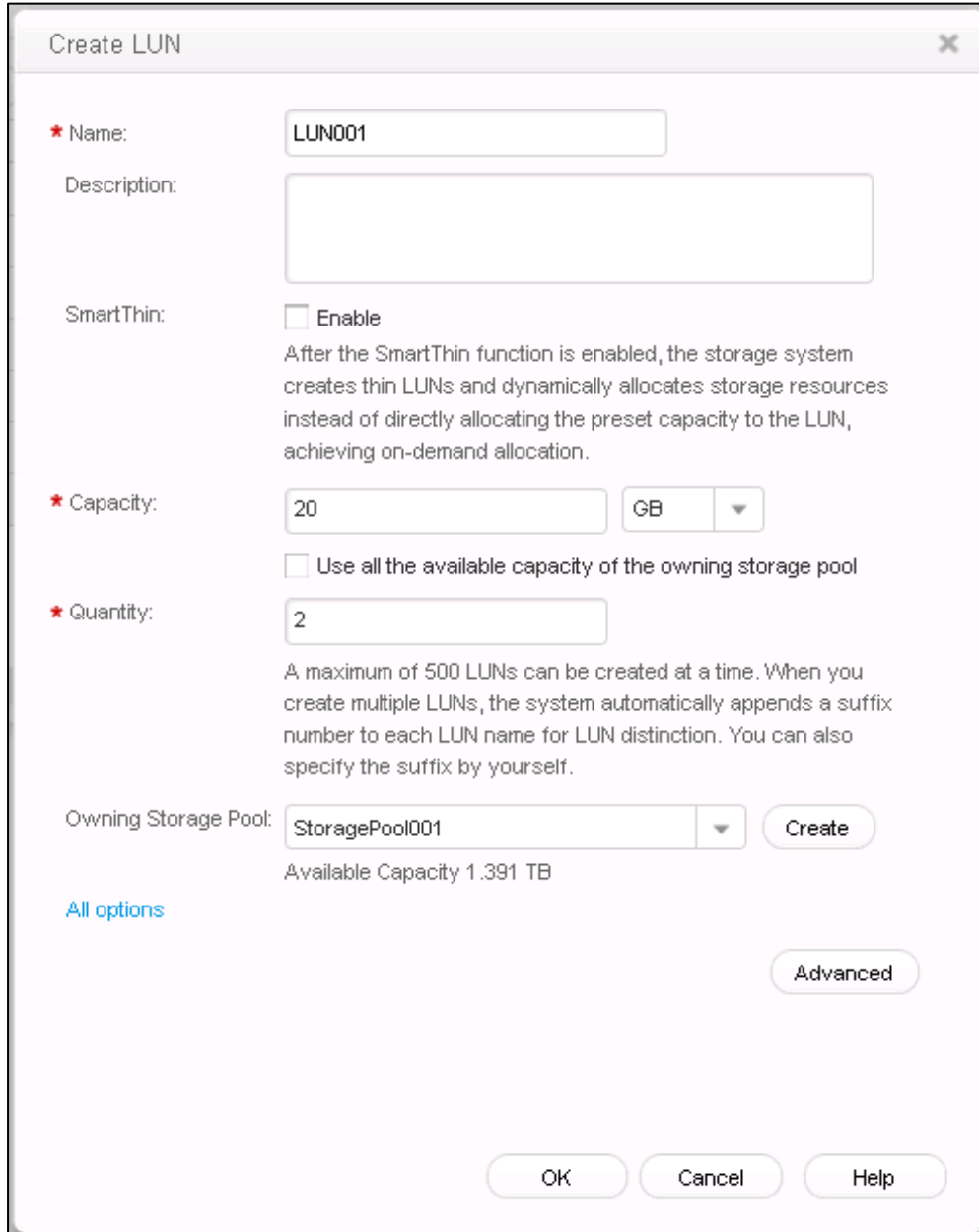
Key in the name of the LUN in the "name" field.

Key in the description of the new LUN within the "Description" field.

Key in 20 within the "Capacity" field, which means that the size of the LUN would be 20GB.

Key in 2 at the "Quantity" field to create two LUNs.

Choose the appropriate storage pool from the "Owning Storage Pool" field.



Create LUN

★ Name: LUN001

Description:

SmartThin: Enable
After the SmartThin function is enabled, the storage system creates thin LUNs and dynamically allocates storage resources instead of directly allocating the preset capacity to the LUN, achieving on-demand allocation.

★ Capacity: 20 GB

Use all the available capacity of the owning storage pool

★ Quantity: 2
A maximum of 500 LUNs can be created at a time. When you create multiple LUNs, the system automatically appends a suffix number to each LUN name for LUN distinction. You can also specify the suffix by yourself.

Owning Storage Pool: StoragePool001
Available Capacity 1.391 TB

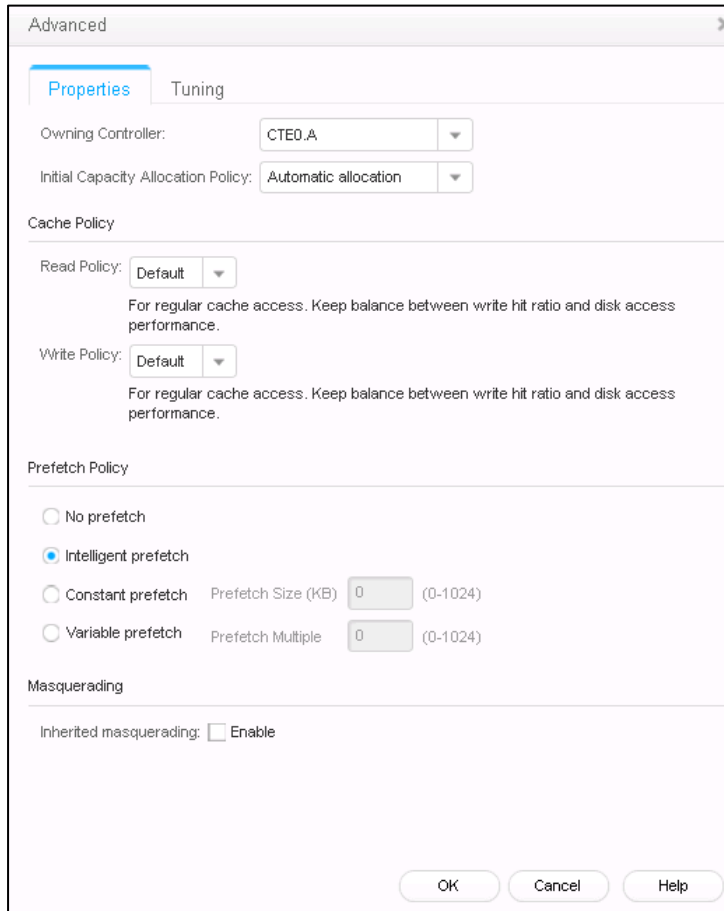
[All options](#)

Click on “Advanced” button.

Click on “Properties” tab.

At the drop down list of the “Owning Controller” field, choose Controller A (CTE0.A). Note: you may also redirect the LUN to Controller B or allow the system to auto select the owning controller.

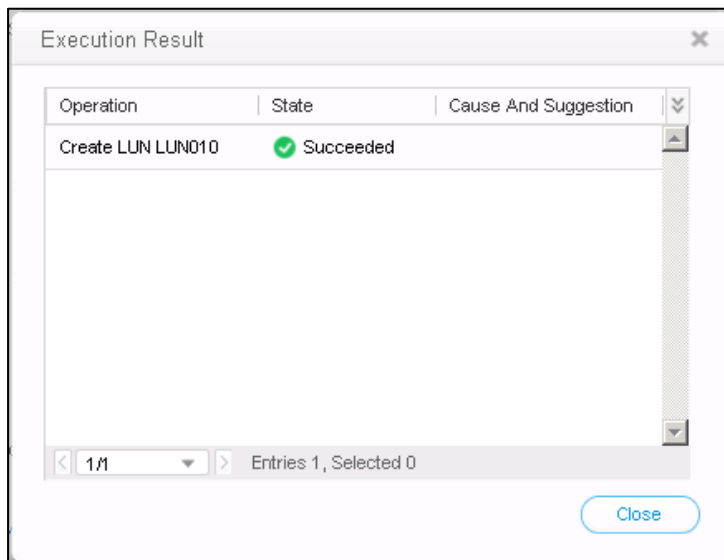
Leave the cache policy and the prefetch policy at its default values.



Click on the “Tuning” tab, leave all the settings at its default value. Note: there are few options here requires license to be available before it can be used.

Click “OK”, and close the “Advanced” dialog box.

Click “OK” and the execution result dialog box will appear to indicate successful operation.



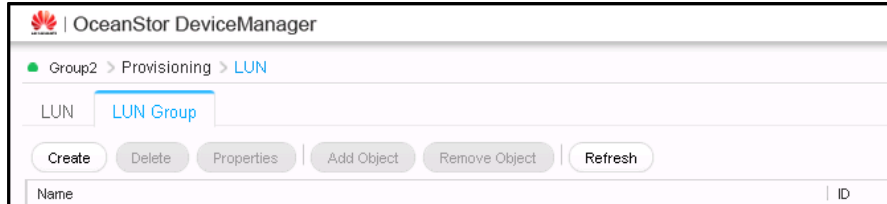
Step 4. Create a LUN Group

At the navigation bar on the right, click on the "Provisioning" button.

At the "Block Storage Service" region, click on "LUN".

Click on the "LUN Group" tab.


Click on the "Create" button.

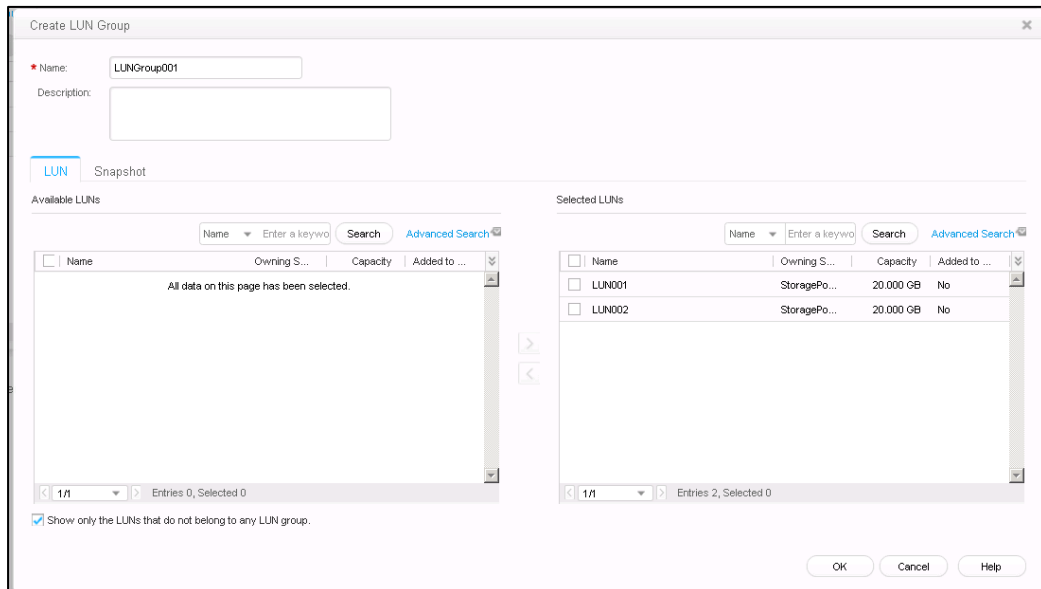


Key in the name of the LUN Group within the "Name" field.

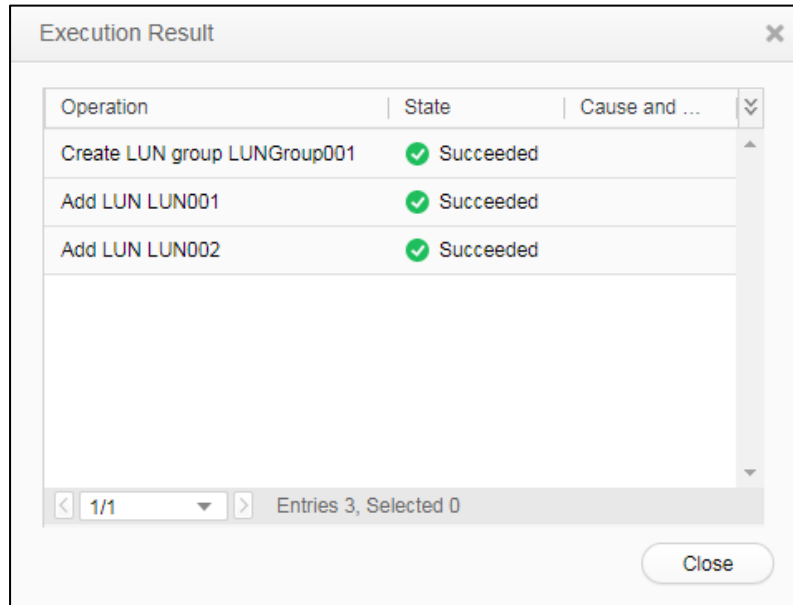
Key in the description for the LUN group within the "Description" field.

At the available LUN region, choose the LUN that you want to add to the LUN Group.

Click  to add the LUN to the LUN Group.



Click "OK", the execution results dialog box will appear to indicate successful operation.



Click "Close".

2.3 Results Verification

Please refer to the configuration steps.

2.4 Configuration Reference

Please refer to the configuration steps.

2.5 Questions

Is creating a storage pool the prerequisite for creating a LUN?

— End of LAB 2.

3 SAN Basic Service Configuration and Usage

3.1 Lab Introduction

3.1.1 Lab Objective

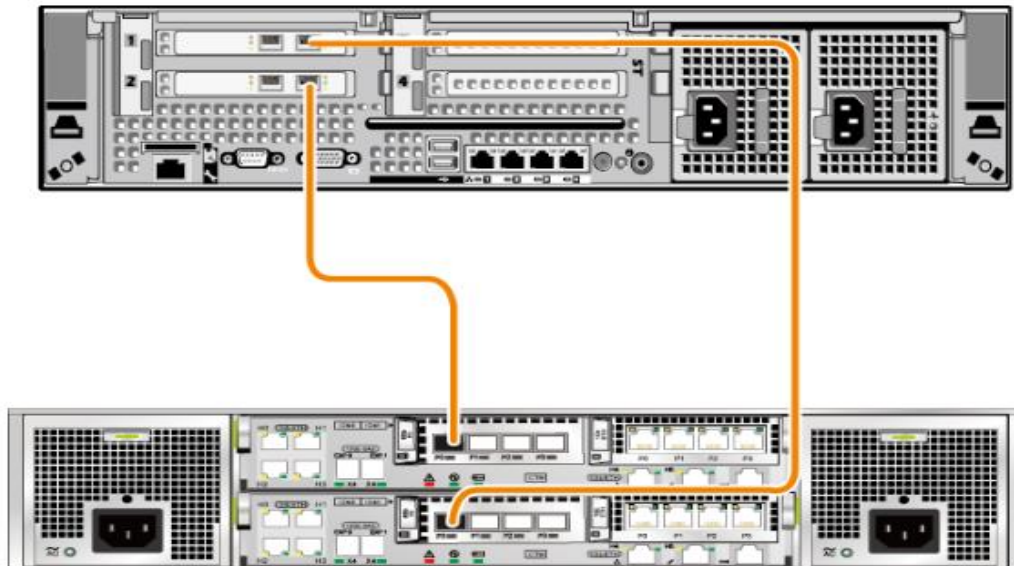
Upon completion of this lab, you will be able to acquire the following operational skills:

- Creating a host.
- Creating a host group.
- Creating a port group.
- Creating mapping view.
- Configuring IP SAN and FC SAN under Windows and Linux environments.
- Install multipathing software under Windows and Linux environments.
- Usage of LUN under Windows and Linux environments.

This lab will use OceanStor 5300 V3 as the example.

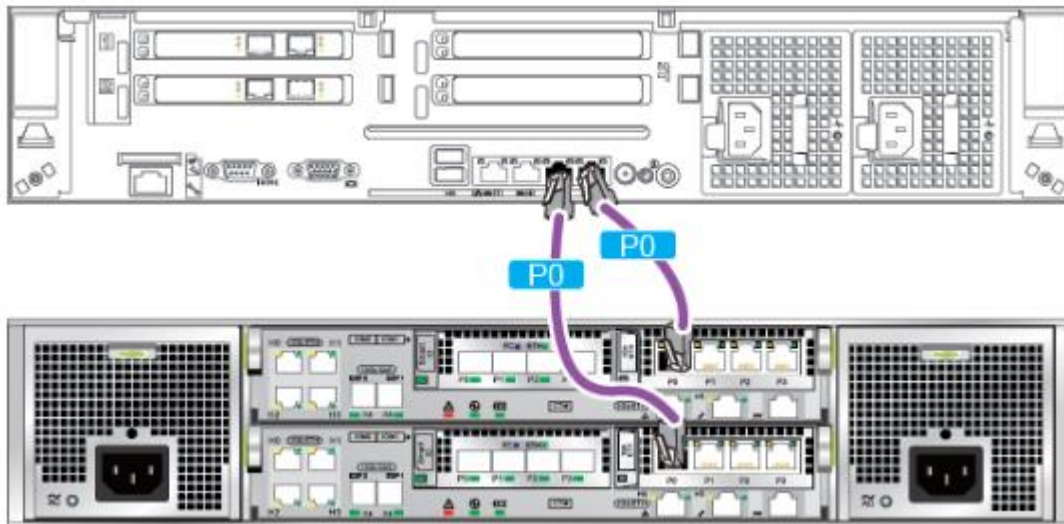
3.1.2 Networking and Service Description

FC SAN (Fibre Channel SAN) networking diagram is as following:



Note: The diagram here only shows the service connections between the production server and storage, please refer to the 1st and 2nd lab for management network connections.

IP SAN networking diagram is as following:

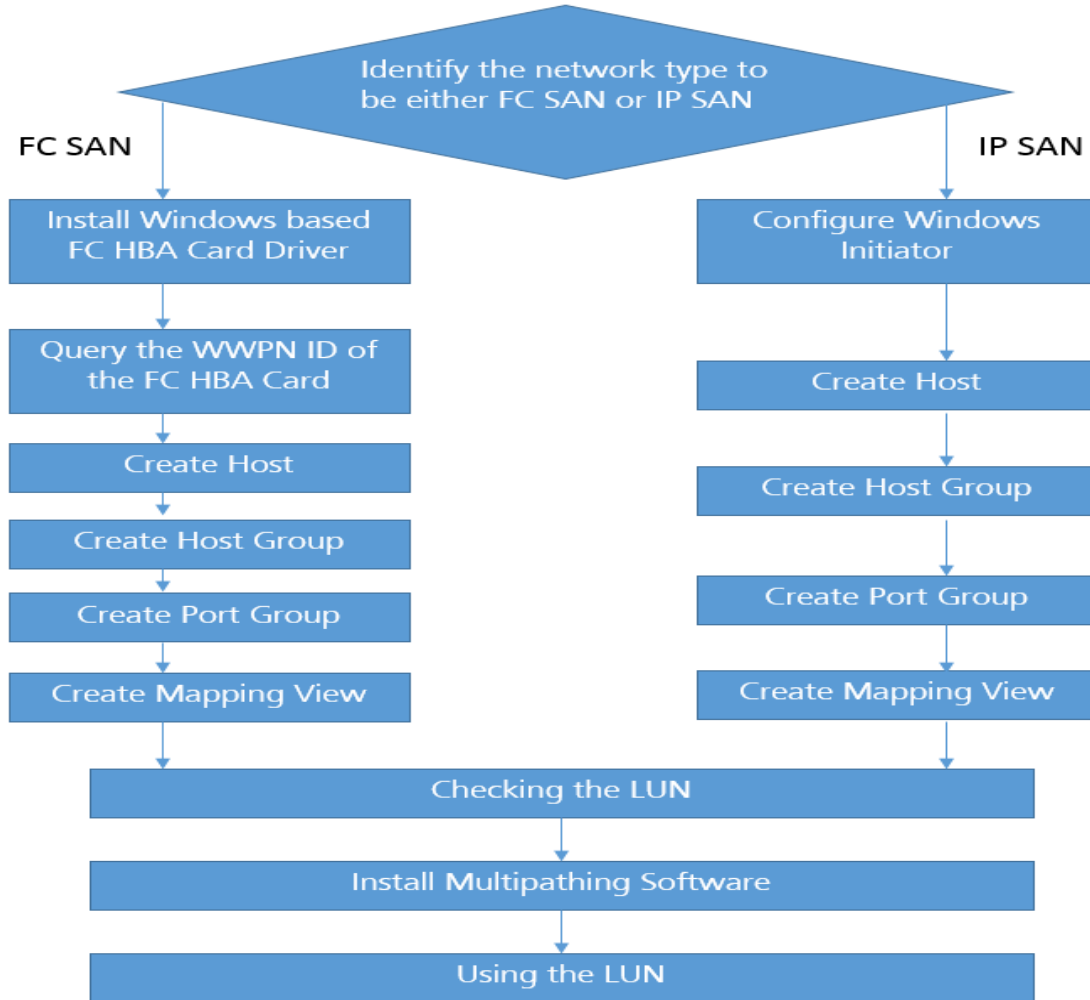


Note: The diagram here only shows the service connections between the production server and storage, please refer to the 1st and 2nd lab for management network connections.

3.2 SAN Configuration Tasks Based On Windows

3.2.1 Configuration Roadmap

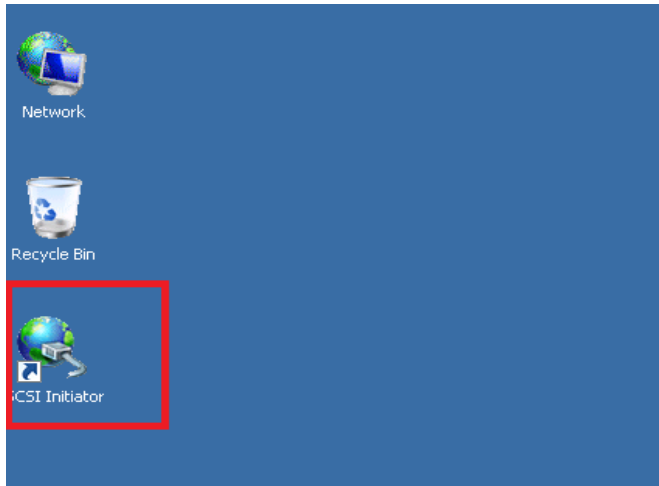
Configuration Prerequisite: Storage pool configuration are already completed.



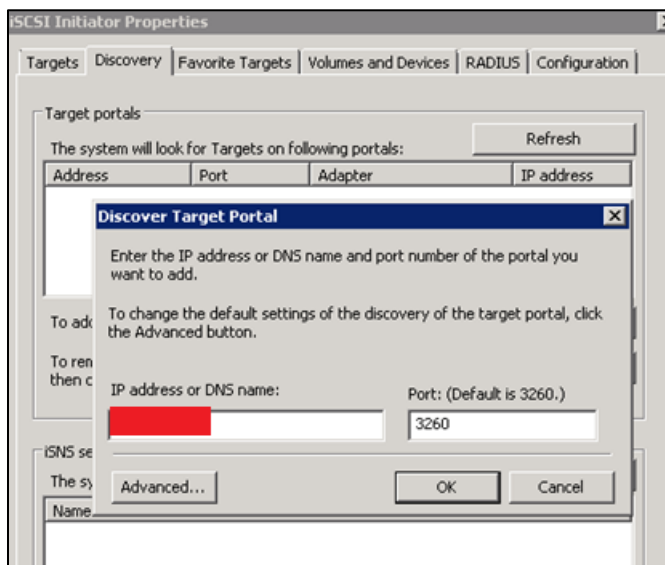
3.2.2 IP SAN Configuration Steps Based On Windows

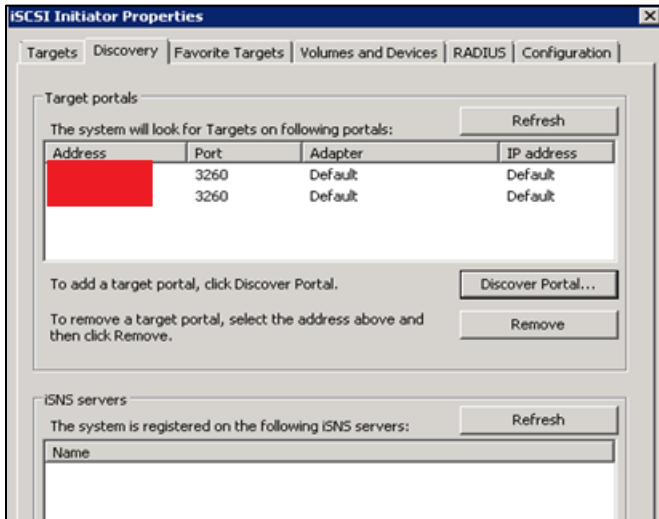
Step 1. Configure the Windows Initiator.

Double click on "iSCSI Initiator" to execute the program.

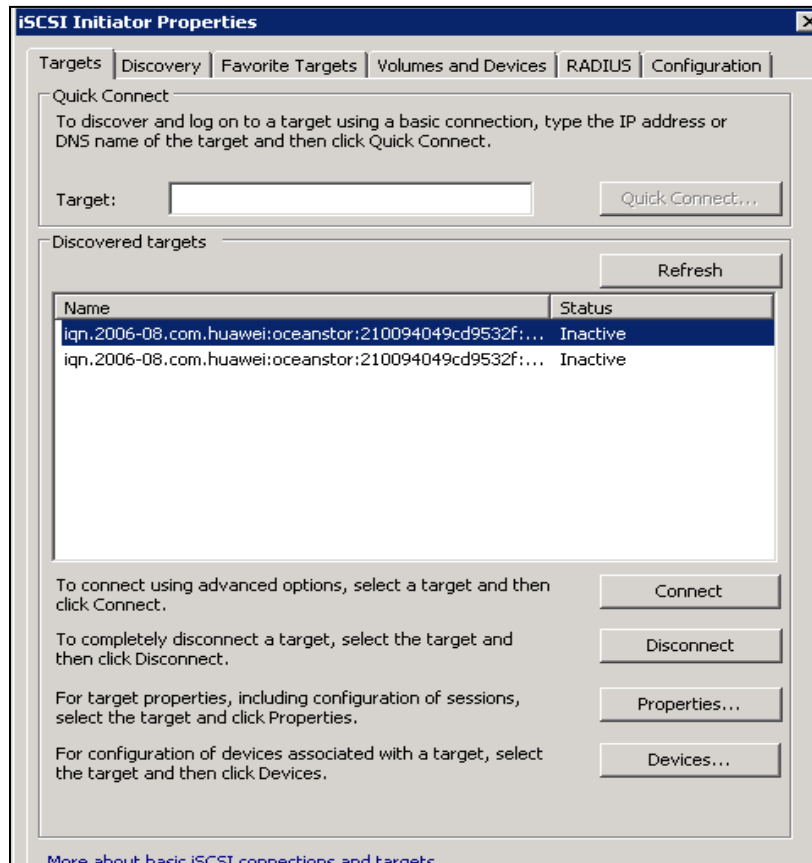


Choose the "Discovery" tab, click on the "Discovery Portal" button, key in the Service IP address of the storage to discover the iSCSI Target. If multipathing is configured, both IP must be added within the "Target Portal". Prerequisite: The corresponding iSCSI port on the storage array has already been configured with the service IP address.

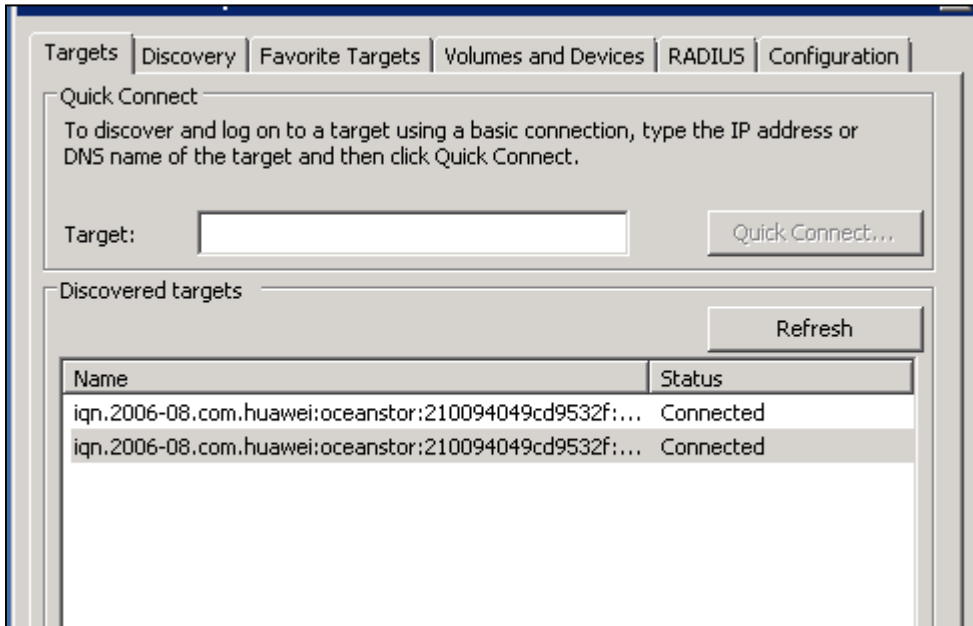
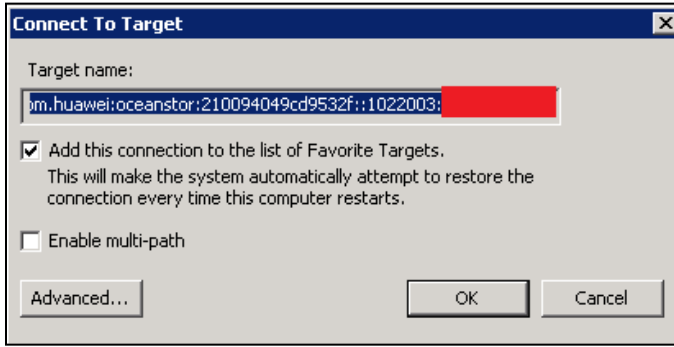




Note: Please use the service IP address provided in the eLab network diagram. Choose the "Targets" tab, and choose the targets that has been discovered, then click the "Connect" button.



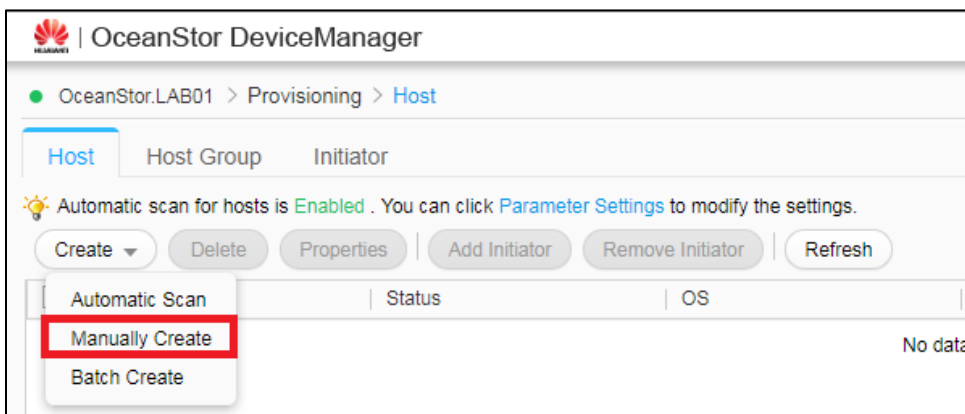
Click "OK".



Step 2. Creating a Host

At the navigation bar on the right, click on the "Provisioning" button.

At "Block Storage Service", click on "Host", choose "Create", and then choose "Manually Create".



At the "name" field, key in the name of the host, choose the operating system as Windows, others are optional.

Create Host Wizard: Step 4-1

Set Host Information
Enter basic information for the host.

* Name:

Description:

OS:

IP Address:

Device Location:

Click "Next", add the selected initiator, choose the valid initiator from the available initiators and click the button to add them to selection.

Create Host Wizard: Step 4-2

Configure Initiator
Initiators are required by hosts to access storage resources. The WWPNs or IQNs of initiators added to the hosts must be the same as those of initiators on the application servers. [What is an initiator?](#)

Available Initiators

Initiator Type: WWPNIQN

<input type="checkbox"/>	Type	WWPN/IQN	Status
<input type="checkbox"/>	iSCSI	bbbbbbbb	Online
<input type="checkbox"/>	iSCSI	cccccccc	Online
<input type="checkbox"/>	iSCSI	dddddddd	Online

1/1 Entries 3, Selected 0

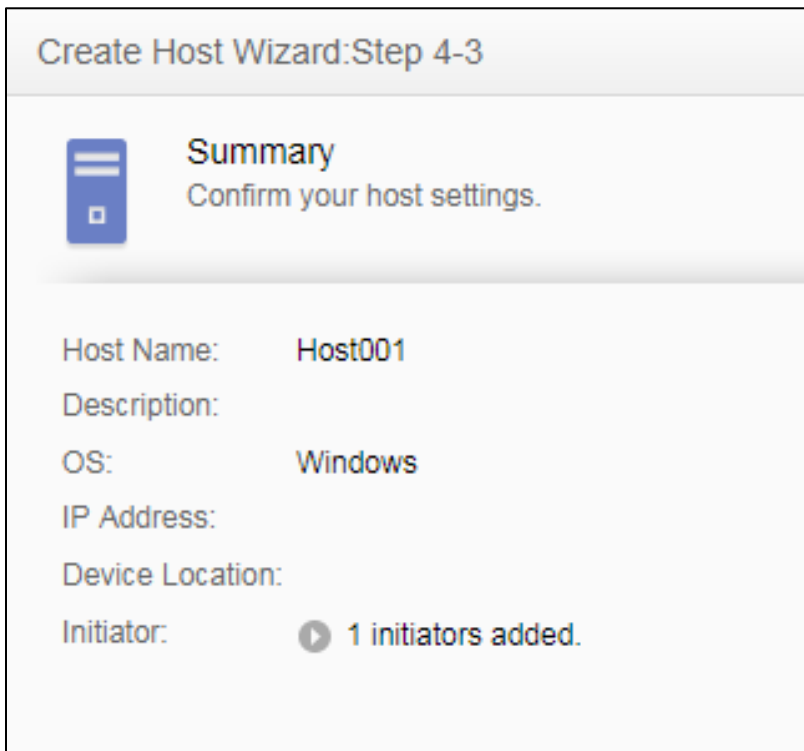
Selected Initiators

WWPN/IQN

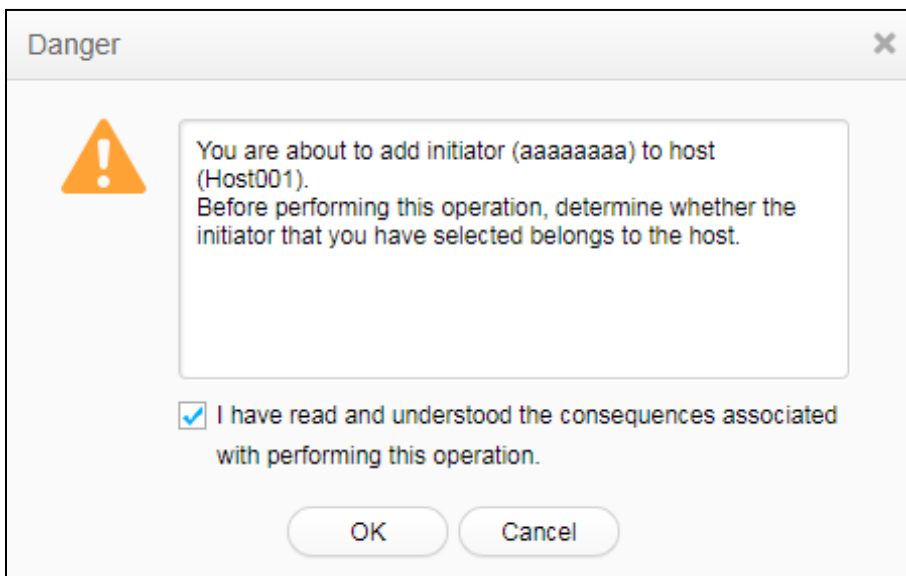
<input type="checkbox"/>	Type	WWPN/IQN	Status
<input type="checkbox"/>	iSCSI	aaaaaaaa	Online

1/1 Entries 1, Selected 0

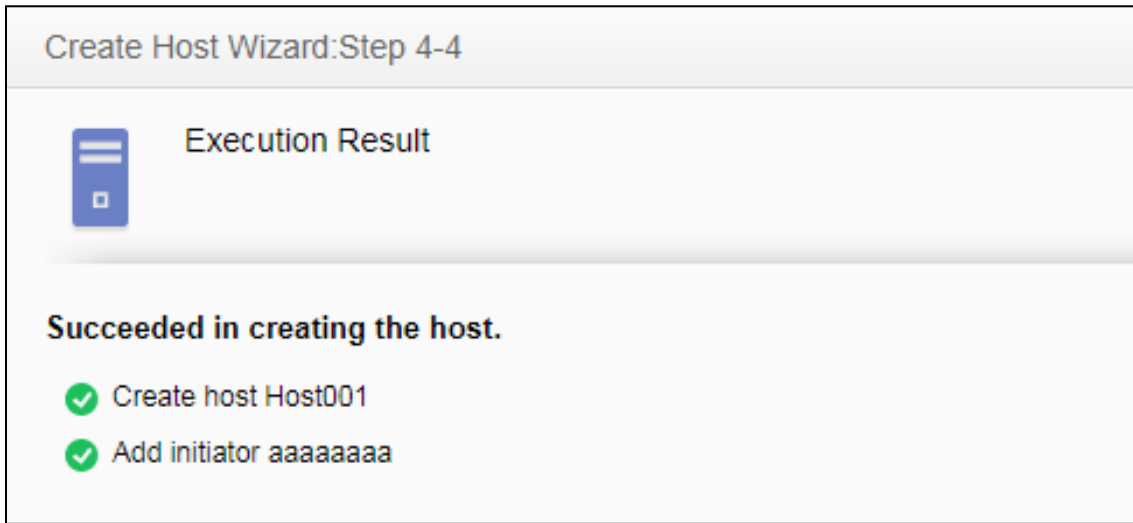
Click "Next", verify the summarized information for the host configuration.



Click "Finish" and verify the operation in the danger dialog box, and press "OK".



Host creation is successful, click "Close" to exit.

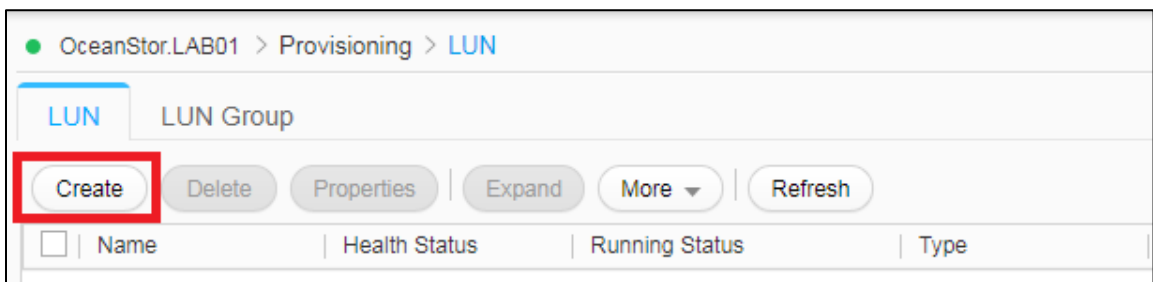


Step 3. Creating a LUN

At the navigation bar on the right, click on the "Provisioning" button.

At "Block Storage Service", click on "LUN".

Click on "Create" button.

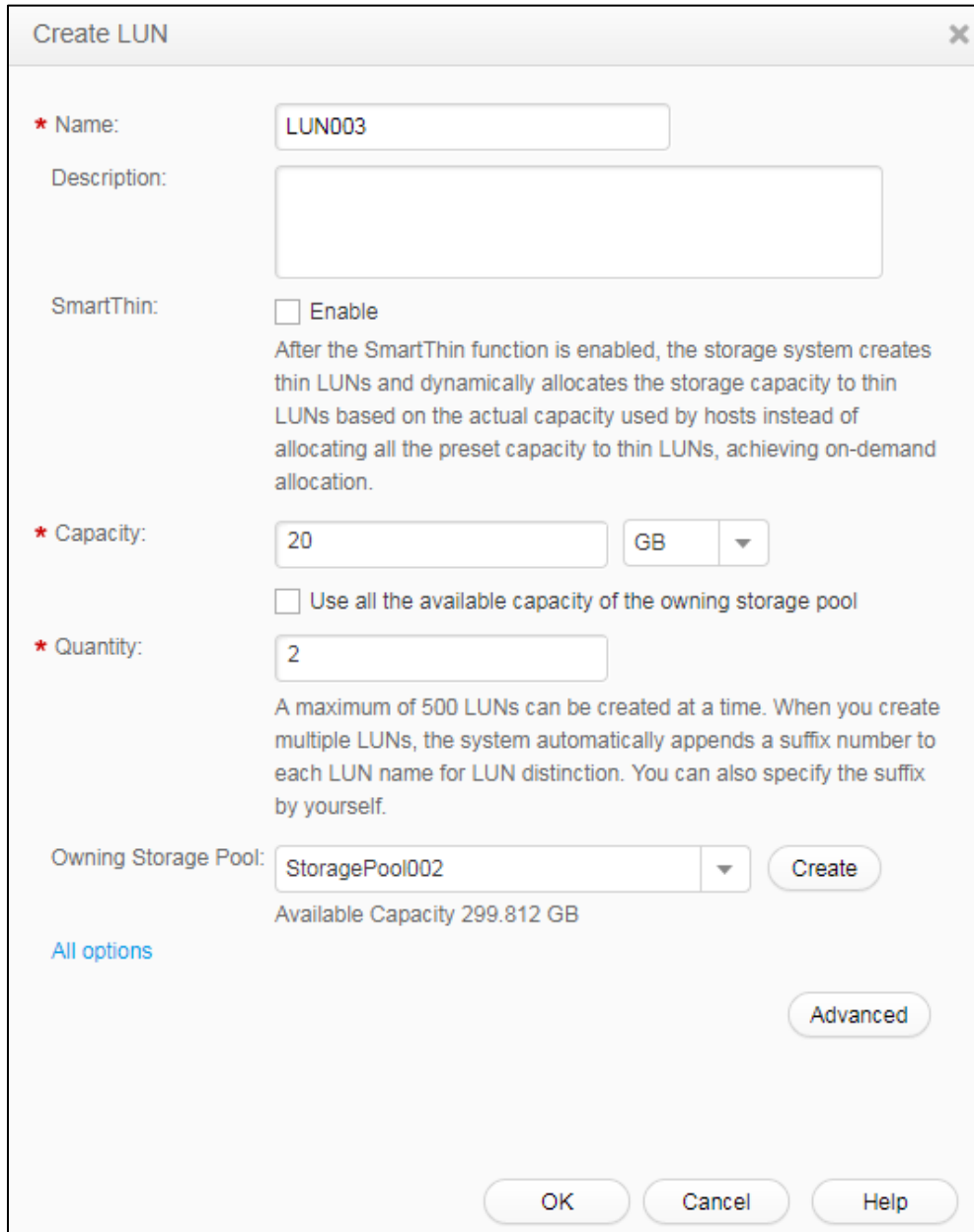


Key in the LUN name in the "Name" field.

Key in the LUN description in the "Description" field.

Key in 20 at the capacity field, which specifies the size of the LUN as 20GB.

Choose the valid storage pool name at the "Owning Storage Pool".



Create LUN

* Name: LUN003

Description:

SmartThin: Enable
After the SmartThin function is enabled, the storage system creates thin LUNs and dynamically allocates the storage capacity to thin LUNs based on the actual capacity used by hosts instead of allocating all the preset capacity to thin LUNs, achieving on-demand allocation.

* Capacity: 20 GB

Use all the available capacity of the owning storage pool

* Quantity: 2
A maximum of 500 LUNs can be created at a time. When you create multiple LUNs, the system automatically appends a suffix number to each LUN name for LUN distinction. You can also specify the suffix by yourself.

Owning Storage Pool: StoragePool002
Available Capacity 299.812 GB

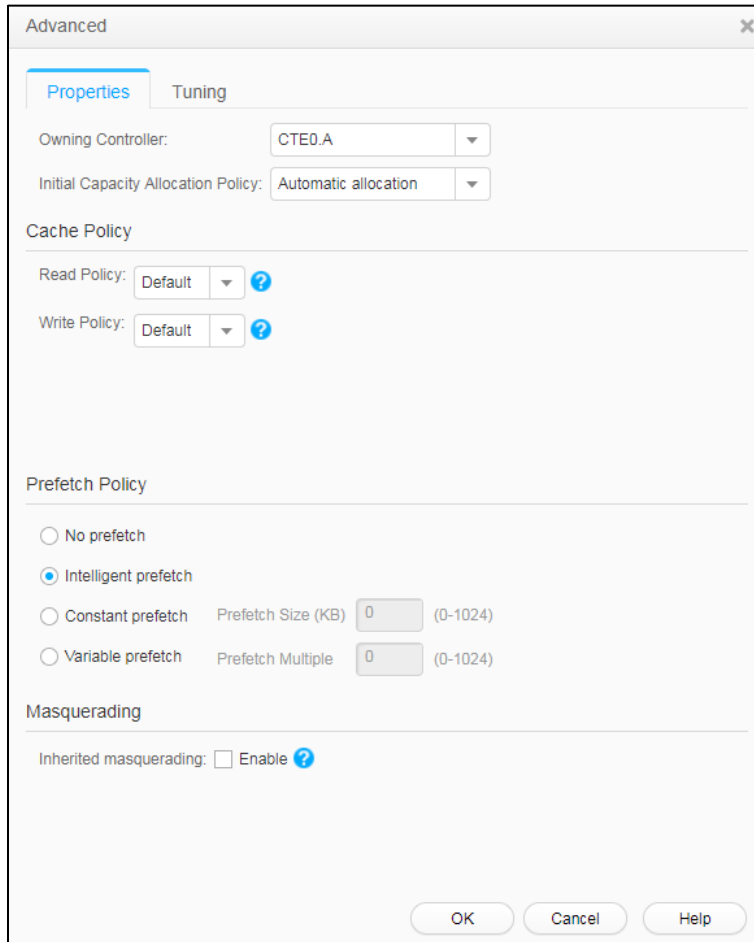
[All options](#)

Click on "Advanced" button.

Click on the "Properties" tab.

At the drop down list of the "Owning Controller" field, choose Controller A (CTE0.A). Note: you may also redirect the LUN to Controller B or allow the system to auto select the owning controller.

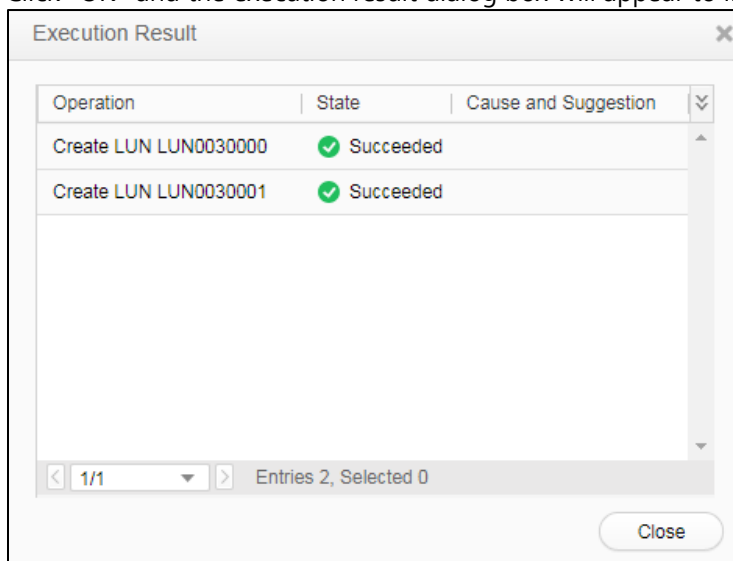
Leave the cache policy and the prefetch policy at its default values.



Click on the “Tuning” tab, leave all the settings at its default value. Note: there are few options here requires license to be available before it can be used.

Click “OK”, and close the “Advanced” dialog box.

Click “OK” and the execution result dialog box will appear to indicate successful operation.

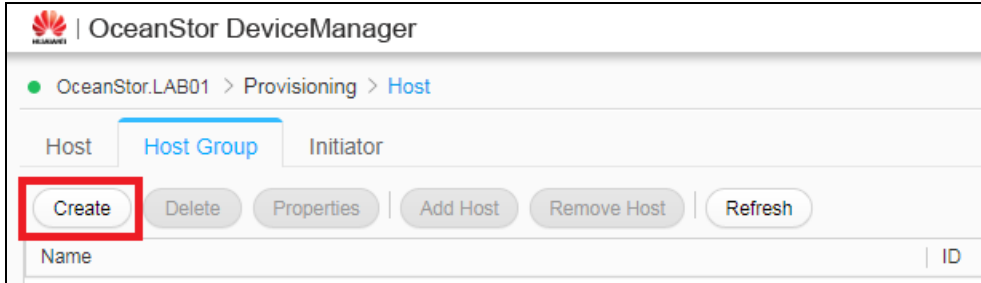


Step 4. Creating a Host Group


At the navigation bar on the right, click on the "Provisioning" button.

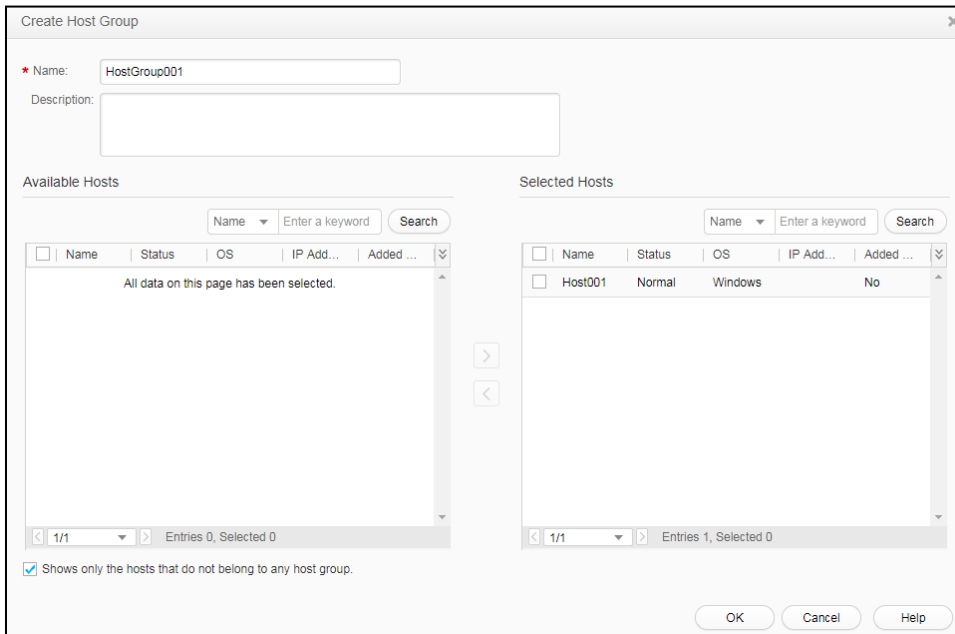
At "Block Storage Service" region, click on "Host".

Choose "Host Group", and click "Create".

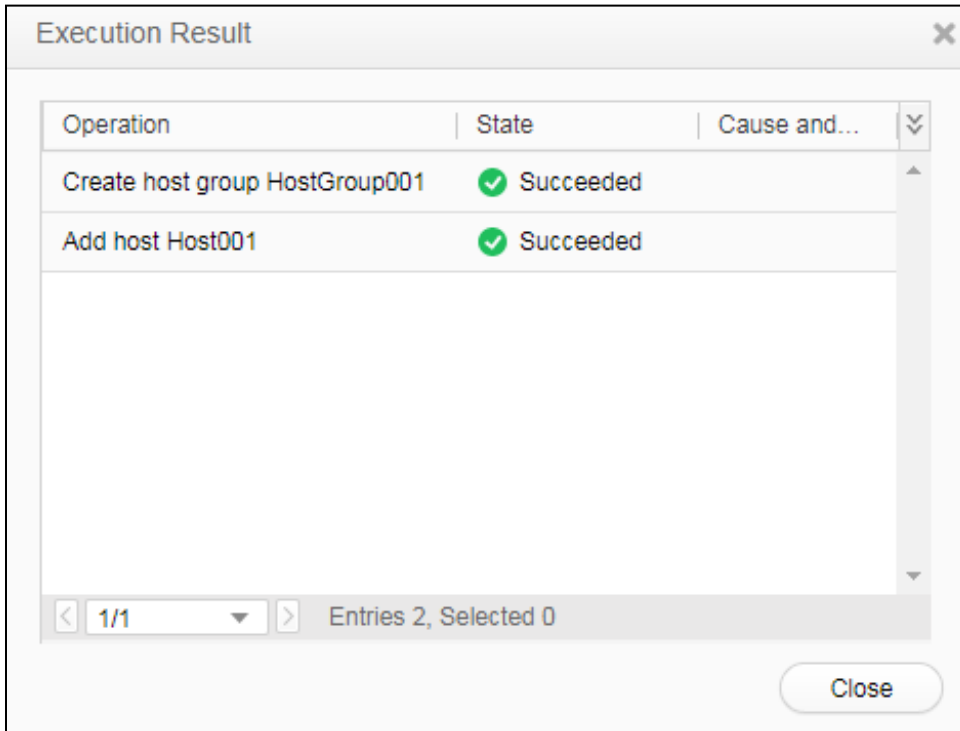


In the host group creation dialog box, key in the host group name and the description information.

Choose the available host and click  to add the host to the selected host region.



Click "OK", the execution result dialog box will appear to indicate successful operations.

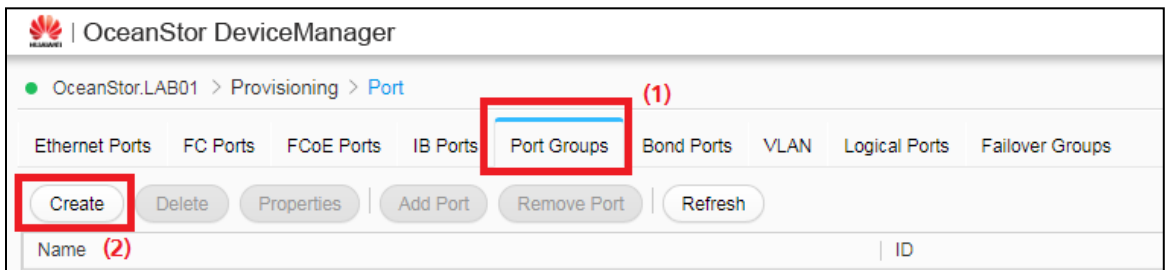


Step 5. Creating a Port Group

At the navigation bar on the right, click on the "Provisioning" button.

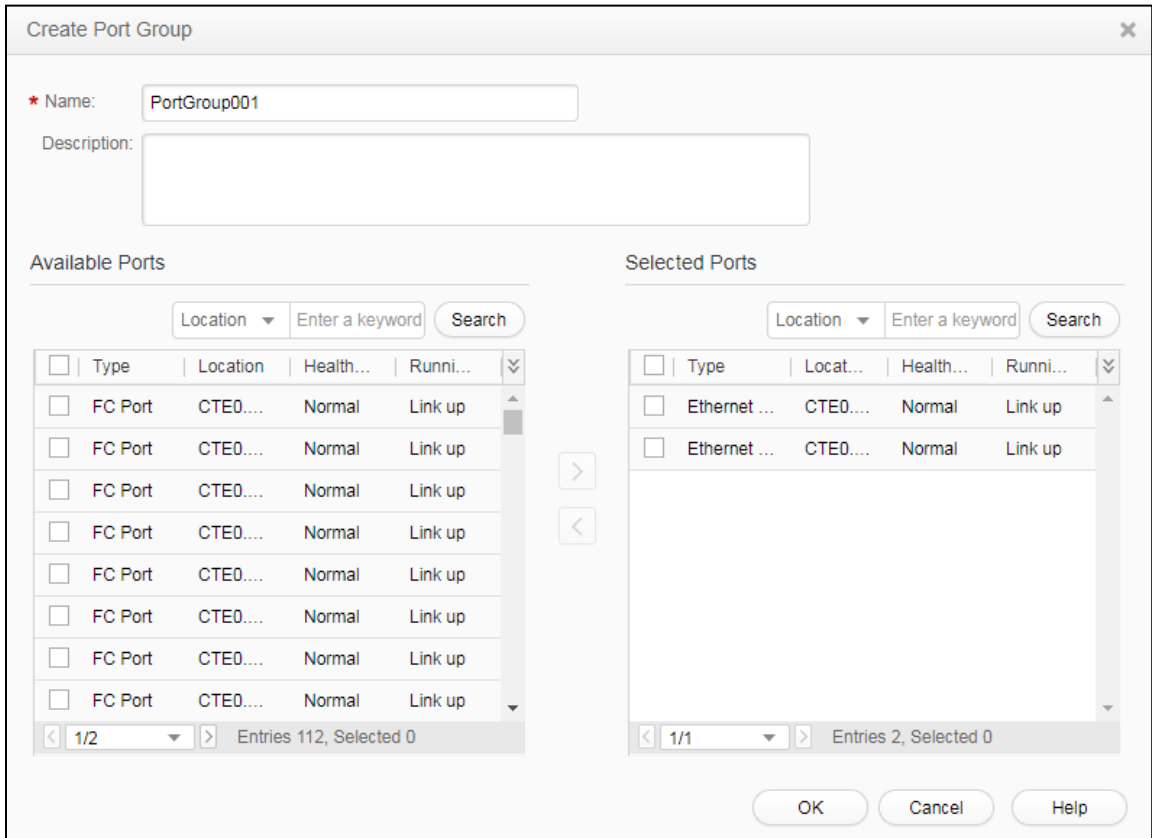
At the "Storage Configuration and Optimization" region, click on "Port".

Choose the "Port Groups" tab and click "Create".

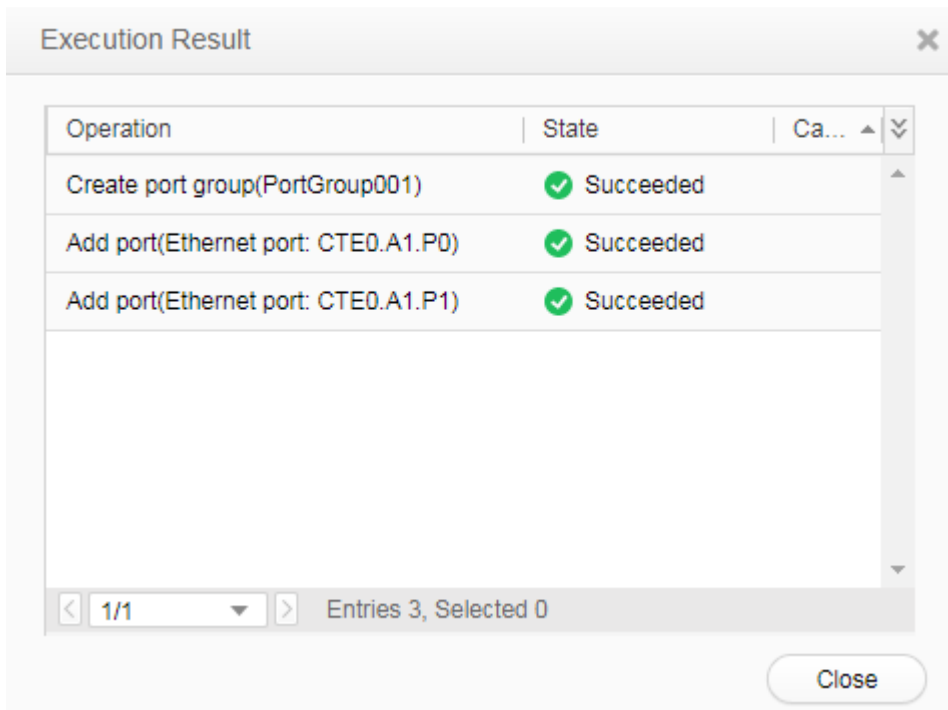


Key in the port group name within the "Name" field, and key in any port description information within the "Description" field.

Choose the valid ports that you wish to add within the port group, and click to add the ports into the selected ports region.



Click "OK", the execution result dialog box will appear to indicate successful operation.



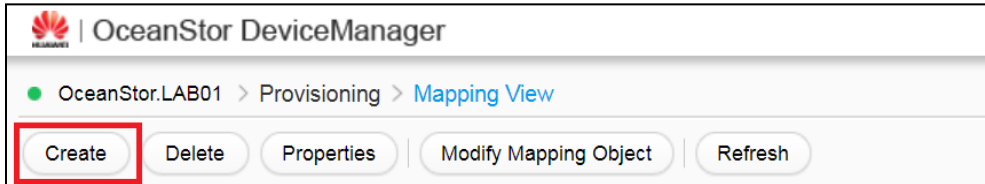
Click "Close" to complete the operation.

Step 6. Creating a Mapping View


At the navigation bar on the right, click on the "Provisioning" button.

At the "Block Storage Service" region, click on "Mapping View".

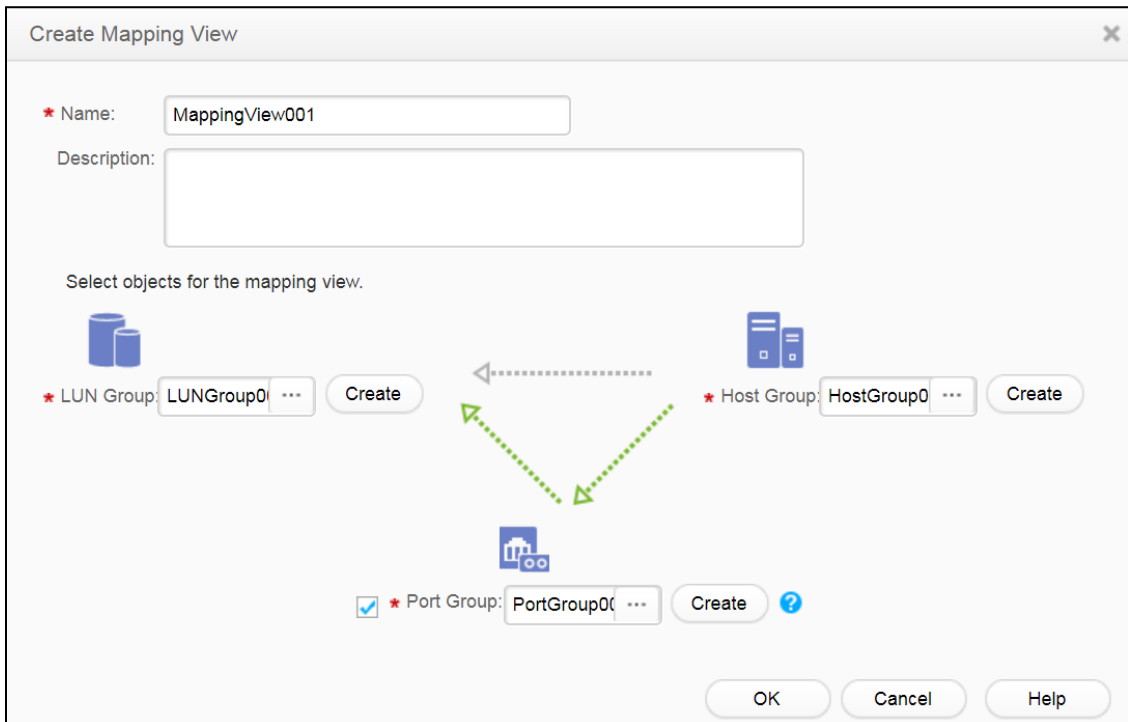
Click "Create".



Key in the mapping view name within the "Name" field.

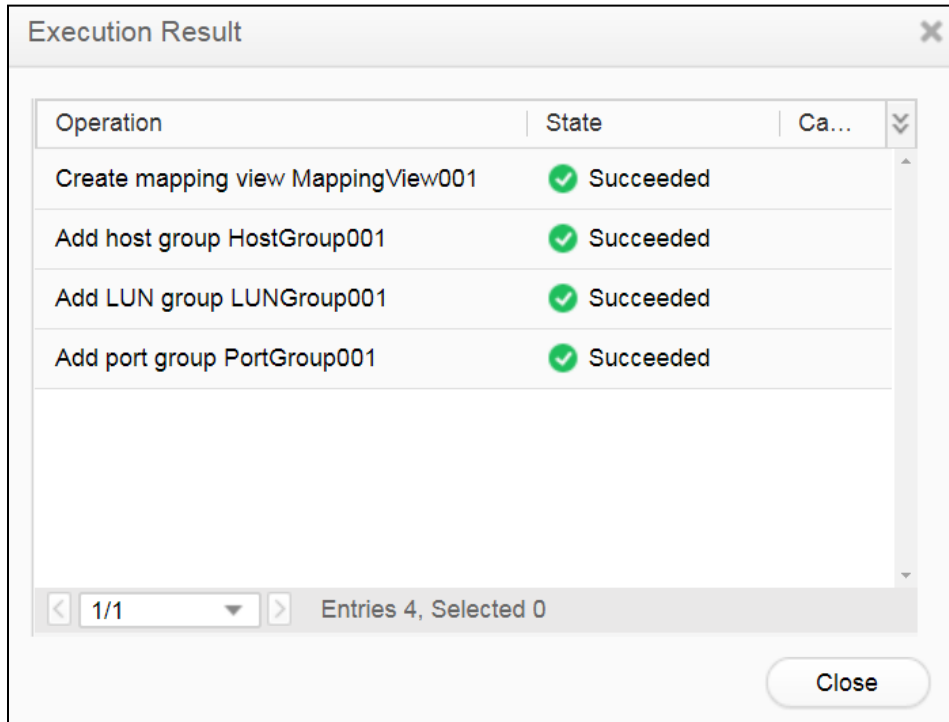
At the LUN group region, click  to open the dialog box to select available LUN groups. Select the LUN group from the LUN group list, and click "OK".

The method for adding the host group and port group is similar as the steps for adding the LUN group.



The danger dialog box will appear, read carefully the contents and tick "I have read and understood the consequences associated with performing this operation" to confirm the operation.

Click "OK", the execution result dialog box will appear to indicate successful operation.



3.2.3 FC SAN Configuration Tasks Based on Windows

Step 1. Installing the Windows Server Based FC HBA Card Driver

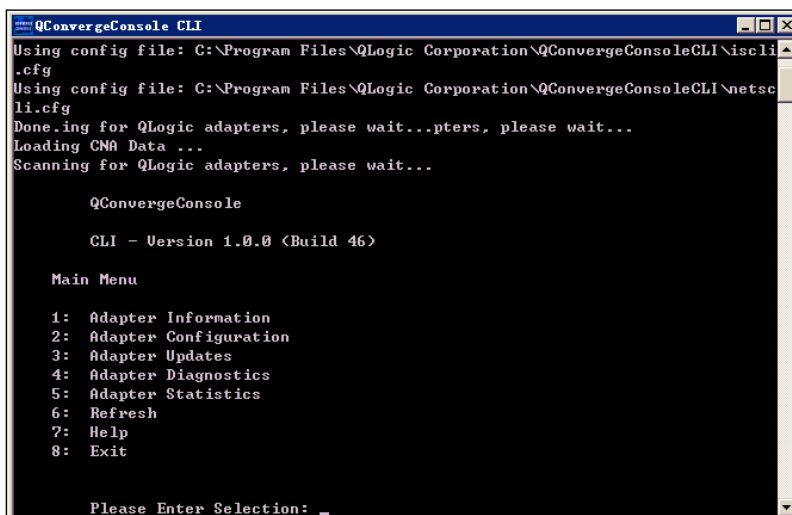
When using the Elab environment for the lab, the FC HBA driver can be obtained under the path: <ftp://10.158.180.10> → 01 Storage Tools → FC HBA. Download the files within the Windows directory to the local PC.

Note: FTP server can only be accessed on the eLAB PC. The FTP IP Address may also be different based on the environment that you are using. Kindly refer to your actual network info and topology to obtain the correct IP address.

Install the FC HBA driver. (This is optional if you are using the Huawei Elab environment)

Step 2. Querying the WWPN ID of the FC HBA Card (Qlogic QLE2562 HBA)

Double click on QConvergeConsole CLI.



Key in 1 at the main menu and press Enter.

```
QConvergeConsole
CLI - Version 1.0.0 <Build 46>

FC Adapter Information

1: FC Adapter Information
2: FC Port Information
3: FC UPD Information
4: FC Target/LUN Information

<p or 0: Previous Menu; m or 98: Main Menu; ex or 99: Quit>
Please Enter Selection: 1
```

Key in 1 at the FC Adapter Information screen and press Enter to obtain the information as shown in the red frame in the picture below.

```
QConvergeConsole CLI
FC Adapter Information

1: FC Adapter Information
2: FC Port Information
3: FC UPD Information
4: FC Target/LUN Information

<p or 0: Previous Menu; m or 98: Main Menu; ex or 99: Quit>
Please Enter Selection: 1

QConvergeConsole
CLI - Version 1.0.0 <Build 46>

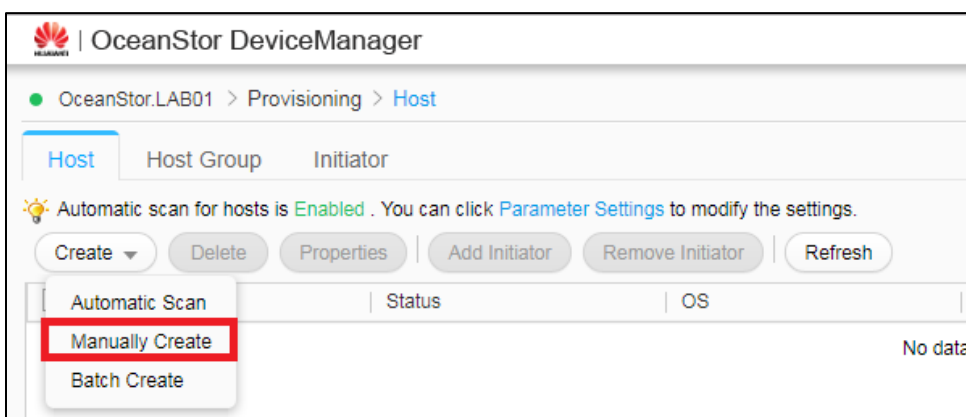
Adapter Information
1: HBA Model: QLE2562 SN: RFD1343R13001
   Port 1 WWPN: 21-00-00-24-FF-54-38-AC
   Port 2 WWPN: 21-00-00-24-FF-54-38-AD

<p or 0: Previous Menu; m or 98: Main Menu; ex or 99: Quit>
Please Enter Selection: 1
```

Step 3. Creating a Host

At the navigation bar on the right, click on the "Provisioning" button.

At the "Block Storage Service" region, click on "Host", click on "Create" and then choose "Manually Create".



At the “Name” field, key in the name of the host, choose the operating system as Windows, other settings are optional.

Create Host Wizard: Step 4-1

Set Host Information
Enter basic information for the host.

* Name:

Description:

OS:

IP Address:

Device Location:

Click “Next”, add the selected initiator, choose the valid initiator from the available initiators and click the button to add it to selection.

Create Host Wizard: Step 4-2

Configure Initiator
Initiators are required by hosts to access storage resources. The WWPNs or IQNs of initiators added to the hosts must be the same as those of initiators on the application servers. [What is an initiator?](#)

Available Initiators

Initiator Type: WWPNIQN

<input type="checkbox"/>	Type	WWPN/IQN	Status
<input type="checkbox"/>	iSCSI	bbbbbbbb	Online
<input type="checkbox"/>	iSCSI	cccccccc	Online
<input type="checkbox"/>	iSCSI	dddddddd	Online

1/1 Entries 3, Selected 0

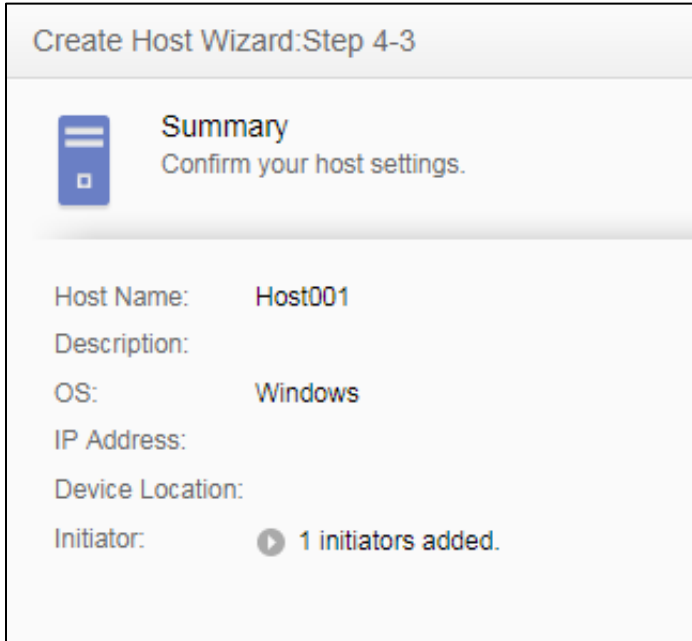
Selected Initiators

WWPN/IQN

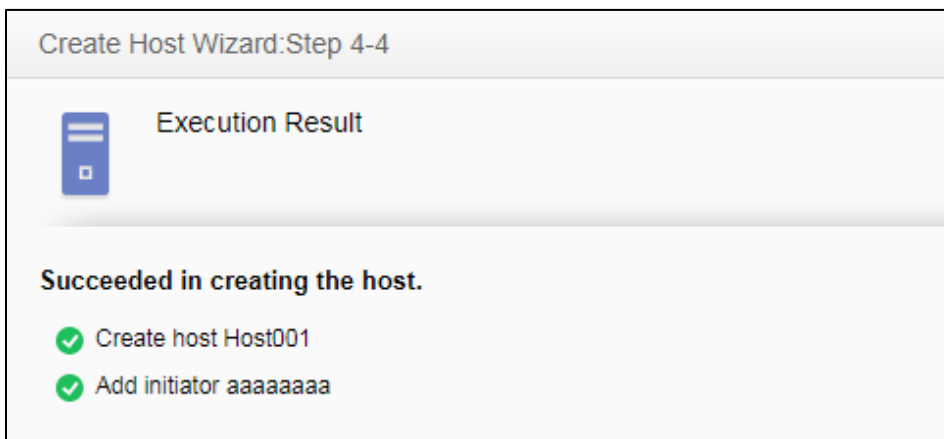
<input type="checkbox"/>	Type	WWPN/IQN	Status
<input type="checkbox"/>	iSCSI	aaaaaaaa	Online

1/1 Entries 1, Selected 0

Click “Next”, and verify the summary of the host creation information.



Click "Complete" and verify the operation in the danger dialog box, and press "OK". Execution results dialog box will appear to show that the host creation is successful, click "Close" to exit.

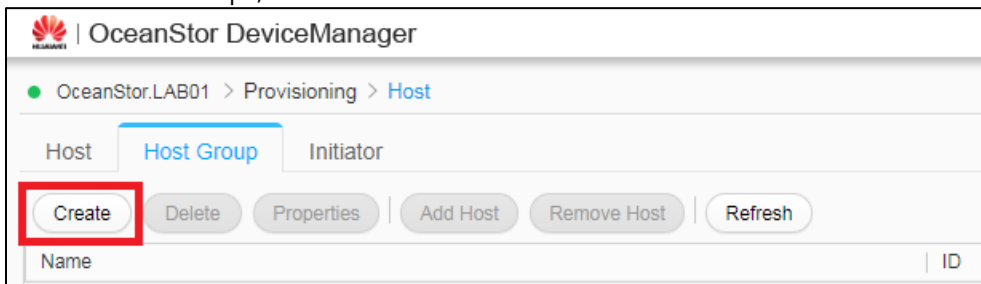


Step 4. Creating a Host Group


At the navigation bar on the right, click on the "Provisioning" button.

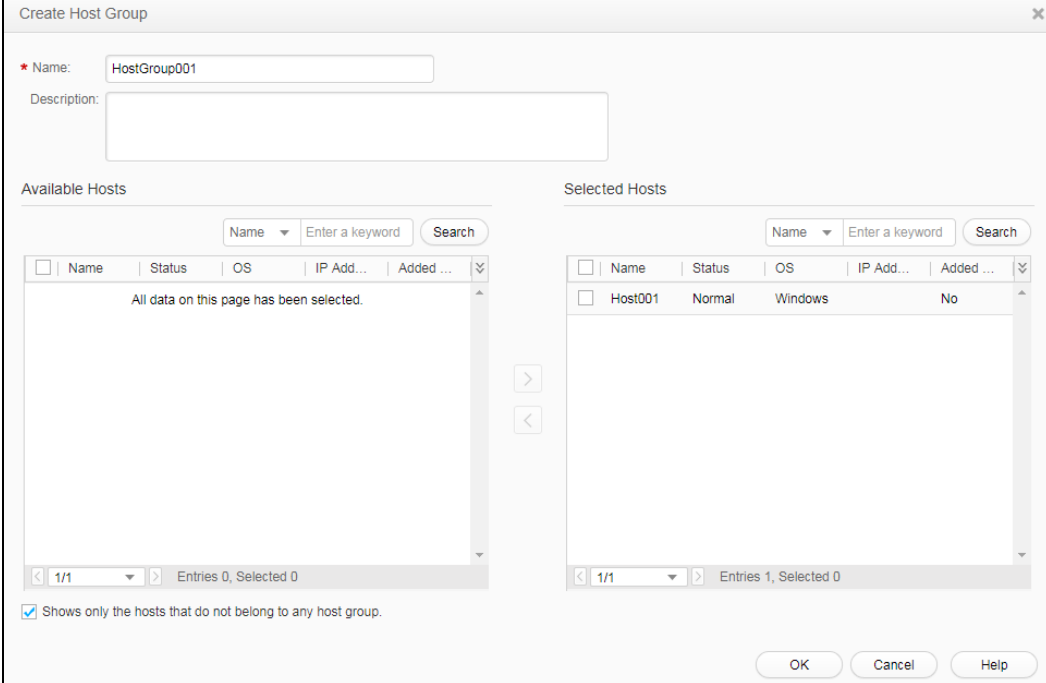
At "Block Storage Service" region, click on "Host".

Choose "Host Group", and click "Create".



In the host group creation dialog box, key in the host group name and the description information.

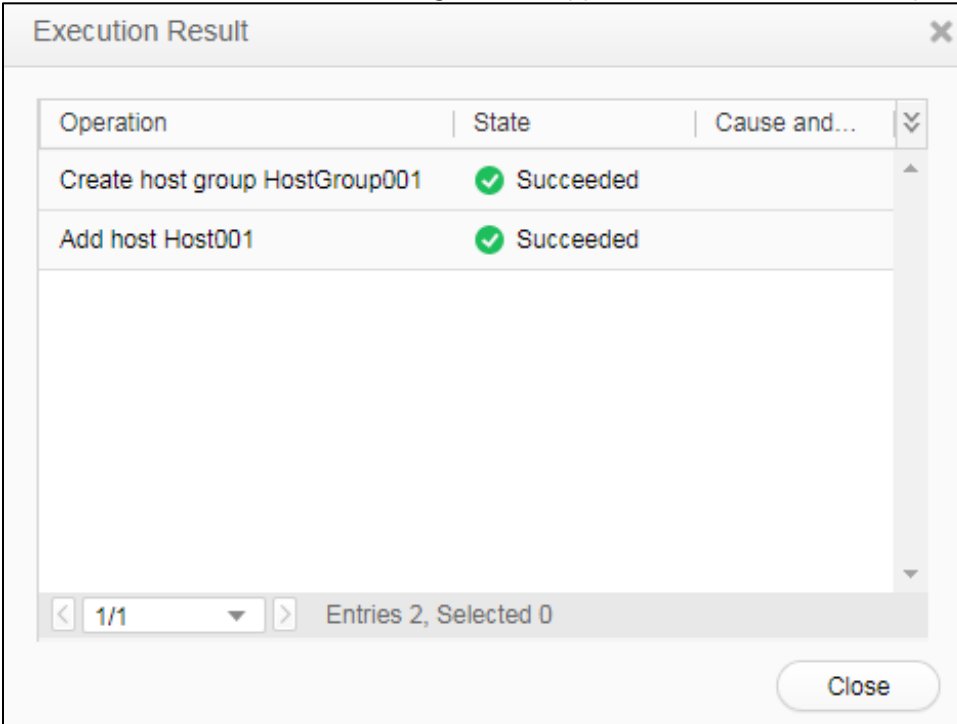
Choose the available host and click  to add the host to the selected host region.



The "Create Host Group" dialog box contains the following fields and components:

- Name:** HostGroup001
- Description:** (empty text area)
- Available Hosts:** A table with columns: Name, Status, OS, IP Add..., Added ...
 - Search bar: Name, Enter a keyword, Search
 - Content: All data on this page has been selected.
 - Footer: 1/1, Entries 0, Selected 0
- Selected Hosts:** A table with columns: Name, Status, OS, IP Add..., Added ...
 - Search bar: Name, Enter a keyword, Search
 - Content: Host001, Normal, Windows, No
 - Footer: 1/1, Entries 1, Selected 0
- Navigation:** Arrow buttons between the two host lists.
- Footer:** Shows only the hosts that do not belong to any host group. Buttons: OK, Cancel, Help.

Click "OK", the execution result dialog box will appear to indicate successful operations.



The "Execution Result" dialog box displays the following table:

Operation	State	Cause and...
Create host group HostGroup001	✔ Succeeded	
Add host Host001	✔ Succeeded	

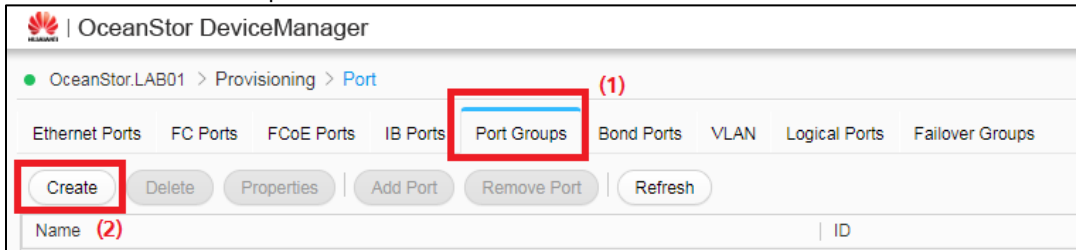
Footer: 1/1, Entries 2, Selected 0. Button: Close

Step 5. Creating a Port Group


At the navigation bar on the right, click on the "Provisioning" button.

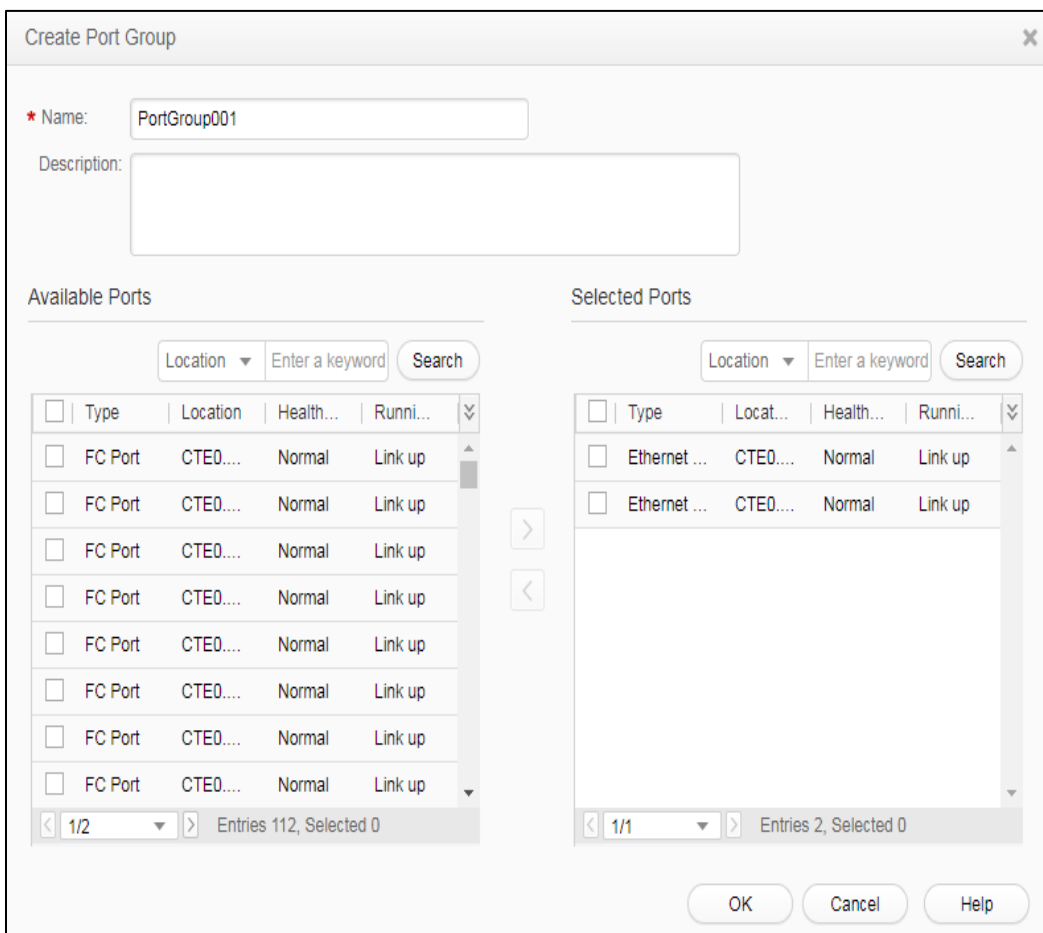
At the "Storage Configuration and Optimization" region, click on "Port".

Choose the "Port Group" tab and click "Create".

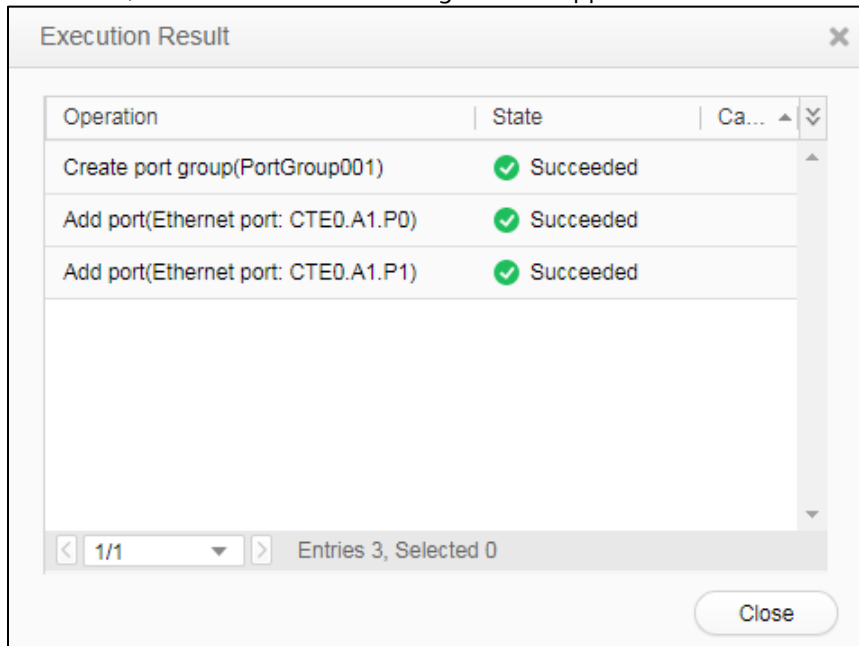


Key in the port group name within the "Name" field, and key in any port description information within the "Description" field.

Choose the valid ports that you wish to add within the port group, and click  to add the ports into the selected ports region.



Click "OK", the execution result dialog box will appear to indicate successful operation.

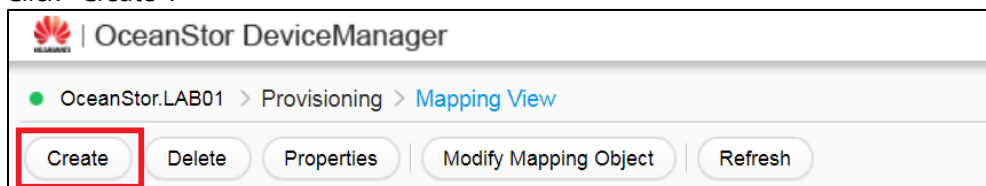


Step 6. Creating a Mapping View


At the navigation bar on the right, click on the "Provisioning" button.

At the "Block Storage Service" region, click on "Mapping View".

Click "Create".



Key in the mapping view name within the "Name" field.

At the LUN group region, click  to open the dialog box to select available LUN groups. Select the LUN group from the LUN group list, and click "OK".

The method for adding the host group and port group is similar as the steps for adding the LUN group.

Create Mapping View

* Name:

Description:

Select objects for the mapping view.

* LUN Group: ...

* Host Group: ...

* Port Group: ... ?

Click "OK", the execution result dialog box will appear to indicate successful operation.

Execution Result

Operation	State	Ca...
Create mapping view MappingView001	✔ Succeeded	
Add host group HostGroup001	✔ Succeeded	
Add LUN group LUNGroup001	✔ Succeeded	
Add port group PortGroup001	✔ Succeeded	

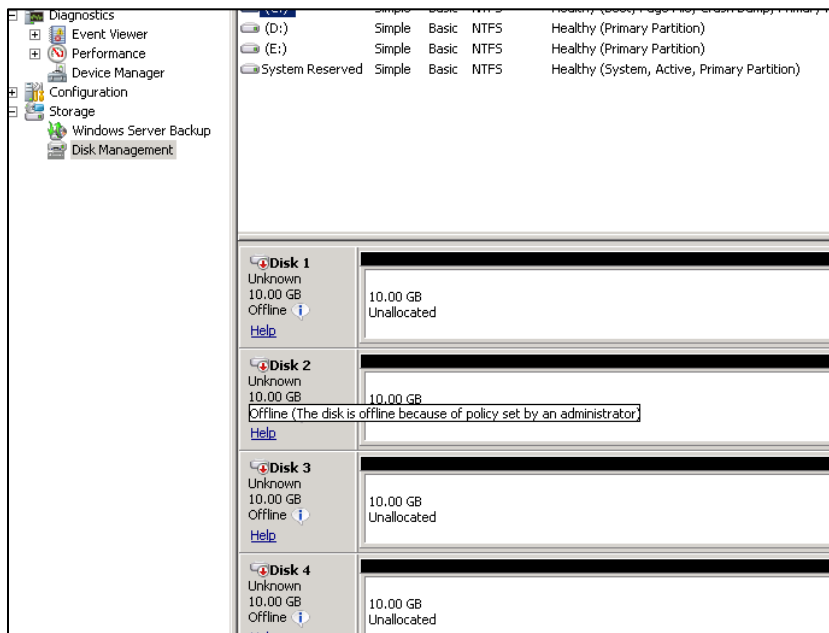
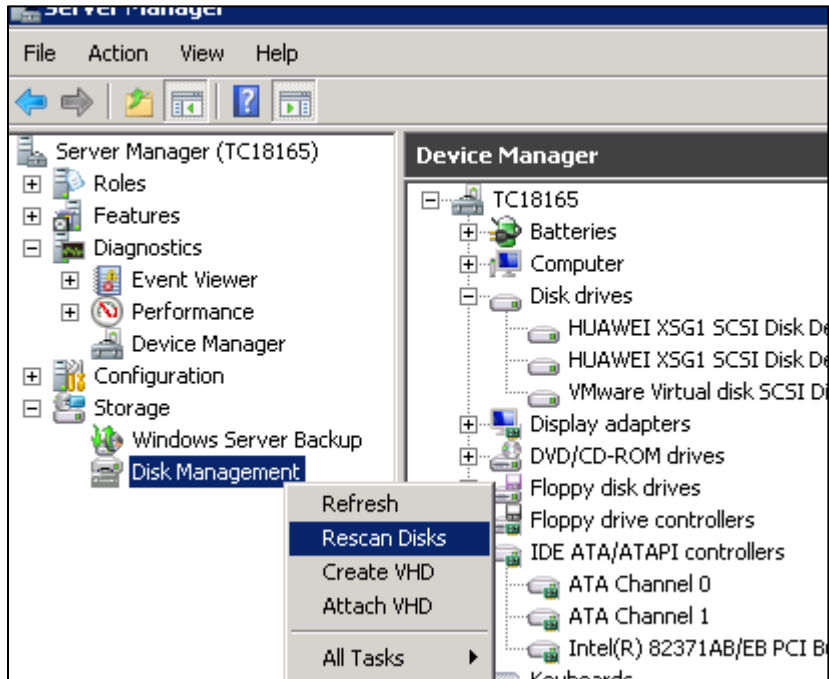
< 1/1 > Entries 4, Selected 0

3.2.4 Multipathing Configuration Based on Windows Environment

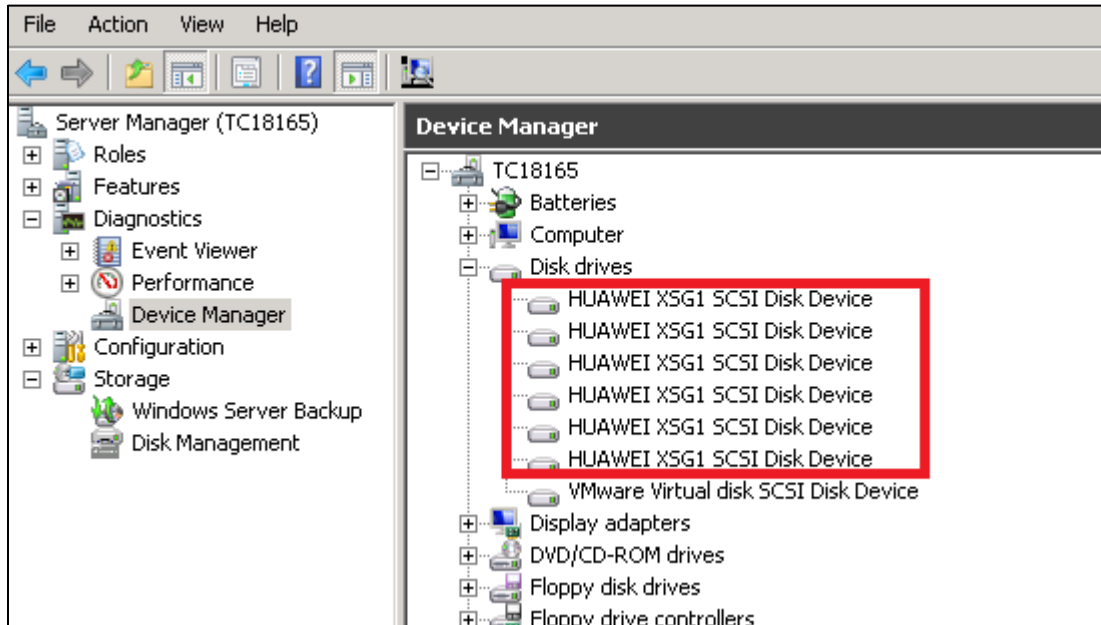
Step 1. Checking the LUN

Open the Server Manager, on the navigation panel on the left, click on Storage → Disk Management.

If the new disk has not been detected, click on the “Action” option on the window and select “Rescan Disks”. You may also right click on “Disk Management” and select “Rescan Disks”.



At the navigation panel on the left, choose “Diagnostics” to expand it and open “Device Manager”. At the Disk Drives section, the disk information will be shown, the following picture shows an example that does not have multipathing software installed.



Actually, there is only 3 LUNs are mapped as drives to the host, but we can see that there is 6 new drives shown because there are no multipathing software is installed.

Step 2. Installing Multipathing Software

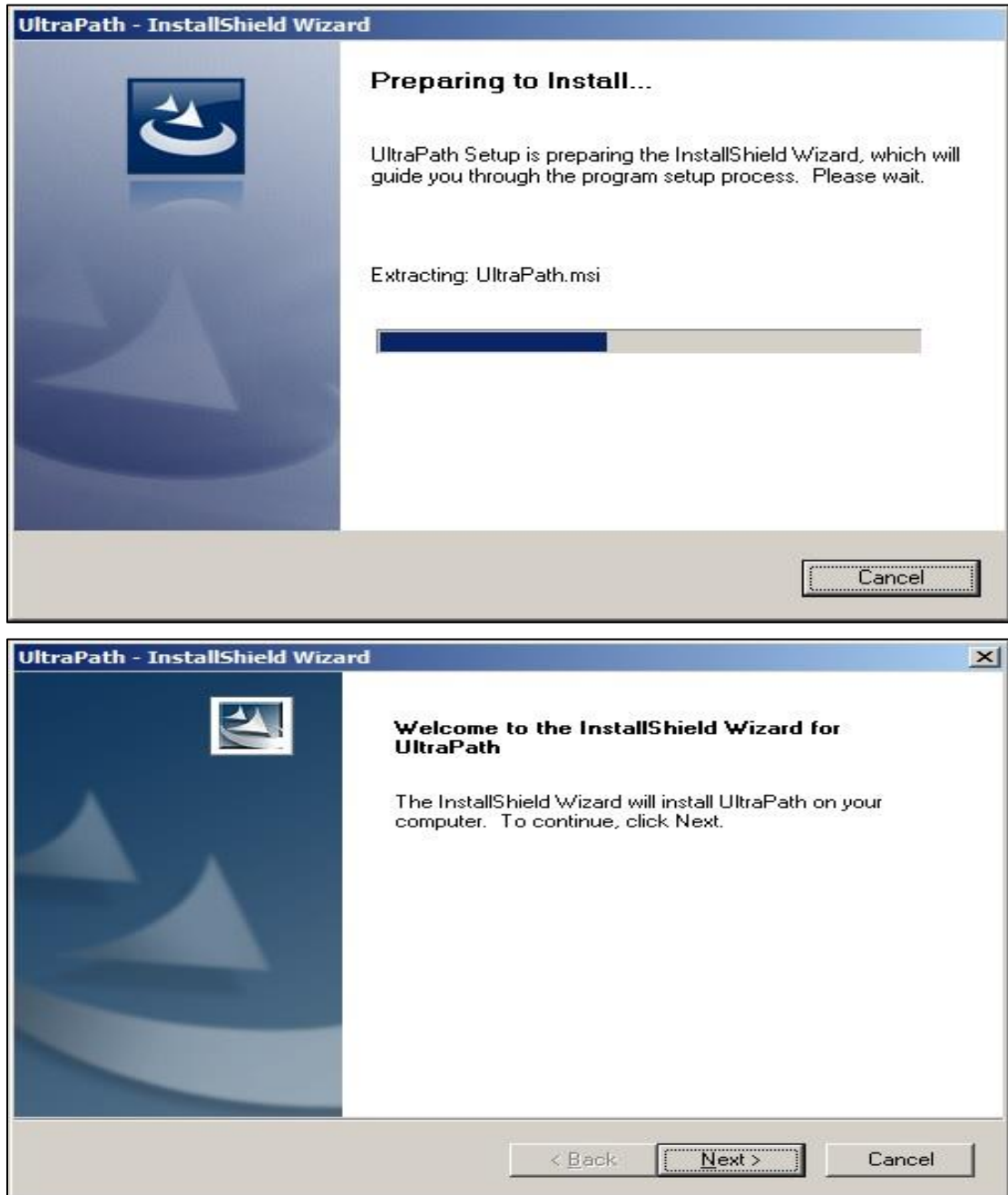
Huawei supported multipathing software is called UltraPath, and can be obtained from Huawei Support website or the CD-ROM packaged together during the purchase of new storage devices. You need to consider the compatibility of UltraPath when using it. You may also obtain the UltraPath multipathing software through the FTP download path in the remote lab environment. (Only applicable when using Huawei Elab environment):

Download path: ftp://10.158.180.10--->admin1/admin1---->01 Storage Tools-----> UltraPath-
→Version is V100R008

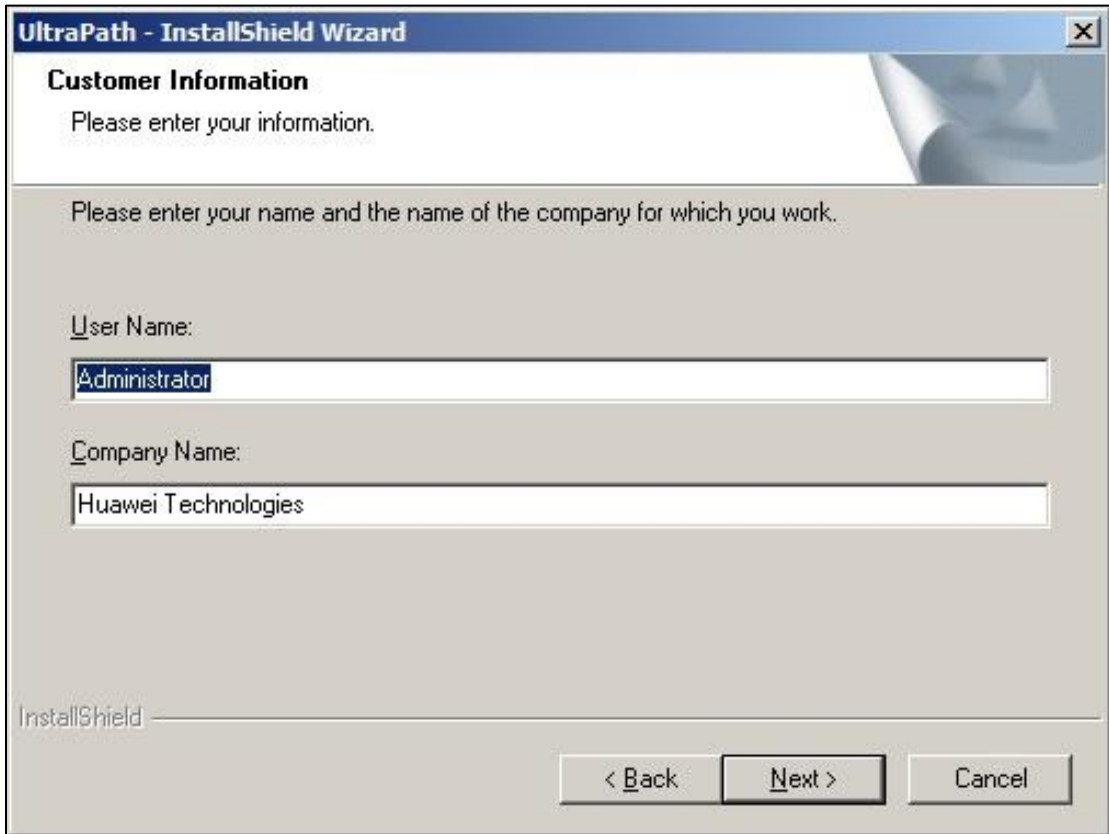
Note: The IP address of the FTP server may differ based on your environment, refer to your actual network information and topology to obtain the correct IP Address.

Decompress UltraPath.

Double click to install the software.



Key in the current user name, and press "Next" until the installation is complete.



UltraPath - InstallShield Wizard

Customer Information

Please enter your information.

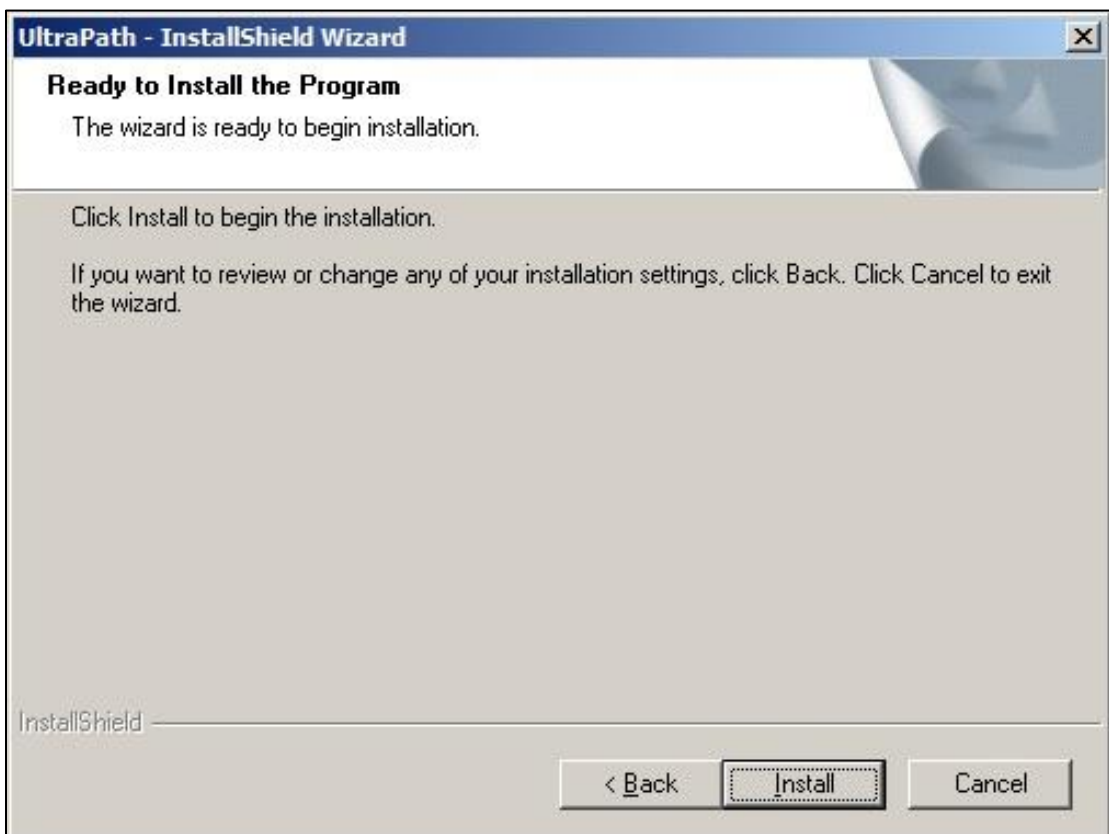
Please enter your name and the name of the company for which you work.

User Name:

Company Name:

InstallShield

< Back Next > Cancel



UltraPath - InstallShield Wizard

Ready to Install the Program

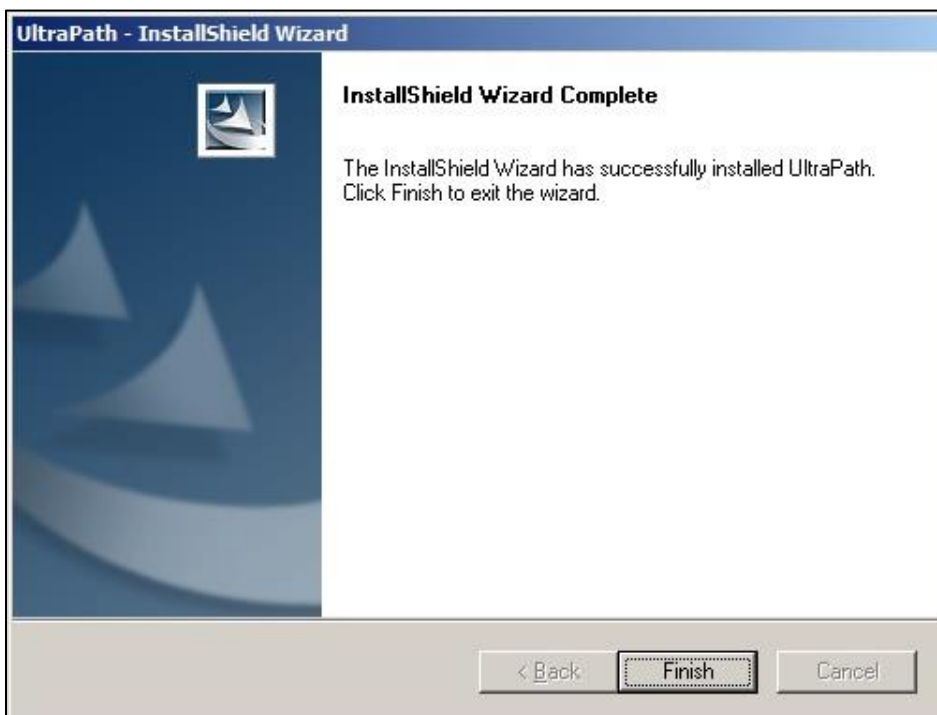
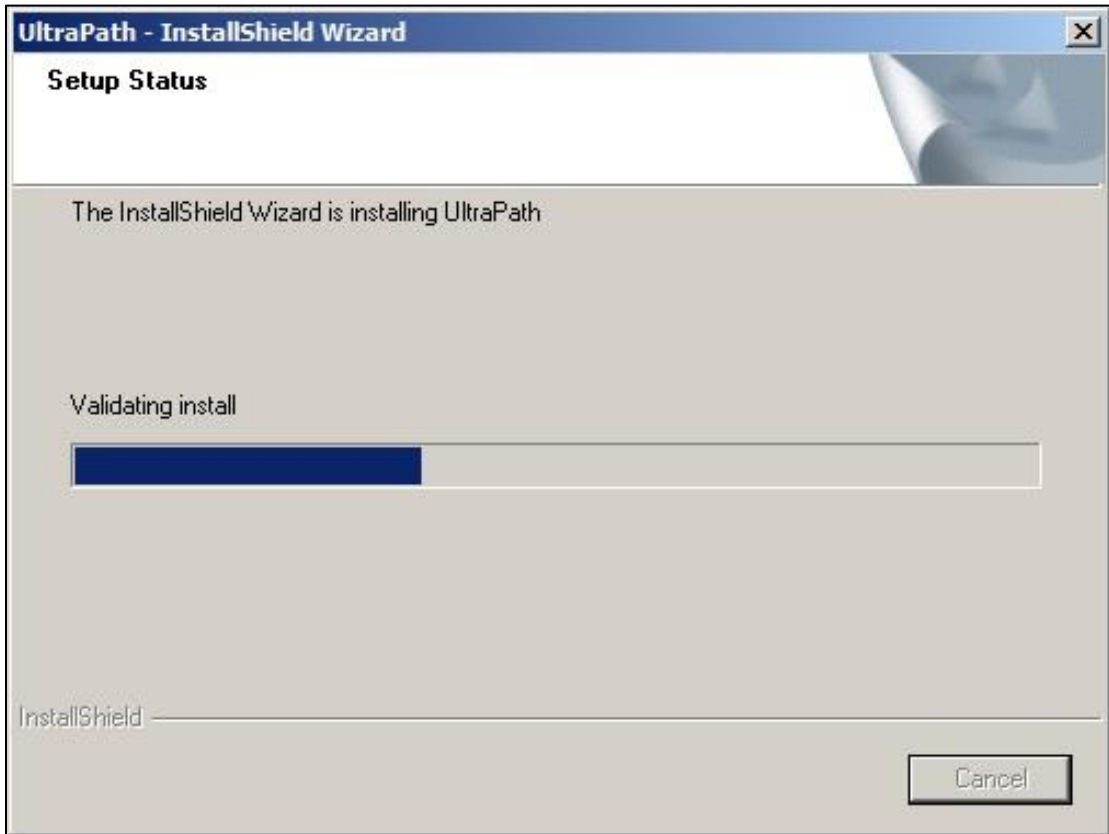
The wizard is ready to begin installation.

Click Install to begin the installation.

If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.

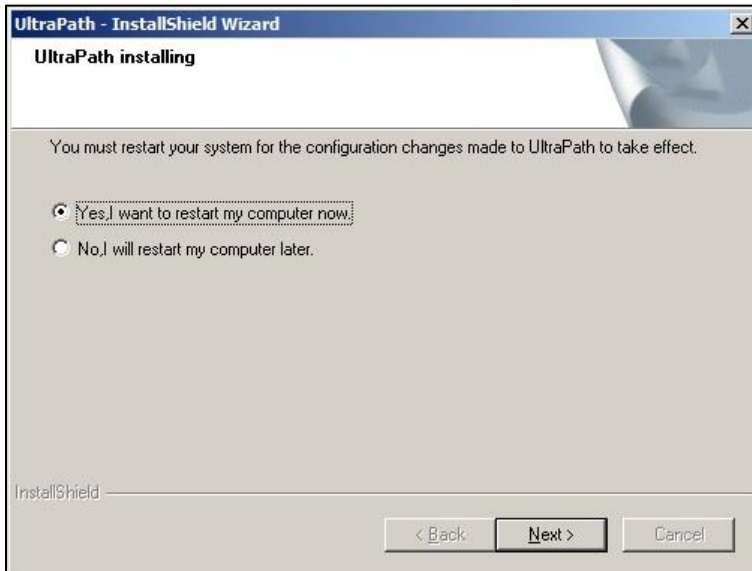
InstallShield

< Back Install Cancel



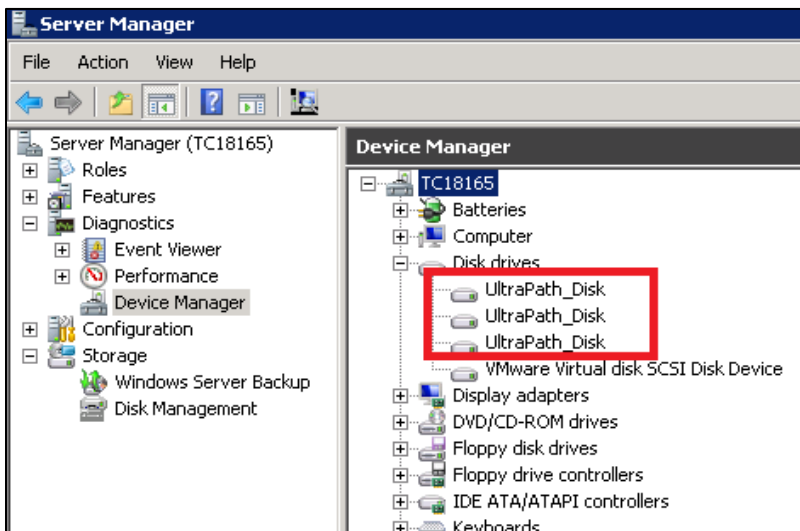
After the installation is completed, click "Finish".

The multipathing software will only be effective after the reboot of operating system after installation is completed, choose "Yes, I want to restart my computer now", and click "Next".



After the reboot of the operating system, open the “Disk Management” under Windows operating system, the amount of disks under disk drives will be reduced to half from the initial basis count. Note: It is reduced in half because the LUN that are mapped to host are no longer detected as duplicates due to multiple paths since multipathing software is installed.

Switch to “Device Manager” under the Windows operating system to check on the disk drives, and you will find that the listed drives are shown as UltraPath_Disk.

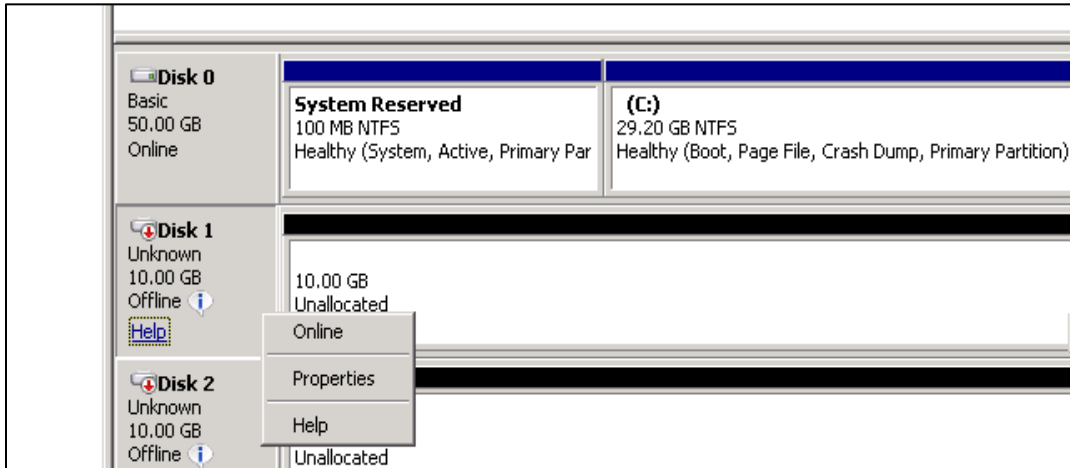


Step 3. Using a LUN

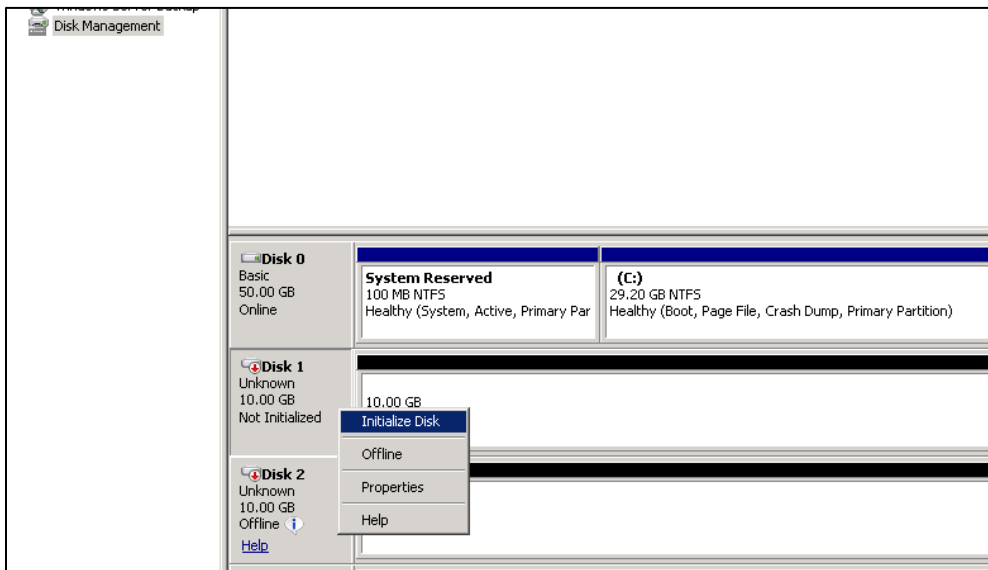
The LUN can be configured through the Disk Management at the Server Manager. After the LUN is configured, it will be automatically assigned with a drive letter, and data can be stored within the LUN drive.

Open Disk Management.

Right click on the LUN, choose "Online".



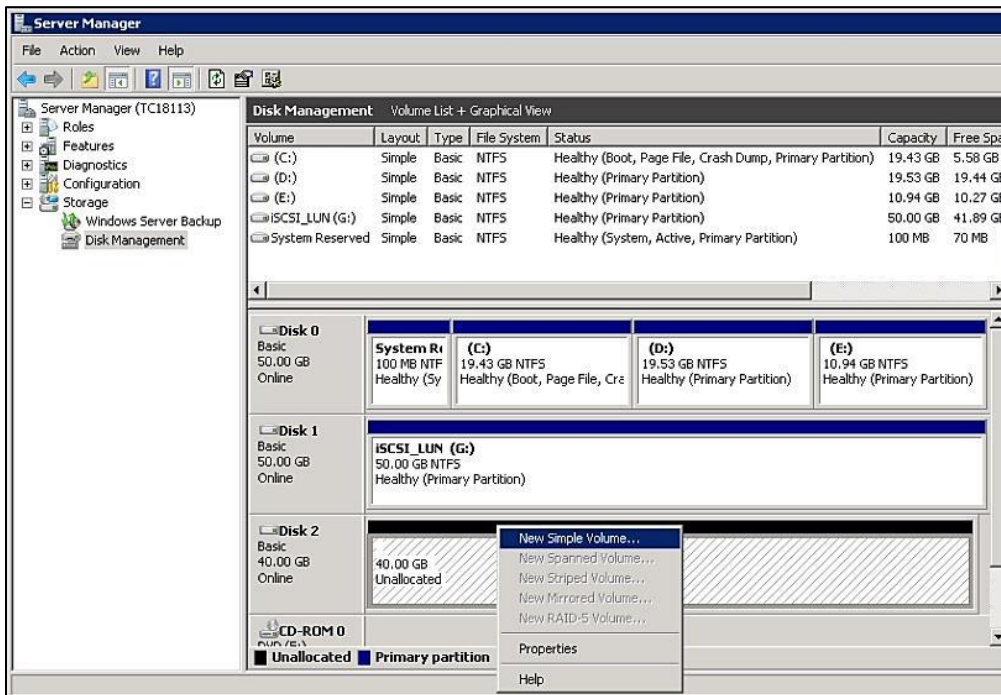
If the LUN is not initialized, select the uninitialized LUN, right click on it and choose "Initialize Disk".

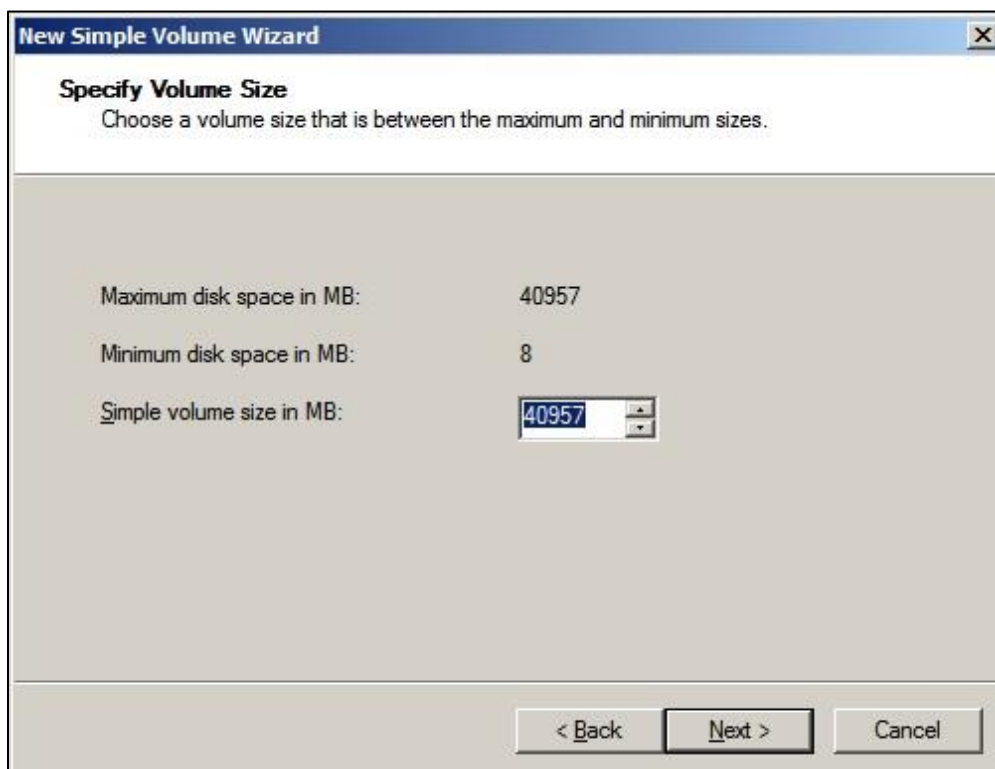


Leave all the other settings at its default value and click "OK".



After the disk initialization is complete, right click and choose “New Simple Volume” to create a new partition.





New Simple Volume Wizard

Assign Drive Letter or Path
For easier access, you can assign a drive letter or drive path to your partition.

Assign the following drive letter:

Mount in the following empty NTFS folder:

Do not assign a drive letter or drive path

< Back Next > Cancel

New Simple Volume Wizard

Format Partition
To store data on this partition, you must format it first.

Choose whether you want to format this volume, and if so, what settings you want to use.

Do not format this volume

Format this volume with the following settings:

File system:

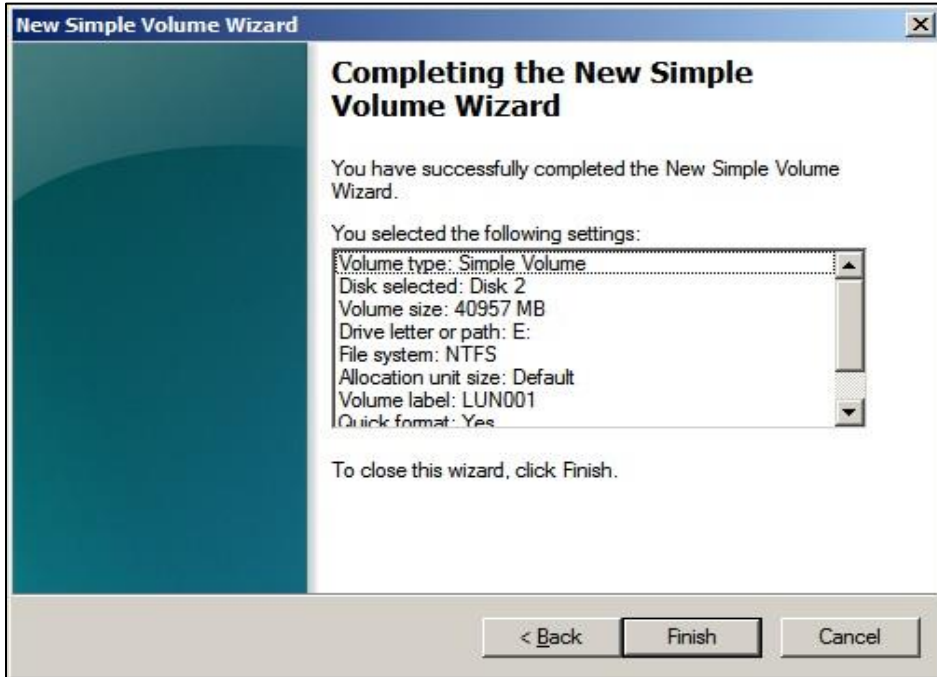
Allocation unit size:

Volume label:

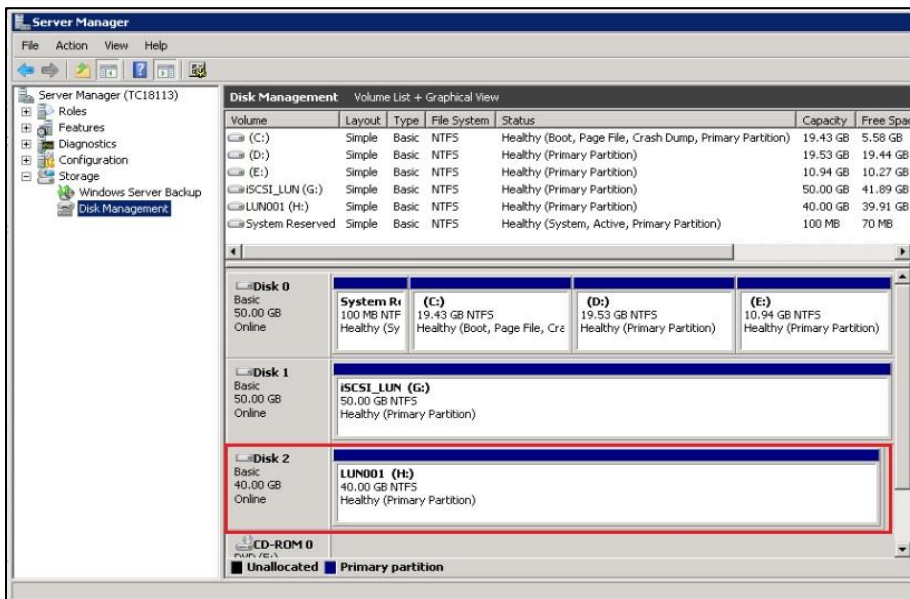
Perform a quick format

Enable file and folder compression

< Back Next > Cancel



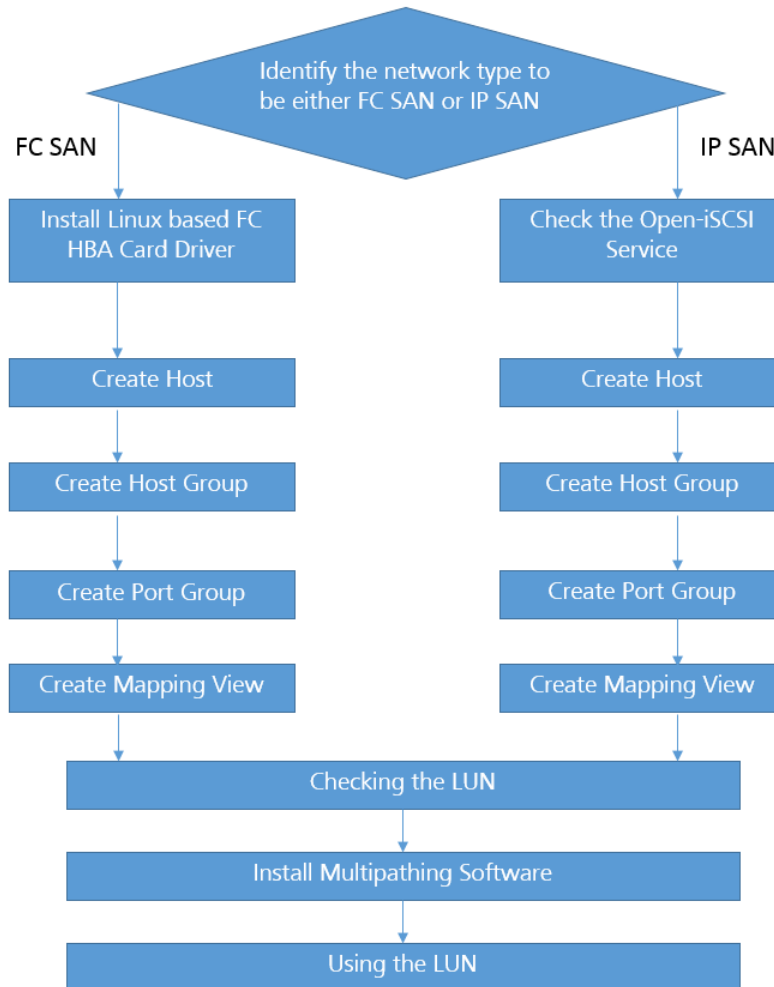
Now we can view the externally mounted disk drive, and able to write data within that drive. The operation method is the same as compared with other externally mounted LUN.



3.3 SAN Configuration Tasks Based on Linux

3.3.1 Configuration Roadmap

Configuration Prerequisite: The resource pool configuration are already completed.



3.3.2 IP SAN Configuration Steps Based on Linux

Step 1. Checking Open-iSCSI service.

Command	Description
service open-iscsi status	Checking the iscsi service status.
service open-iscsi start	Start the iscsi service.
service open-iscsi stop	Stop the iscsi service.
Service open-iscsi restart	Restart the iscsi service.

Querying the Initiator Name:

Run the following command: `cat /etc/iscsi/initiatorname.iscsi` to query the initiator name.

```
tc18167:~ # cat /etc/iscsi/initiatorname.iscsi
##
## /etc/iscsi/iscsi.initiatorname
##
## Default iSCSI Initiatorname.
##
## DO NOT EDIT OR REMOVE THIS FILE!
## If you remove this file, the iSCSI daemon will not start.
## If you change the InitiatorName, existing access control lists
## may reject this initiator. The InitiatorName must be unique
## for each iSCSI initiator. Do NOT duplicate iSCSI InitiatorNames.
InitiatorName=iqn.1996-04.de.suse:01:36f28beb398c
```

Configuring iSCSI connection in Linux Environment:

Login to the Linux host as the root user, the root user password is 123456.

Run the command: `iscsiadm -m discovery -t st -p "Storage Service IP"` or `iscsiadm -m discovery -t st -p "Other Storage Service IP"`. If multipathing is configured, both commands must be executed. Prerequisite: The service IP is already configured on the corresponding iSCSI service port on the storage array.

```
tc18167:~ # iscsiadm -m discovery -t st -p [redacted]
[redacted]:3260,8196 iqn.2006-08.com.huawei:oceanstor:210094049cd9532f
[redacted]
tc18167:~ # iscsiadm -m discovery -t st -p [redacted]
[redacted]:3260,8206 iqn.2006-08.com.huawei:oceanstor:210094049cd9532
3: [redacted]
```

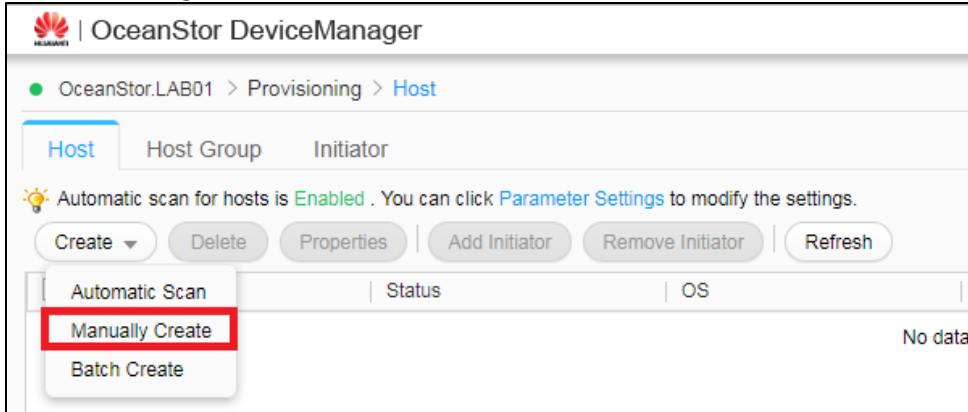
Run the command: `iscsiadm -m node -l` to login to the initiator.

```
tc18167:~ # iscsiadm -m node -l
Logging in to [iface: default, target: iqn.2006-08.com.huawei:oceanstor:210094049cd9532f::22003:[redacted], portal: [redacted],3260] (multiple)
Logging in to [iface: default, target: iqn.2006-08.com.huawei:oceanstor:210094049cd9532f::1022003:[redacted], portal: [redacted],3260] (multiple)
Login to [iface: default, target: iqn.2006-08.com.huawei:oceanstor:210094049cd9532f::22003:[redacted], portal: [redacted],3260] successful.
Login to [iface: default, target: iqn.2006-08.com.huawei:oceanstor:210094049cd9532f::1022003:[redacted], portal: [redacted],3260] successful.
tc18167:~ #
```

Step 2. Creating a Host

At the navigation bar on the right, click on the "Provisioning" button.


At "Block Storage Service", click on "Host", choose "Create", and then choose "Manually Create".

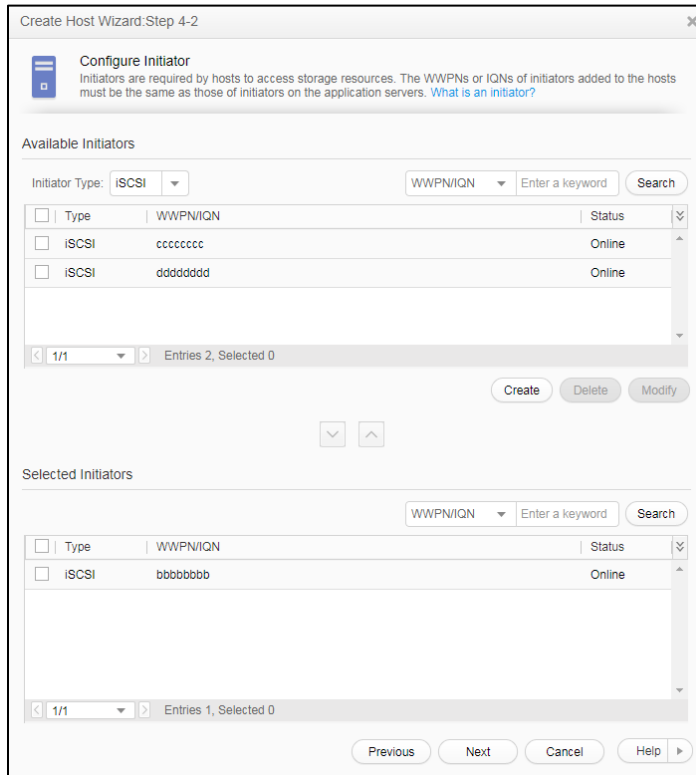


At the "Name" field, key in the name of the host, choose the operating system as Linux, others are optional.

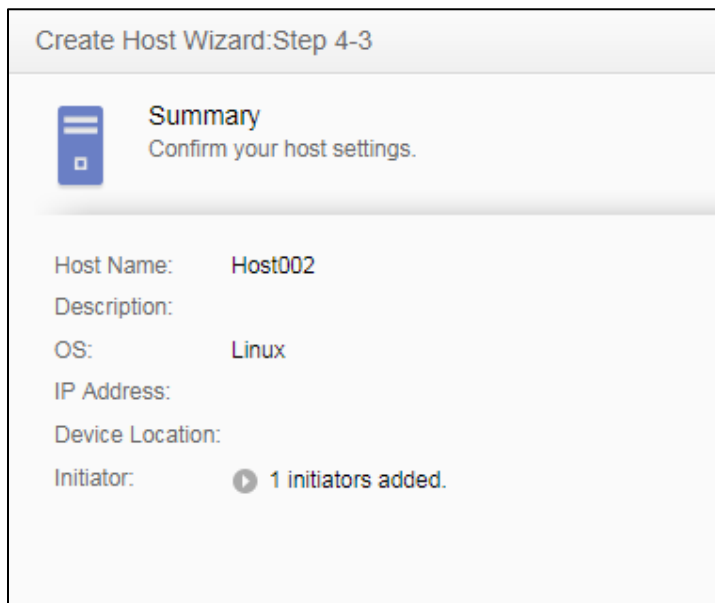
The screenshot shows the "Create Host Wizard: Step 4-1" form. The title is "Set Host Information" with the instruction "Enter basic information for the host." The form contains the following fields:

- Name:** Host002
- Description:** (empty text area)
- OS:** Linux (dropdown menu)
- IP Address:** (empty text field)
- Device Location:** (empty text field)

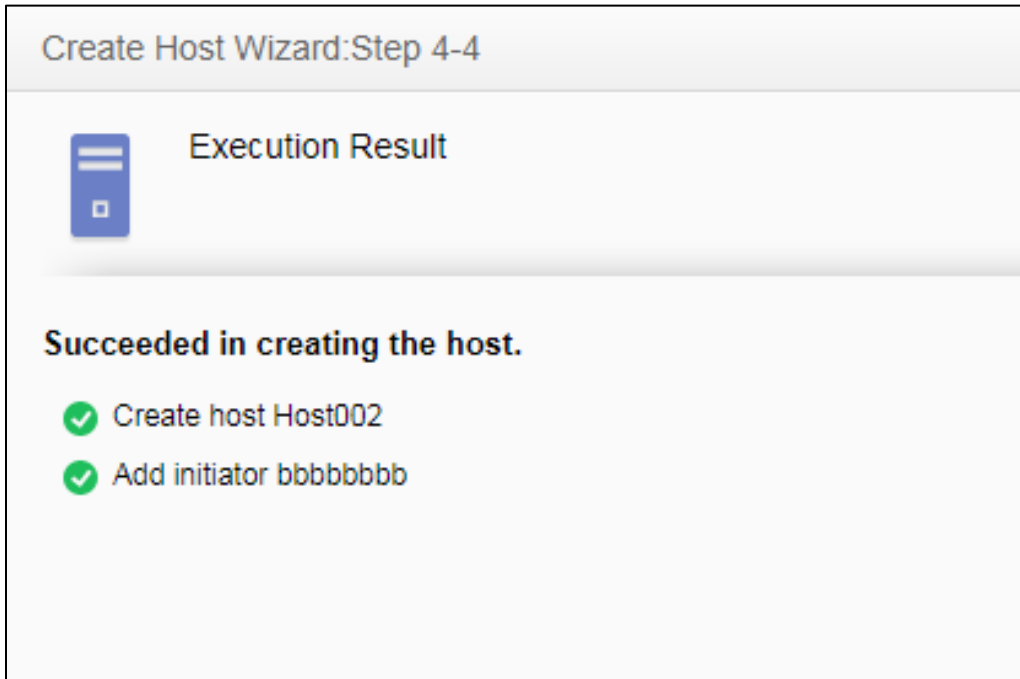
Click "Next", add the selected initiator, and choose the valid initiator from the list of available initiators and click the  button to add it to selection.



Click "Next", and verify the summary of the host creation information. Choose "Finish" and verify that you wish to proceed with the operation and click "OK".



After host creation is successful, press "Close" on the execution results dialog box.

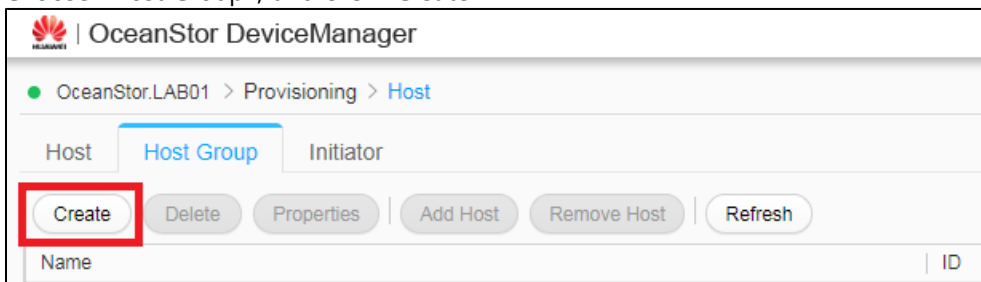


Step 3. Creating a Host Group


At the navigation bar on the right, click on the "Provisioning" button.

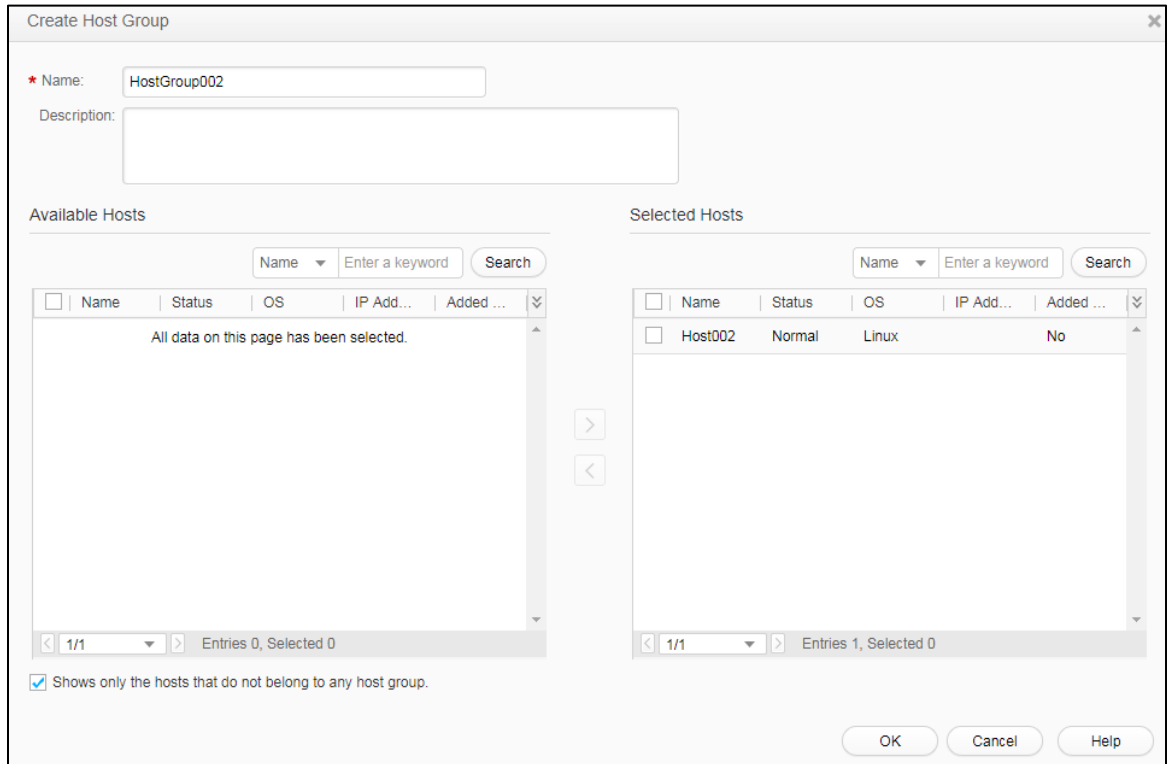
At "Block Storage Service" region, click on "Host".

Choose "Host Group", and click "Create".

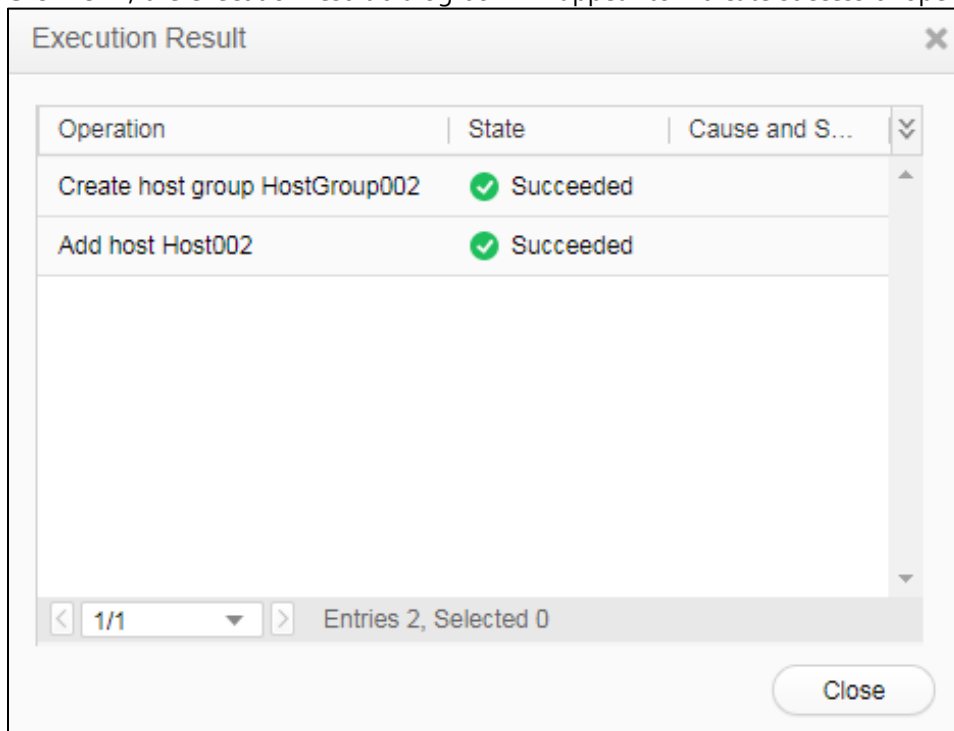


In the host group creation dialog box, key in the host group name and the description information.

Choose the available host and click  to add the host to the selected host region.



Click "OK", the execution result dialog box will appear to indicate successful operation.

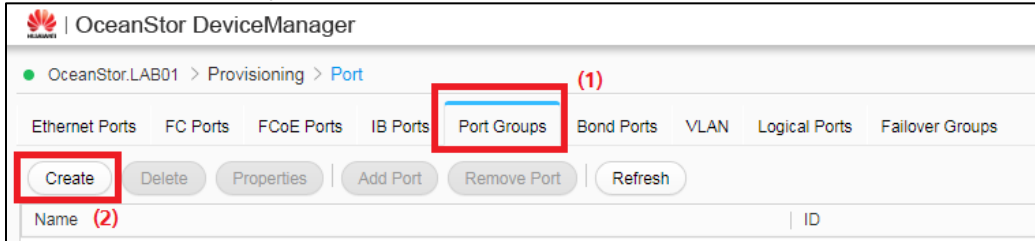


Step 4. Creating a Port Group


At the navigation bar on the right, click on the "Provisioning" button.

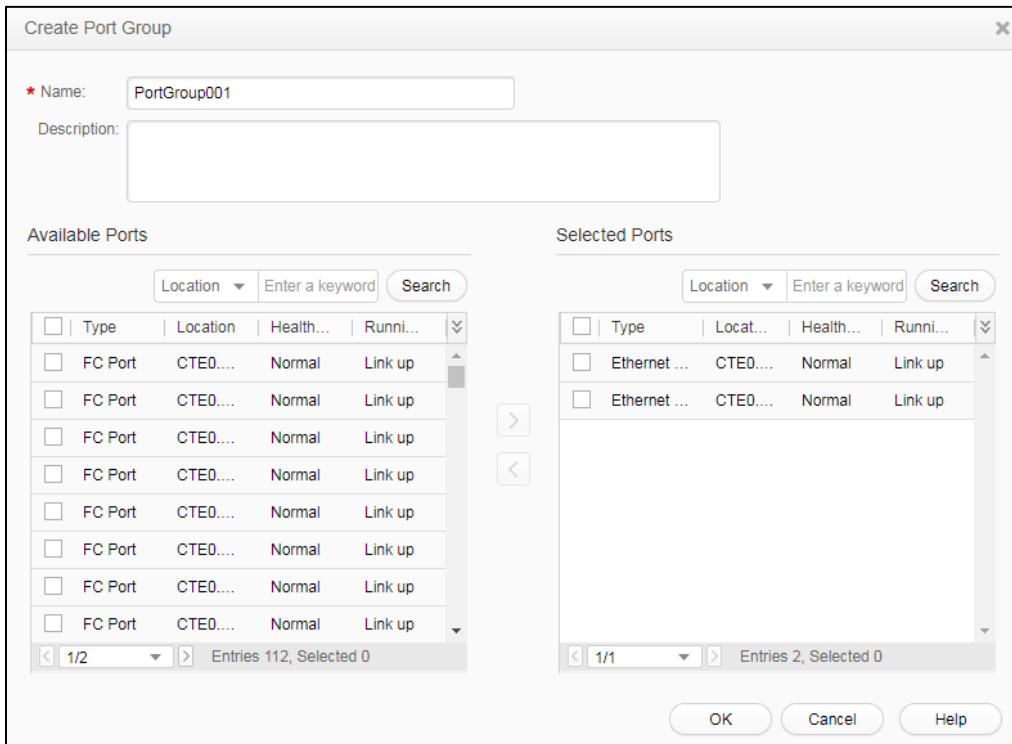
At the "Storage Configuration and Optimization" region, click on "Port".

Choose the "Port Groups" tab and click "Create".



Key in the port group name within the "Name" field, and key in any port description information within the "Description" field.

Choose the valid ports that you wish to add within the port group, and click  to add the ports into the selected ports region.



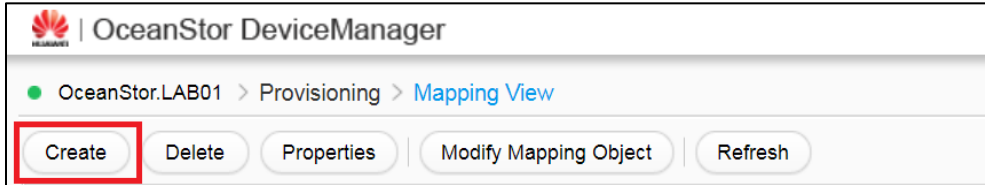
Click "OK", the execution result dialog box will appear to indicate successful operation.

Step 5. Creating a Mapping View


At the navigation bar on the right, click on the "Provisioning" button.

At the "Block Storage Service" region, click on "Mapping View".

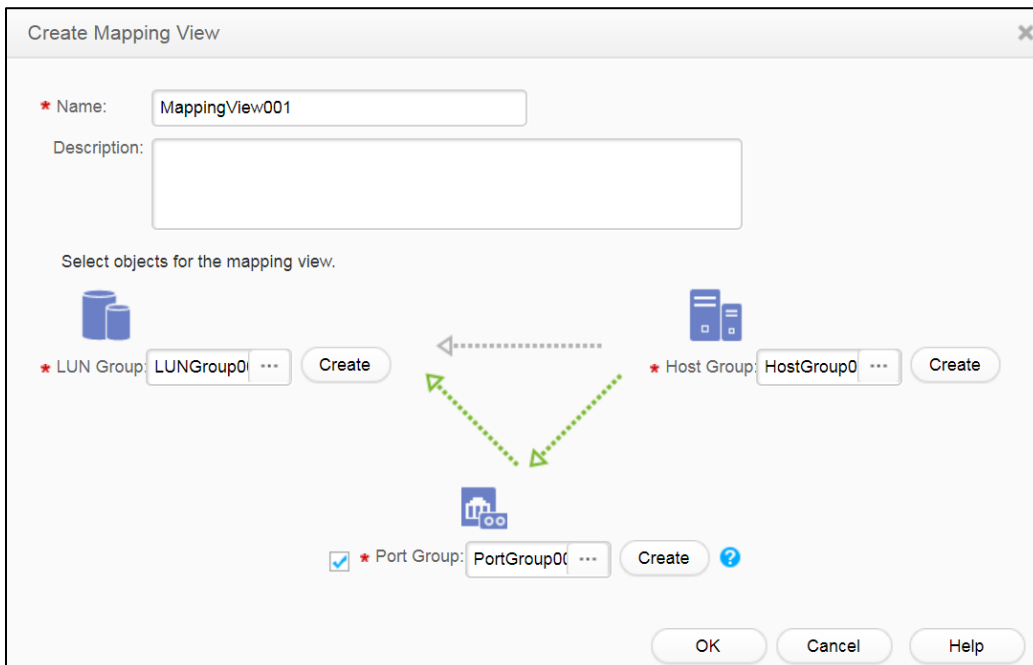
Click "Create".



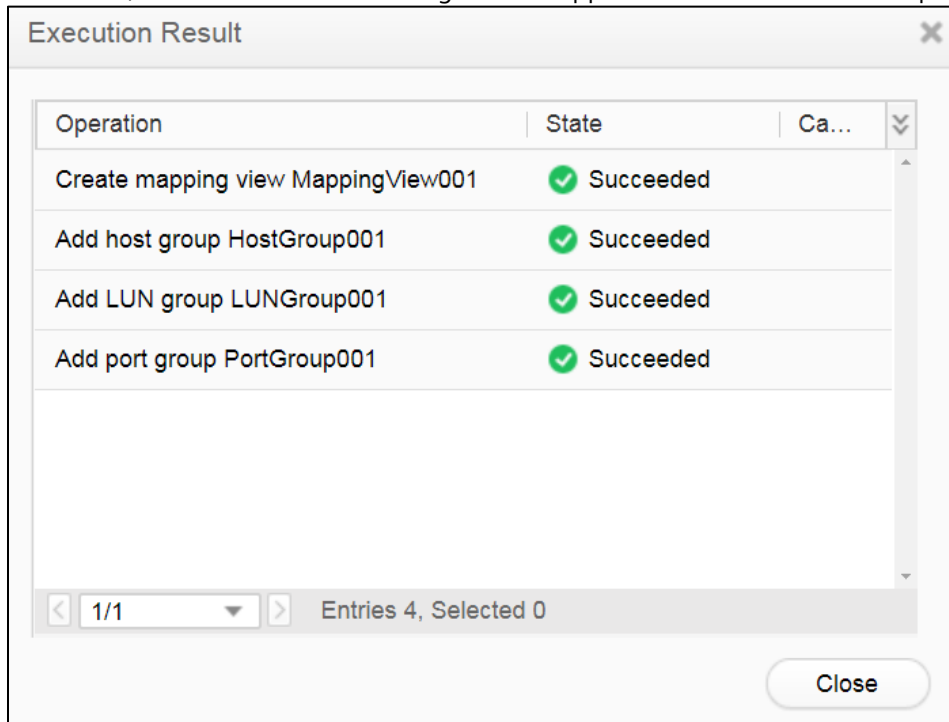
Key in the mapping view name within the "Name" field.

At the LUN group region, click  to open the dialog box to select available LUN groups. Select the LUN group from the LUN group list, and click "OK".

The method for adding the host group and port group is similar as the steps for adding the LUN group.



Click "OK", the execution result dialog box will appear to indicate successful operation.



3.3.3 FC SAN Configuration Tasks Based on Linux

Step 1. Installing the FC HBA Card Driver In Linux Environment

Run the command: `cat /etc/issue` to query the operating system version, the result will be displayed as the following example:

```
tc18167:~ # cat /etc/issue
Welcome to SUSE Linux Enterprise Server 11 SP2 (x86_64) - Kernel \r (\l).
```

Check whether the SUSE 11 SP2 host has the FC HBA driver ID, run the command: `cat /sys/class/fc_host/host3 (host4) /node_name` to query the WWN ID of the FC HBA card. The example output is as below:

```
TC18171:~ # cat /sys/class/fc_host/host3/node_name
0x20000024ff54392e
TC18171:~ # cat /sys/class/fc_host/host4/node_name
0x20000024ff54392f
```

If there is no FC HBA driver ID existing within the host, the HBA driver must be manually installed. The download path is as following:

Obtain FC HBA Driver: `ftp://10.158.180.10---->01 Storage Tools----->FC HBA`, download the files within the Linux directory to the local PC. Note: The FTP server can only be accessed on the Elab PC.

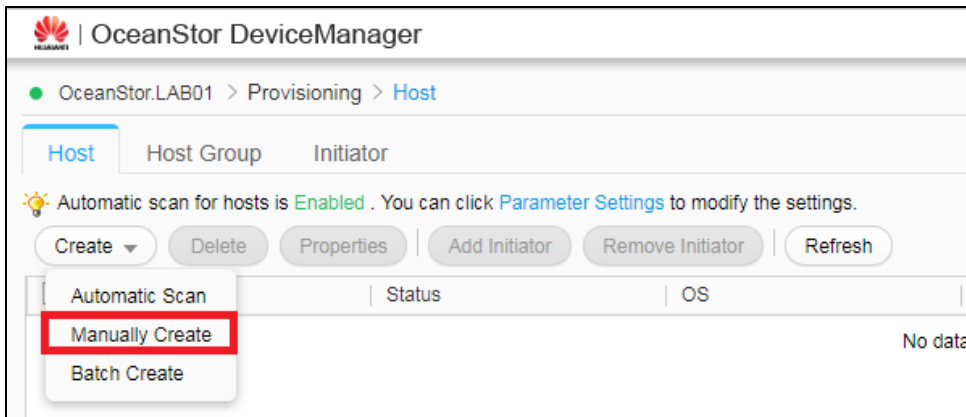
Note: The IP address of the FTP server may differ based on your environment, refer to your actual network information and topology to obtain the correct IP Address.

Run the command: `rpm -ivh XXX` to install.

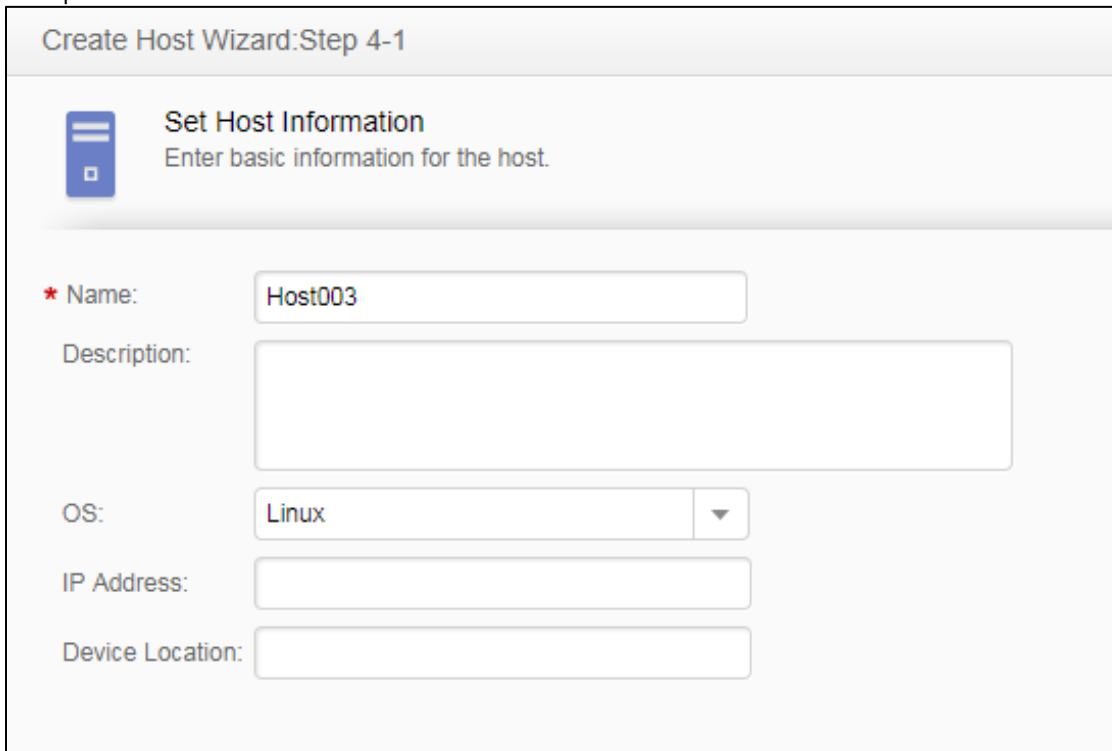
Step 2. Creating a Host


At the navigation bar on the right, click on the "Provisioning" button.

At the "Block Storage Service" region, click on "Host", click on "Create" and then choose "Manually Create".



At the "Name" field, key in the name of the host, choose the operating system as Linux, others are optional.



Click "Next", add the selected initiator, and choose the valid initiator from the list of available initiators and click the  button to add it to selection.

Create Host Wizard: Step 4-2

Configure Initiator

Initiators are required by hosts to access storage resources. The WWPNs or IQNs of initiators added to the hosts must be the same as those of initiators on the application servers. [What is an initiator?](#)

Available Initiators

Initiator Type: FC | WWPN/IQN | Enter a keyword | Search

<input type="checkbox"/>	Type	WWPN/IQN	Status
<input type="checkbox"/>	FC	1313131313131313	Online
<input type="checkbox"/>	FC	1414141414141414	Online
<input type="checkbox"/>	FC	1515151515151515	Online

Entries 3, Selected 0

Create Delete Modify

Selected Initiators

WWPN/IQN | Enter a keyword | Search

<input checked="" type="checkbox"/>	Type	WWPN/IQN	Status
<input checked="" type="checkbox"/>	FC	1212121212121212	Online

Entries 1, Selected 1

Previous Next Cancel Help

Click "Next", verify the summary of the host creation information, choose "Complete" then verify the operation and click "OK".

Create Host Wizard: Step 4-3

Summary

Confirm your host settings.

Host Name: Host003

Description:

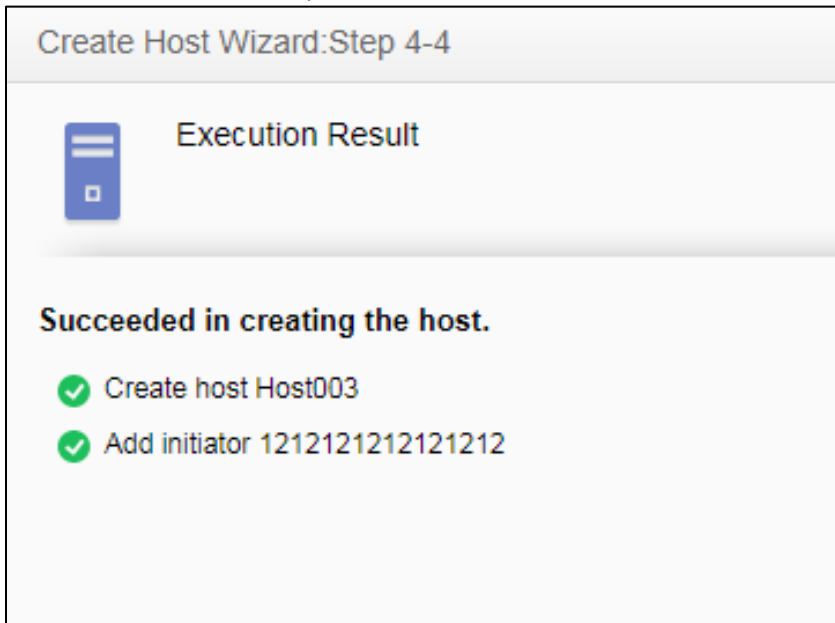
OS: Linux

IP Address:

Device Location:

Initiator: 1 initiators added.

Host creation is successful, click "Close" to exit

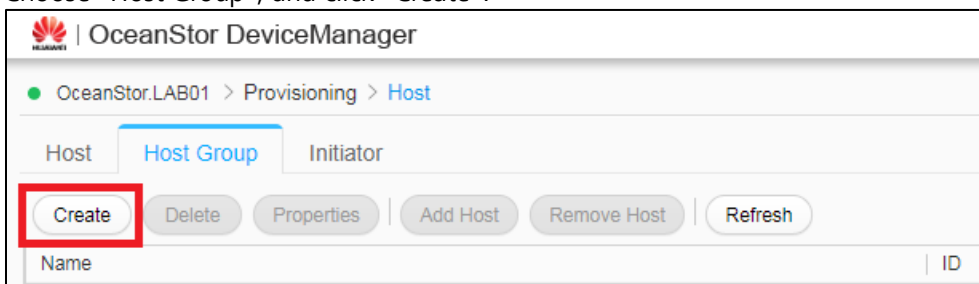


Step 3. Creating a Host Group


At the navigation bar on the right, click on the "Provisioning" button.

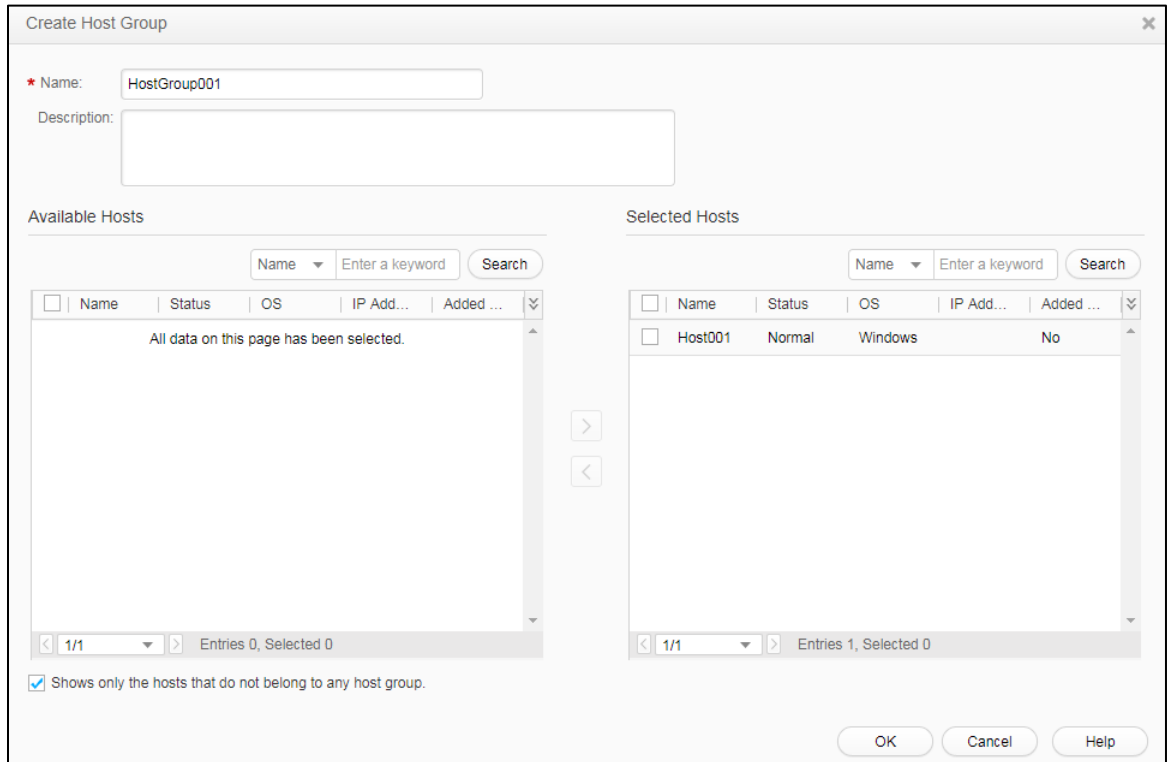
At "Block Storage Service" region, click on "Host".

Choose "Host Group", and click "Create".

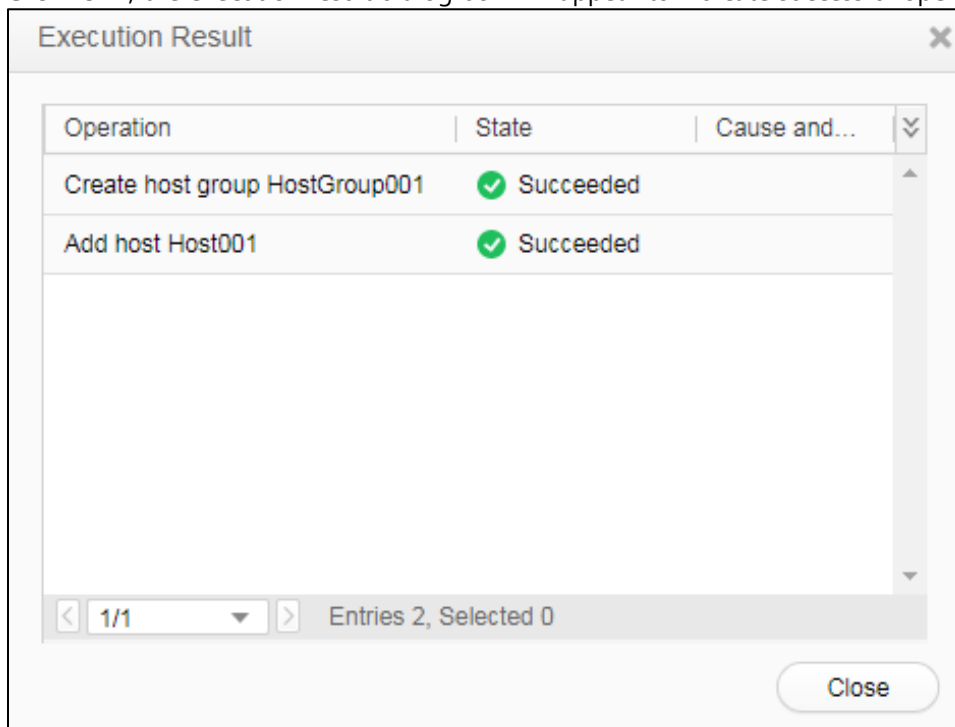


In the host group creation dialog box, key in the host group name and the description information.

Choose the available host and click  to add the host to the selected host region.



Click "OK", the execution result dialog box will appear to indicate successful operation

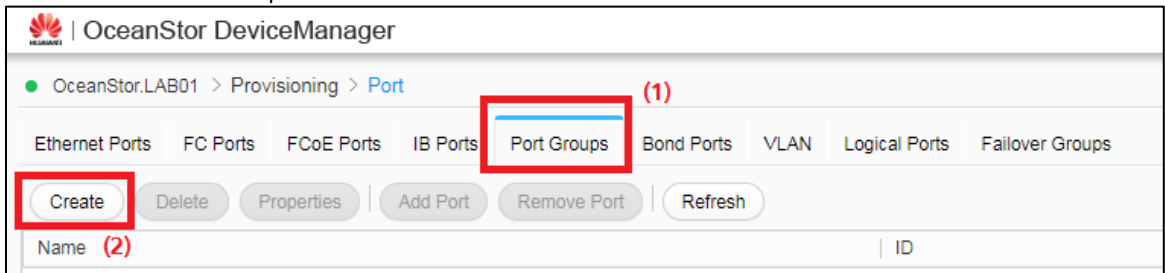


Step 4. Creating a Port Group


At the navigation bar on the right, click on the "Provisioning" button.

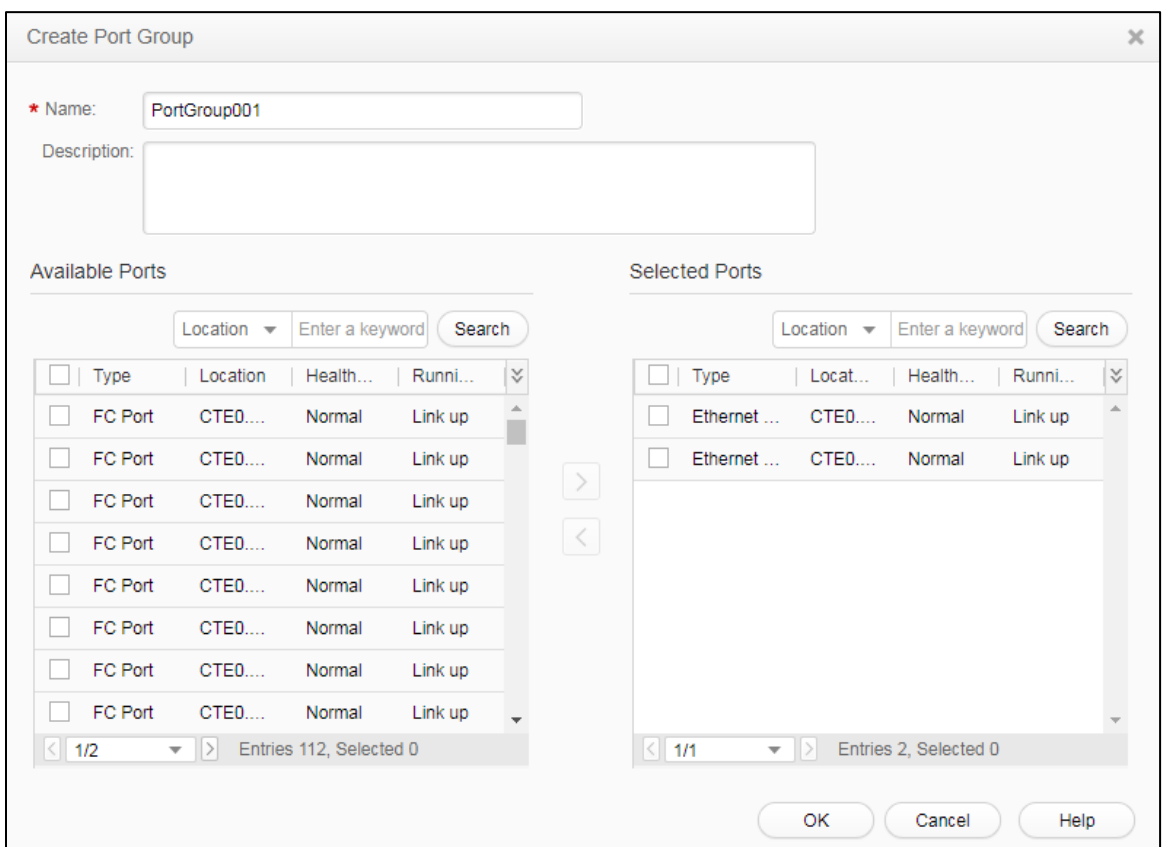
At the "Storage Configuration and Optimization" region, click on "Port".

Choose the "Port Group" tab and click "Create".



Key in the port group name within the "Name" field, and key in any port description information within the "Description" field.

Choose the valid ports that you wish to add within the port group, and click  to add the ports into the selected ports region.



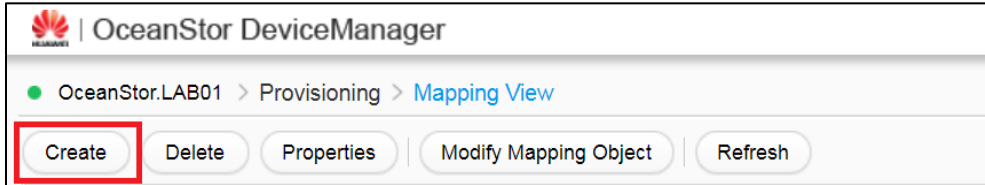
Click "OK", the execution result dialog box will appear to indicate successful operation.

Step 5. Creating a Mapping View


At the navigation bar on the right, click on the "Provisioning" button.

At the "Block Storage Service" region, click on "Mapping View".

Click "Create".

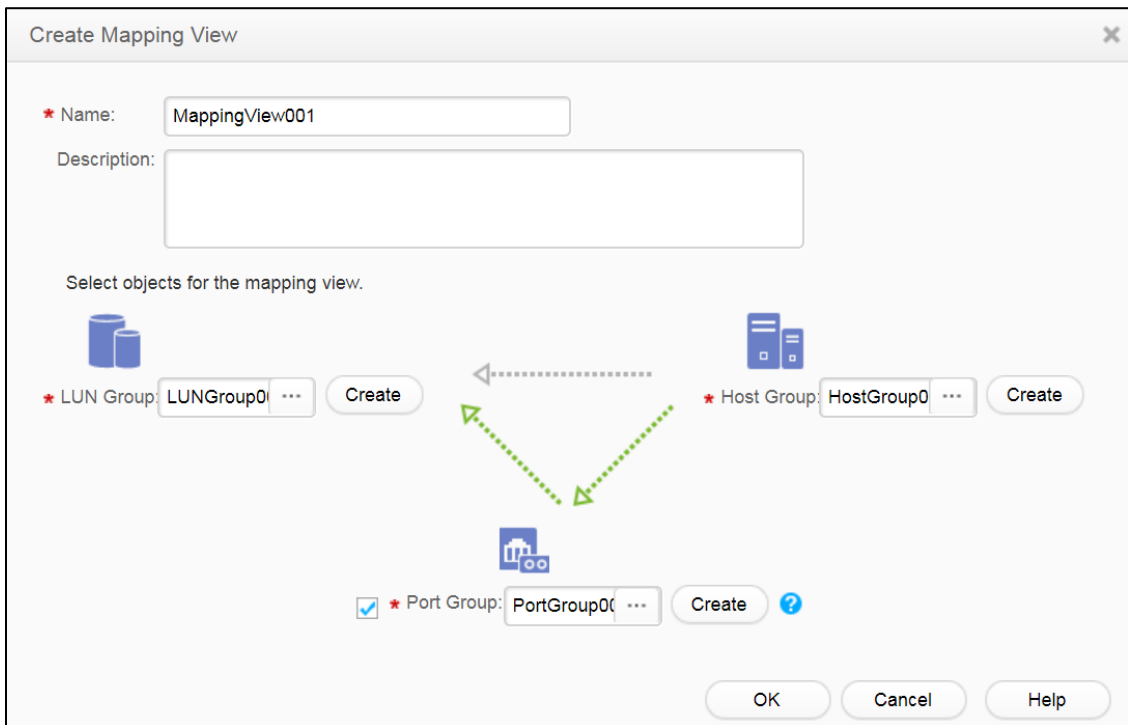


Key in the mapping view name within the "Name" field.

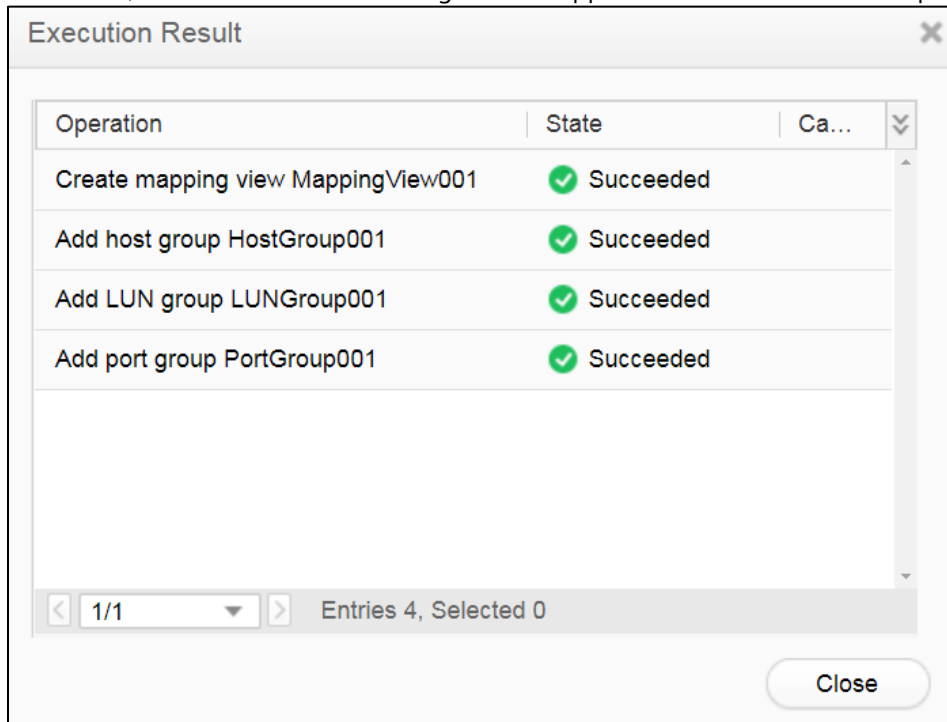
At the LUN group region, click  to open the dialog box to select available LUN groups.

Select the LUN group from the LUN group list, and click "OK".

The method for adding the host group and port group is similar as the steps for adding the LUN group.



Click "OK", the execution result dialog box will appear to indicate successful operation.



3.3.4 Multipathing Configuration Based on Linux Environment

Step 1. Checking the LUN

Run the command: `fdisk -l` to check the LUN mapped to host.

```
tc18167:~ # fdisk -l
Disk /dev/sda: 42.9 GB, 42949672960 bytes
255 heads, 63 sectors/track, 5221 cylinders, total 83886080 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x000a9881

   Device Boot      Start         End      Blocks   Id  System
/dev/sda1                2048        3067903        1532928   82  Linux swap / Solaris
/dev/sda2 *           3067904        83886079        40409088   83  Linux

Disk /dev/sdb: 10.7 GB, 10737418240 bytes
64 heads, 32 sectors/track, 10240 cylinders, total 20971520 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x00000000

Disk /dev/sdb doesn't contain a valid partition table
```

You may also run the command: `lsscsi` to check the LUN mapped to the host.

```
tc18167:~ # lsscsi
[0:0:0:0]   disk      VMware   Virtual disk      1.0   /dev/sda
[2:0:0:0]   cd/dvd    NECVMWar  VMware IDE CDR10  1.00  /dev/sr0
[7:0:0:0]   disk      HUAWEI   XSG1               4302  -
[7:0:0:1]   disk      HUAWEI   XSG1               4302  /dev/sdb
[7:0:0:2]   disk      HUAWEI   XSG1               4302  /dev/sdc
[7:0:0:3]   disk      HUAWEI   XSG1               4302  /dev/sdd
[8:0:0:0]   disk      HUAWEI   XSG1               4302  /dev/sde
[8:0:0:1]   disk      HUAWEI   XSG1               4302  /dev/sdf
[8:0:0:2]   disk      HUAWEI   XSG1               4302  /dev/sdg
[8:0:0:3]   disk      HUAWEI   XSG1               4302  /dev/sdh
tc18167:~ #
```

Actually, there is only 3 LUNs are mapped as drives to the host, but we can see that there is 6 new drives shown in the picture above because there are no multipathing software is installed.

Step 2. Installing Multipathing Software

When using the Elab lab environment, the download path for the multipathing software is: `ftp://10.158.180.10--->admin1/admin1---->01 Storage Tools----->UltraPath-→Version is V100R008.`

```
tc18167:/home # ftp 10.158.180.10
Connected to 10.158.180.10.
220-FileZilla Server version 0.9.39 beta
220-written by Tim Kosse (Tim.Kosse@gmx.de)
220 Please visit http://sourceforge.net/projects/filezilla/
Name (10.158.180.10:root): admin1
331 Password required for admin1
Password: admin1
230 Logged on
Remote system type is UNIX.
ftp> binary
200 Type set to I

ftp> cd 01\ Storage\ Tools\
250 CWD successful. "/01 Storage Tools" is current directory.
ftp> cd UltraPath
250 CWD successful. "/01 Storage Tools/UltraPath" is current directory.
ftp> cd U
UltraPathV100R005C013PC400      UltraPathV100R008C00SPC600
ftp> cd UltraPathV100R008C00SPC600
250 CWD successful. "/01 Storage Tools/UltraPath/UltraPathV100R008C00SPC600" is
current directory.
ftp> get OceanStor\
OceanStor AIX_ODM.zip
OceanStor UltraPath V100R008C00SPC600_AIX.zip
OceanStor UltraPath V100R008C00SPC600_LinuxOther.zip
OceanStor UltraPath V100R008C00SPC600_RHEL.zip
OceanStor UltraPath V100R008C00SPC600_SLES.zip
OceanStor UltraPath V100R008C00SPC600_Solaris.zip
OceanStor UltraPath V100R008C00SPC600_VMware_vSphere.zip
OceanStor UltraPath V100R008C00SPC600_Windows.zip
ftp> get OceanStor\ UltraPath\ V100R008C00SPC600_S
OceanStor UltraPath V100R008C00SPC600_SLES.zip
OceanStor UltraPath V100R008C00SPC600_Solaris.zip
ftp> get OceanStor\ UltraPath\ V100R008C00SPC600_SLES.zip
local: OceanStor UltraPath V100R008C00SPC600_SLES.zip remote: OceanStor UltraPa
h V100R008C00SPC600_SLES.zip
229 Entering Extended Passive Mode (|||60448|)
150 Connection accepted
100% |*****| 137 MB 23.44 MB/s 00:00 ETA
226 Transfer OK
143667163 bytes received in 00:05 (23.43 MB/s)
```

```
ftp> bye
221 Goodbye
```

As shown in the picture below: The installation directory of UltraPath (Linux version).

Login to the Linux server to execute the following command to install the multipathing software. The first step is to unzip the compressed zip file of the UltraPath installer.

```
tc18167:/home # unzip OceanStor\ UltraPath\ V100R008C00SPC600_SLES.zip
```

Run the following commands in sequence:

```
dos2unix install.sh
```

```
chmod +x install.sh
```

```
./install.sh
```

Choose the boot type of your system. To boot the operating system from local disk, input "1". To boot the operating system from SAN, input "2".

```
tc18167:/home/SLES # ./install.sh
complete iscsi checking.
complete FC checking.
Verify the UltraPath existence.
The UltraPath is not installed.
Modify system configuration.[file:/etc/iscsi/iscsid.conf,item:node.startup ,value: automatic]
Modify system configuration.[file:/etc/iscsi/iscsid.conf,item:node.session.timeout_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]
Please choose the boot type of your system:
<1>--boot-from-Local
<2>--boot-from-SAN
please input your select:1
```

When the first installation of UltraPath is complete, you need to reboot the operating system. Input "y" to reboot.

```
The installation is complete. Whether to restart the system now?
<Y|N>:y
```

Once the system is rebooted, please check the amount of disks, if there is only 3 disks, it means that the multipathing software is successfully installed.

```
tc18167:~ # fdisk -l

Disk /dev/sda: 42.9 GB, 42949672960 bytes
255 heads, 63 sectors/track, 5221 cylinders, total 83886080 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x000a9881

   Device Boot      Start         End      Blocks   Id  System
/dev/sda1                2048     3067903     1532928   82  Linux swap / Solaris
/dev/sda2 *           3067904     83886079     40409088   83  Linux

Disk /dev/sdb: 10.7 GB, 10737418240 bytes
64 heads, 32 sectors/track, 10240 cylinders, total 20971520 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x00000000

Disk /dev/sdb doesn't contain a valid partition table
```

```

tc18167:~ # lsscsi
[0:0:0:0]   disk    VMware   Virtual disk    1.0   /dev/sda
[2:0:0:0]   cd/dvd  NECVMWar  VMware IDE CDR10 1.00  /dev/sr0
[3:0:0:0]   disk    HUAWEI   XSG1            4302  -
[3:0:0:1]   disk    HUAWEI   XSG1            4302  -
[3:0:0:2]   disk    HUAWEI   XSG1            4302  -
[3:0:0:3]   disk    HUAWEI   XSG1            4302  -
[4:0:0:0]   disk    HUAWEI   XSG1            4302  -
[4:0:0:1]   disk    HUAWEI   XSG1            4302  -
[4:0:0:2]   disk    HUAWEI   XSG1            4302  -
[4:0:0:3]   disk    HUAWEI   XSG1            4302  -
[5:0:0:1]   disk    up       updisk          4302  /dev/sdb
[5:0:0:2]   disk    up       updisk          4302  /dev/sdc
[5:0:0:3]   disk    up       updisk          4302  /dev/sdd
tc18167:~ #
tc18167:~ # █
    
```

Note:

- Do not copy the UltraPath software into a directory that has a space in the directory name, for example: /home/Dad Dir/. If not, the execution of the install.sh script will have errors.
- If UltraPath is installed within the same directory where the UltraPath installation files resides, do not copy new UltraPath files into this folder again in order to prevent confusion and errors.

Step 3. Using the LUN

Login into the Linux environment as the root user.

In multipathing scenario, to check whether UltraPath is installed, run the command: `rpm -qa|grepUltraPath`.

If the information displayed shows: Package UltraPath is not installed, it means that UltraPath is not installed.

If the information displayed shows: UltraPath-8.01.047-2 (or any other version of UltraPath), it means that UltraPath is already installed.

Note: This lab manual uses UltraPath-8.01.047-2 as the example. The actual version of the UltraPath used may be different.

Start the port service on the server.

When iSCSI ports are used and UltraPath has not been installed, run the command: `service openiscsi restart` to start the iSCSI service and scan for the LUN that are recently mapped.

When the iSCSI ports are used and UltraPath has already been installed, run the command: `/etc/init.d/iSCSI restart` to start the iSCSI service.

When FC host ports are used and UltraPath are installed, run the command: `hot_add` to remount the LUN as shown in the picture below:

```

tc18167:~ # hot_add
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
The device scanning is complete.
tc18167:~ # █
    
```

Run the command: `fdisk -l` to check the disk information. The example output is as below:

```
tc18167:~ # fdisk -l

Disk /dev/sda: 42.9 GB, 42949672960 bytes
255 heads, 63 sectors/track, 5221 cylinders, total 83886080 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x000a9881

   Device Boot      Start         End      Blocks   Id  System
/dev/sda1                2048     3067903     1532928   82  Linux swap / Solaris
/dev/sda2 *           3067904     83886079     40409088   83  Linux

Disk /dev/sdb: 10.7 GB, 10737418240 bytes
64 heads, 32 sectors/track, 10240 cylinders, total 20971520 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x00000000

Disk /dev/sdb doesn't contain a valid partition table

Disk /dev/sdc: 10.7 GB, 10737418240 bytes
64 heads, 32 sectors/track, 10240 cylinders, total 20971520 sectors
Units = sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x00000000

Disk /dev/sdc doesn't contain a valid partition table
```

In this example, run the command: `fdisk /dev/sdb` to expand the disk for sdb. The example output is as below:

```
tc18167:/usr/sbin # fdisk /dev/sdb
```

Device contains neither a valid DOS partition table nor Sun, SGI or OSF disklabel

Building a new DOS disklabel. Changes will remain in memory until you decide to write them. After that, of course, the previous content won't be recoverable.

The number of cylinders for this disk is set to 10240. There is nothing wrong with that, but this is larger than 1024 and could in certain setups cause problems with:

software that runs at boot time. I.e. old versions of LILO

Booting and partitioning software from other Oss. I.e. DOS FDISK, OS/2 FDISK

Warning: invalid flag 0x0000 of partition table 4 will be corrected by w(rite)

Command (m for help): m

Command action

- a toggle a bootable flag
- b edit bsd disklabel
- c toggle the dos compatibility flag
- d delete a partition
- l list known partition types
- m print this menu
- n add a new partition
- o create a new empty DOS partition table
- p print the partition table

- q quit without saving changes
- s create a new empty Sun disklabel
- t change a partition's system id
- u change display/entry units
- v verify the partition table
- w write table to disk and exit
- x extra functionality (experts only)

Command (m for help): n

Command action

- e extended
- p primary partition (1-4)

Partition number (1-4): 1

First cylinder (1-10240, default 1):

Using default value 1

Last cylinder or +size or +sizeM or +sizeK (1-10240, default 10240): Using default value 10240

Command (m for help): w

The partition table has been altered!
Calling ioctl() to re-read partition table.
Syncing disks.

Set /dev/sdb as the logical partition.

```
tc18167:~ # fdisk /dev/sdb
```

The number of cylinders for this disk is set to 10240.

There is nothing wrong with that, but this is larger than 1024 and could in certain setups cause problems with:

Software that runs at boot time, I.e. old versions of LILO)

Booting and partitioning software from other OSs I.e. DOS FDISK, OS/2 FDISK)

Command (m for help): m

Command action

- a toggle a bootable flag
- b edit bsd disklabel
- c toggle the dos compatibility flag
- d delete a partition
- l list known partition types
- m print this menu
- n add a new partition
- o create a new empty DOS partition table
- p print the partition table
- q quit without saving changes
- s create a new empty Sun disklabel
- t change a partition's system id
- u change display/entry units

- v verify the partition table
- w write table to disk and exit
- x extra functionality (experts only)

Command (m for help): n (add a new partition)

Command action

- l logical (5 or over)
- p primary partition (1-4)
- l

First cylinder (1-10240, default 1): Using default value 1

Last cylinder or +size or +sizeM or +sizeK (1-10240, default 10240): Using default value 10240

Command (m for help): w (write table to disk and exit)

The partition table has been altered!

Calling ioctl() to re-read partition table

Syncing disks.

Run the command: `mkfs.ext3 /dev/sdb5` to create a file system for sdb. (Please execute the steps based on actual requirements). The example output are as below:

```
tc18167:~ # mkfs.ext3 /dev/sdb5
mke2fs 1.38 (30-Jun-2005)
Filesystem label=
OS type: Linux
Block size=4096 (log=2)
Fragment size=4096 (log=2)
1310720 inodes, 2621432 blocks
131071 blocks (5.00%) reserved for the super user
First data block=0
Maximum filesystem blocks=2684354560
80 block groups
32768 blocks per group, 32768 fragments per group
16384 inodes per group
Superblock backups stored on blocks:32768, 98304, 163840, 229376, 294912, 819200, 884736,
1605632
Writing inode tables: done
Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information:
done
This filesystem will be automatically checked every 36 mounts or 180 days, whichever comes first.
Use tune2fs -c or -i to override.
```

Run the command to create the directory and name it based on actual client requirements: `mkdir /mnt/sdb5`.

Run the command to mount the directory: `mount /dev/sdb5 /mnt/sdb5`.

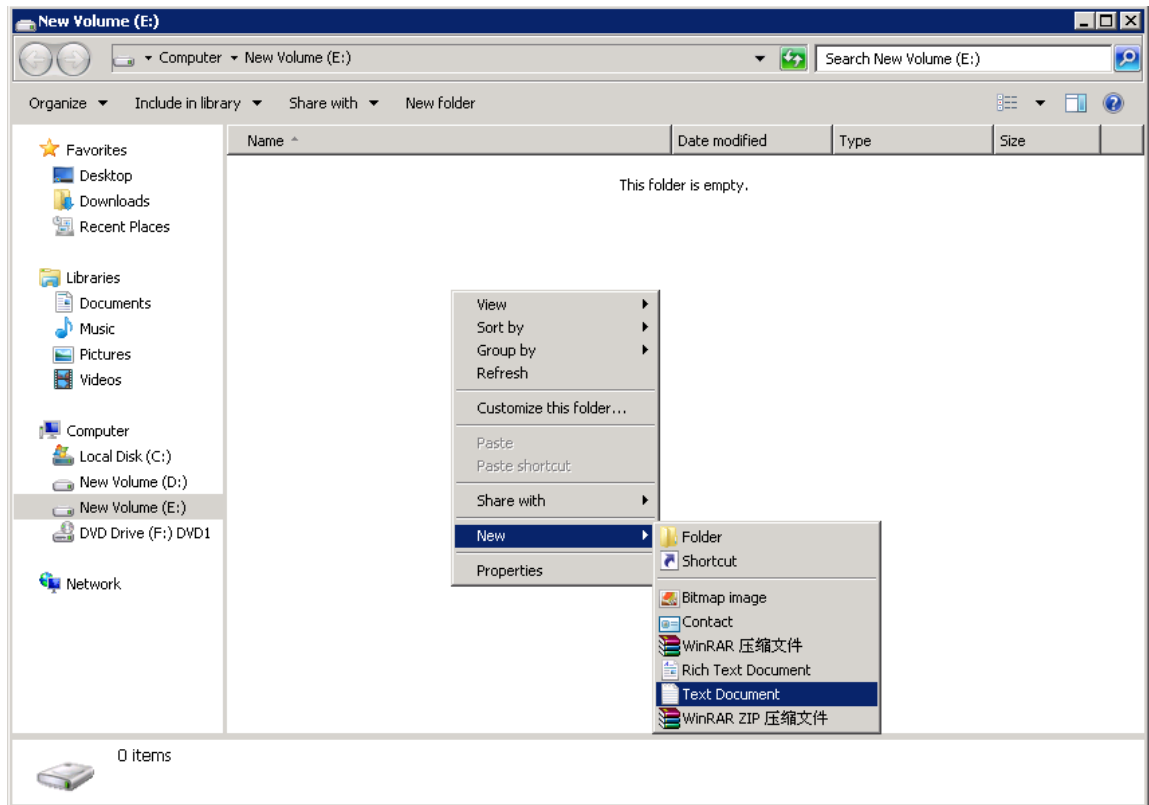
Use the `df -h` command to check whether the directory is mounted successfully.

```
tc18167:~ # df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/sda2       38G   3.5G   34G   10% /
devtmpfs        467M   184K   467M    1% /dev
tmpfs           467M    88K   467M    1% /dev/shm
/dev/sdb5       9.9G   151M   9.2G    2% /mnt/sdb5
```

3.4 Results Verification

3.4.1 Verification on a Windows Host

Try to write some data into the LUN that is mounted from the storage array on the Windows host.



3.4.2 Verification on a Linux Host

Try to write some data into the LUN that is mounted from the storage array on the Linux host.

```
TC18163:/mnt/sdb5 # touch huawei
TC18163:/mnt/sdb5 # ls
huawei
TC18163:/mnt/sdb5 # █
```

3.5 Configuration Reference

Please refer to the configuration steps.

3.6 Questions

Is the “hot_add” command the native command of Linux?

—End of Lab 3.

4 LUN Expansion and Using SmartThin to Create Thin LUN

4.1 Lab Introduction

4.1.1 Lab Objective

Upon completion of this lab, you will be acquire the following operation skills:

- Expanding the LUN.
- Using the LUN.
- Using SmartThin to create Thin LUN.

This lab will use OceanStor 5300 V3 as the example.

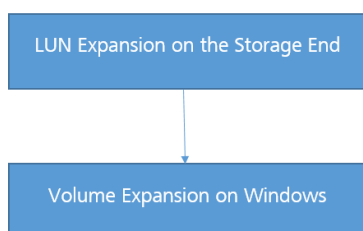
4.1.2 Networking and Service Description

Networking is the same as the IP SAN or FC SAN networking in the 3rd lab.

This lab will introduce on how to expand the existing LUN capacity using OceanStor DeviceManager and Windows Disk Management.

4.2 LUN Expansion Lab Configuration Tasks

4.2.1 Configuration Roadmap



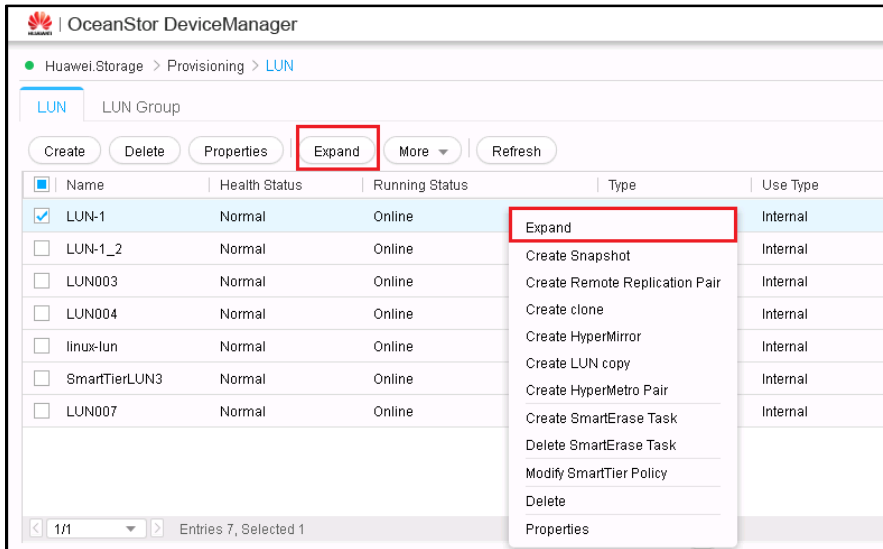
4.2.2 Configuration Steps

Step 1. Expand the LUN on the Storage End

At the navigation bar on the right, click on "Provisioning" button.

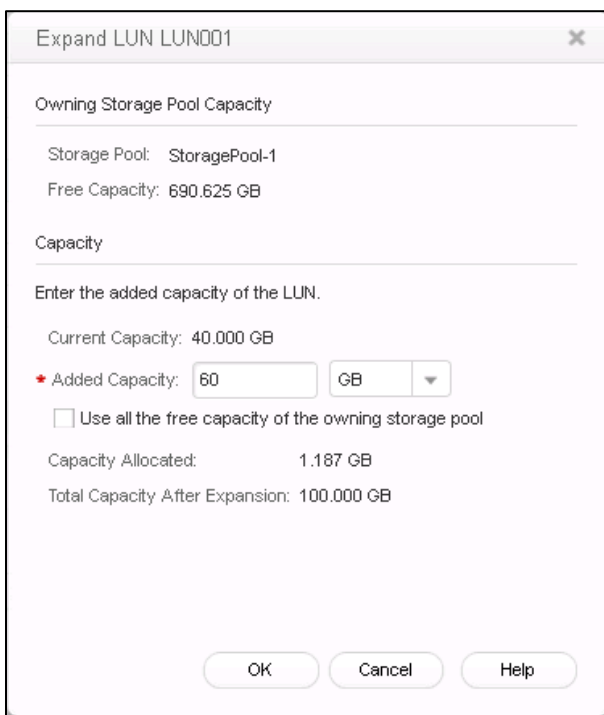
At "Block Storage Service" region, click on "LUN".

Choose a LUN and click on the "Expand" button on top of the page, or right click on the LUN that you want to expand and choose "Expand".



Open the LUN expansion window, at the “Added Capacity” field, key in the amount of storage capacity that you wish to add. Note that the capacity units are in the options of Blocks, MB, GB and TB.

Click “OK” to confirm the operation and click “OK” again on the info dialog box.



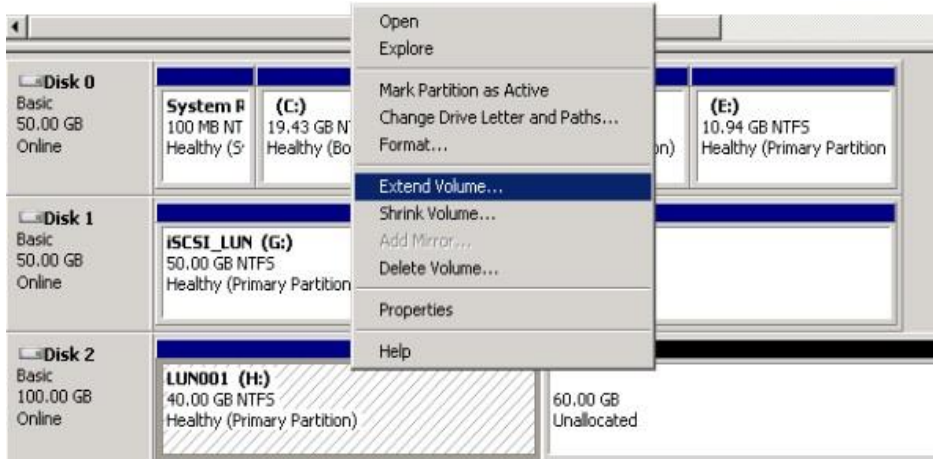
Click “OK” on the dialog box that appears to indicate successful expansion to complete the LUN expansion.

Step 2. Expanding the Volume on Windows

Open "Disk Management", right click on "Disk Management", and choose "Rescan Disks", then you will be able to view the unallocated space.



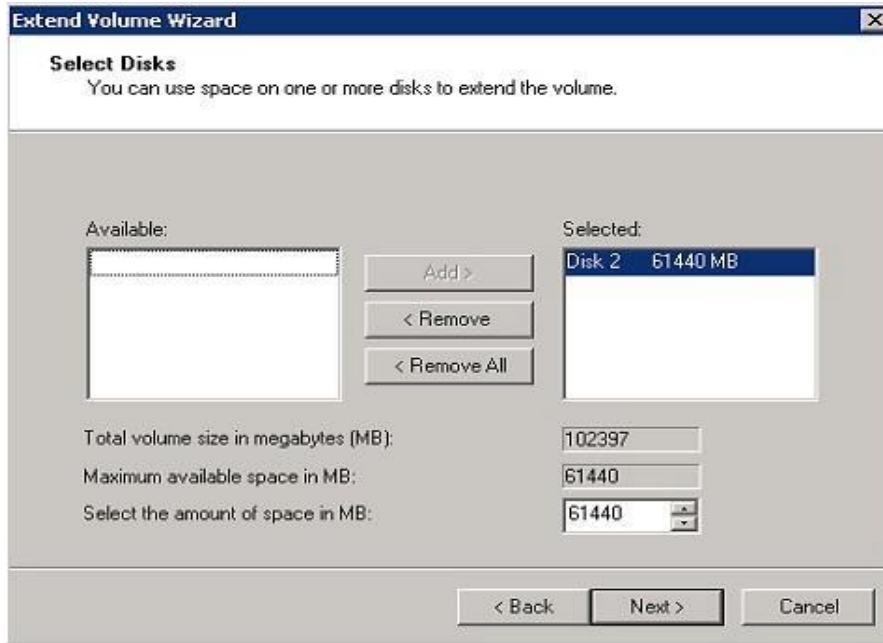
Right click on the existing partition and choose "Extend Volume" to open the "Extend Volume Wizard".



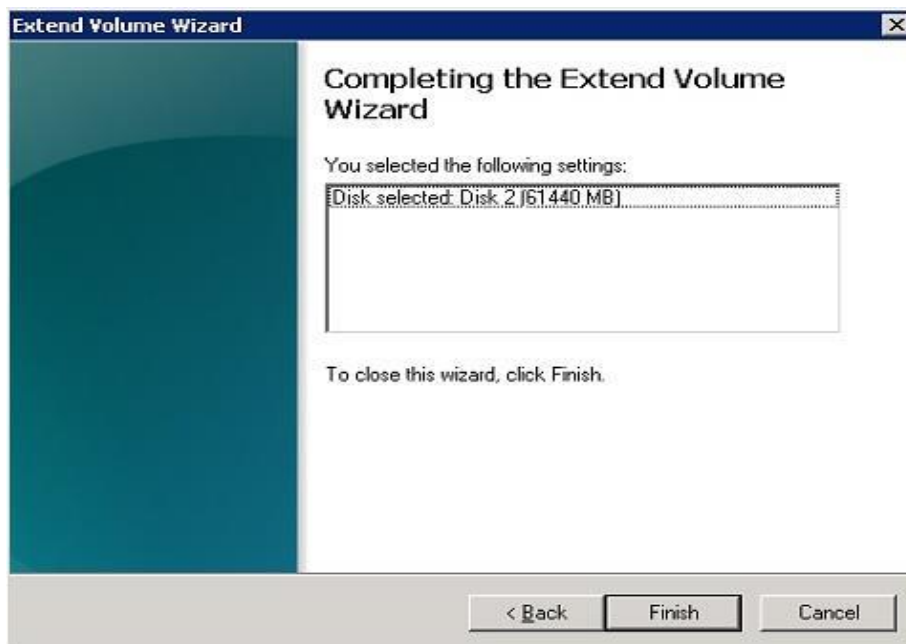
Click "Next" on the following interface of the wizard.



Choose the valid available space from the "Available" region and click "Add>" to add it to selection. Click "Next" to proceed.



Click "Finish" to complete the volume expansion process.

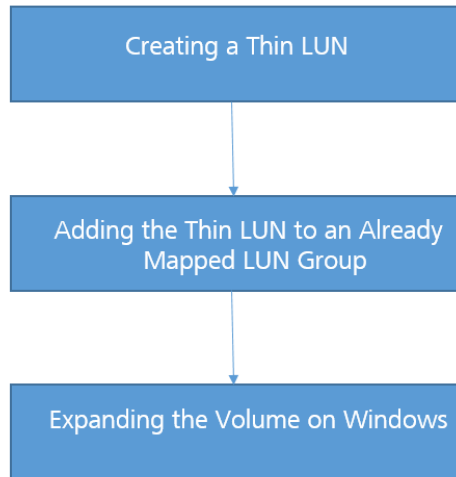


Check on the expanded partition, if the size is expanded, then it means that the volume expansion is successful.



4.3 Lab Configuration Tasks for Creating a Thin LUN

4.3.1 Configuration Roadmap



4.3.2 Configuration Steps

Step 1. Creating a Thin LUN

At the navigation bar on the right, click on “Provisioning” button.

At “Block Storage Service” region, click on the “LUN” button.

Click on the “Create” button to enter the LUN creation window.



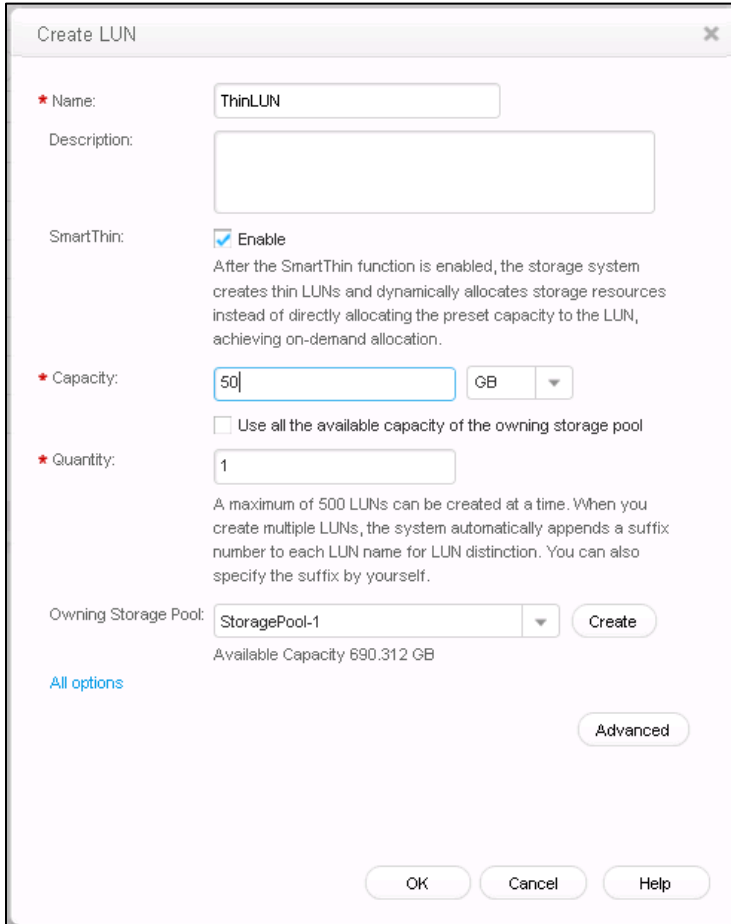
Key in the name of the LUN in the “Name” field.

Tick on the “Enable” option for SmartThin.

Key in the total “Capacity” for the Thin LUN.

After the SmartThin function is enabled, the storage system creates thin LUNs and dynamically allocates storage resources instead of directly allocating the preset capacity to the LUN, achieving on-demand allocation.

Choose the “Owning Storage Pool” from the list of available storage pools.



Create LUN

* Name:

Description:

SmartThin: **Enable**
 After the SmartThin function is enabled, the storage system creates thin LUNs and dynamically allocates storage resources instead of directly allocating the preset capacity to the LUN, achieving on-demand allocation.

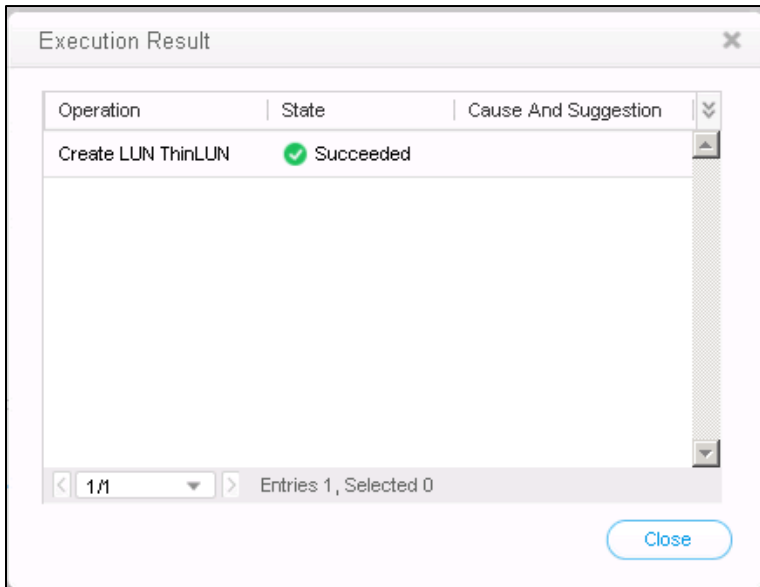
* Capacity: GB
 Use all the available capacity of the owning storage pool

* Quantity:
 A maximum of 500 LUNs can be created at a time. When you create multiple LUNs, the system automatically appends a suffix number to each LUN name for LUN distinction. You can also specify the suffix by yourself.

Owning Storage Pool:
 Available Capacity 690.312 GB

[All options](#)

After all the necessary information is filled up, click on the “OK” button to create the Thin LUN. Execution results dialog box will appear to indicate successful operation.

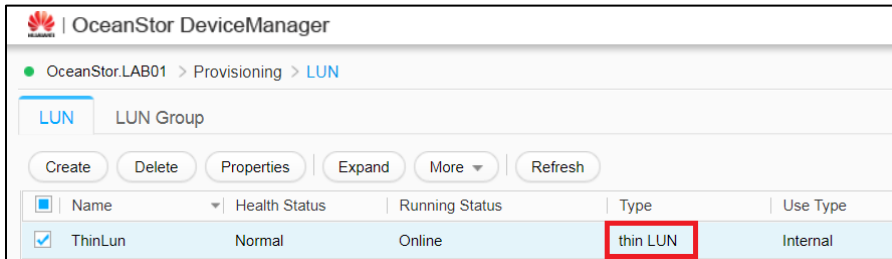


Execution Result

Operation	State	Cause And Suggestion
Create LUN ThinLUN	✔ Succeeded	

1/1 Entries 1, Selected 0

Note: Under the LUN tab, the LUN type will be shown as “thin LUN”.



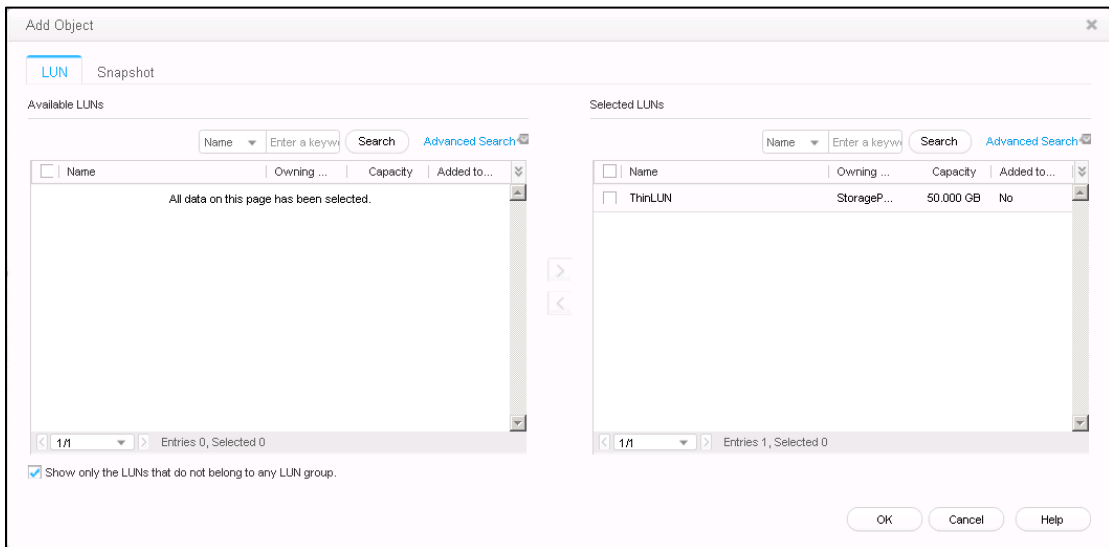
Step 2. Adding the Thin LUN to an Already Mapped LUN Group

Click on the “LUN Group” tab and click on the “Add Object” button to add the Thin LUN to an existing LUN Group.

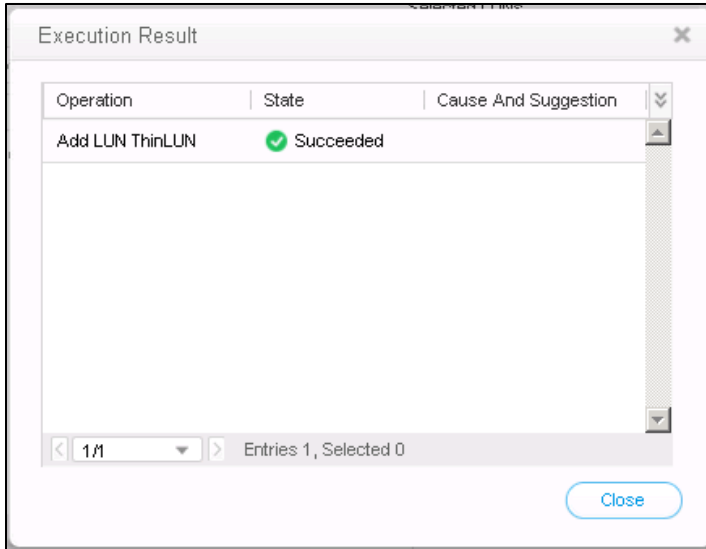


Choose the Thin LUN and click on the  button to add the Thin LUN to the “Selected LUNs” region.

Click “OK”.



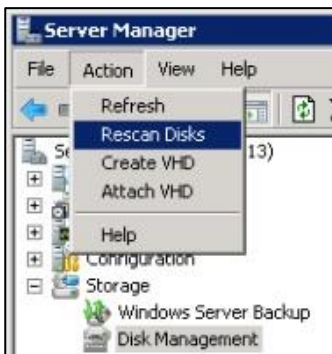
Execution result dialog box will appear to indicate successful operation.



Step 3. Expanding the Volume on Windows

Open "Server Manager" and click on "Disk Management".

Click on the "Action" button on the top window, and choose the "Rescan Disks" option.



Once the new volume appears, right click on it and choose "Online" to activate it.



Select the uninitialized disk, right click on it and choose "Initialize Disk". Leave all the settings at its default value and click "OK".

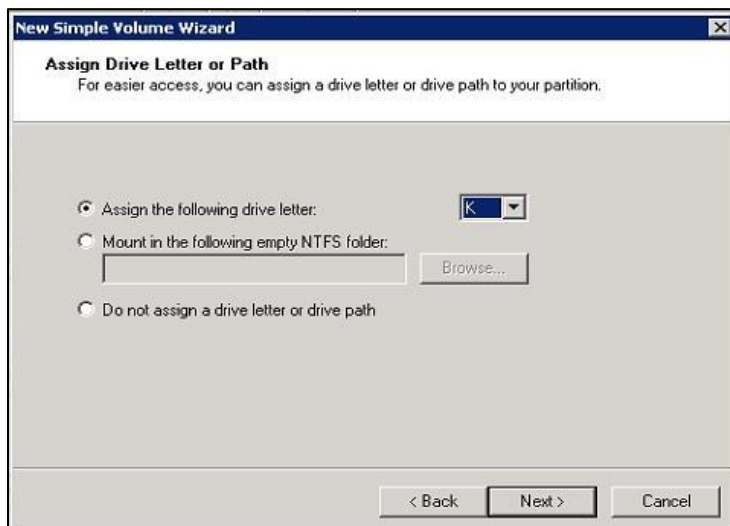


Select the unallocated space on the drive, right click on it and choose "New Simple Volume". Follow the steps of the "New Simple Volume Wizard" accordingly.

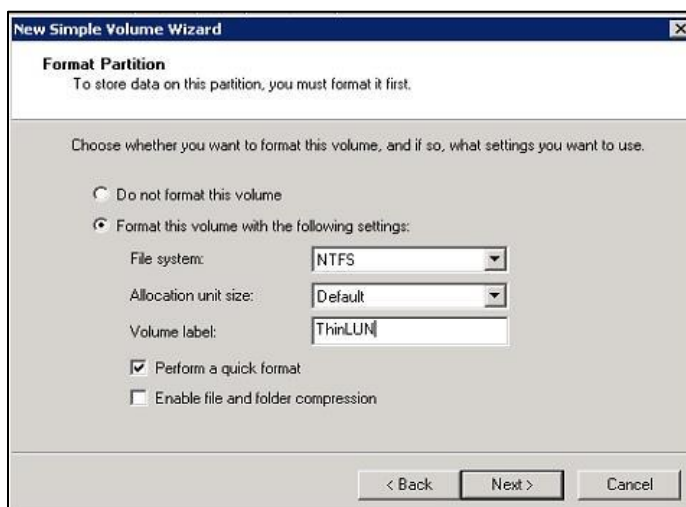




Assign a drive letter and click "Next".



Key in the LUN ID in the "Volume Label" description field, and leave the other settings at its default value and click "Next".



Click “Finish” to complete the “New Simple Volume Wizard”.



4.4 Results Verification

Please refer to the configuration steps.

4.5 Configuration Reference

Please refer to the configuration steps.

4.6 Questions

Will volume expansion on the Windows side cause service interruption?

—End of Lab 4.

5 HyperSnap (LUN) Configuration and Usage

5.1 Lab Introduction

5.1.1 Lab Objective

This lab allows you to grasp the knowledge of snapshot operation, and restore data from snapshots in block storage services.

This lab will use OceanStor 5300 V3 as the example.

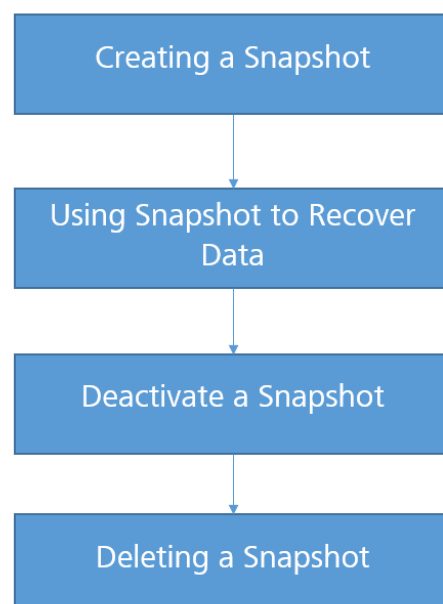
5.1.2 Networking and Service Description

The networking is the same as the IP-SAN or FC-SAN network in the 3rd Lab.

Create snapshot of the data on the LUN that is already mapped, and then delete those data, afterwards perform the snapshot rollback operation to observe the results of snapshot rollback and understand the usage and functions of snapshot. Additionally, perform snapshot deactivation and deletion of snapshot operation.

5.2 Lab Configuration Tasks

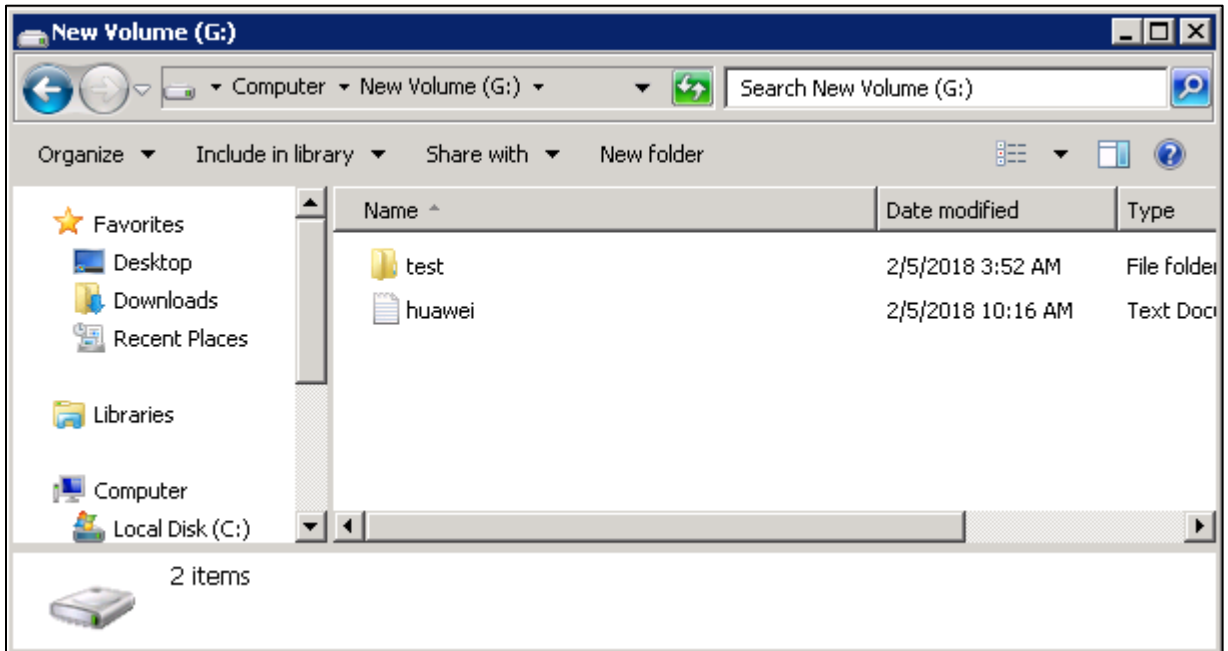
5.2.1 Configuration Roadmap



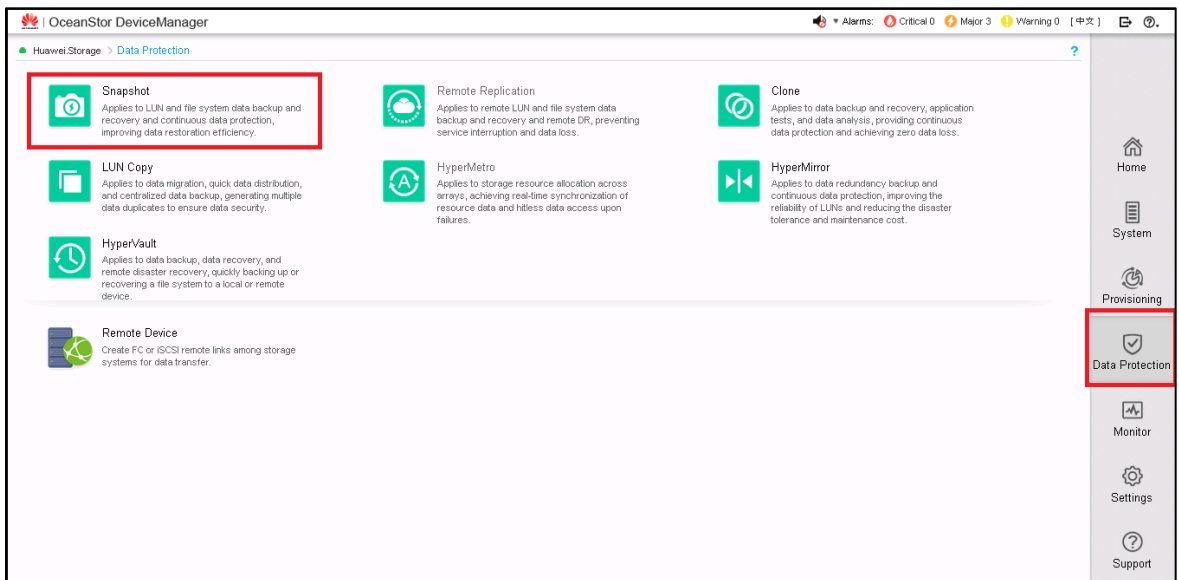
5.2.2 Configuration Steps

Step 1. Creating a Snapshot

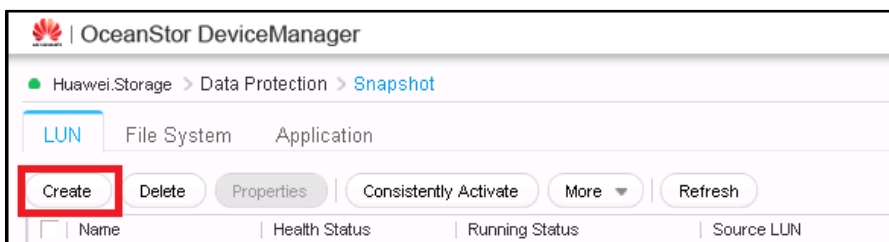
For this step, use the LUN that is already mapped to the Windows host during the 3rd Lab, and add data within that LUN.



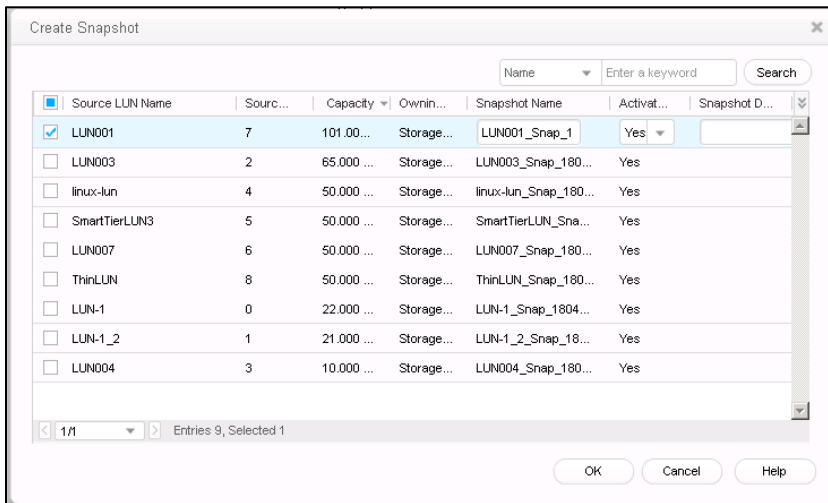
Click "Data Protection" in the OceanStor DeviceManager navigation bar, and choose "Snapshot".



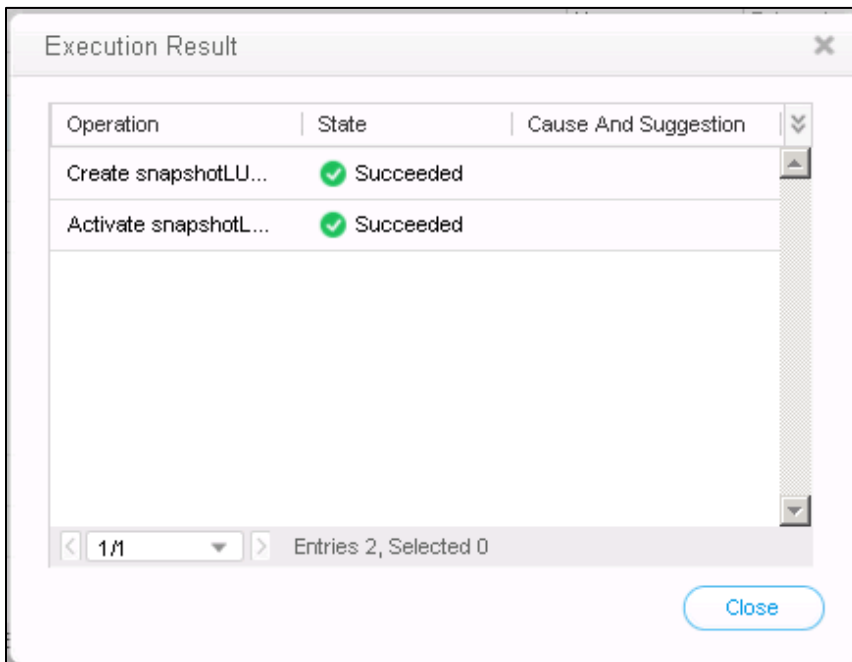
In the "LUN" tab, click on "Create".



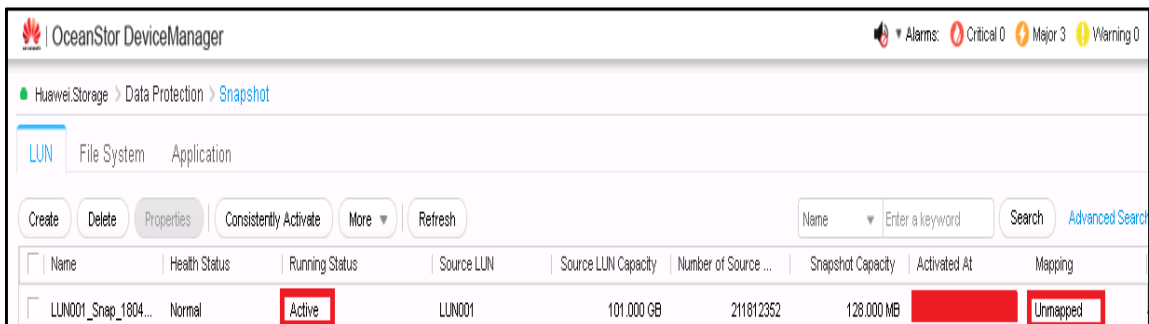
Choose the LUN for the snapshot operation, and the name of the snapshot can be custom defined.



Click "OK", the system will show the execution results dialog box to indicate successful operation, click "Close" to complete the snapshot creation.

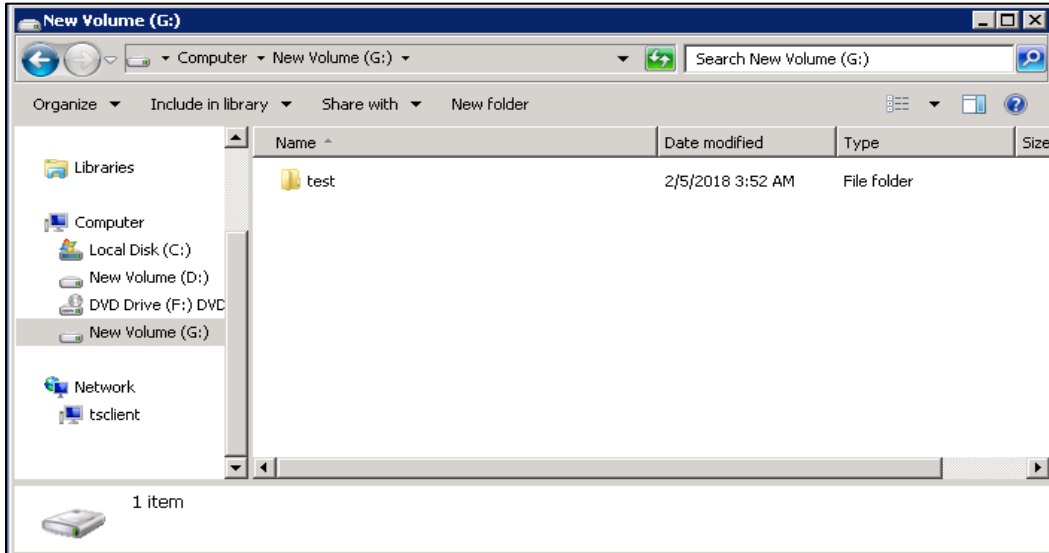


The status of the created snapshot LUN will appear as "Active" and "Unmapped" to any host.

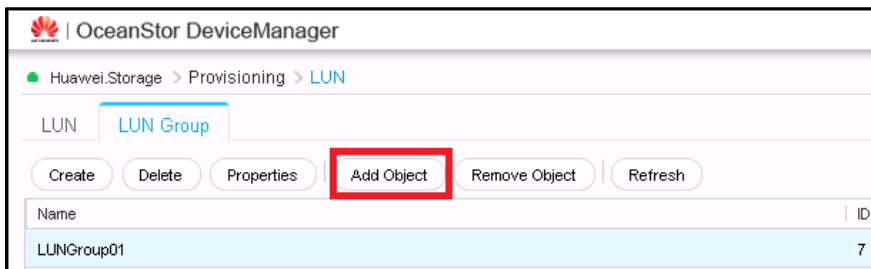


Step 2. Using Snapshot to Recover Data

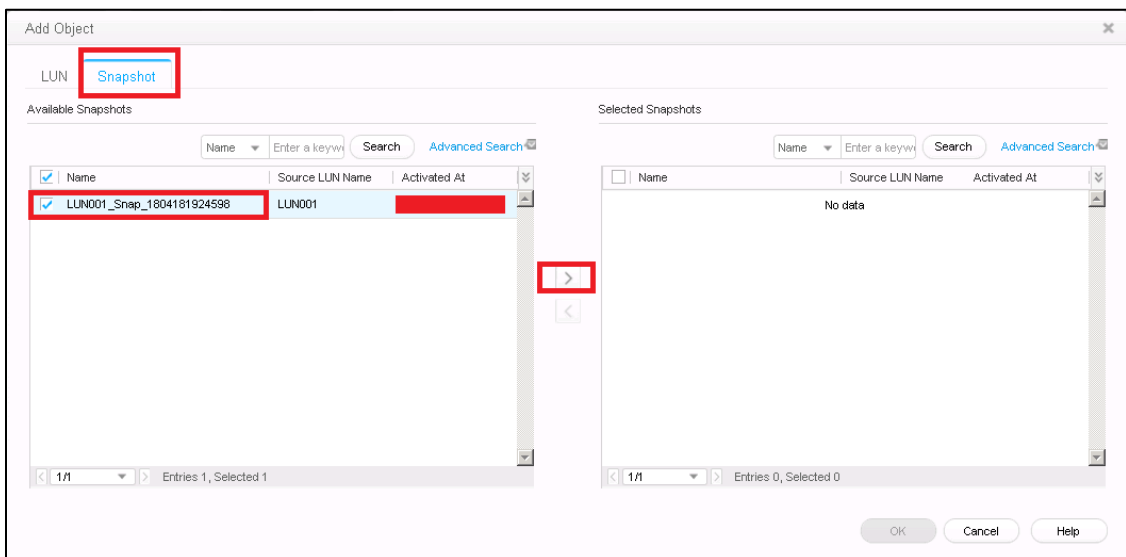
This lab task uses the previously created snapshot to recover data. First, we will recover a single file through the mapped snapshot. Delete the data that is written into the LUN previously during the initial step of this lab.



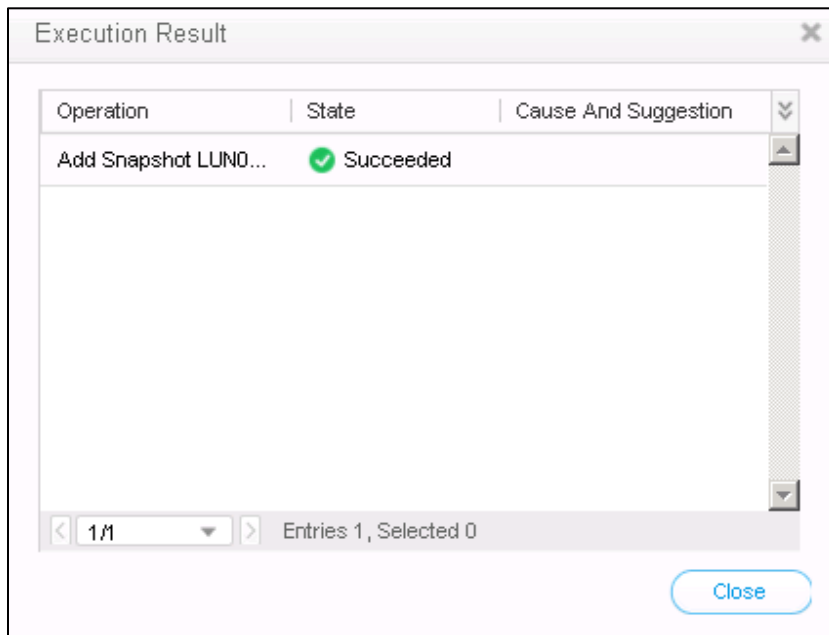
Click on "Provisioning" on the OceanStor DeviceManager, select "LUN" > "LUN Group", choose the LUN group that you wish to modify and click "Add Object".



The system will show the "Add Object" dialog box, click on the "Snapshot" tab, choose the snapshot that you wish to add to the LUN group, click on the arrow pointing to right, the snapshot will be added to the "Selected Snapshot" region, then click "OK".



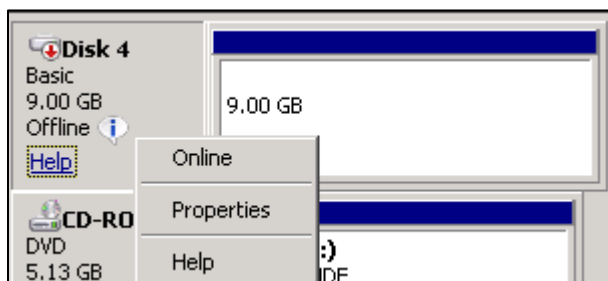
The execution results dialog box will appear to indicate successful operation.



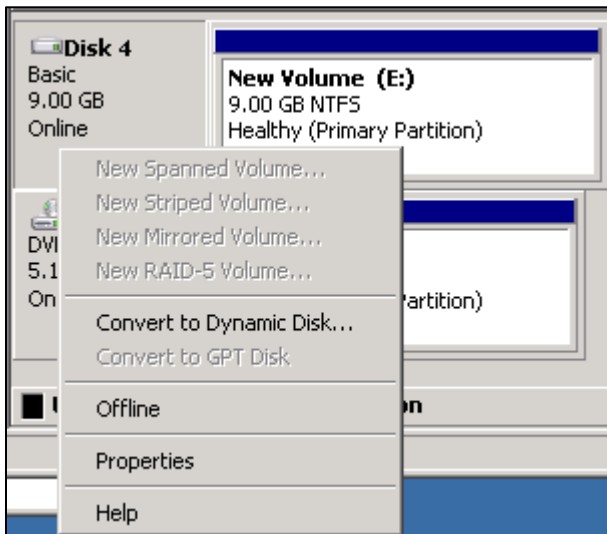
Open "Server Manager" under the Windows operating system. Choose "Disk Management", and click "Action" on the menu bar of the Server Manager window, then choose "Rescan Disks".



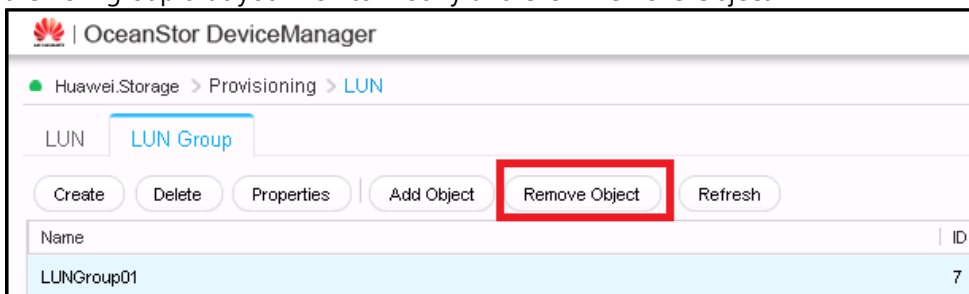
You will be able to see an additional disk, right click on that disk and choose "Online", the drive will obtain a drive letter automatically (you may also click "Refresh" and check "Disk Management" if no additional disk appears). Open the partition of the two disk separately to check the data contents, you will notice that the snapshot LUN that was mounted has all the original data. The missing files can be copied from the Snapshot LUN to the Source LUN.



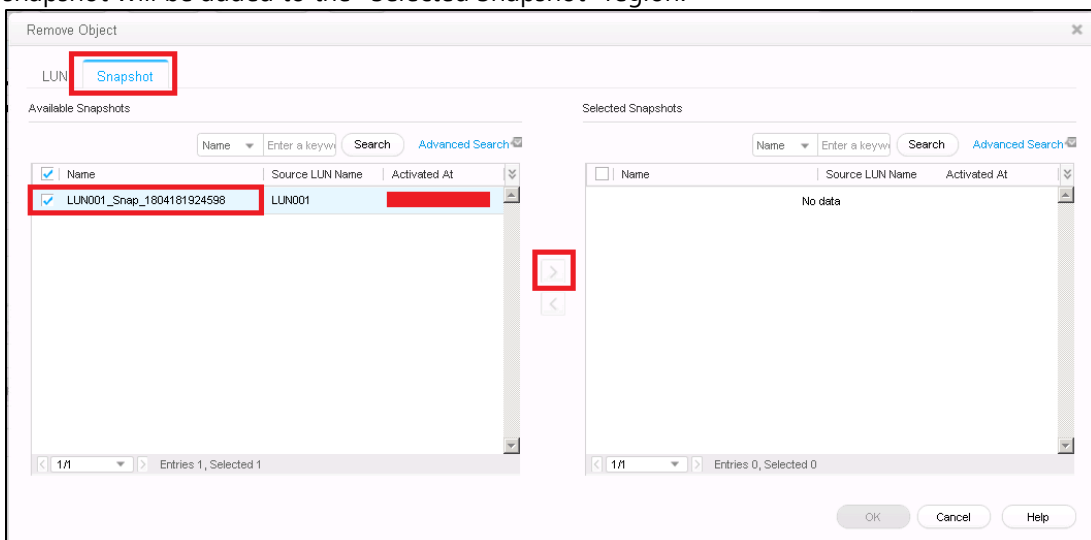
Once the deleted files are recovered, you may cancel the snapshot LUN mapping by opening "Disk Management", right click and choose "Offline" on the snapshot LUN.



Click on "Provisioning" on the OceanStor DeviceManager, select "LUN" > "LUN GROUP", choose the LUN group that you wish to modify and click "Remove Object".

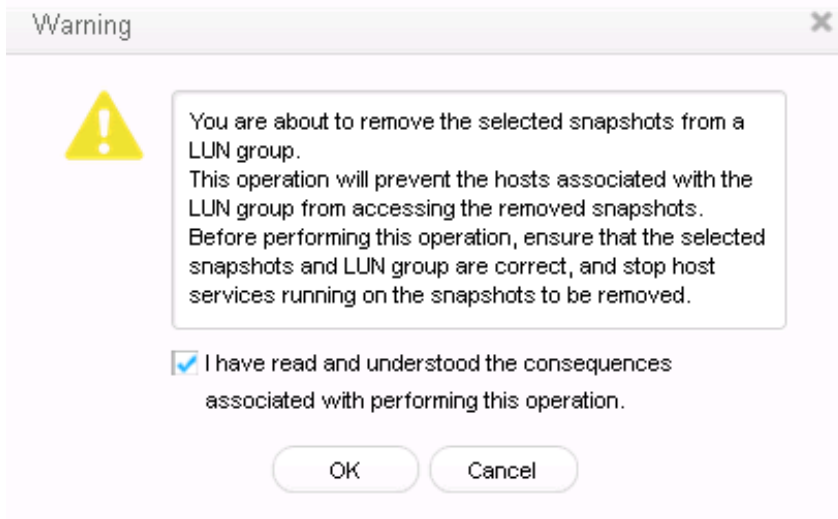


The system will show the "Remove Object" dialog box, click on the "Snapshot" tab, choose the snapshot that you wish to remove from the LUN group, click on the arrow pointing to right, the snapshot will be added to the "Selected Snapshot" region.

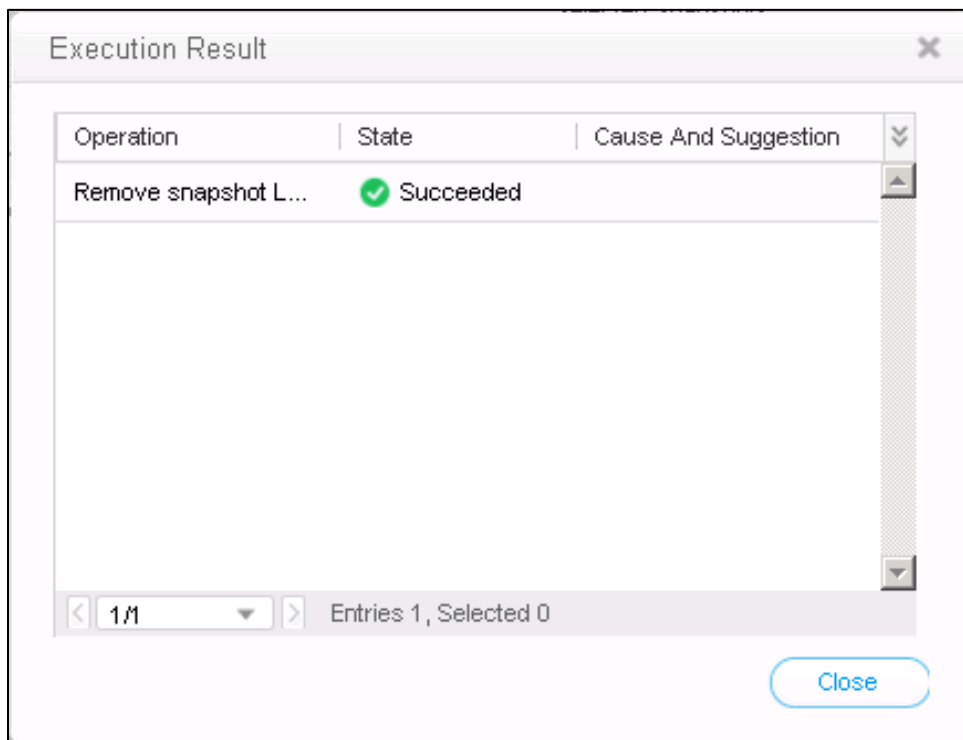


Click "OK".

The system will show the danger dialog box, read the information carefully and tick "I have read and understood the consequences associated with performing this operation".

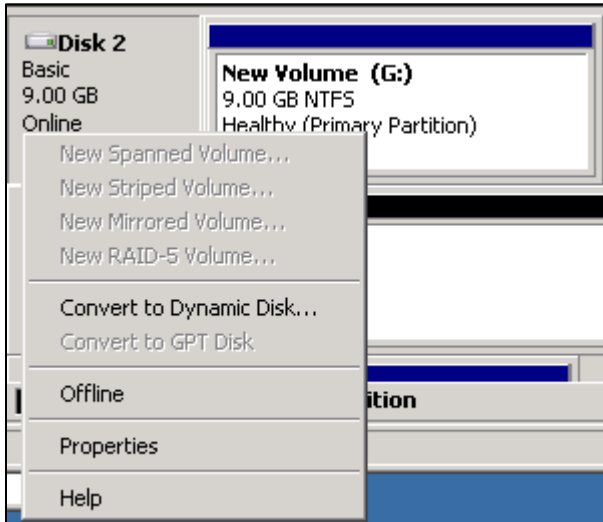


Click "OK" and the execution results dialog box will appear to indicate successful operation, click "Close" to complete the operation.

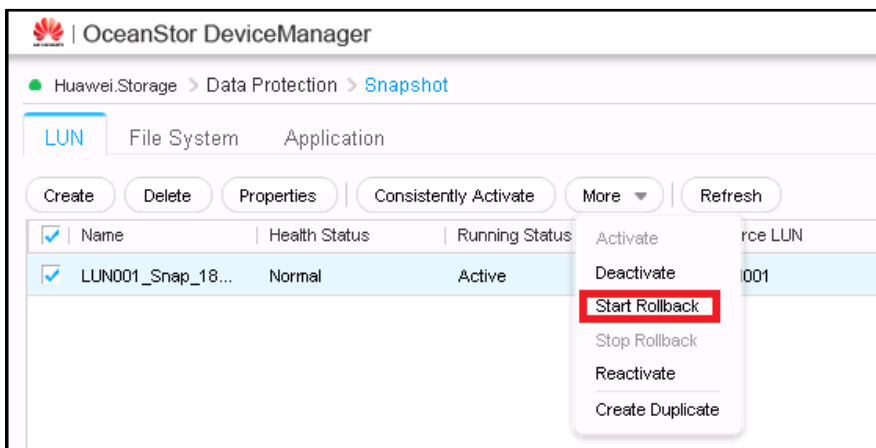


The following steps uses snapshot rollback to recover all the data, before beginning this lab task, delete all the data within the source LUN in the Windows operating system for verifying the effect of snapshot rollback.

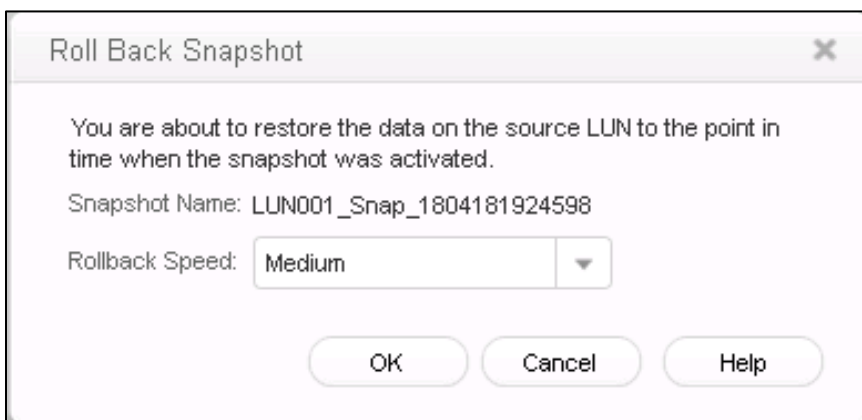
Open "Server Manager" on the Windows operating system, and switch to "Disk Management". Right click on the Volume ID of the LUN that you wish to perform rollback, and choose "Offline".



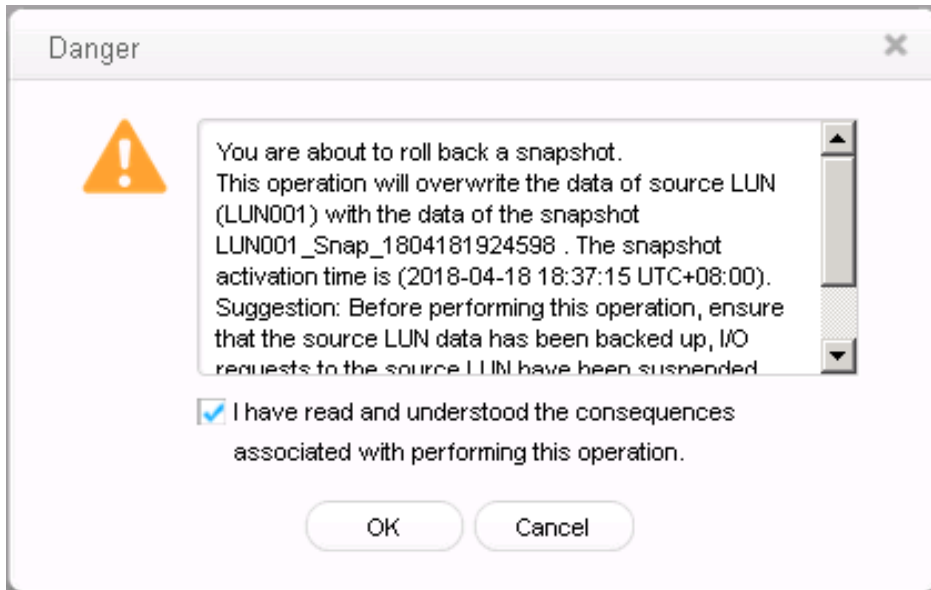
Choose "Data Protection > Snapshot" in the OceanStor DeviceManager. Choose the snapshot LUN that you wish to rollback under the "LUN" tab, click "More" button on the menu, and choose "Start Rollback".



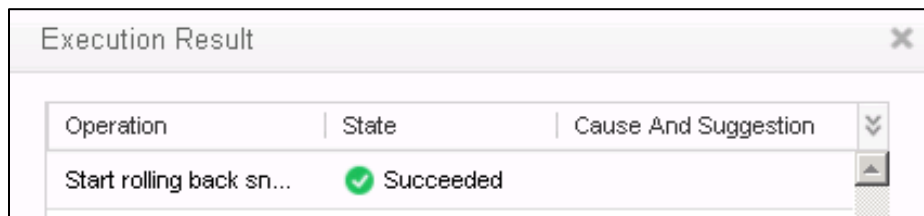
The "Roll Back Snapshot" dialog box will appear, (Note: the status of the snapshot must be Unmapped), choose the "Rollback Speed" as "Medium" and click "OK".



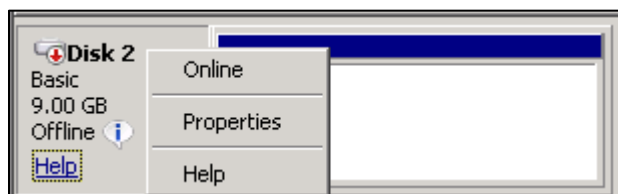
The system will show the danger dialog box, read the contents carefully and tick "I have read and understood the consequences associated with performing this operation" to confirm, and click "OK".



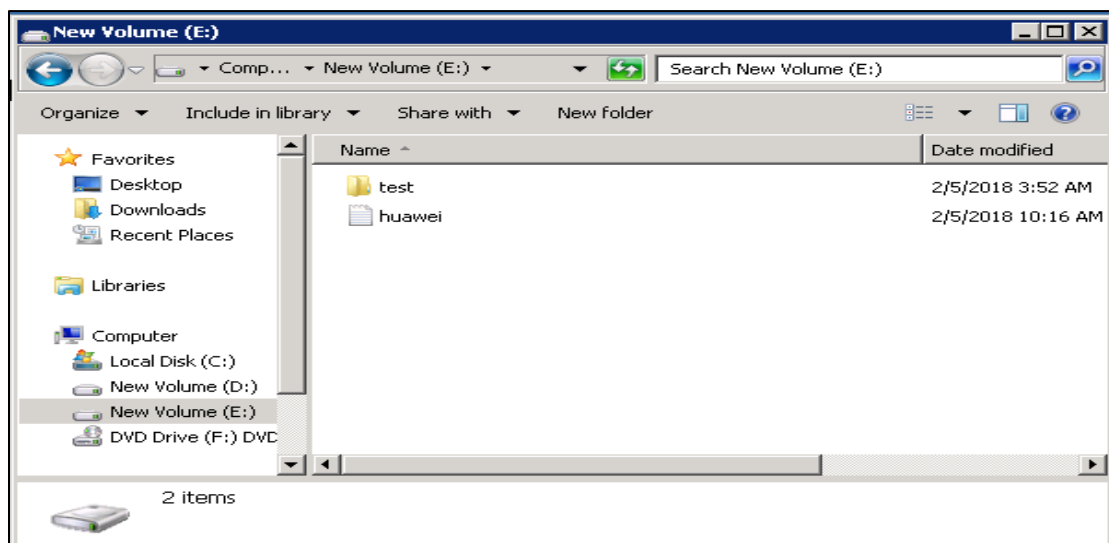
The execution results dialog box will appear to indicate successful operation.



Open "Server Manager" on the Windows operating system, and switch to "Disk Management". Right click on the Volume ID of the LUN that you performed the snapshot rollback, and choose "Online".



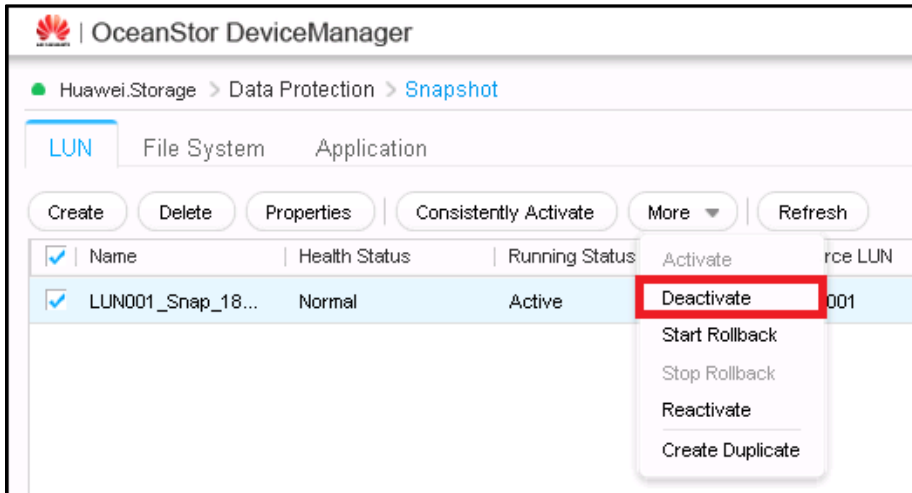
Check if the files are recovered successfully.



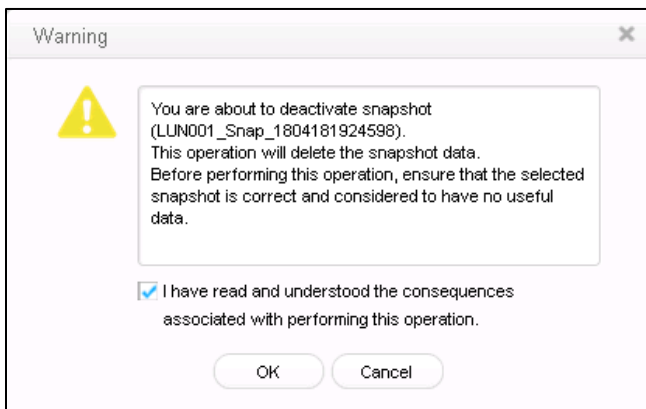
Step 3. Deactivate a Snapshot

When the storage pool of the source LUN is low in capacity, deactivating snapshot can reclaim the storage space consumed by snapshots, which means that those reclaimed storage space can be used for other snapshot tasks.

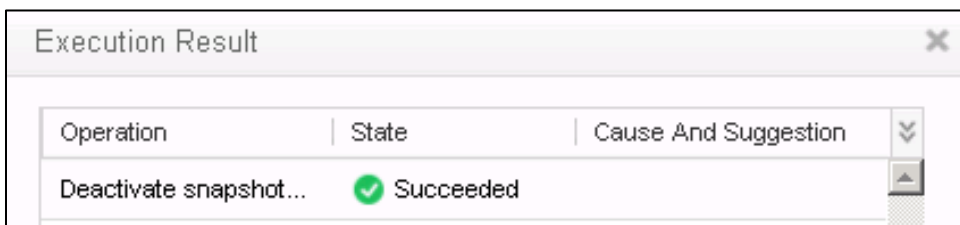
Choose "Data Protection > Snapshot > LUN" within the OceanStor DeviceManager, choose a snapshot that needs to be deleted at the information region, and click on the "More" button on the menu and choose "Deactivate".



The system will show the warning dialog box, read the contents carefully and tick "I have read and understood the consequences associated with performing this operation" to confirm, and click "OK".



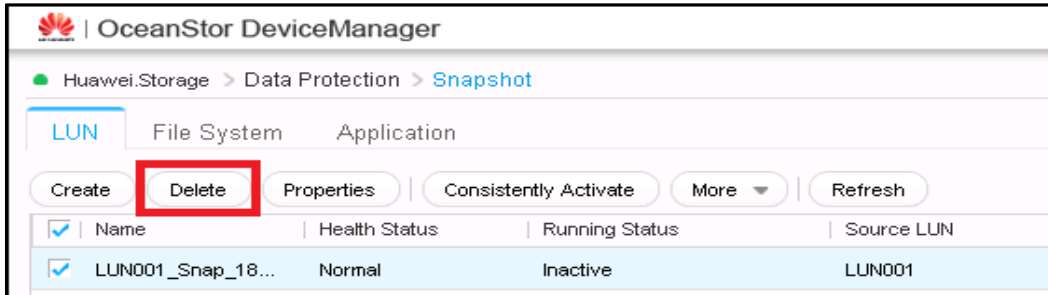
The execution results dialog box will appear to indicate successful operation.



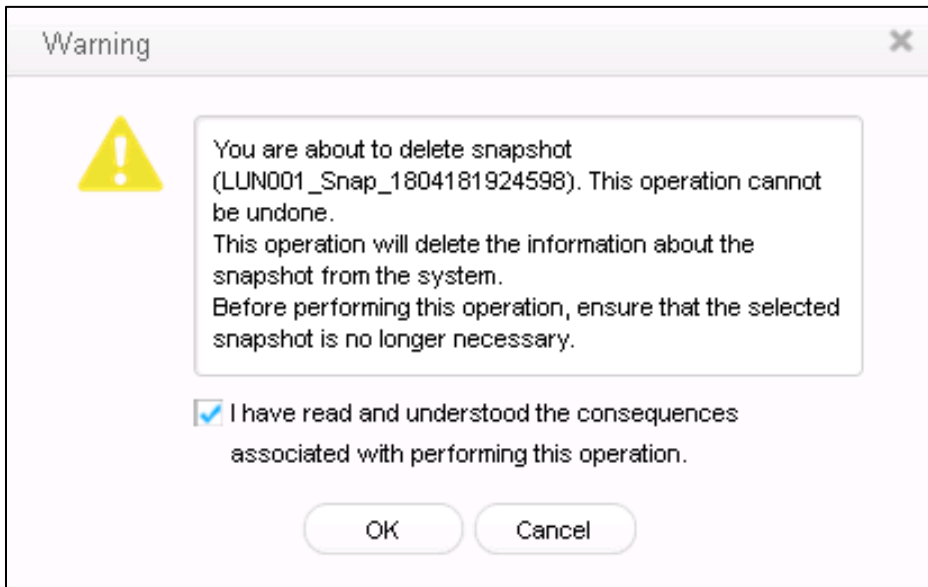
Step 4. Deleting a Snapshot

Through the following operations, the snapshot can be deleted. Once the snapshot is deleted, the storage space consumed by the snapshot will be released.

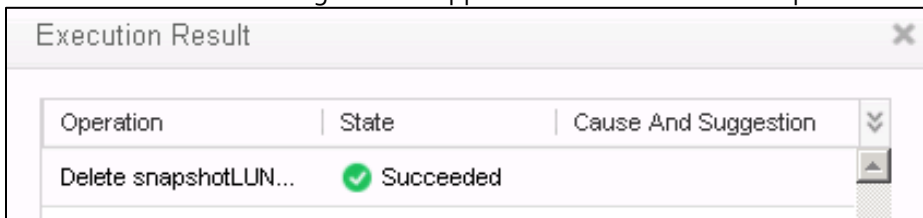
Choose "Data Protection > Snapshot > LUN" within the OceanStor DeviceManager, choose a snapshot that needs to be deleted at the information region, and click on the "Delete" button on the menu.



The system will show the warning dialog box, read the contents carefully and tick "I have read and understood the consequences associated with performing this operation" to confirm, and click "OK".



The execution results dialog box will appear to indicate successful operation.



5.3 Results Verification

Please refer to the configuration steps. The source LUN on the host was added with data before performing the snapshot, then the data within the LUN was deleted, and finally the deleted data was recovered through snapshot rollback.

5.4 Configuration Reference

Please refer to the configuration steps.

5.5 Questions

Will the snapshot rollback operation will cause service interruption on the host?

—End of Lab 5.

6 SmartTier Configuration and Usage

6.1 Lab Introduction

6.1.1 Lab Objective

Upon completion of this lab, you will be able to acquire the following skills:

- The usage characteristics of SmartTier.
- Creating SmartTier service monitoring.
- Monitoring the data migration.

This lab will use OceanStor 5300 V3 as the example.

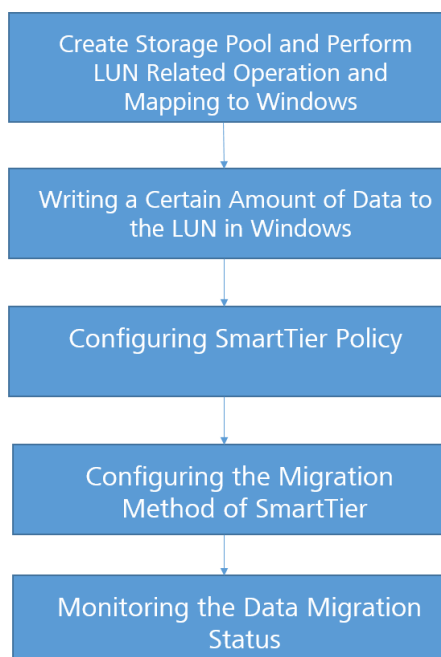
6.1.2 Networking and Service Description

The networking is the same as the IP-SAN or FC-SAN network in the 3rd Lab.

Write a certain amount of data to the LUN mapped to the Windows host, and configure the SmartTier policy, then set the migration method to migrate to lower performance tier, and monitor the data migration status after the migration is complete.

6.2 Lab Configuration Tasks

6.2.1 Configuration Roadmap



6.2.2 Configuration Steps

Step 1. Create Storage Pool and Perform LUN Related Operation and Mapping to Windows

At the navigation bar on the right, click on "Provisioning" button.

At the "Storage Configuration and Optimization" region, click on "Storage Pool".

Click "Create".

When configuring the storage medium, choose at least 2 different types of disk drives.

Select the RAID policy and key in the capacity for the storage pool.

Note: Since the initial storage capacity is auto allocated, the LUN will prioritize the usage of storage capacity in the Performance Tier. To allow the created LUN's capacity to span across all three types of disks, create a Storage Pool with 2G capacity for each storage tier, with the total storage pool capacity as 6G, and create a LUN with the capacity of 2G in that storage pool.

✕
Create Storage Pool

*** Name:**

Description:

Usage: Block Storage Service File Storage Service

i Usage is unchangeable after it is configured. The storage pool can be used to create LUNs only.

Disk Domain: ▼

*** Storage Medium:** Please select a disk type and a RAID policy for the storage pool. ?

High Performance Tier (SSD)

RAID Policy: ▼ ▼

Available Capacity: 50183.000 GB

*** Capacity:** ▼

Performance Tier (SAS)

RAID Policy: ▼ ▼

Available Capacity: 64551.000 GB

*** Capacity:** ▼

Capacity Tier (NL-SAS)

RAID Policy: ▼ ▼

Available Capacity: 60959.000 GB

*** Capacity:** ▼

Total Storage Pool Capacity: 6.000 GB

Create LUN

* Name:

Description:

SmartThin: Enable
After the SmartThin function is enabled, the storage system creates thin LUNs and dynamically allocates storage resources instead of directly allocating the preset capacity to the LUN, achieving on-demand allocation.

* Capacity:
 Use all the available capacity of the owning storage pool

* Quantity:
A maximum of 500 LUNs can be created at a time. When you create multiple LUNs, the system automatically appends a suffix number to each LUN name for LUN distinction. You can also specify the suffix by yourself.

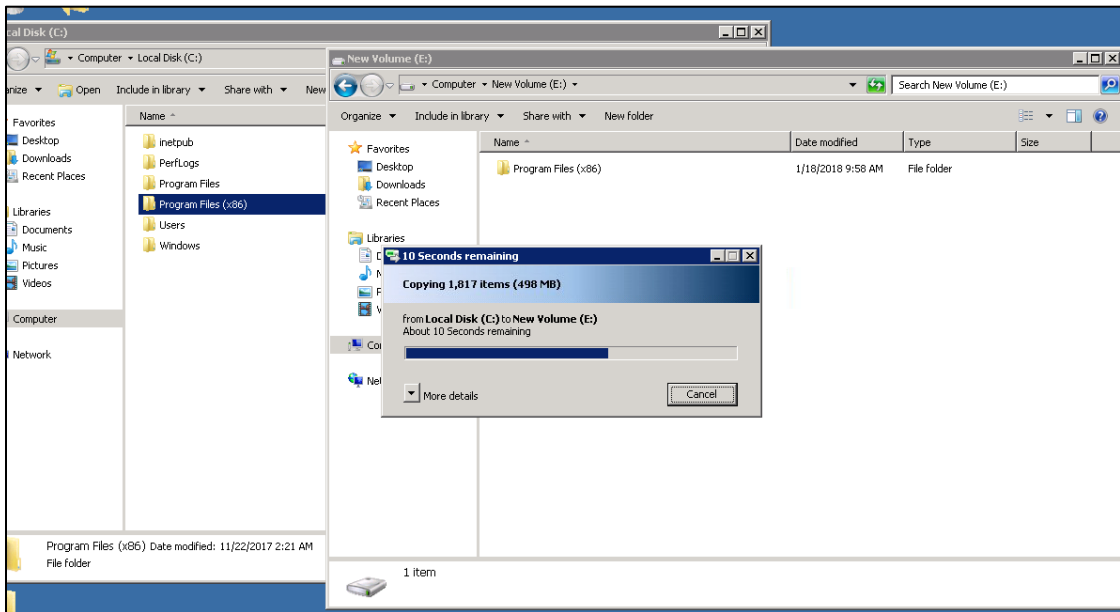
Owning Storage Pool:
Available Capacity 3.812 GB

[All options](#)

Complete the mapping of the LUN to the Windows host based on the configuration steps shown in the IP SAN configuration in the previous labs.

Step 2. Writing a Certain Amount of Data to the LUN in Windows

Write a certain amount of data to the LUN mapped to the Windows host, for convenience purposes, you may just copy some data from the C: Drive to the target LUN.

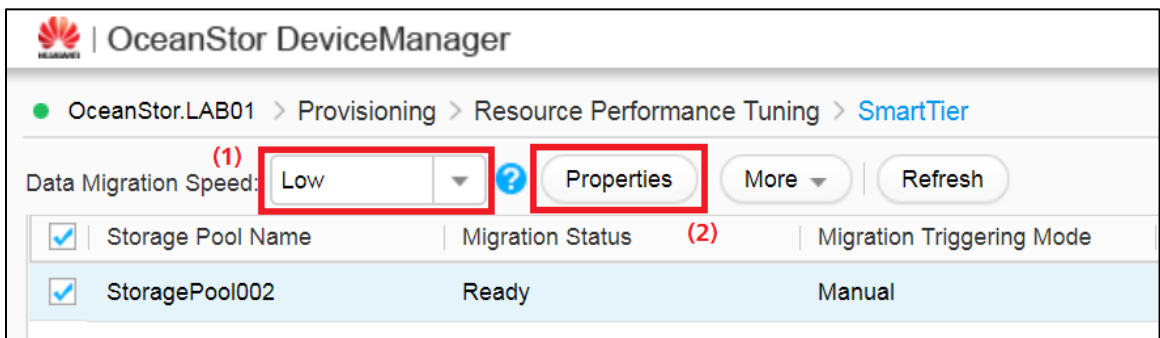


Step 3. Configuring SmartTier Policy

Choose "Provisioning > Resource Performance Tuning > SmartTier" in the OceanStor DeviceManager. Select the storage pool that you wish to configure, set the "Data Migration Speed" as "Low", and then click on "Properties".

Configure the settings in the "SmartTier Policy" tab as the picture below:

Set the "Data Migration Plan" to "Manual".



✕
Properties of Storage Pool: StoragePool001

General
SmartTier Policy
SmartTier Status
Forecast Analysis
Advanced

Cache Mode

i The cache mode is unavailable currently. [Before enabling the cache mode, ensure that the following conditions are met>>](#)

Enable

Service Monitoring Period

This feature monitors hotspot data within the set period. The results can serve as reference for migration between storage tiers.

Enable I/O monitoring

Mon
 Tues
 Wed
 Thurs
 Fri
 Sat
 Sun

Start Time:

Duration: Hours minutes

End Time: 19:00

Data Migration Plan

Manual
Selecting this option disables automatic data migration. You can manually start data migration on the SmartTier page at any time.

Periodical
Data is automatically migrated in a specified period. Set the period to off-peak hours.

Mon
 Tues
 Wed
 Thurs
 Fri
 Sat
 Sun

Start Time:

Duration: Hours minutes

End Time: 05:00

OK
Apply
Cancel
Help

Click "OK" and the execution dialog box will appear to indicate successful operation.

✕
Execution Result

Operation	State	Cause And Suggestion
Create I/O monitorin...	✔ Succeeded	

Step 4. Configuring the Migration Method of SmartTier

Choose "Provisioning > LUN" in the OceanStor DeviceManager, select the LUN that you wish to configure, click on "Properties", and choose the "SmartTier" tab. Select "Relocation to low-performance tier" or "Relocation to high-performance tier" in the "SmartTier Policy" region. At the same time, you can see that the current capacity distribution for the data on the LUN is 97% on the Performance Tier and 3% on the Capacity Tier. Click "OK" for the configuration to take effect.

The screenshot shows the OceanStor DeviceManager interface. The breadcrumb is "OceanStor.LAB01 > Provisioning > LUN". The "LUN" tab is active, and the "LUN Group" is selected. The "Properties" button is highlighted. The table below shows the LUN details:

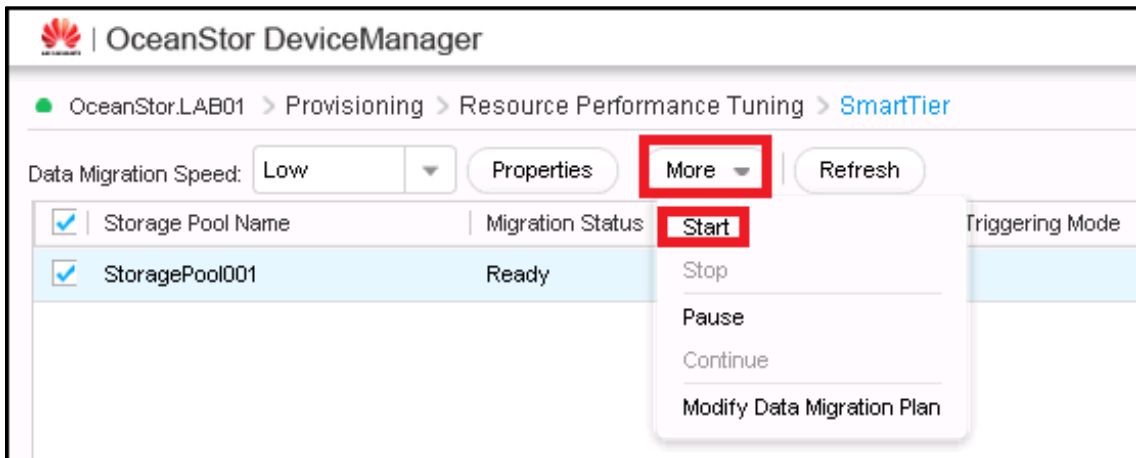
Name	Health Status	Running Status
LUN_Tier	Normal	Online

The "Properties of LUN: LUN_Tier" dialog is open, with the "SmartTier" tab selected. Under "SmartTier Policy", the "Relocation to low-performance tier" option is selected. The "Capacity Distribution" table is shown below:

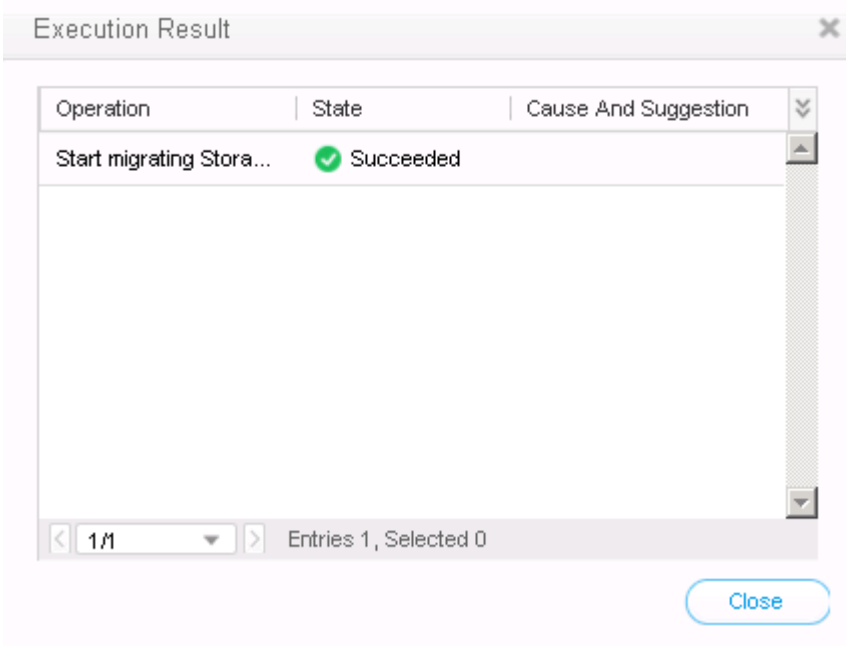
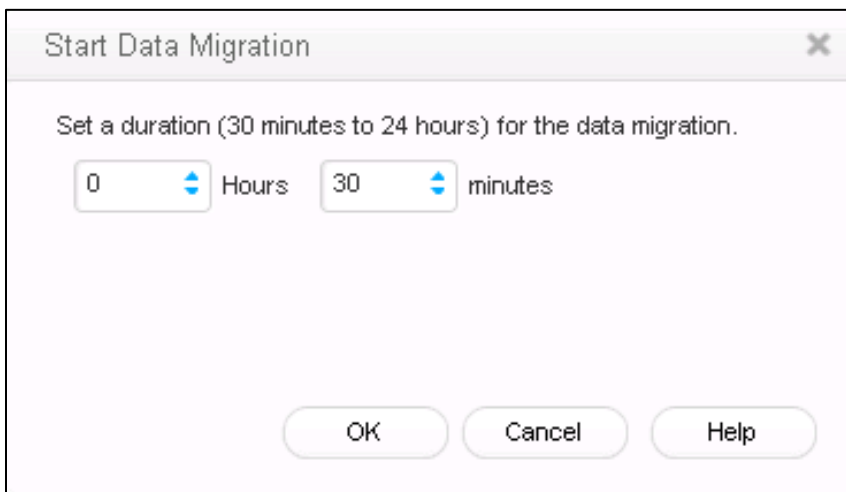
Storage Tier	Percentage
High-Performance tier	0%
Performance tier	97%
Capacity tier	3%

At the bottom of the dialog, there are buttons for "OK", "Apply", "Cancel", and "Help".

Go back to the SmartTier configuration and usage interface and click “More” button on the menu and select “Start” to initiate data the migration process.



Leave the settings at its default value and click “OK”. The execution results will appear.



Step 5. Monitoring the Data Migration Status

You may configure the data migration to relocate the data towards higher performance tier or lower performance tier, the manual trigger the data migration as shown in the previous steps. To monitor the status of the data migration, click on the "Properties" button and choose the "SmartTier Status" tab in the main interface for SmartTier in OceanStor DeviceManager as shown in the picture below:

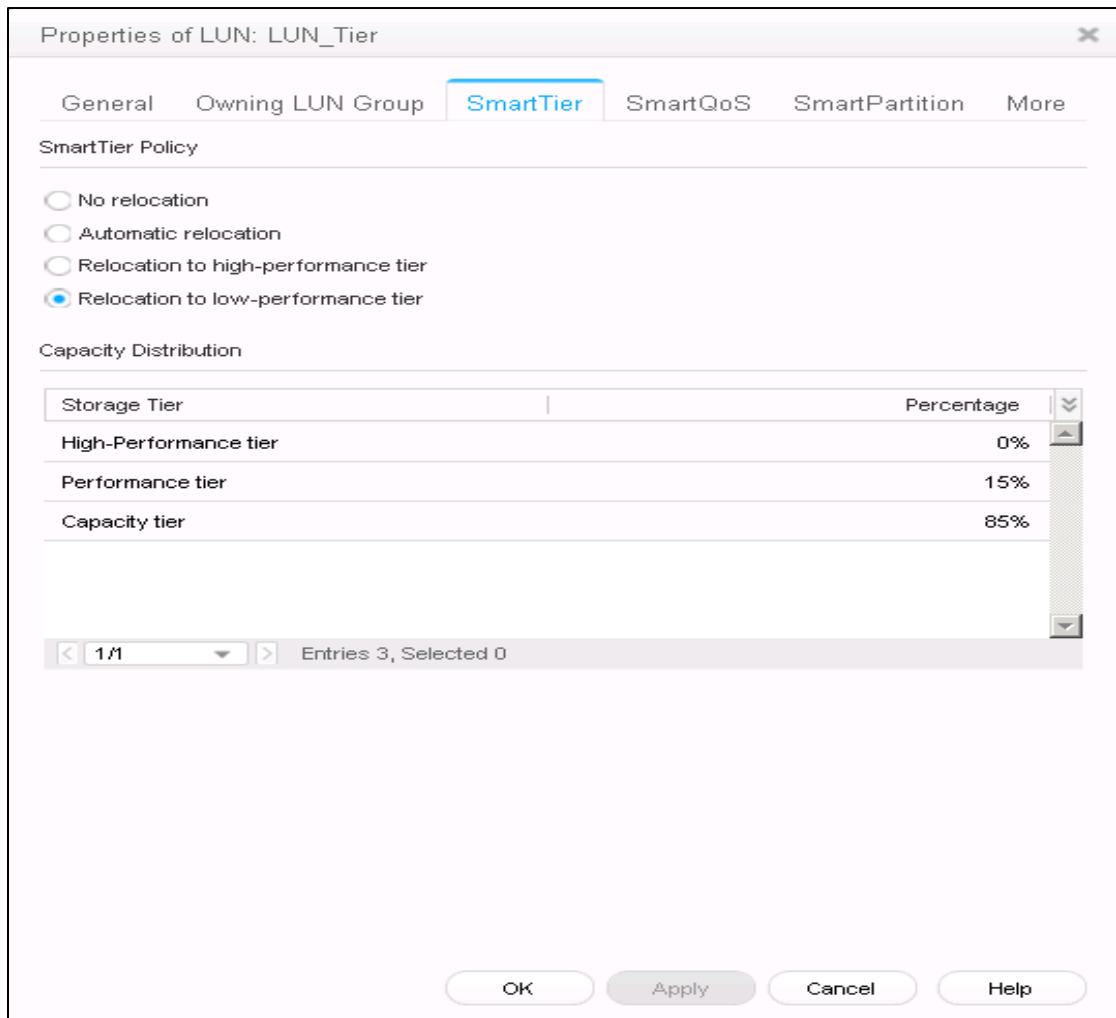
The screenshot displays the OceanStor DeviceManager interface. At the top, the breadcrumb navigation shows: OceanStor.LAB01 > Provisioning > Resource Performance Tuning > SmartTier. Below this, the 'Data Migration Speed' is set to 'Low'. A 'Properties' button is highlighted with a red box. To its right are 'More' and 'Refresh' buttons. Below these buttons is a table with columns: Storage Pool Name, Migration Status, and Migration Triggering Mode. The first row, 'StoragePool001', is highlighted with a red box and shows a status of 'Relocating' and a 'Manual' triggering mode. Below the table is a dialog box titled 'Properties of Storage Pool: StoragePool001'. It has tabs for 'General', 'SmartTier Policy', 'SmartTier Status' (which is selected), 'Forecast Analysis', and 'Advanced'. Under the 'SmartTier Status' tab, the 'Status' section shows: Feature Status: Active, Migration Status: Relocating, To Be Moved Up: 0.000 MB, To Be Moved Down: 768.000 MB, and Estimated Duration: 1 minutes. Below this is the 'Storage Tier Information' section, which contains a table with the following data:

Storage Tier	Capacity Allocat...	Free Capa...	To Be Moved Up	To Be M...
Performance ...	1000.000 MB	1.023 GB	0.000 MB	768.000 MB
Capacity Tier ...	1.250 GB	768.000 MB	0.000 MB	0.000 MB

At the bottom of the dialog box are buttons for 'OK', 'Apply', 'Cancel', and 'Help'.

6.3 Results Verification

After the manual migration is complete, check on the properties of the LUN, you will notice that the Performance Tier takes up 15% while Capacity Tier takes up 85% of the capacity distribution. (Example shown here is after relocating to low-performance tier, results will vary if you choose to migrate to higher-performance tier).



6.4 Configuration Reference

Please refer to the configuration steps.

6.5 Questions

Please describe the migration results corresponding to configuring different types of migration methods in SmartTier.

—End of Lab 6.

7 SmartPartition Configuration and Usage

7.1 Lab Introduction

7.1.1 Lab Objective

This lab helps you to understand the configuration and usage of SmartPartition. This lab involves creating SmartPartition, modifying its properties, adding LUN and at the end of this lab, we will delete the created SmartPartition.

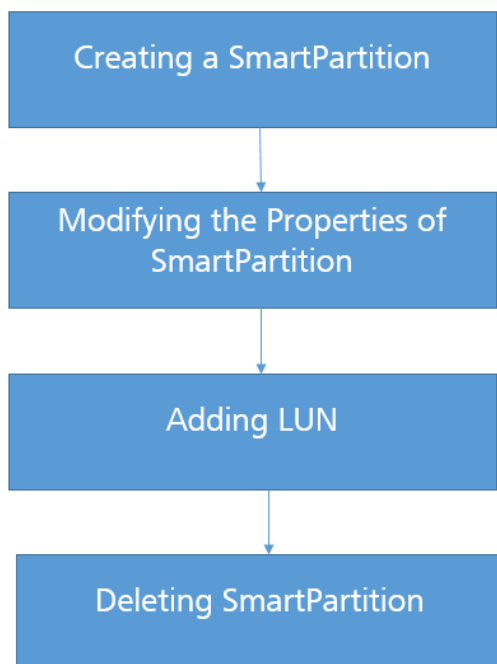
7.1.2 Networking and Service Description

The networking is the same as the IP-SAN or FC-SAN network in the 3rd Lab.

Increase a certain service's cache resource usage by configuring SmartPartition and its usage policies in the cache of a certain LUN.

7.2 Lab Configuration Tasks

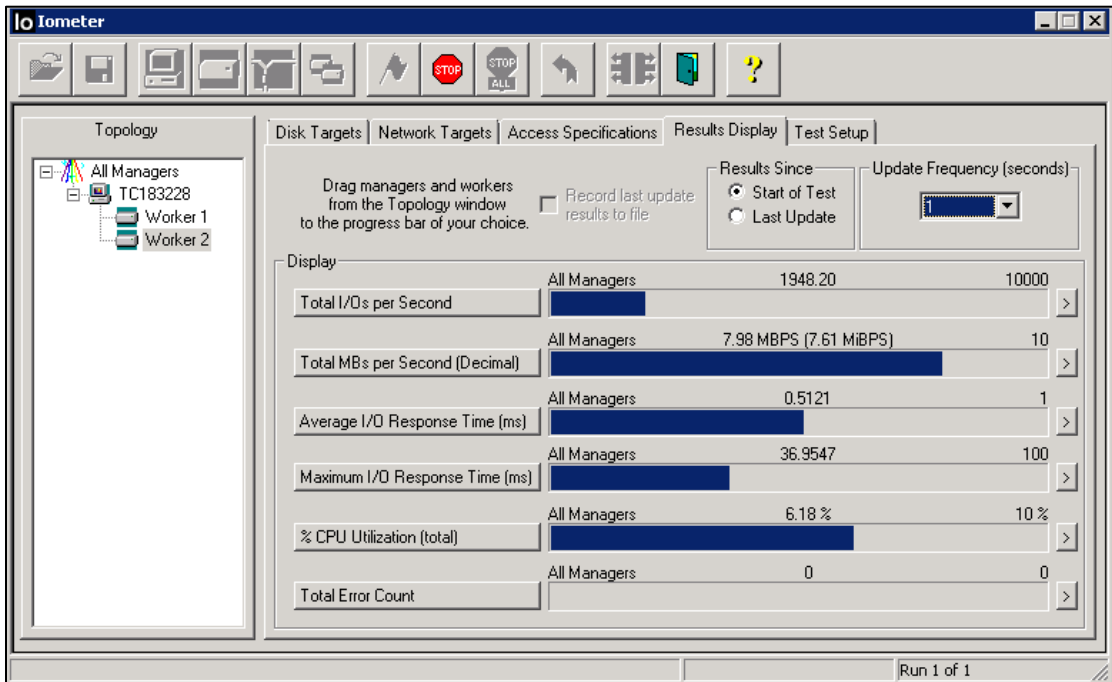
7.2.1 Configuration Roadmap



7.2.2 Configuration Steps

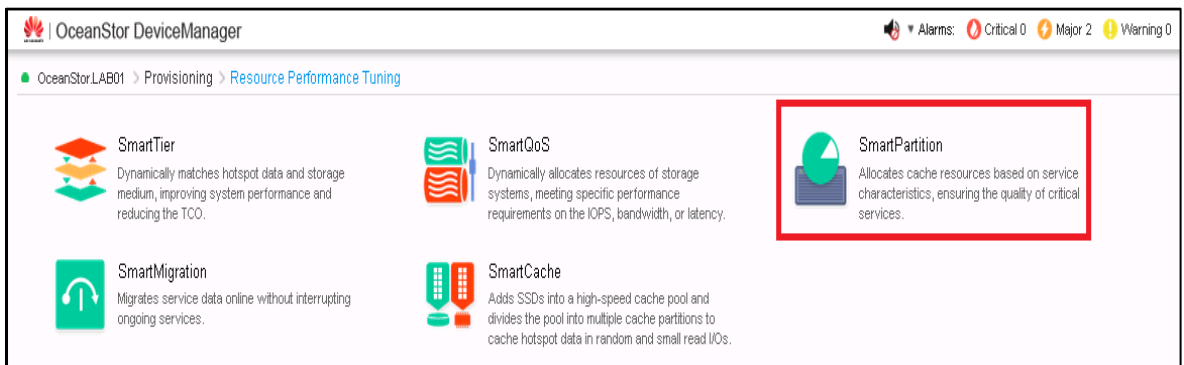
Step 1. Creating a SmartPartition

Before configuring SmartPartition, use the IOMeter tool to create a 4KB (0% Read Operation; 0% Random Test). The test allows us to obtain the performance statistics after running for 1 minute on the LUN. Example results are shown in the picture below:

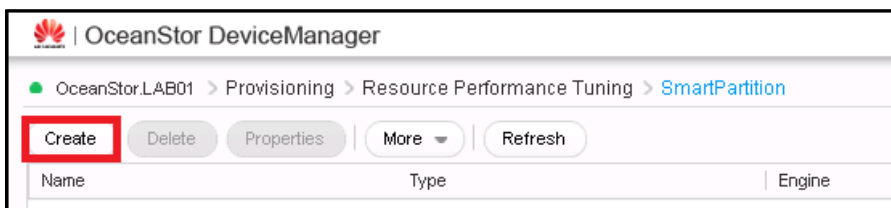


We can see that the total I/O per second is 1948.20.

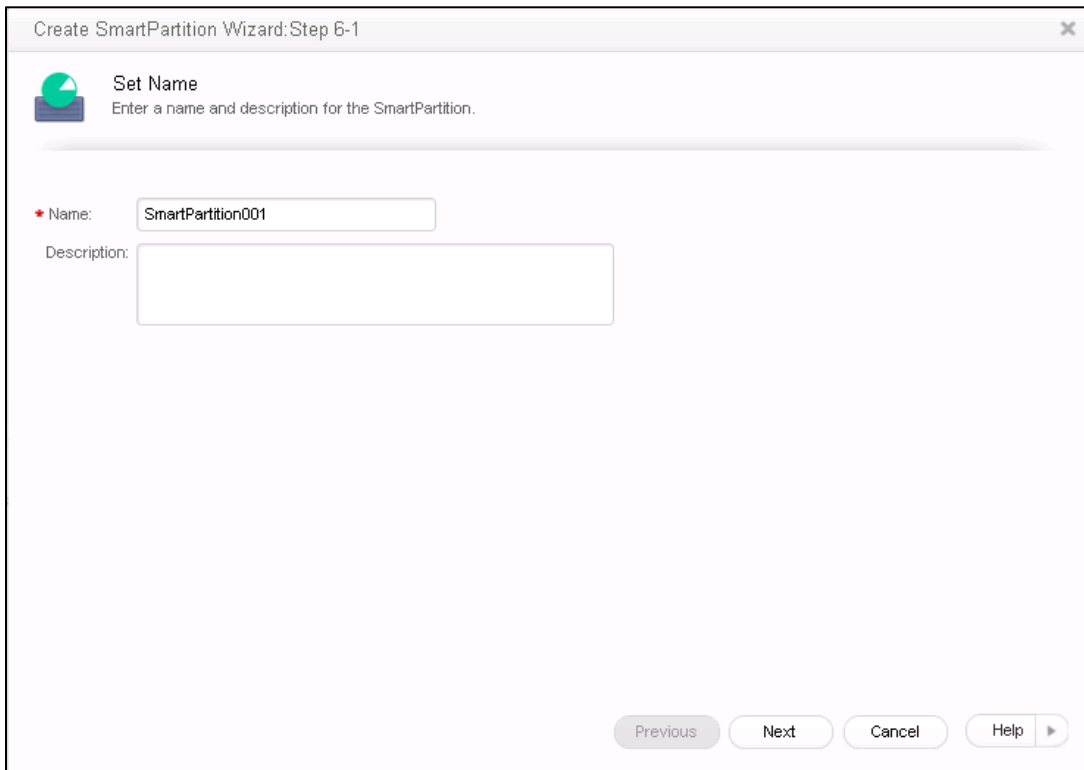
Choose "Provisioning > Resource Performance Tuning > SmartPartition" in the OceanStor DeviceManager.



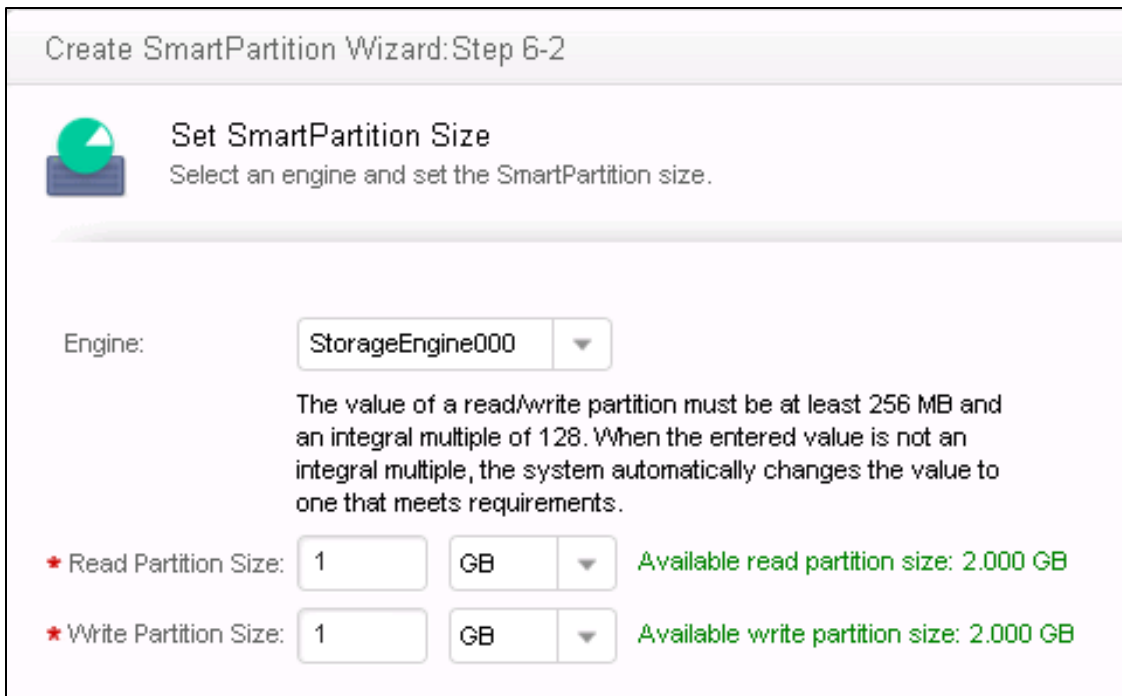
The system will enter the SmartPartition interface, click "Create".



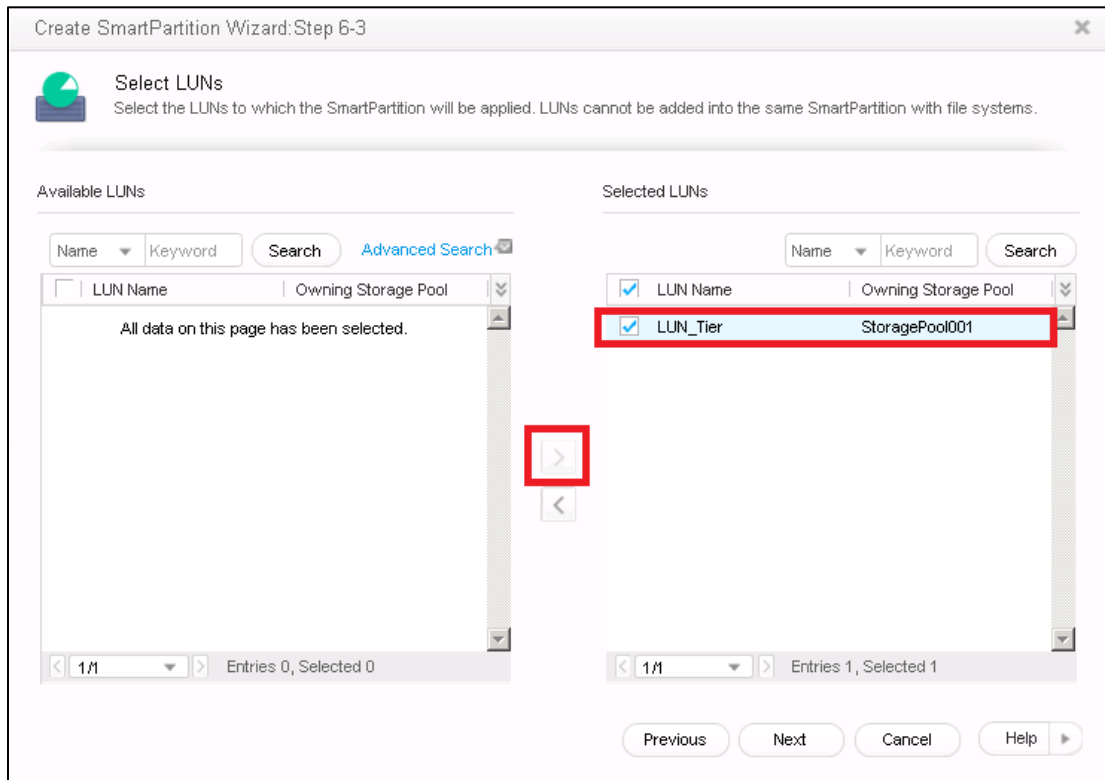
The “Create Smart Partition Wizard” will appear, and key in the name and description for the SmartPartition, and then click “Next”.



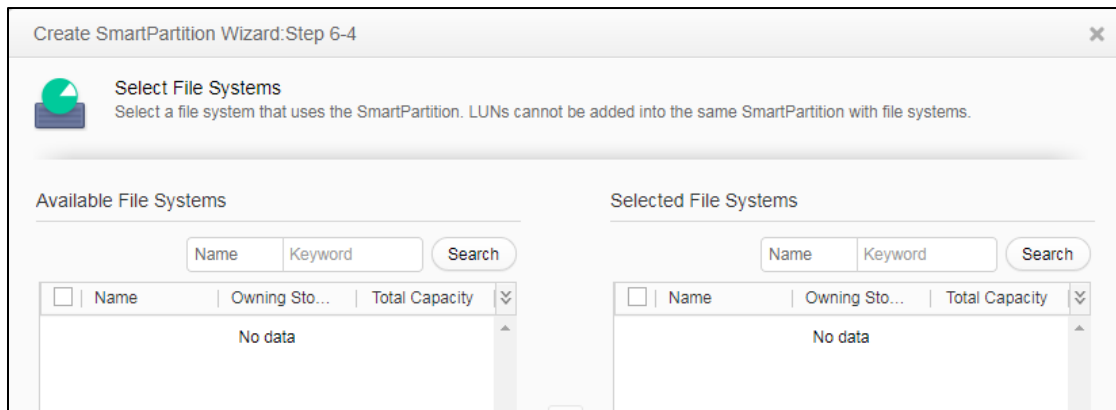
In the “Set SmartPartition Size” interface, set the “Engine” for the newly created SmartPartition, set 1GB for the “Read Partition Size” and “Write Partition Size” respectively, and then click “Next”.



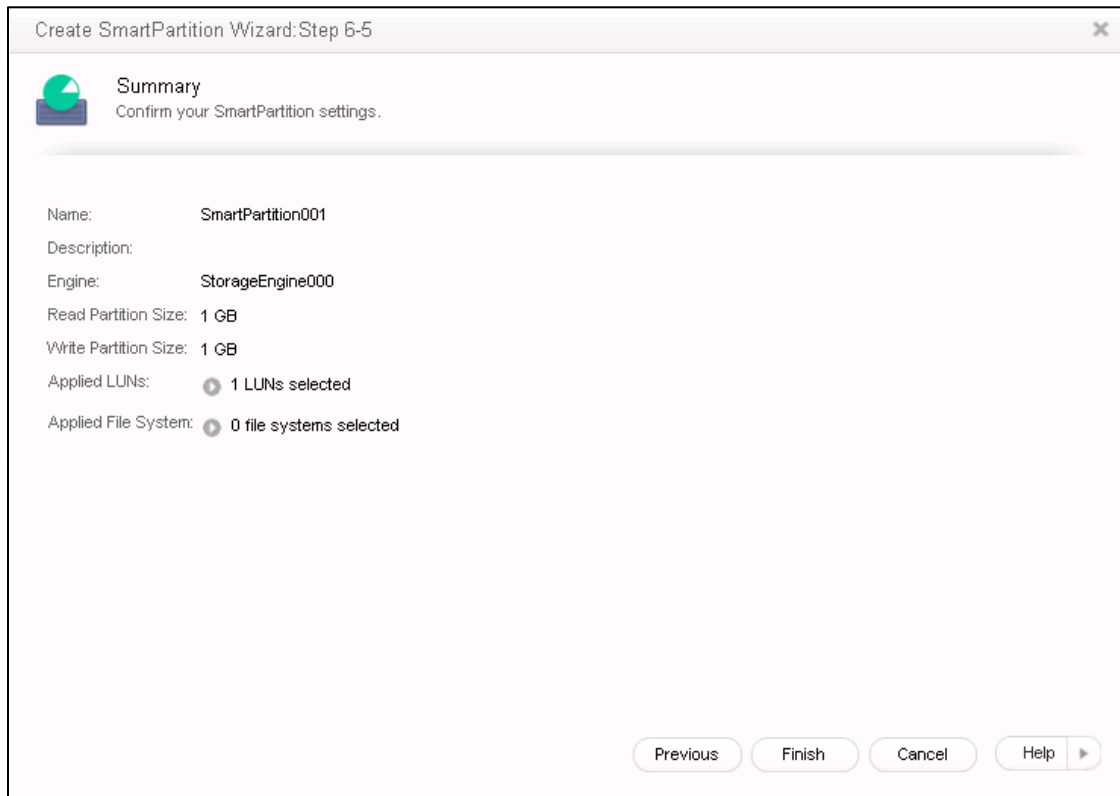
In the “Select LUNs” interface, choose the LUN which you would like to apply SmartPartition, click on the arrow pointing to the right to move the LUN to the “Selected LUNs” region, and then click “Next”.



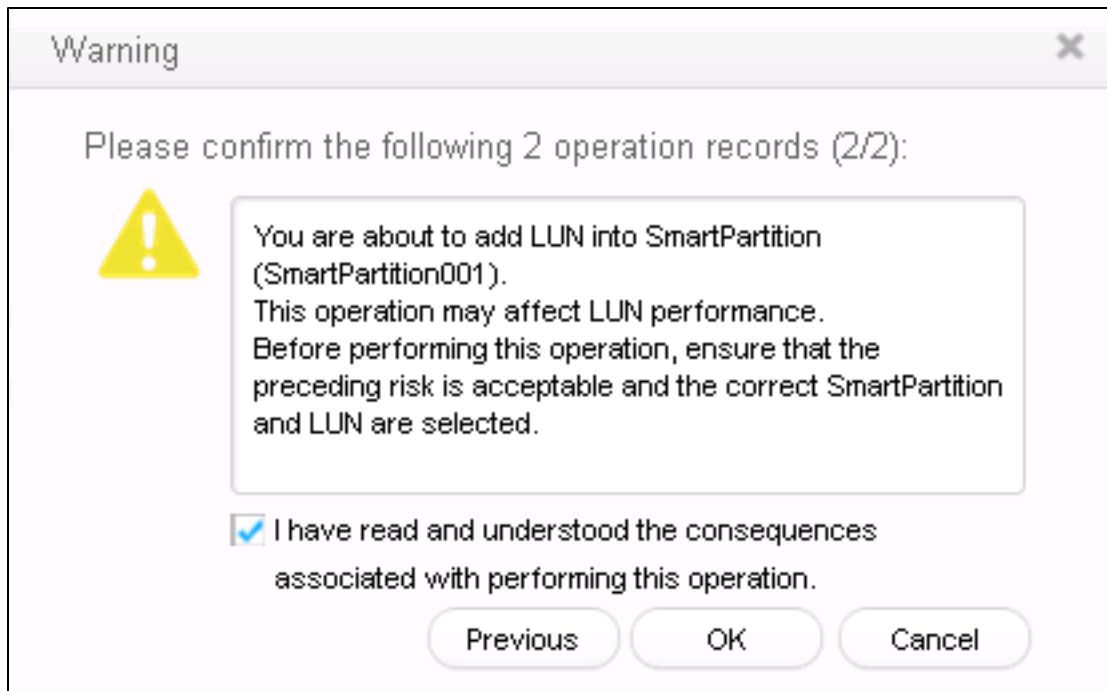
In the “Select File Systems” interface, you may choose the corresponding file system which you want to apply SmartPartition, and then add the file system accordingly. However, this lab does not involve file systems so you can just click “Next” without selecting a file system.



The summary page will be shown, and if all the information for the new SmartPartition is correct, click "Finish".

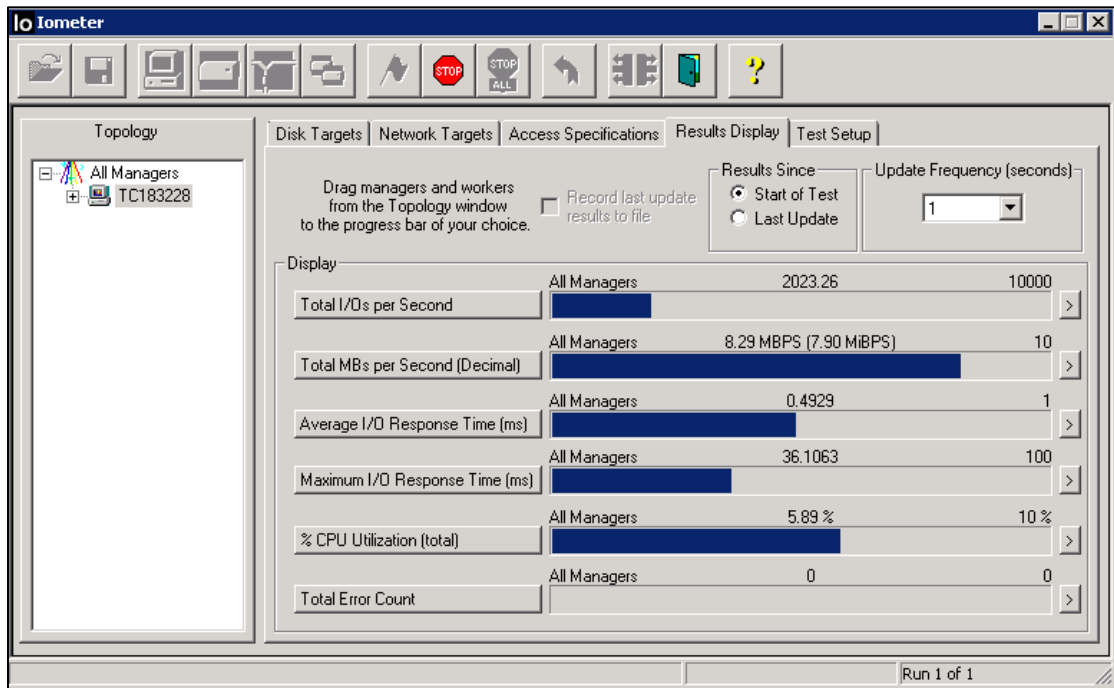


The warning dialog box will appear, please carefully read through the content, and tick "I have read and understood the consequences associated with performing this operation" to confirm and click "OK" to proceed.



The execution results dialog box will pop up to indicate successful operation.

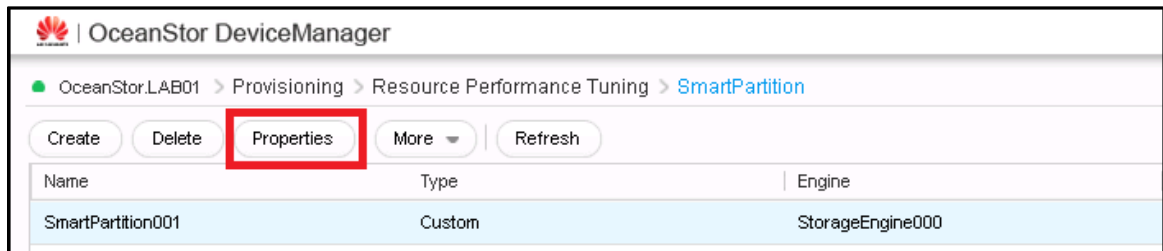
Use the IOMeter tool again with the same test mode to test the LUN, you will be able to see that the total I/O per second has increased to 2023.6 as shown in the example result below. Note that the total I/O per second performance might vary during your test during the lab.



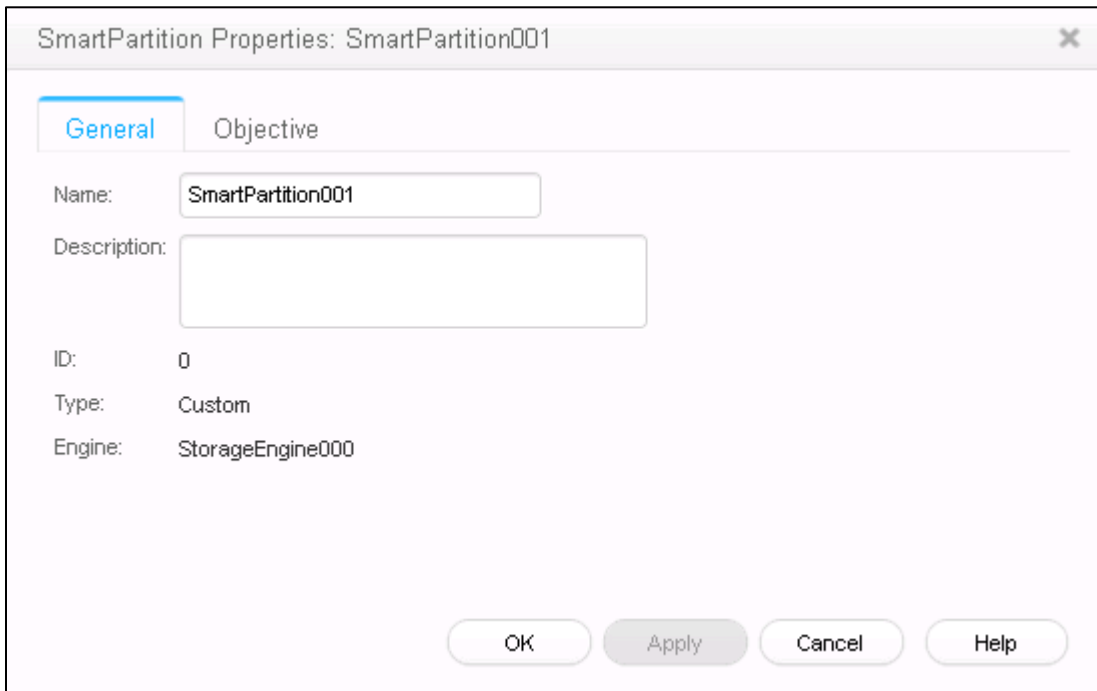
Step 2. Modifying the Properties of SmartPartition

To modify the properties of SmartPartition:

Choose "Provisioning > Resource Performance Tuning > SmartPartition" in OceanStor DeviceManager. Select the SmartPartition that you wish to modify and click "Properties".



Click on the “General” tab, and change the “Name” or “Description” based on requirements. We will not be making modification to name and description in this lab.



SmartPartition Properties: SmartPartition001

General Objective

Name: SmartPartition001

Description:

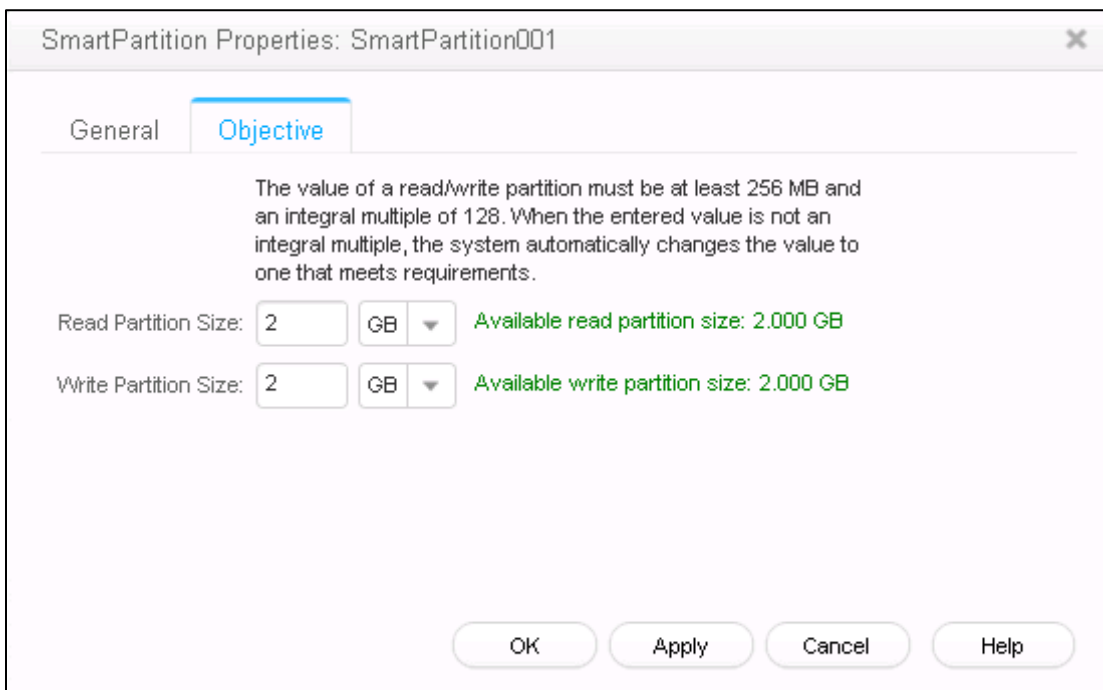
ID: 0

Type: Custom

Engine: StorageEngine000

OK Apply Cancel Help

Click on the “Objective” tab, based on service requirements, set the “Read Partition Size” and “Write Partition Size”. Modify the values here as 2GB for “Read Partition Size” and “Write Partition Size”, and click “OK”.



SmartPartition Properties: SmartPartition001

General Objective

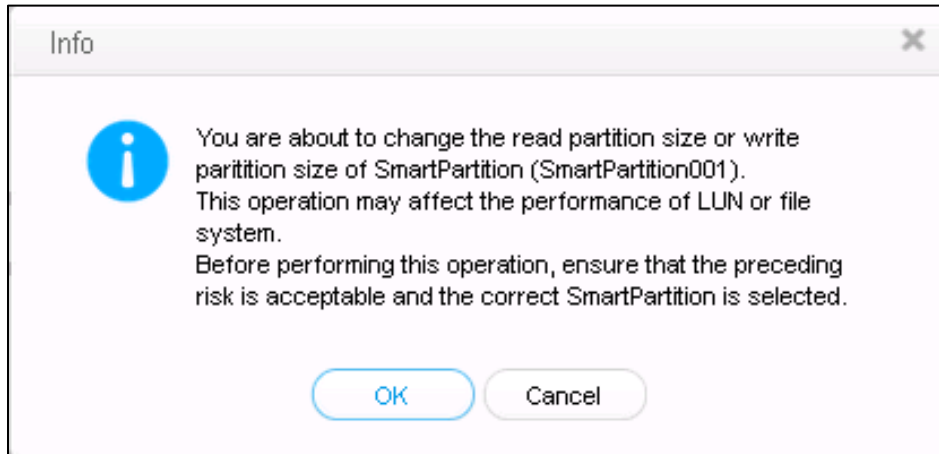
The value of a read/write partition must be at least 256 MB and an integral multiple of 128. When the entered value is not an integral multiple, the system automatically changes the value to one that meets requirements.

Read Partition Size: 2 GB Available read partition size: 2.000 GB

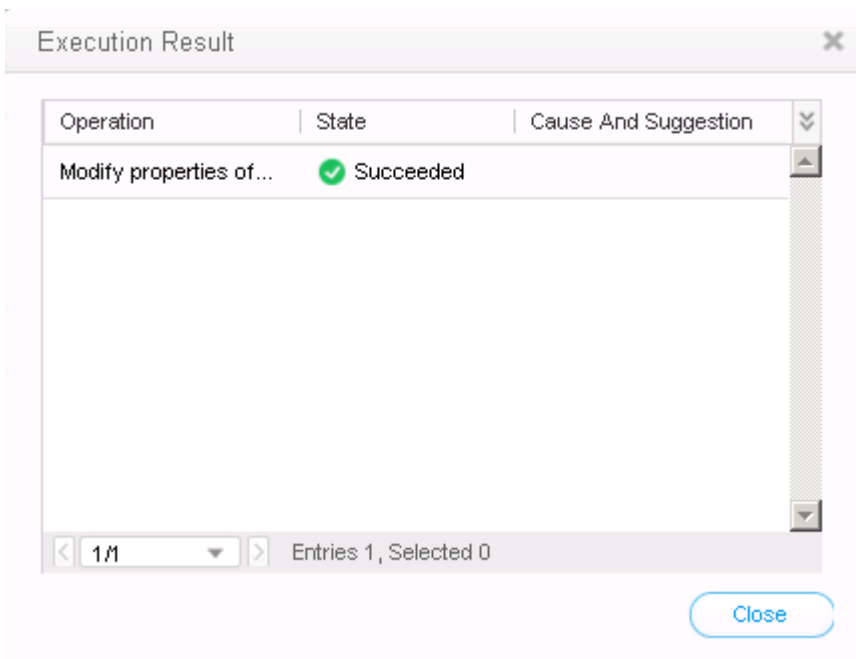
Write Partition Size: 2 GB Available write partition size: 2.000 GB

OK Apply Cancel Help

Click “OK” on the info dialog box that appears.

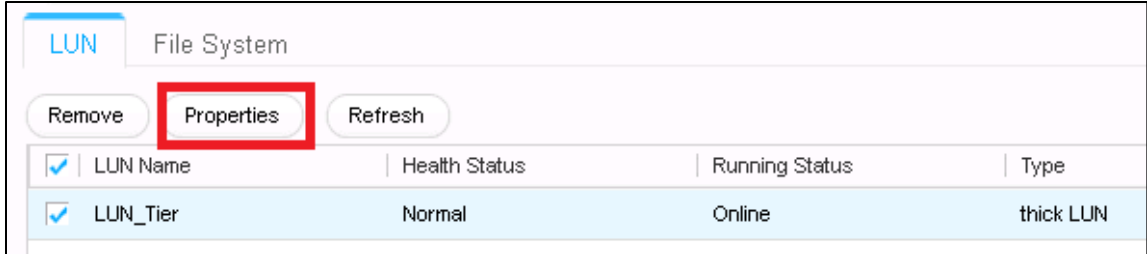


The execution results dialog box will appear to indicate successful operation.

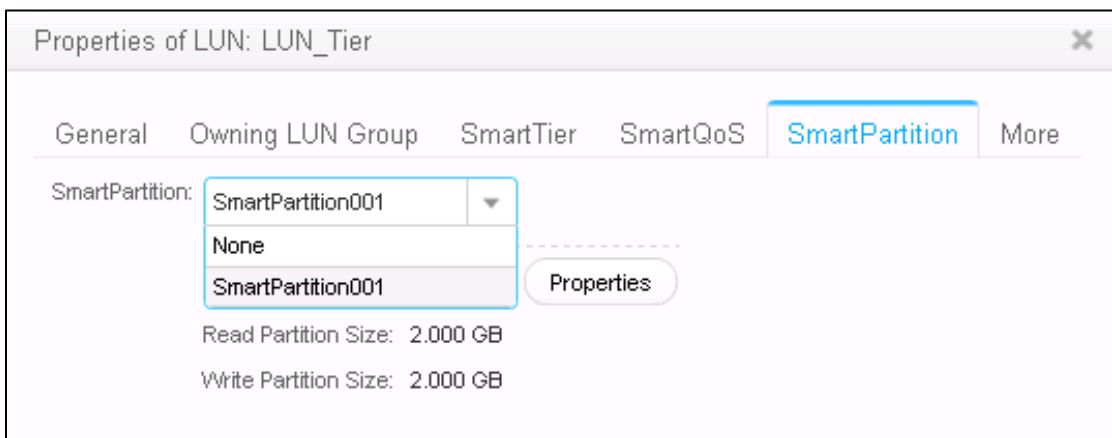


Modifying the Properties of SmartPartition LUN:

Choose "Provisioning > Resource Performance Tuning > SmartPartition" in OceanStor DeviceManager, and select the SmartPartition that you wish to modify, then click on the "LUN" tab below. Choose the LUN that you wanted to modify and click "Properties".

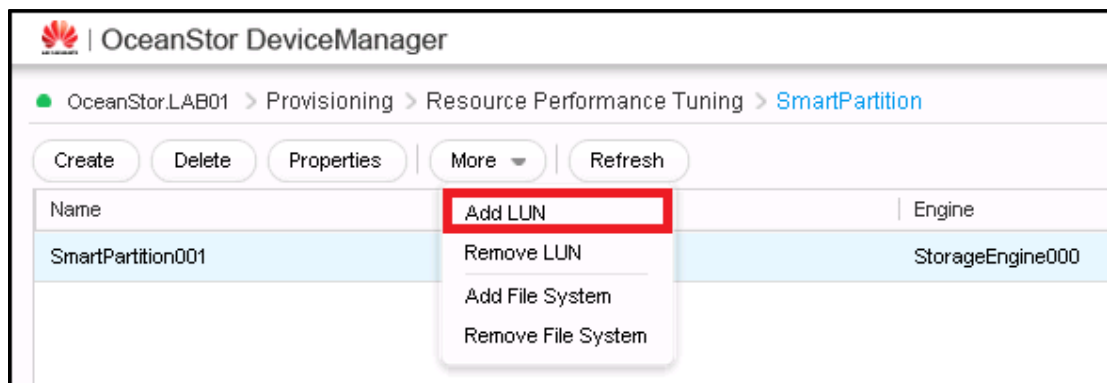


The "Properties of LUN" dialog box will appear, select the "SmartPartition" tab. Based on requirements, please select the SmartPartition that the LUN should belong to in the dropdown list at the "SmartPartition" option. In this lab, there is no changes here, so click "Cancel".

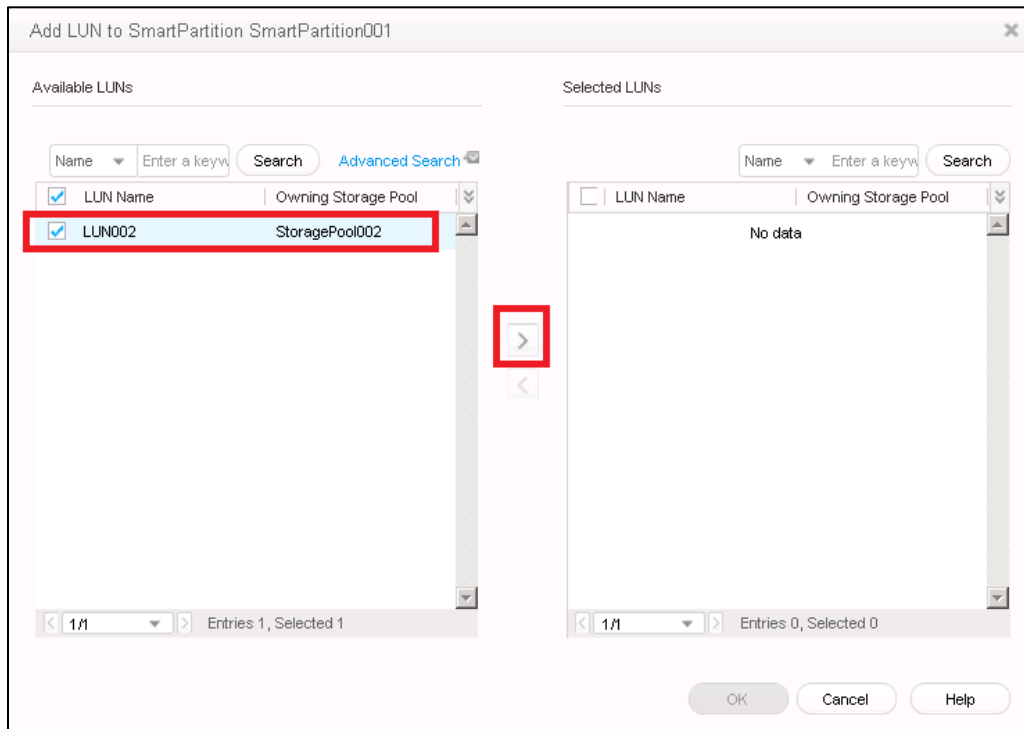


Step 3. Adding LUN

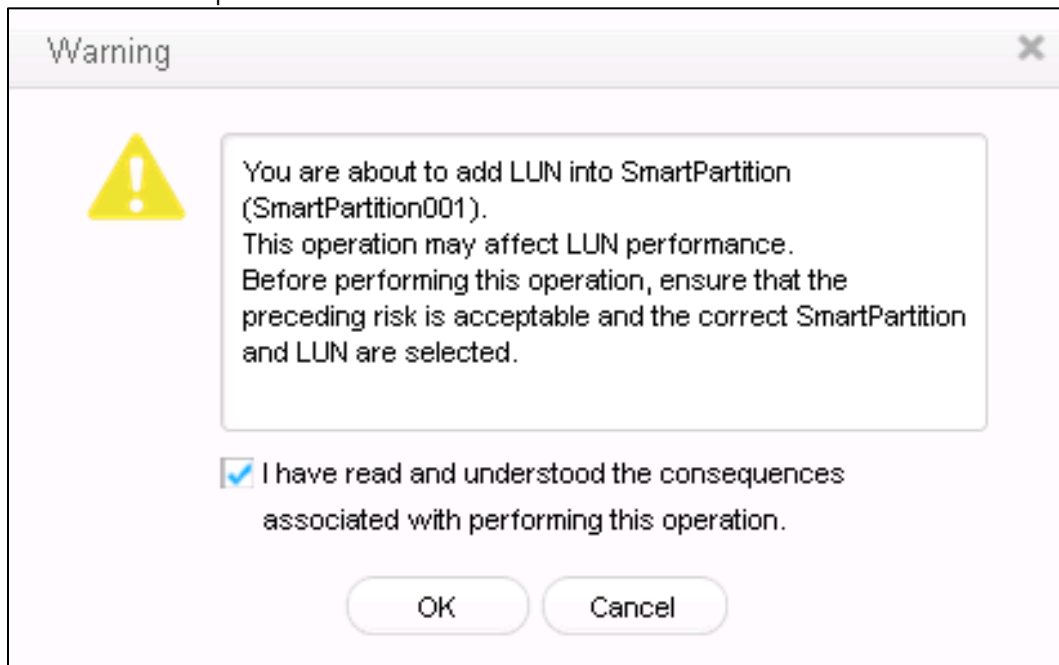
Choose "Provisioning > Resource Performance Tuning > SmartPartition" in OceanStor DeviceManager, select the SmartPartition that you wish to add LUN to it from the main information region, click on the "More" button and choose "Add LUN".



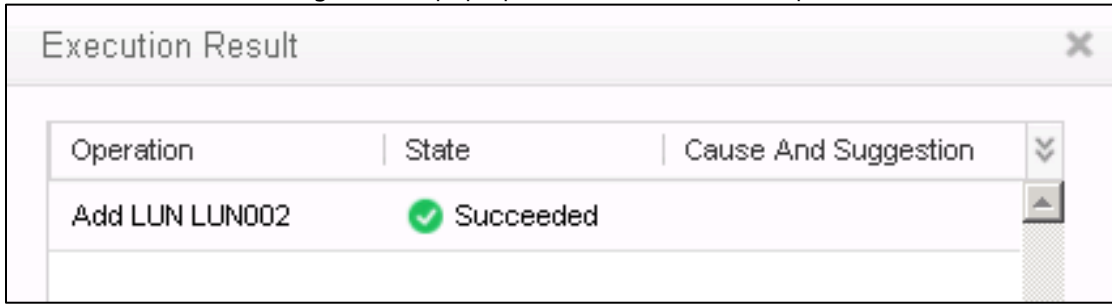
In the "Add LUN to SmartPartition" dialog box, choose the LUN that you wish to add from the "Available LUNs" region and click on the arrow pointing to the right to add the LUN to the "Selected LUNs" region then click "OK".



The warning dialog box will appear, please carefully read through the content, and tick "I have read and understood the consequences associated with performing this operation" to confirm and click "OK" to proceed.

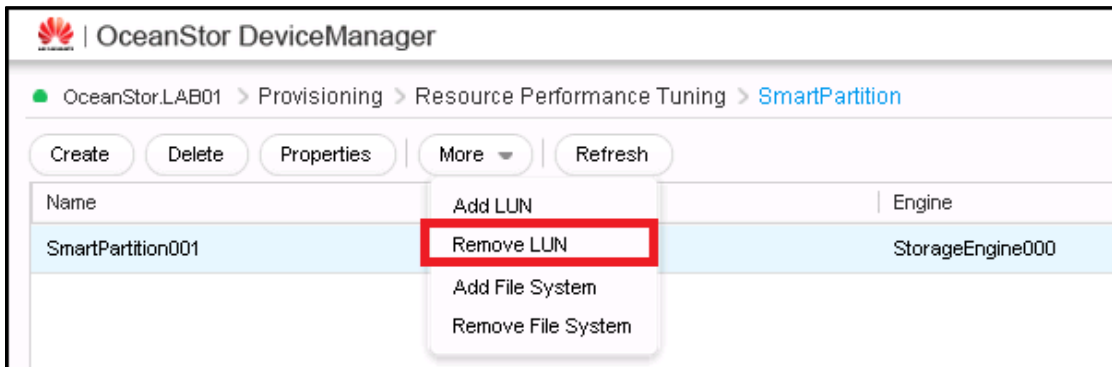


The execution results dialog box will pop up to indicate successful operation.

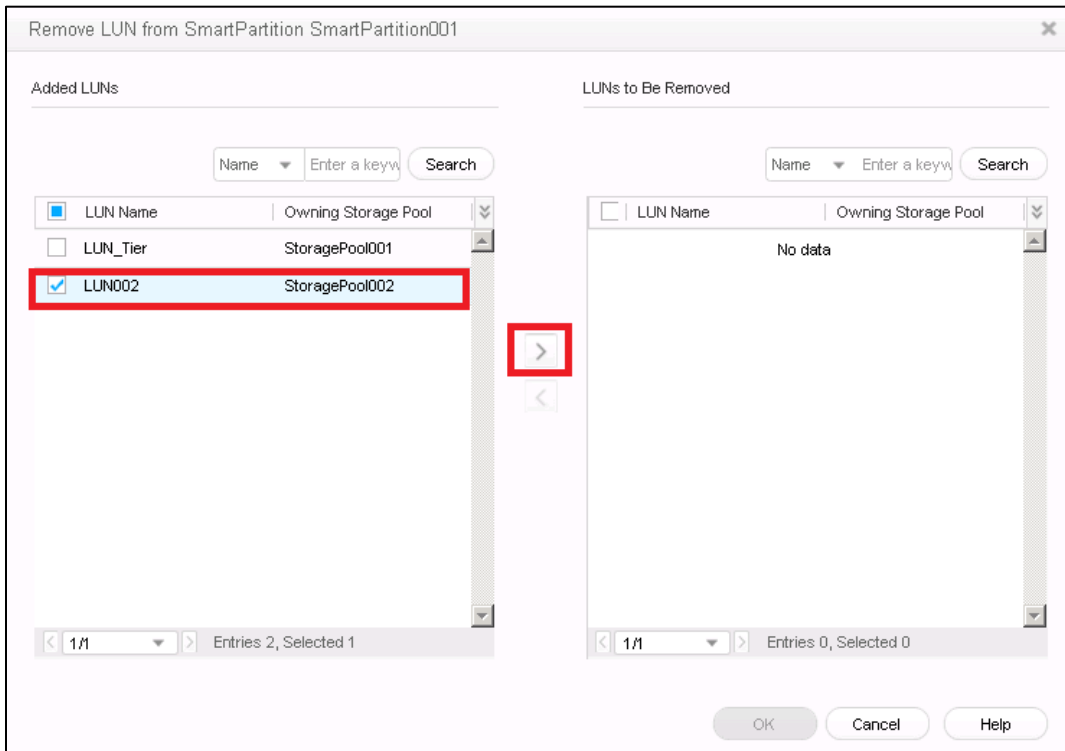


Step 4. Deleting SmartPartition

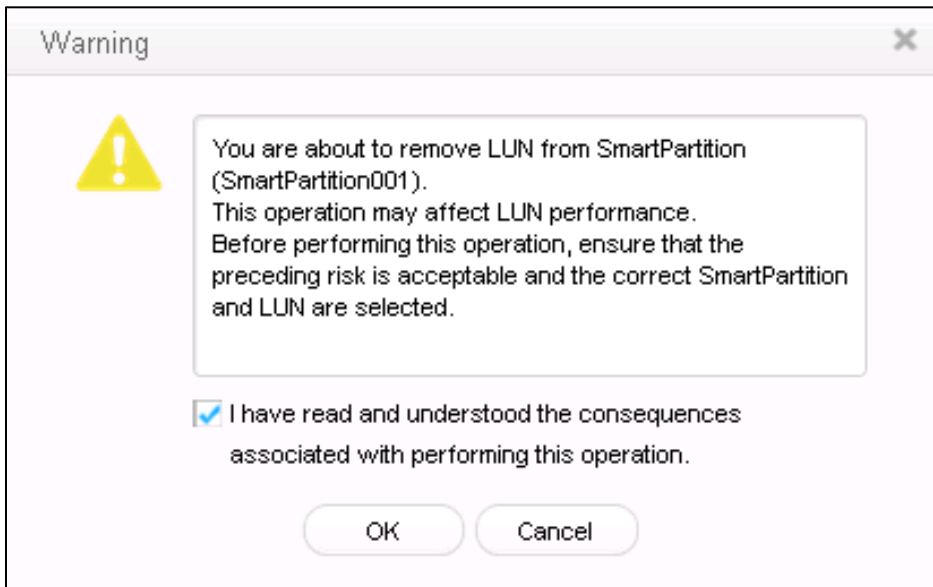
Choose "Provisioning > Resource Performance Tuning > SmartPartition" in OceanStor DeviceManager, choose the SmartPartition that you wish to remove LUN, and click "Remove LUN".



In the "Remove LUN from SmartPartition" dialog box, select the LUN that you wish to remove from the "Available LUNs" region and click on the arrow pointing to the right to add it to the "LUNs to Be Removed" region.



Click "OK" and the warning dialog box will appear, please carefully read through the content, and tick "I have read and understood the consequences associated with performing this operation" to confirm and click "OK" to proceed.

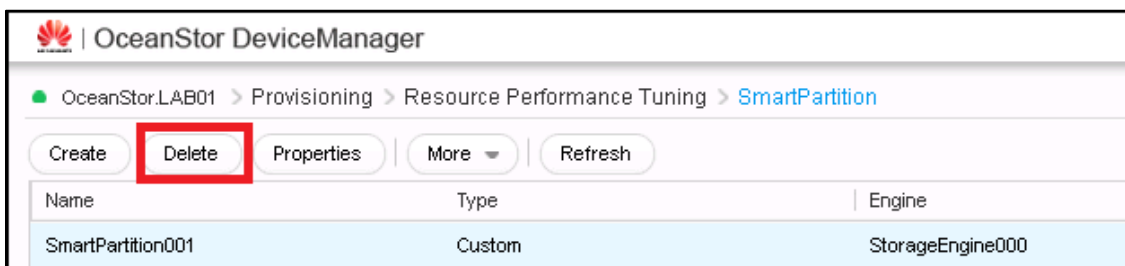


The execution results dialog box will appear to indicate successful operation. Click "Close".

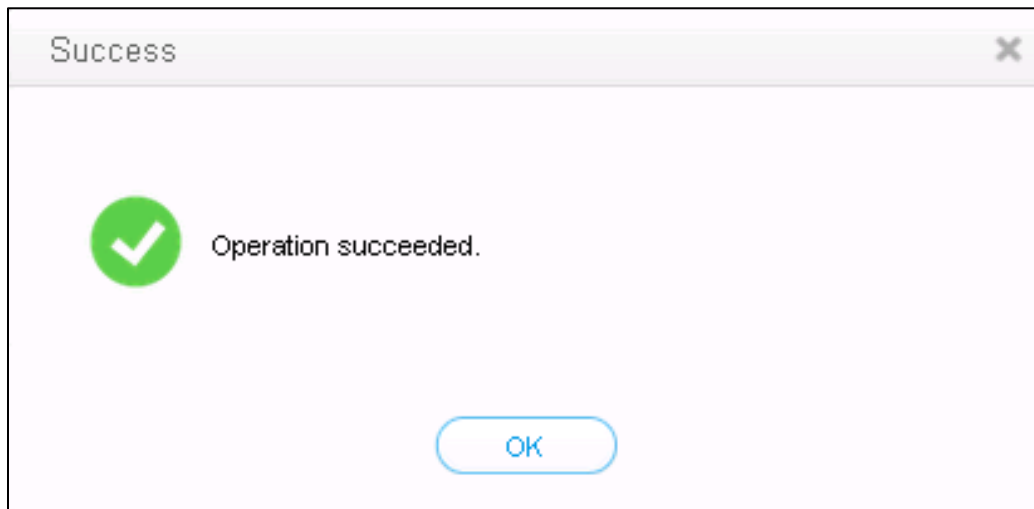


Go back to the main SmartPartition interface, choose the SmartPartition that you wish to delete, and click on the "Delete" button.

Note: Only the SmartPartition that has all its LUNs removed can be deleted.



Click "OK" on the operation success dialog box to complete the operation.



7.3 Results Verification

We can verify the effect and results of SmartPartition through the difference in the IOPS value obtained through the IOMeter test that was conducted before and after configuring the SmartPartition feature in Step 1.

Note: Due to the fact that we are unable to simulate a full service workload scenario in the lab environment, the effects of SmartPartition is not clearly visible for verification, it serves only as a reference to explain the functions of SmartPartition.

7.4 Configuration Reference

Please refer to the configuration steps.

7.5 Questions

Can LUNs from different services share the same SmartPartition?

—End of Lab 7.

8 SmartQoS Configuration and Usage

8.1 Lab Introduction

8.1.1 Lab Objective

This lab allows you to grasp the knowledge on SmartQoS configuration, we will set the I/O priority level for LUN, create SmartQoS policy, activating and stopping SmartQoS policy, adding and removing LUN into the traffic control policy and modifying SmartQoS policy. At the end of this lab, we will delete the SmartQoS policy.

8.1.2 Networking and Service Description

The networking is the same as the IP-SAN or FC-SAN network in the 3rd Lab.

Increase the service priority level and performance control through SmartQoS policy configuration to a certain LUN.

8.2 Lab Configuration Tasks

8.2.1 Configuration Roadmap

Setting the I/O Priority Level

Create a Traffic Control Policy

Adding LUN to the Traffic Control Policy

Modifying the Properties of
Traffic Control Policy

Activating
Traffic Control Policy

Deactivate a
Traffic Control Policy

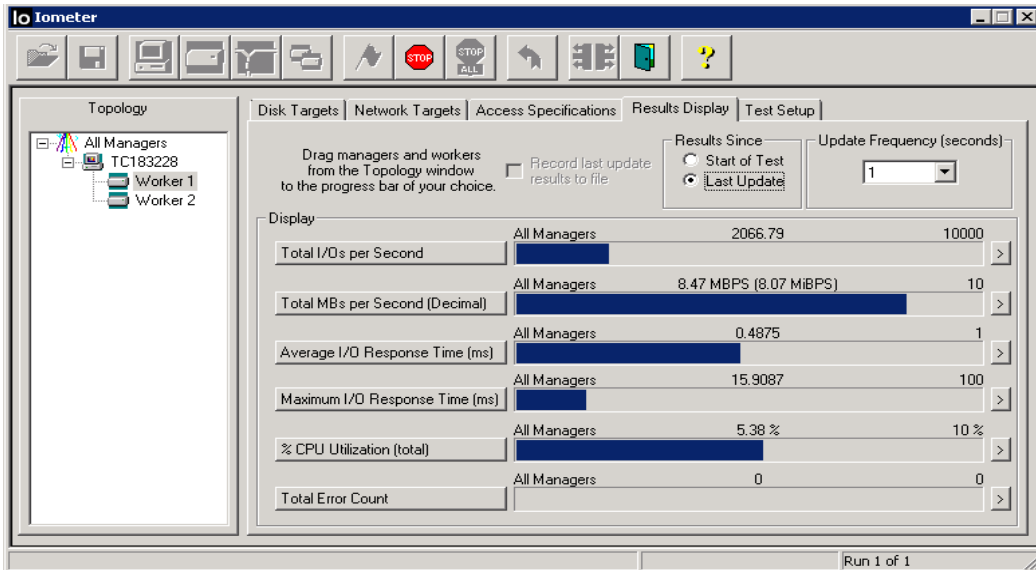
Deleting
Traffic Control Policy

8.2.2 Configuration Steps

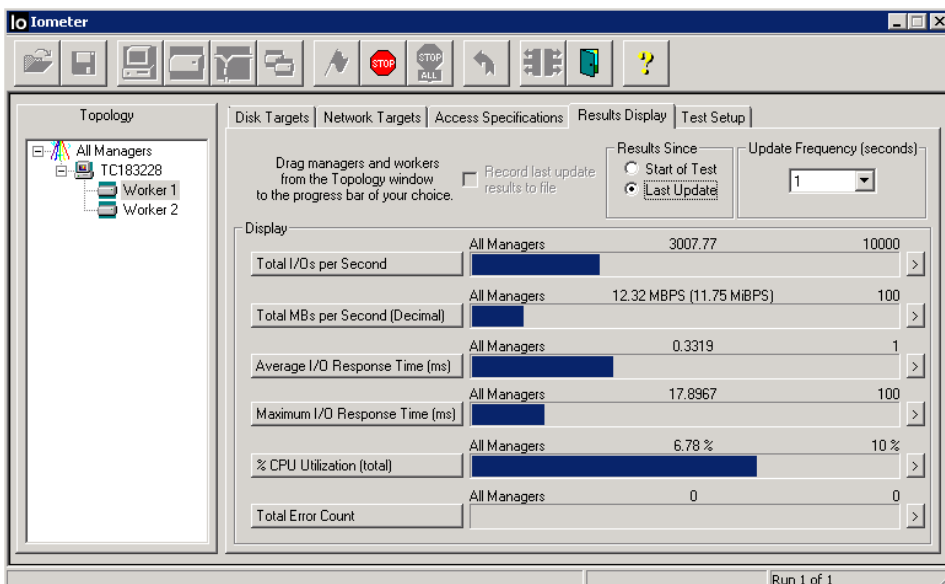
Step 1. Setting the I/O Priority Level

Before the start of this lab, create 2 LUN with 5GB size, and map them to 2 different host. Before configuring SmartQoS, use the IOMeter tool to perform the test on I/O performance statistics. The test method is the same as the steps in Lab 7.

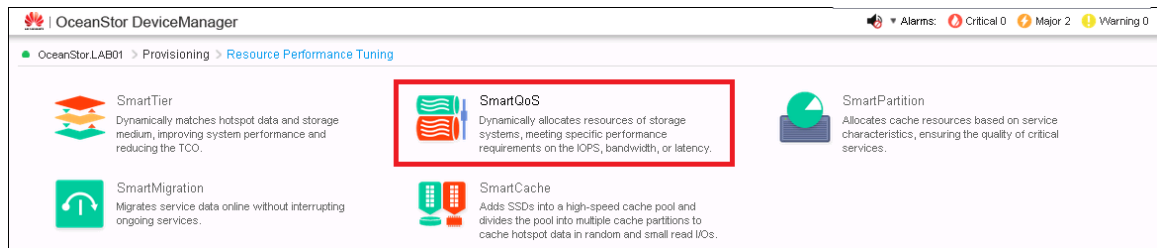
LUN001:



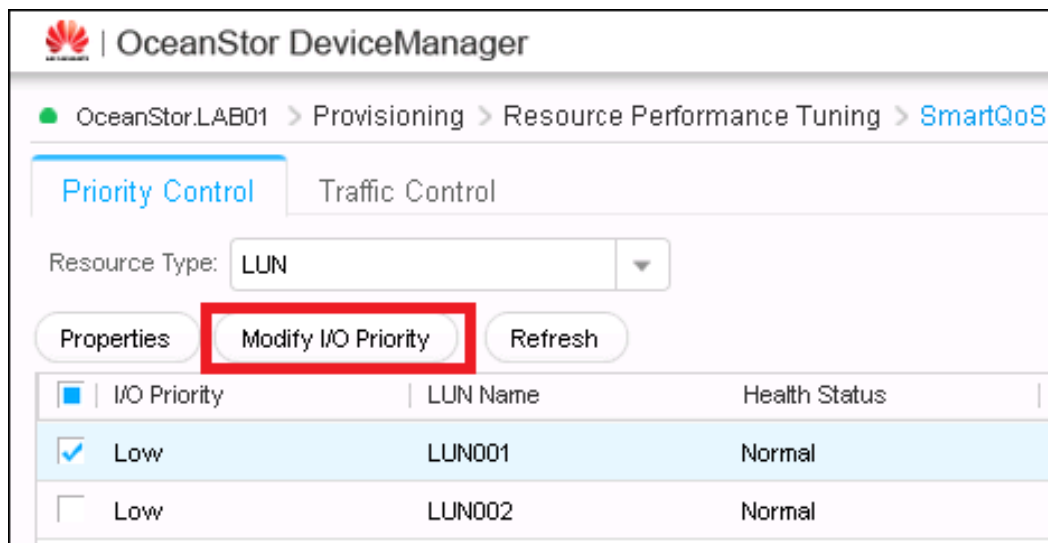
LUN002:



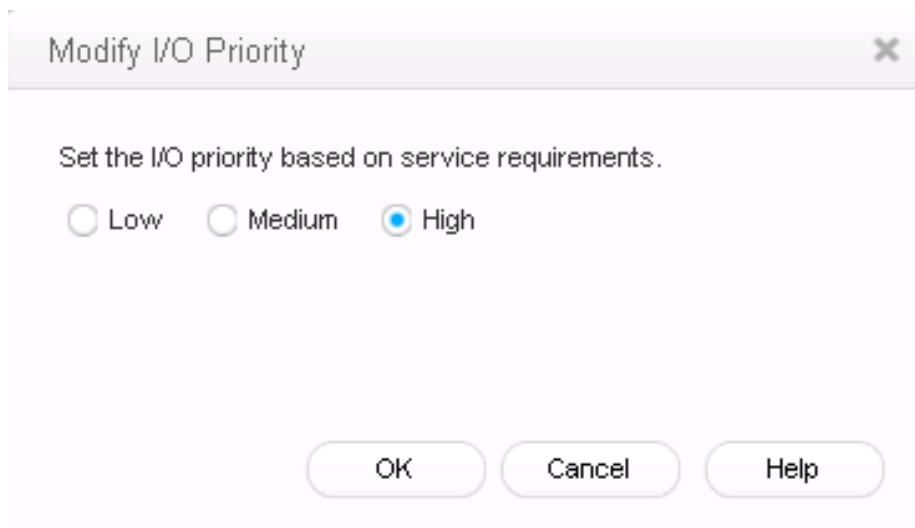
Choose "Provisioning > Resource Performance Tuning > SmartQoS" in OceanStor DeviceManager.



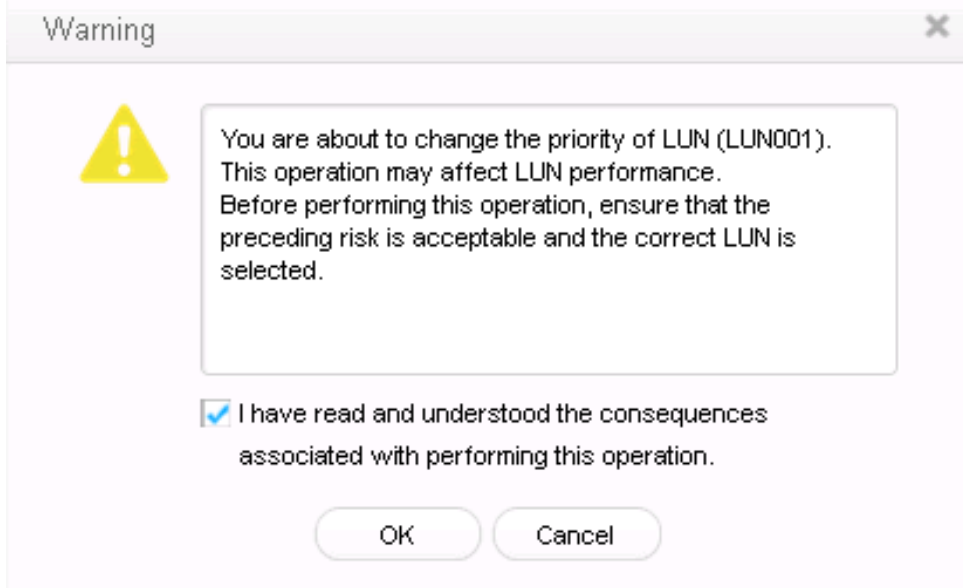
Click on the "Priority Control" tab, select the LUN that you wish to modify, and click on the "Modify I/O Priority" button.



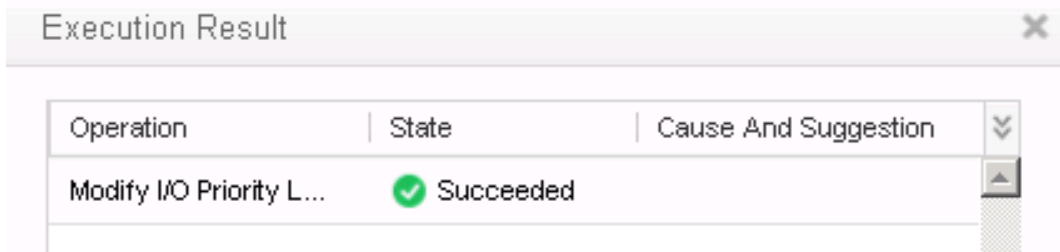
The "Modify I/O Priority" dialog box will appear, choose "High" for the I/O Priority, and click "OK".



The warning dialog box will appear, read the contents carefully and tick "I have read and understood the consequences associated with performing this operation" to confirm and click "OK".

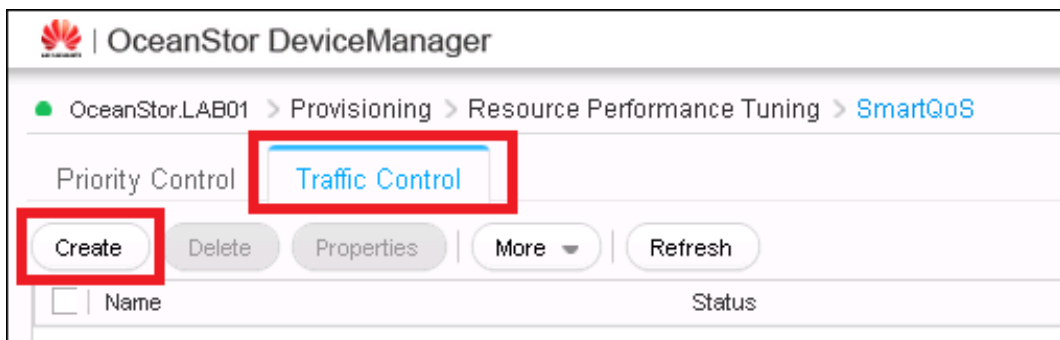


The execution results dialog box will appear to indicate successful operation. Click "Close".

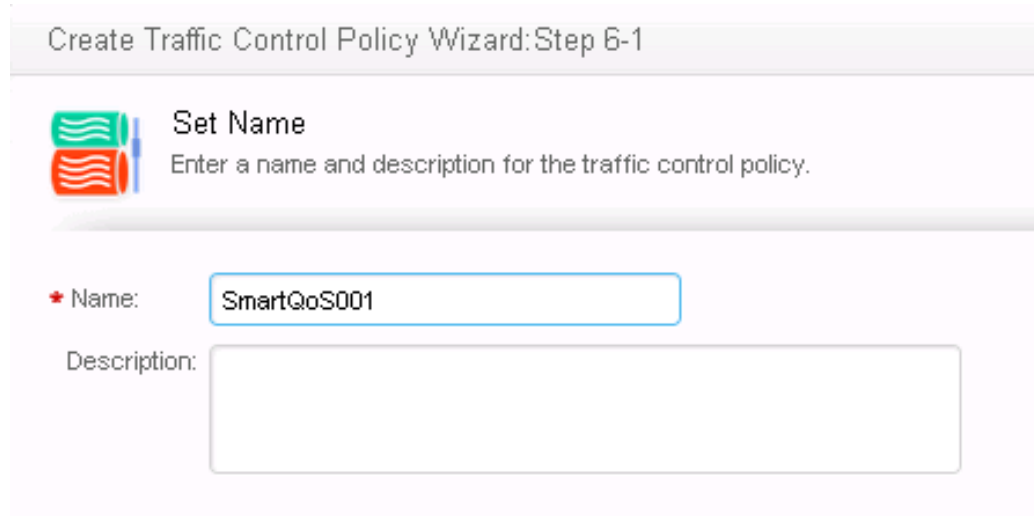


Step 2. Create a Traffic Control Policy

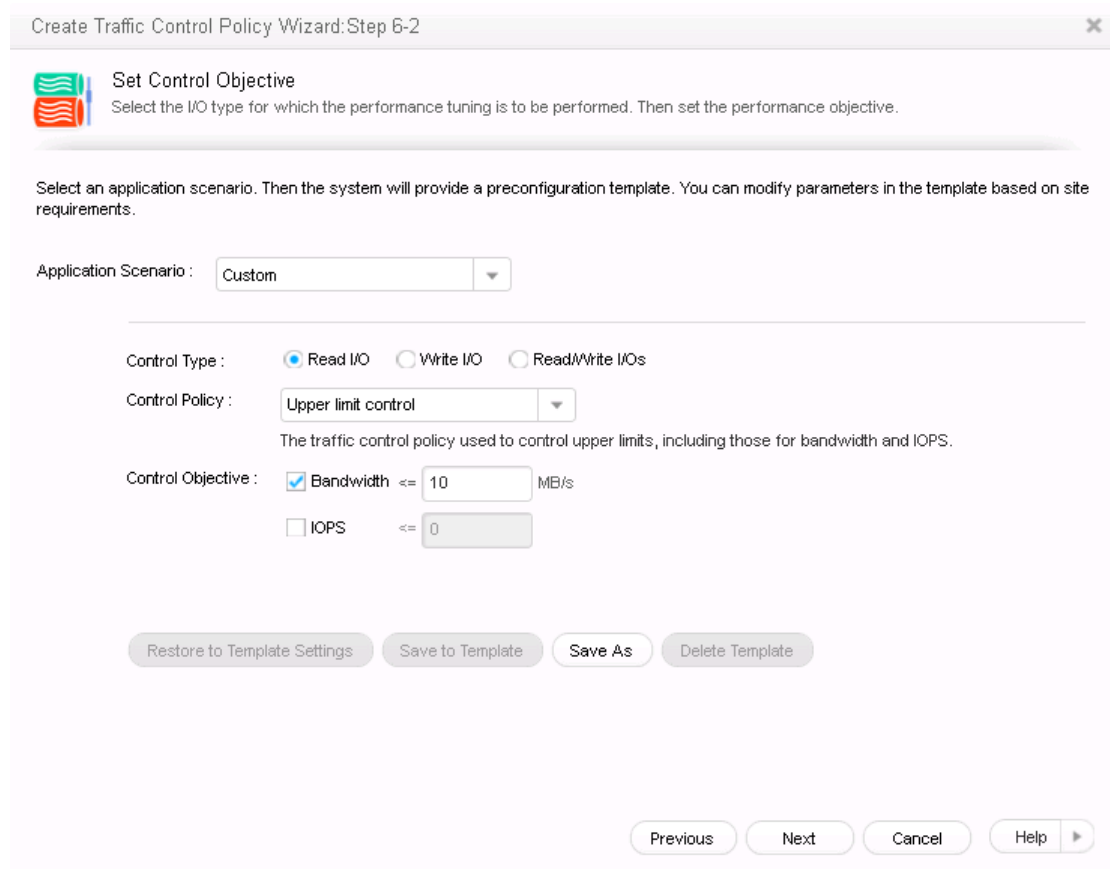
Choose "Provisioning > Resource Performance Tuning > SmartQoS" in OceanStor DeviceManager. Click on the "Traffic Control" tab and click the "Create" button.



The "Create Traffic Control Policy Wizard" will appear, key in the name and description for the traffic control policy and click "Next".



In the "Set Control Objective" interface, choose "Custom" in the "Application Scenario" option, select "Read I/O" in the "Control Type" option, and set the "Bandwidth" as 10Mbps in the "Control Objective" option.



Click "Next".

The "Set Trigger Policy" dialog box will appear, set the "Start Date" to the date you wish the configured policy to start running. In the "Execution Period" section, configure the policy running cycle, and set the "Start Time" and "Duration" for the policy in the "Execution Time" section.

Create Traffic Control Policy Wizard: Step 6-3

Set Trigger Policy

The system triggers the policy to control traffic based on the preset time.

Start Date:

Execution Period

One-off

Weekly

Mon Tues Wed Thurs

Fri Sat Sun

Execution Time

Duration must be equal to or larger than 30 minutes

Start Time:

Duration: Hours minutes

End Time: Next day 08:00

Previous Next Cancel Help

Click "Next" and choose the LUN that you would like to apply the policy on from the "Available LUNs" region.

Create Traffic Control Policy Wizard: Step 6-4

Select Control Object

Select the LUNs, filesystems or snapshots to which the control policy will be applied.

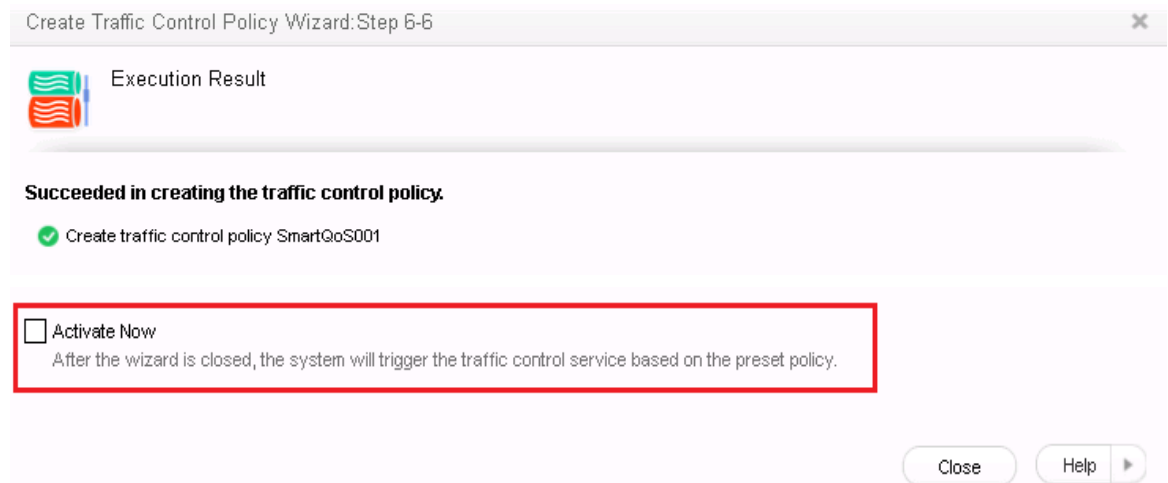
A maximum of 64 objects can be selected. (Selected/Total: 1/64)

Resource Type:

LUN Snapshot

Available LUNs				Selected LUNs			
Name	Keyword	Search	Name	Keyword	Search		
<input type="checkbox"/>	Name	Owning Sto...	Total Capacity	<input type="checkbox"/>	Name	Owning Sto...	Total Capacity
<input type="checkbox"/>	LUN002	StoragePool...	5.000 GB	<input checked="" type="checkbox"/>	LUN001	StoragePool...	5.000 GB

Click "Next" and the system will show the "Summary" information dialog box. Click "Finish" after verifying the configuration.

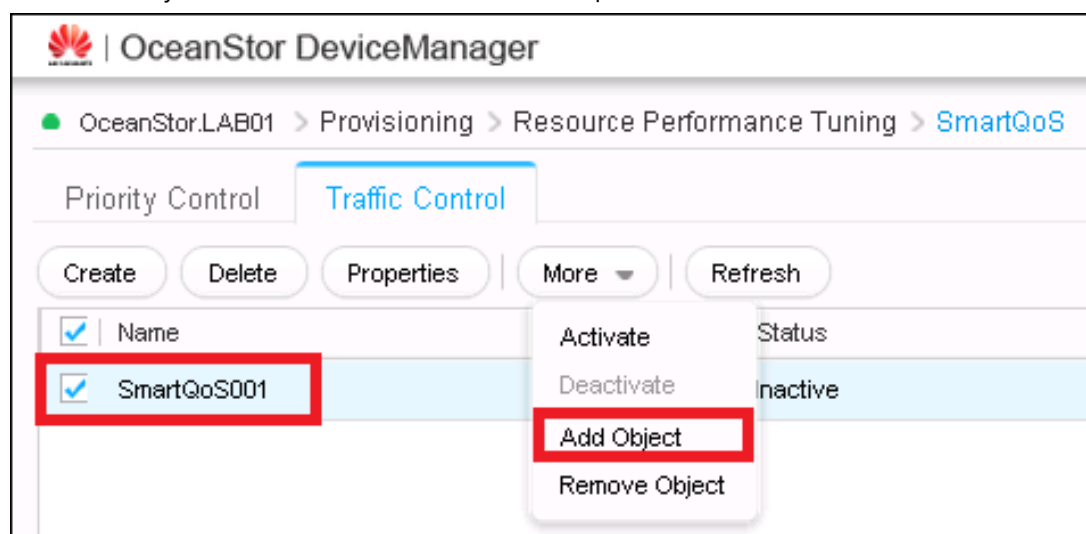


The system will show the execution result dialog box, untick the "Activate Now" option and click "Close".

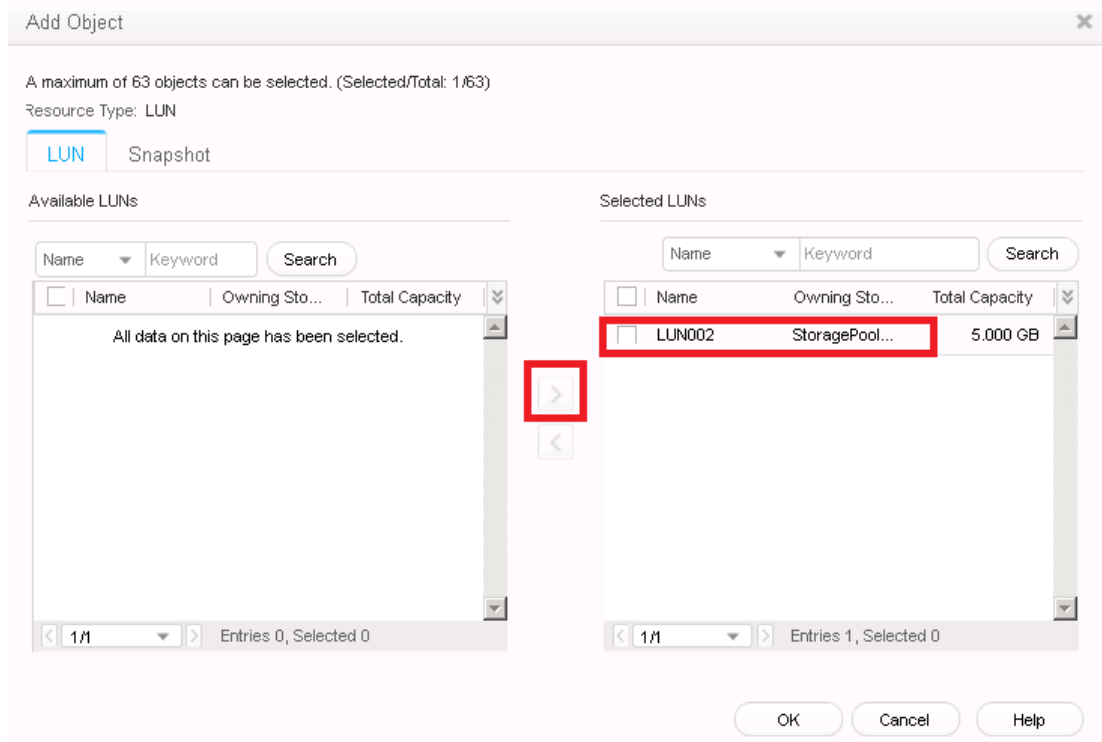
Use the IOMeter tool in the Windows operating system to test both of the LUNs using the same test model. You will be able to see that there is not much difference in the performance statistics value. This is because SmartQoS is a feature that is used to ensure the performance of critical services are not affected in the scenario where the storage performance is in the full workload. The ELAB environment is unable to simulate the scenario of a full workload of storage performance, thus the IOMeter results are just for references for this simulated practice of the SmartQoS configuration.

Step 3. Adding LUN into the Traffic Control Policy

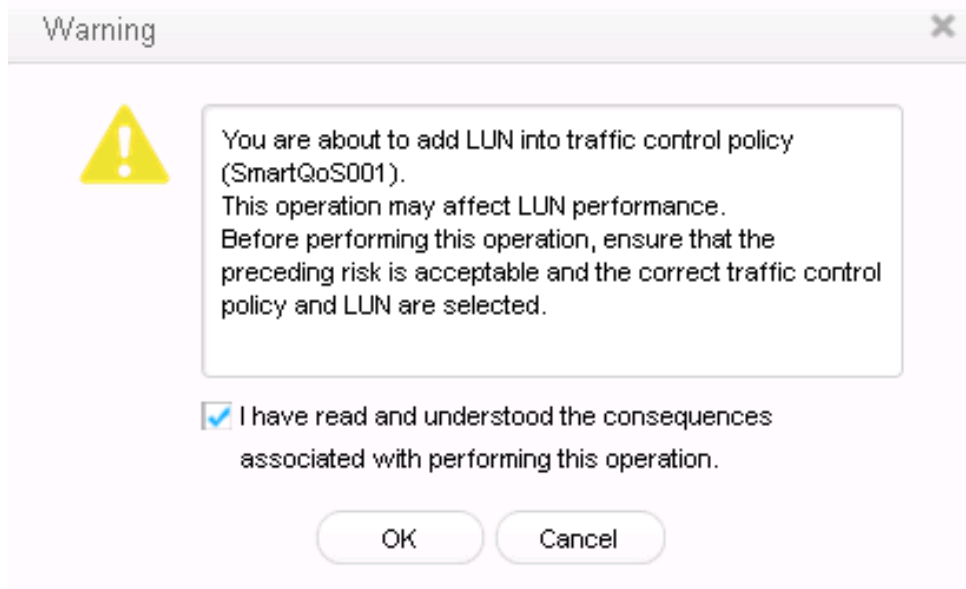
Choose "Provisioning > Resource Performance Tuning > SmartQoS" in OceanStor DeviceManager. Click on the "Traffic Control" tab and choose the traffic control policy that you wish to add the LUN into, then click on the "More" button and choose "Add Object" from the dropdown menu. LUNs can only be added to inactive traffic control policies.



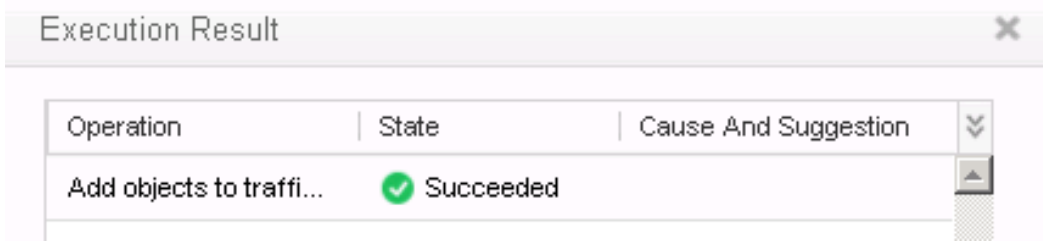
In the "Add Object" dialog box, choose the LUN that you wish to add to the traffic control policy from the "Available LUNs" region and click on the arrow pointing to the right to add it into the "Selected LUNs" list and click "OK".



The warning dialog box will appear, read the contents carefully and tick "I have read and understood the consequences associated with performing this operation" to confirm and click "OK".

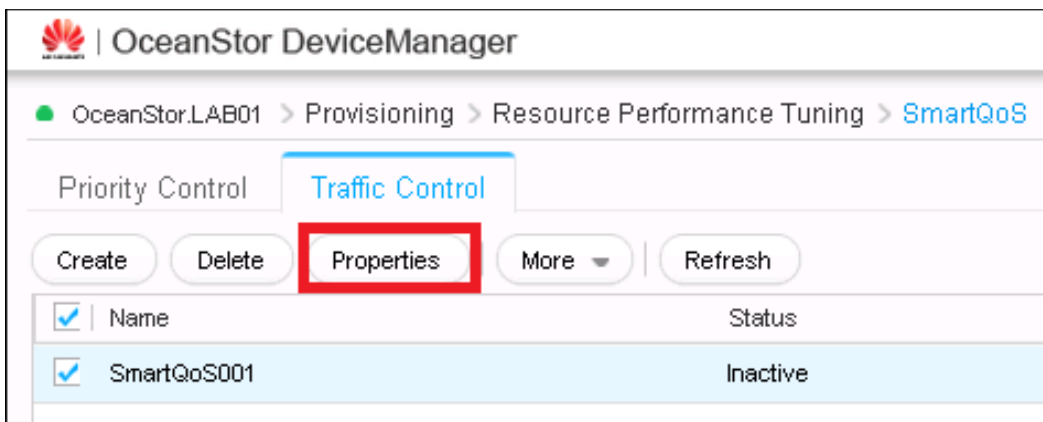


The execution results dialog box will appear to indicate successful operation. Click "Close".

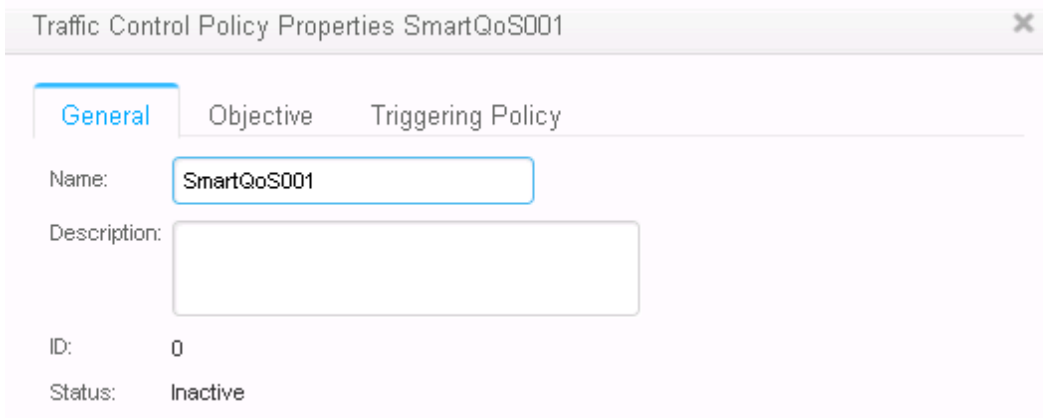


Step 4. Modifying the Properties of Traffic Control Policy

Choose "Provisioning > Resource Performance Tuning > SmartQoS" in OceanStor DeviceManager. Click on the "Traffic Control" tab and choose the traffic control policy that you wish to modify its properties and click on the "Properties" button. Only properties of inactive traffic control policy can be modified.



In the "Traffic Control Policy Properties" dialog box, click on the "General" tab, and you may modify the name and description of the policy.



Choose the "Objective" tab, change the "Bandwidth" to 20MB/s, and click "Apply".

Traffic Control Policy Properties SmartQoS001

General Objective Triggering Policy

Control Type: Read I/O Write I/O Read/Write I/Os

Control Policy: Upper limit control

Control Objective: Bandwidth <= 20 MB/s

IOPS <= 0

The execution results dialog box will appear to indicate successful operation. Click "Close".

Execution Result

Operation	State	Cause And Suggestion
Modify properties of...	✔ Succeeded	

Choose the "Triggering Policy" tab, you may change the "Start Date", "Execution Period", "Execution Time", however we will not make any changes here. Click "OK" to return to the main management interface for Traffic Control Policy.

Traffic Control Policy Properties SmartQoS001

General Objective Triggering Policy

Start Date: 2018-04-19

Execution Period

One-off

Weekly

Mon Tues Wed Thurs

Fri Sat Sun

Execution Time

Duration must be equal to or larger than 30 minutes

Start Time: 08:00

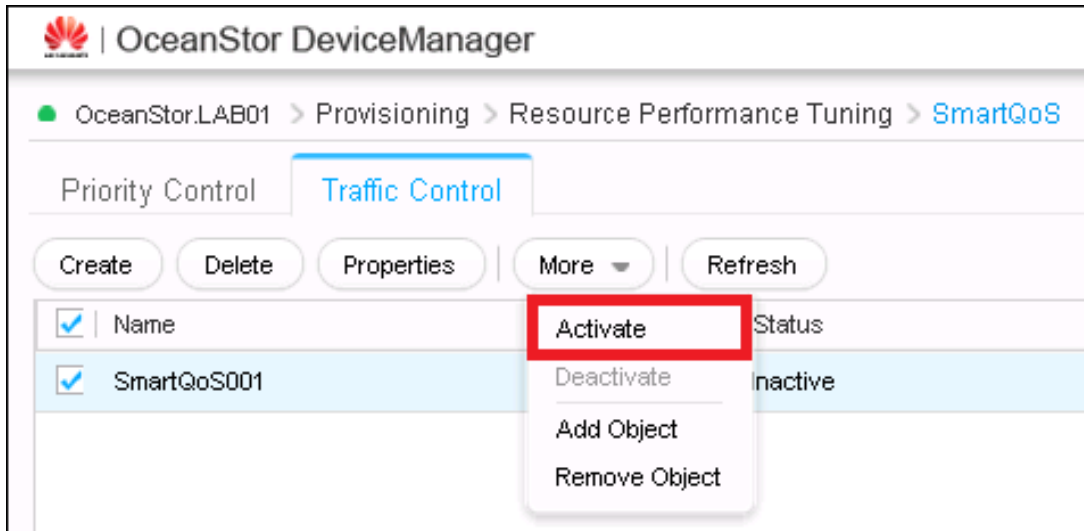
Duration: 24 Hours 0 minutes

End Time: Next day08:00

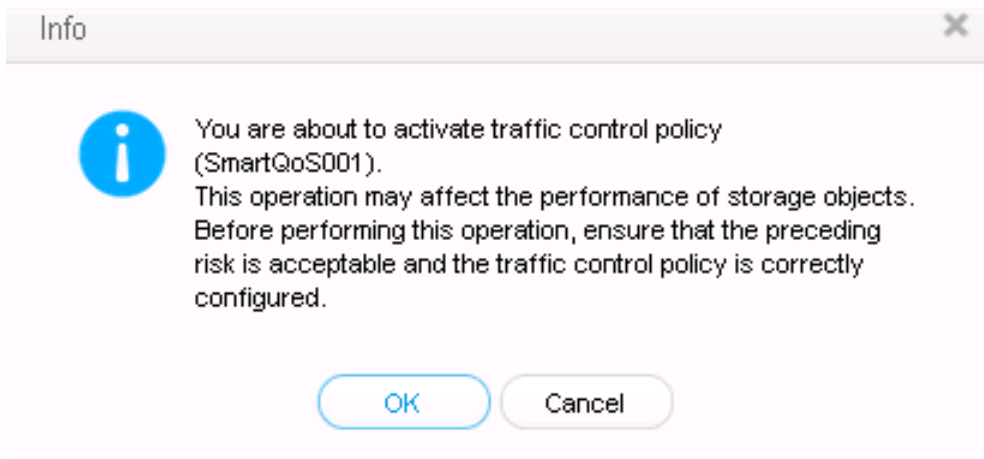
OK Apply Cancel Help

Step 5. Activating Traffic Control Policy

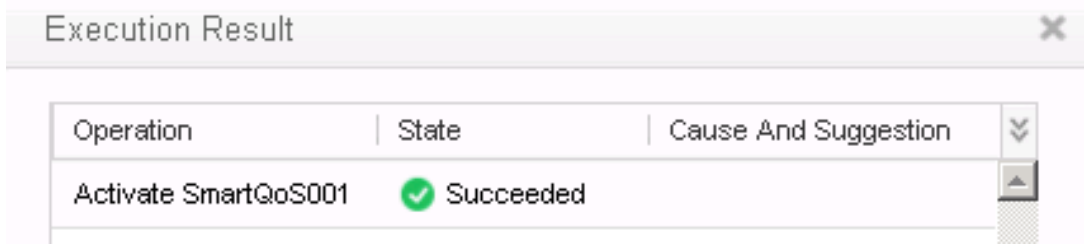
Choose "Provisioning > Resource Performance Tuning > SmartQoS > Traffic Control" in OceanStor DeviceManager. Choose the traffic control policy that you wish to activate, click on "More > Activate".



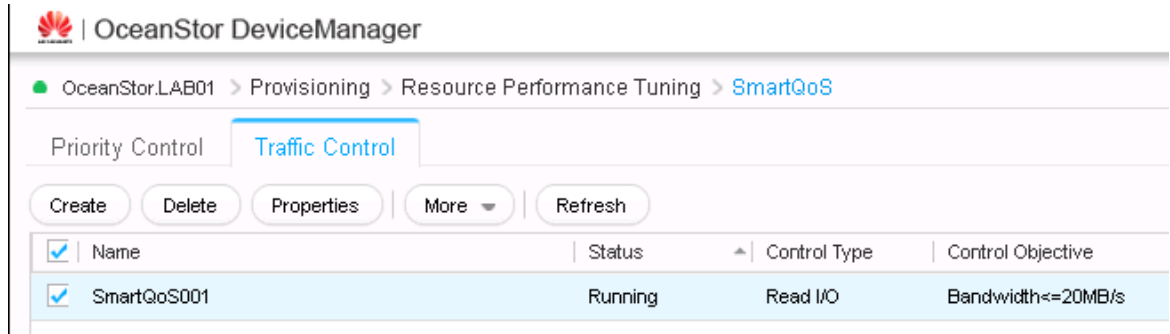
Click "OK" after reading through the info dialog box that appears.



The execution results dialog box will appear to indicate successful operation. Click "Close".

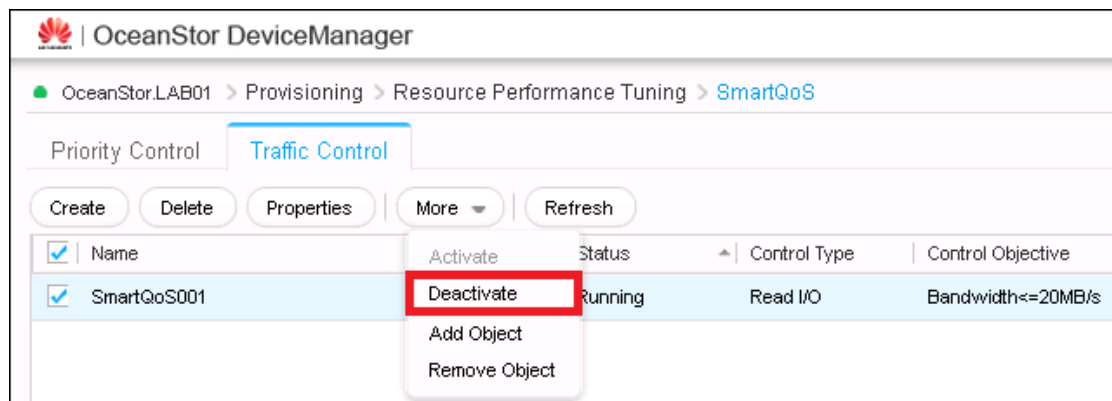


Return to the Traffic Control management interface, and you could see that the status of the SmartQoS policy is active and running.

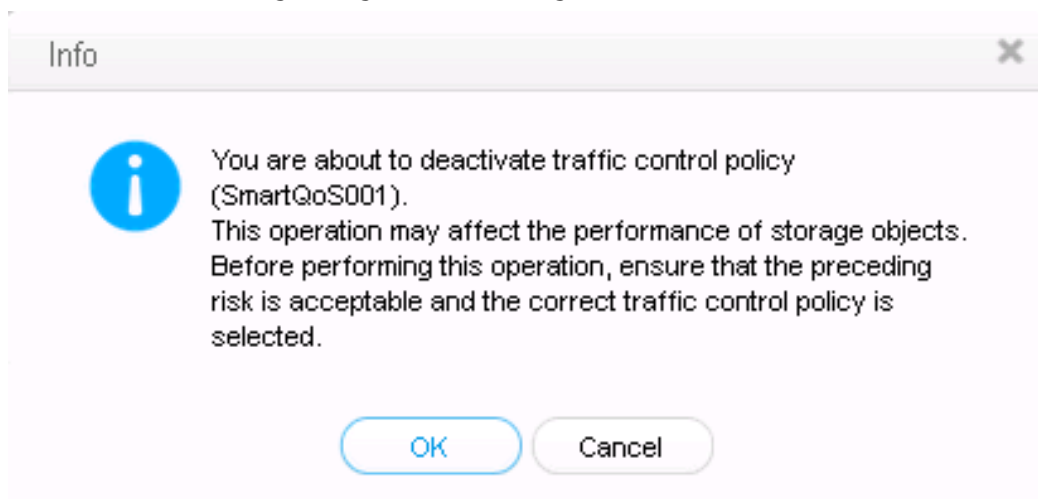


Step 6. Deactivate a Traffic Control Policy

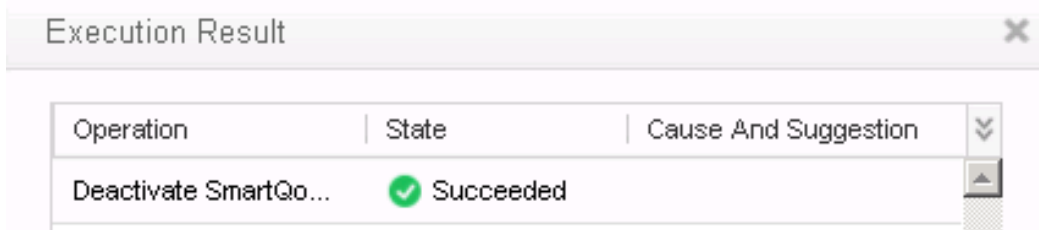
Choose “Provisioning > Resource Performance Tuning > SmartQoS > Traffic Control” in OceanStor DeviceManager. Choose the traffic control policy that you wish to deactivate, click on “More > Deactivate”.



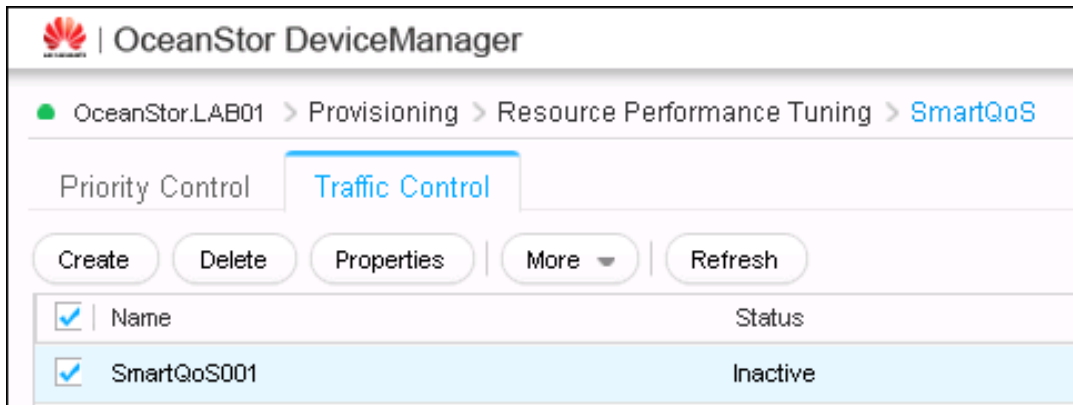
Click “OK” after reading through the info dialog box.



The execution results dialog box will appear to indicate successful operation. Click "Close".

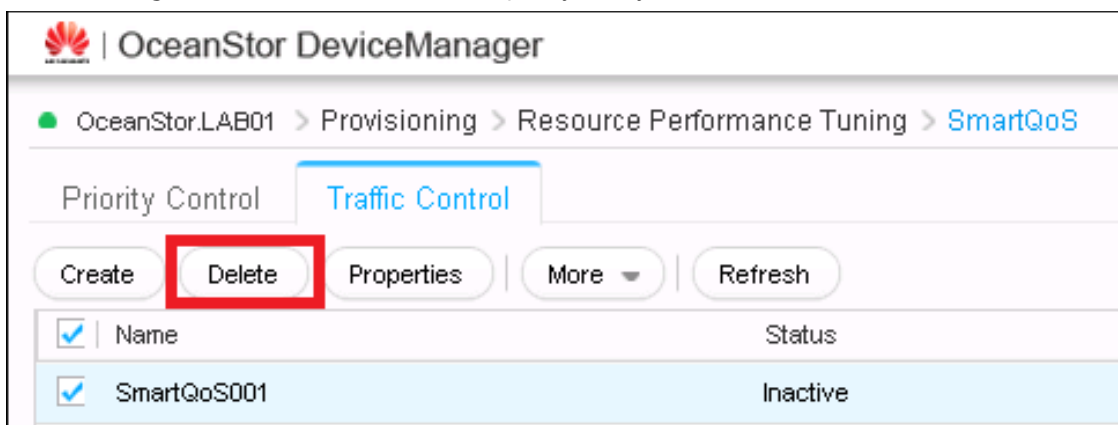


Return to the Traffic Control management interface, and you could see that the status of the SmartQoS policy is inactive.

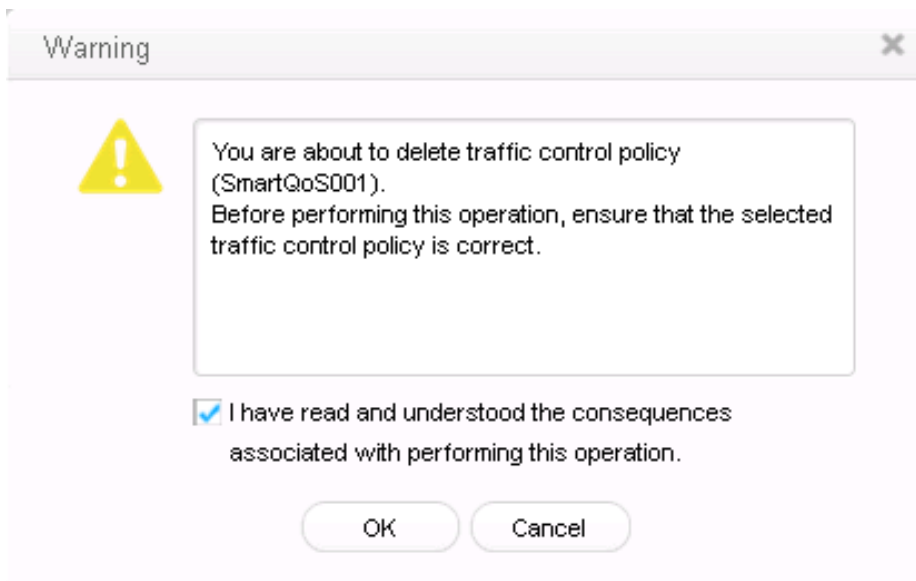


Step 7. Deleting Traffic Control Policy

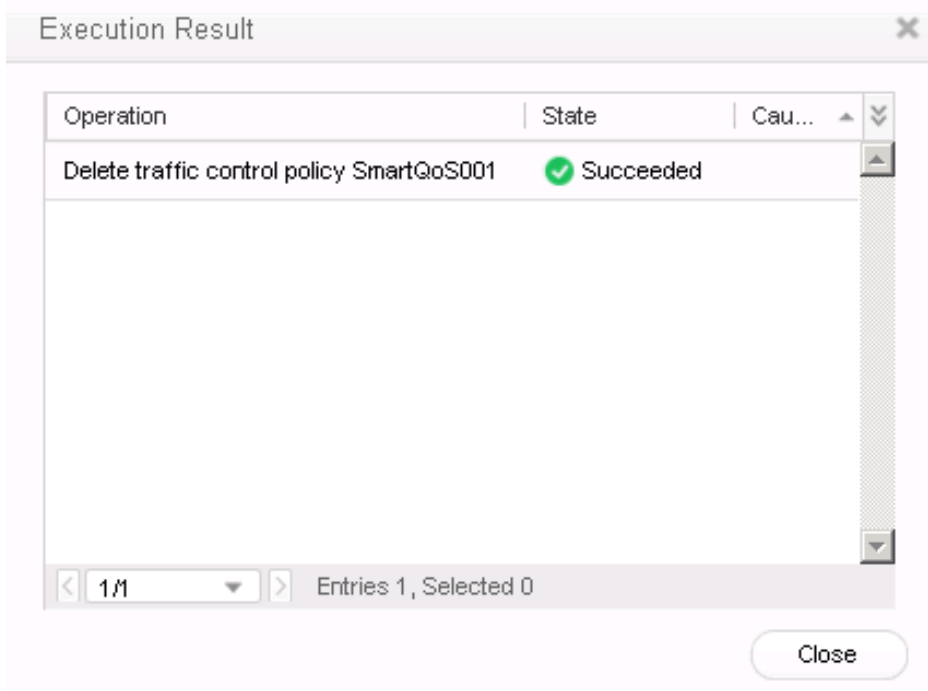
Choose "Provisioning > Resource Performance Tuning > SmartQoS > Traffic Control" in OceanStor DeviceManager. Choose the traffic control policy that you wish to delete, click on "Delete".



The warning dialog box will appear, read the contents carefully and tick "I have read and understood the consequences associated with performing this operation" to confirm and click "OK".



The execution results dialog box will appear to indicate successful operation. Click "Close".



8.3 Results Verification

SmartQoS is a feature that is used to ensure the performance of critical service are not affected in the scenario where the storage performance is in the full workload. The ELAB environment is unable to simulate the scenario of a full workload of storage performance, thus the IOMeter results are just for references for this simulated practice of the SmartQoS configuration.

8.4 Configuration Reference

Please refer to the configuration steps.

8.5 Questions

SmartQoS can restrict which types of values?

—End of Lab 8.

9 NAS Basic Service Configuration and Usage

9.1 Lab Introduction

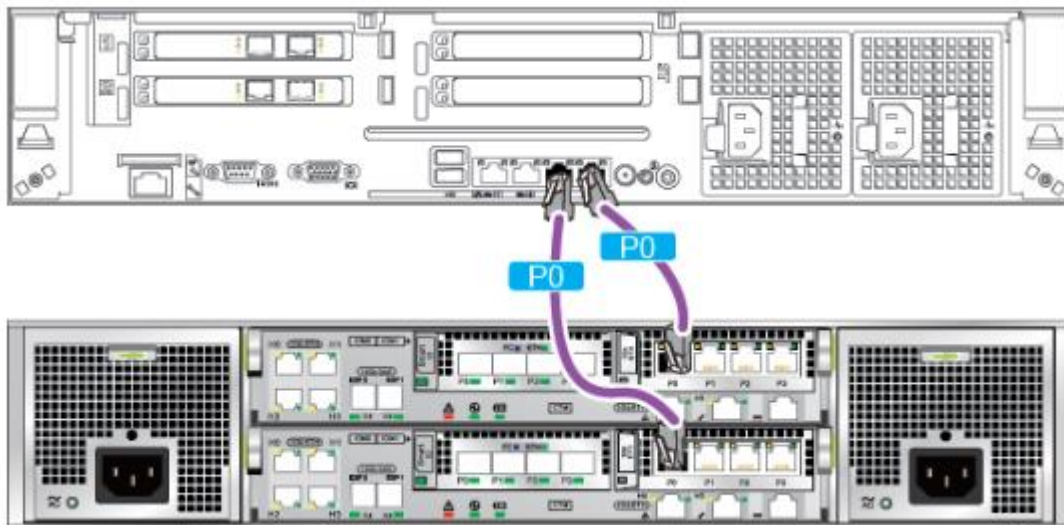
9.1.1 Lab Objective

Upon the completion of this lab, you will be equipped with the following skills:

- Basic principles and application of NAS technologies.
- CIFS sharing configuration.
- NFS sharing configuration.

This lab will be using OceanStor 5300 V3 as the example.

9.1.2 Networking and Service Description

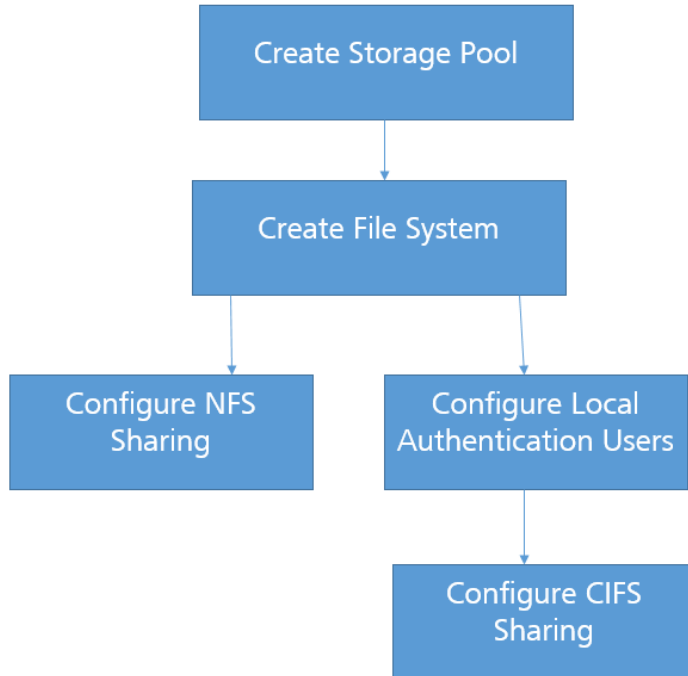


Note:

- The diagram here only labels the connection between the production server and the storage, please refer to the 1st and 2nd lab for management network connection and cabling.
- Use IP network connection to achieve CIFS and NFS sharing respectively between Windows or Linux application servers with the storage system.

9.2 Lab Configuration Tasks

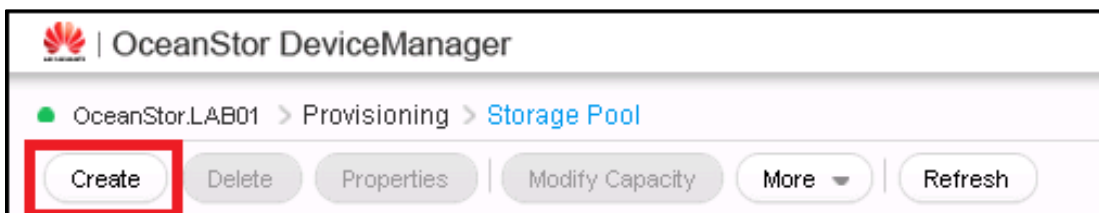
9.2.1 Configuration Roadmap



9.2.2 Configuration Steps

Step 1. Create a Storage Pool

In OceanStor DeviceManager, choose "Provisioning" and click "Storage Pool" in the "Storage Configuration and Optimization" region, then click on the "Create" button.



Key in the name of the storage pool in the "Name" field, and key in the functions and properties of the storage pool in the "Description" field.

Choose "File Storage Service" at the "Usage" field.

Choose the available disk domain at the "Disk Domain" option.

Choose the "Storage Medium" settings based on user requirements, other settings are optional.

✕
Create Storage Pool

★ Name:

Description:

Usage: File Storage Service ▼

i Usage is unchangeable after it is configured. The storage pool is only used to create file systems.

Disk Domain: DiskDomain001 ▼

★ Storage Medium: Please select a disk type and a RAID policy for the storage pool.

Performance Tier (SAS)

RAID Policy: RAID 5 ▼ 2D+1P ▼

Available Capacity: 410.000 GB

★ Capacity: 100 GB ▼

Capacity Tier (NL-SAS)

RAID Policy: RAID 6 ▼ 2D+2P ▼

Available Capacity: 2.465 TB

★ Capacity: 1 TB ▼

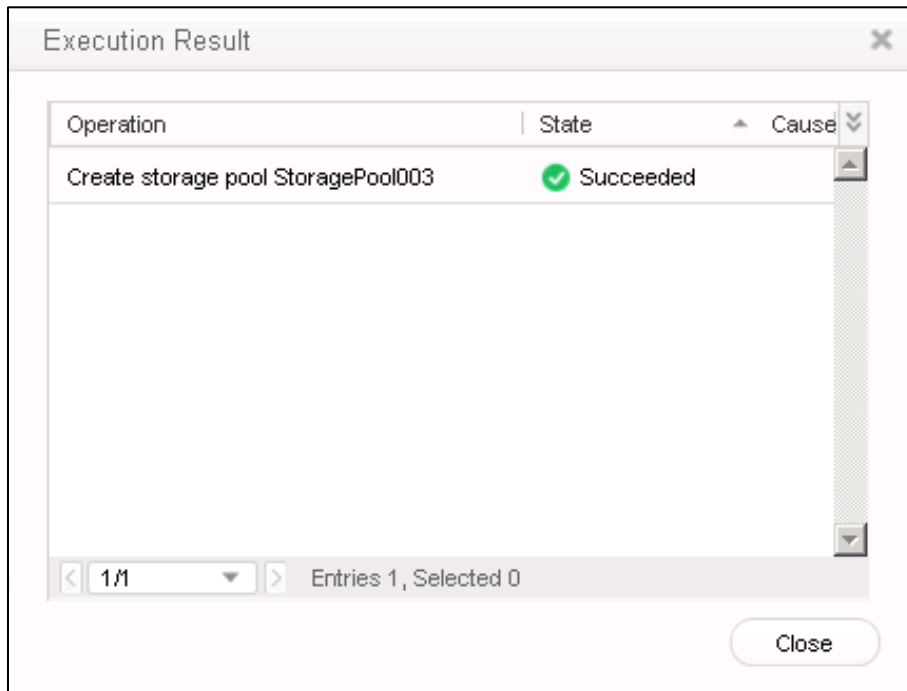
Total Storage Pool Capacity: 1.097 TB

Advanced

i The number of RAID data disks of different storage pool tiers must be a multiple of 1, 2, 4, or 8.
After the storage pool is created, the RAID policy of a new storage tier of the storage pool can only be RAID 1(2D/4D), RAID10, RAID 3(2D+1P/4D+1P/8D+1P), RAID 5(2D+1P/4D+1P/8D+1P), RAID 50((2D+1P)×2(4D+1P)×2(8D+1P)×2), RAID 6(2D+2P/4D+2P/8D+2P/16D+2P).

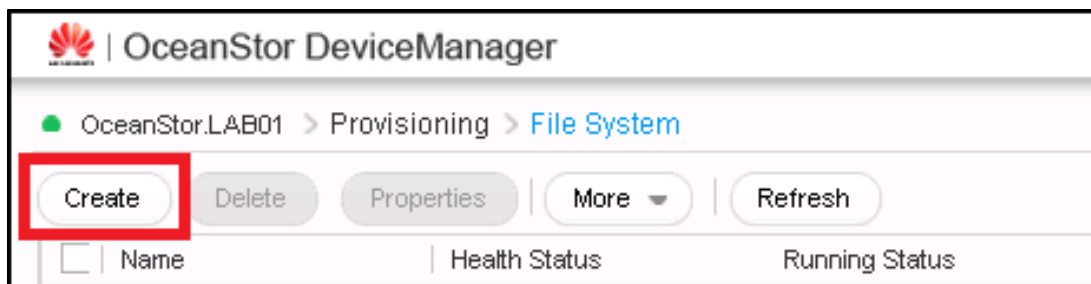
OK
Cancel
Help

After all the values are filled up, click "OK" and the execution result dialog box will appear to indicate successful operation.

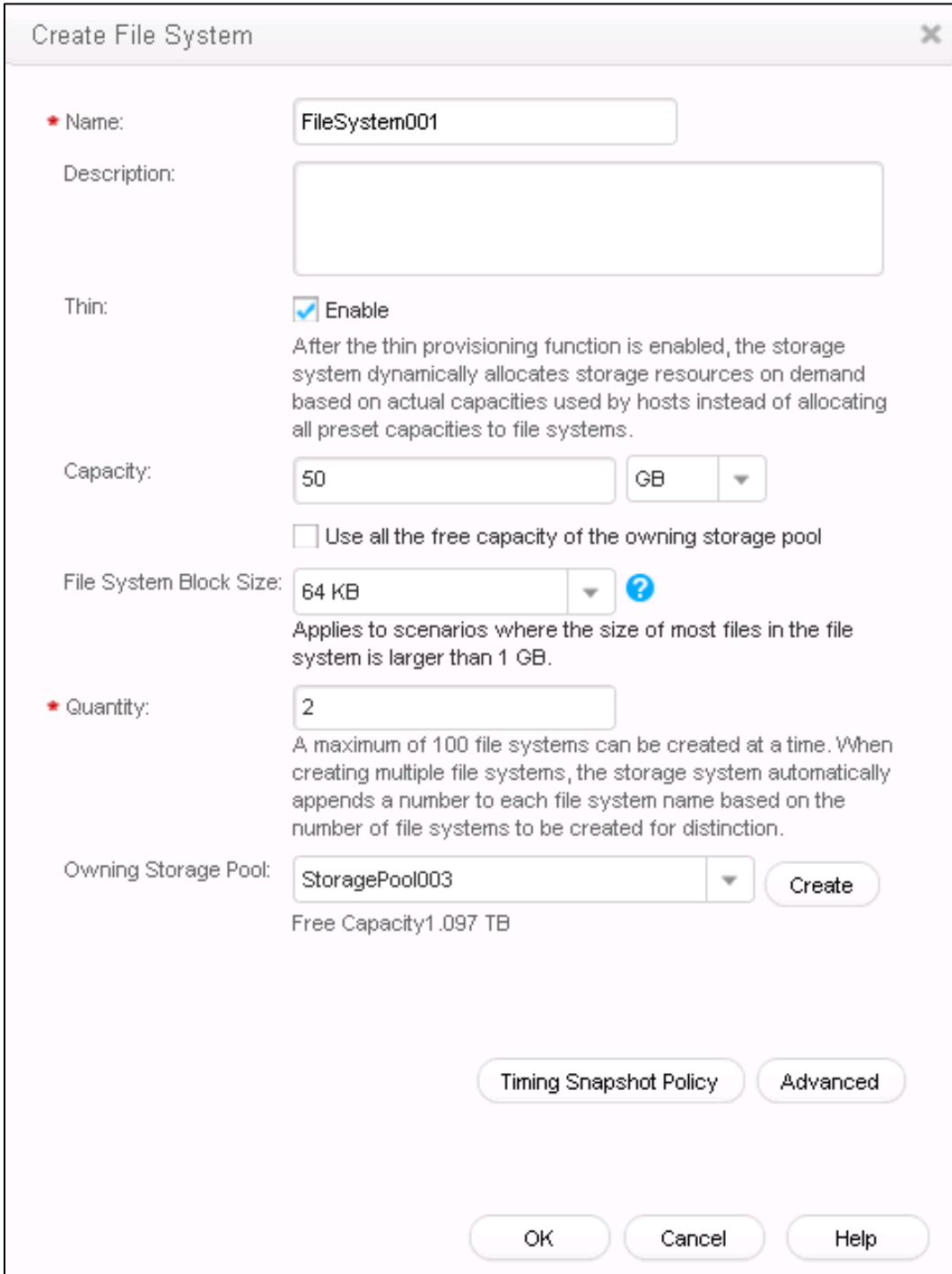


Step 2. Create a File System

In OceanStor DeviceManager, choose "Provisioning" then click on "File System" under "File Storage Service". Click "Create".



In the "Create File System" dialog box, key in the "Name" and "Description" of the file system. Based on user requirements, choose to "Enable" thin provisioning. (Optional) Based on user requirements, fill the "Capacity" of the file system as 50GB. Based on user requirements, fill the "Quantity" of the file system to be created, other settings are optional.



Create File System [X]

* Name:

Description:

Thin: Enable
After the thin provisioning function is enabled, the storage system dynamically allocates storage resources on demand based on actual capacities used by hosts instead of allocating all preset capacities to file systems.

Capacity:

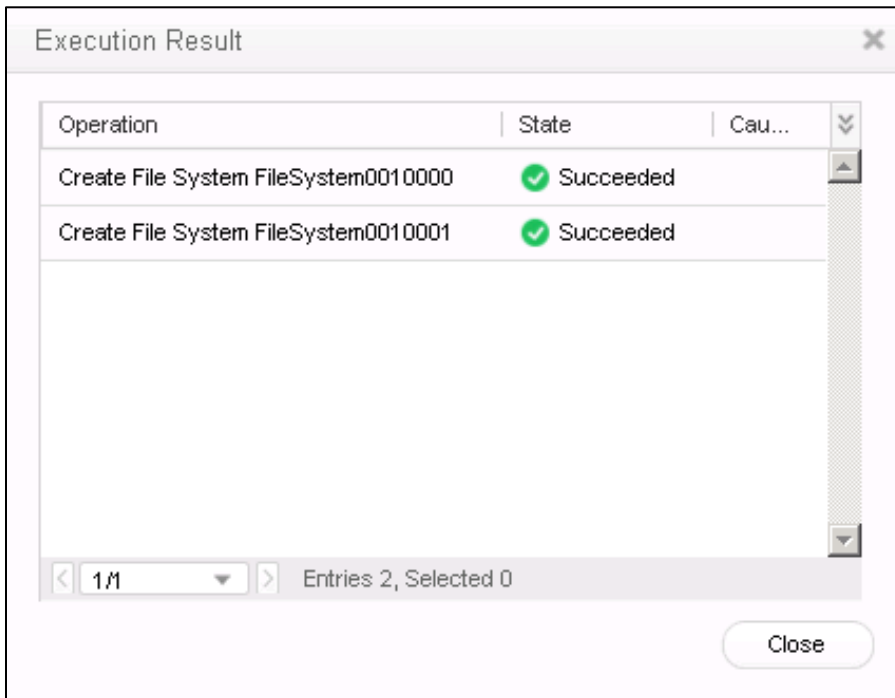
Use all the free capacity of the owning storage pool

File System Block Size: Applies to scenarios where the size of most files in the file system is larger than 1 GB.

* Quantity:
A maximum of 100 file systems can be created at a time. When creating multiple file systems, the storage system automatically appends a number to each file system name based on the number of file systems to be created for distinction.

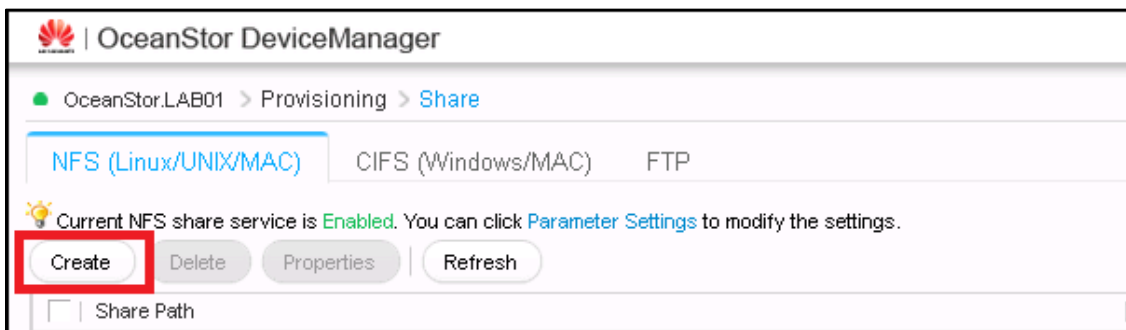
Owning Storage Pool:
Free Capacity 1.097 TB

Click "OK", the execution results dialog box will appear to indicate successful operation. Click "Close".



Step 3. Configure NFS Sharing

In OceanStor DeviceManager, choose "Provisioning" then click on "Share" under "File Storage Service". Click "Create" under the "NFS (Linux/UNIX/MAC)" tab.



In the “Create NFS Share Wizard” dialog box, choose the name of the file system that you wish to share under the “File System” option, other settings are optional.

Create NFS Share Wizard: Step 4-1

Set NFS
Select an NFS share path.

Select the file system that you want to share by clicking the browse button. If you want to share quota tree, select a file system and select the quota tree. Quota tree is a first-level subdirectory of the file system.

* File System: ...

Quota Tree: ...

Share Path:

Description:

Previous Next Cancel Help

Click “Next” to proceed, and to set the permissions, click on the “Add” button.

Create NFS Share Wizard: Step 4-2

Set Permissions
Assign the client the permission for the NFS share.

Client Information

<input type="checkbox"/>	Name	Type	Permission Level
No data			

Entries 0, Selected 0

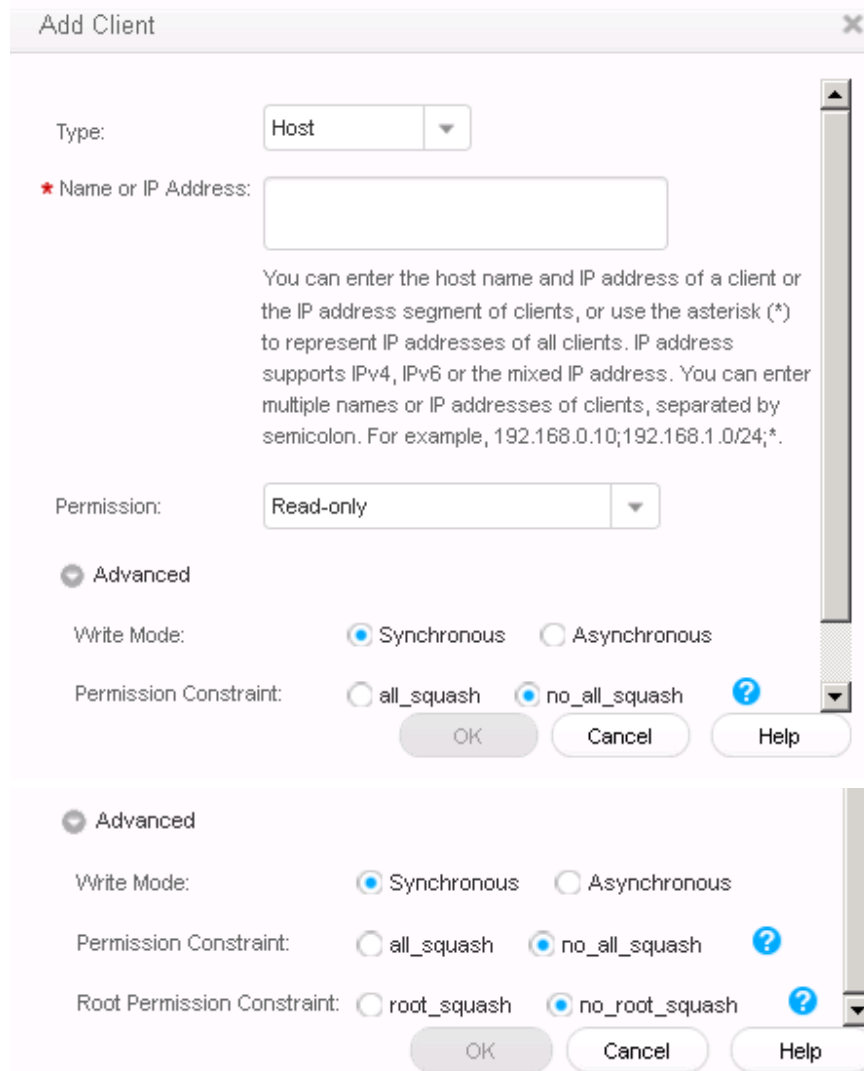
Add Remove Modify

Previous Next Cancel Help

You may choose either "Host" or "Network Group" in the "Type" option.

Choose the "Permission" based on user requirements.

In the "Advanced" dropdown menu, set the "Root Permission Constraint" as "no_root_squash", leave other settings at its default value. Click "OK".



Add Client

Type:

★ Name or IP Address:

You can enter the host name and IP address of a client or the IP address segment of clients, or use the asterisk (*) to represent IP addresses of all clients. IP address supports IPv4, IPv6 or the mixed IP address. You can enter multiple names or IP addresses of clients, separated by semicolon. For example, 192.168.0.10;192.168.1.0/24;*

Permission:

Advanced

Write Mode: Synchronous Asynchronous

Permission Constraint: all_squash no_all_squash ?

OK Cancel Help

Advanced

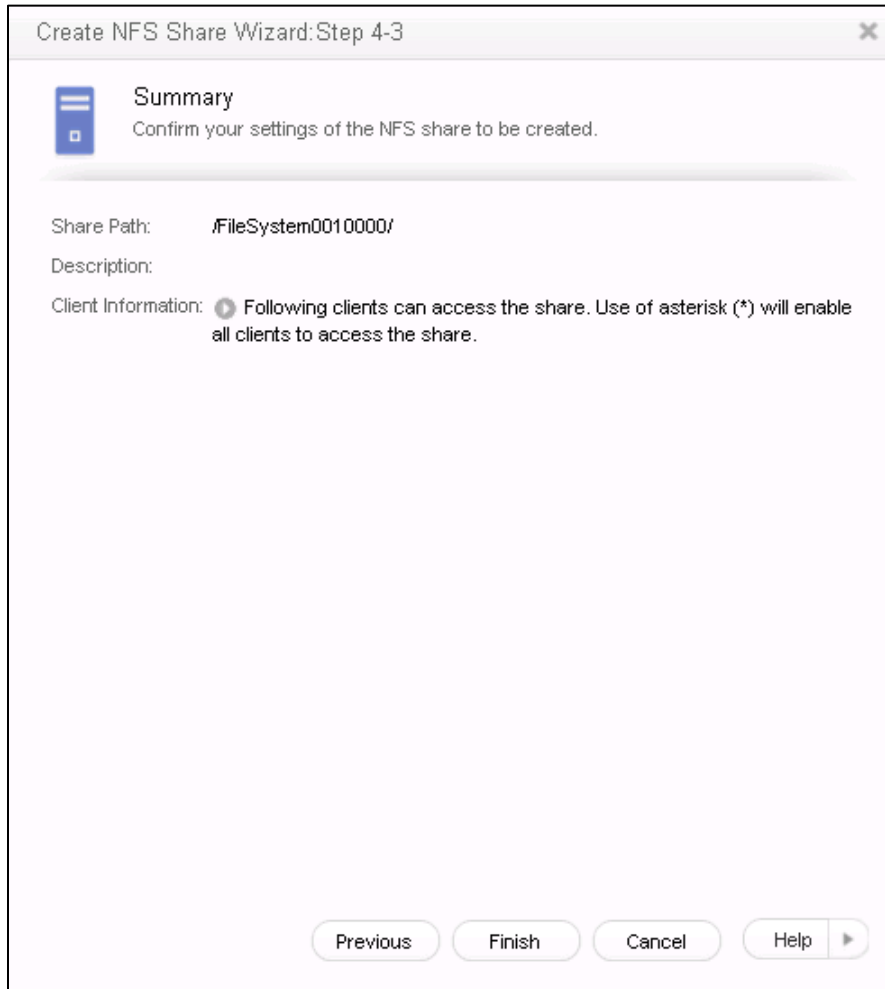
Write Mode: Synchronous Asynchronous

Permission Constraint: all_squash no_all_squash ?

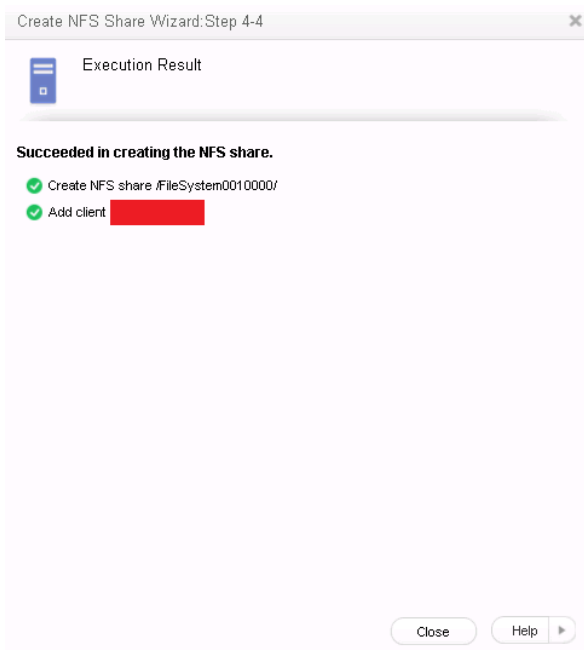
Root Permission Constraint: root_squash no_root_squash ?

OK Cancel Help

Click "Next", verify NFS share information on the "Summary" dialog box.

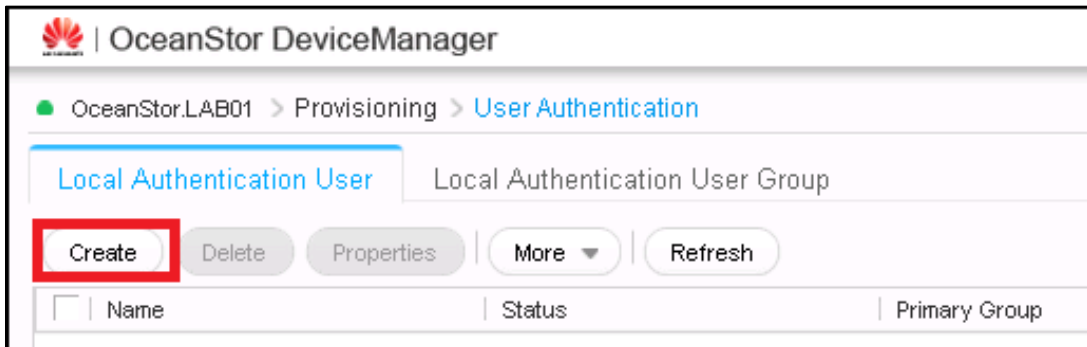


Click "Finish". The execution results dialog box will appear to indicate successful operation. Click "Close".



Step 4. Create Local Authentication Users

In OceanStor DeviceManager, choose "Provisioning" then click on "User Authentication" under "File Storage Service". Click "Create" under the "Local Authentication User" tab.

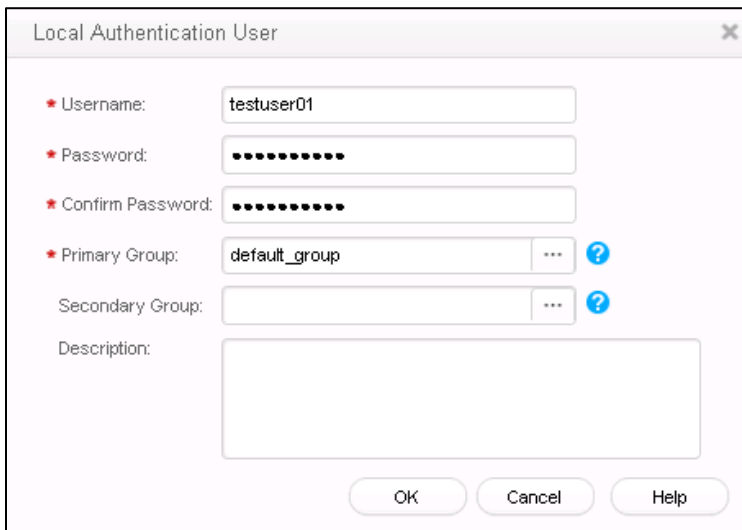


Key in "testuser01" in the "Username" field.

Set both the "Password" and "Confirm Password" field as "Huawei@123".

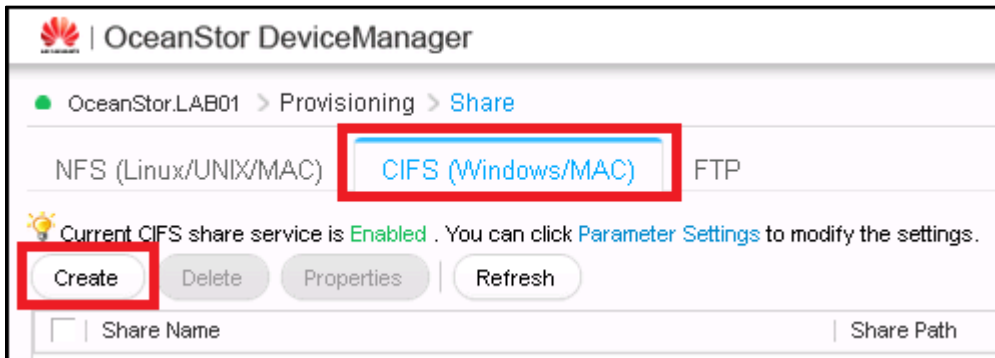
Choose "default_group" in the "Primary Group" option, you may also create your own primary group or choose the system default primary group.

Click "OK", and a success dialog box will appear to indicate successful operation in adding a local authentication user. Click "OK" to close the dialog box.



Step 5. Configure CIFS Sharing

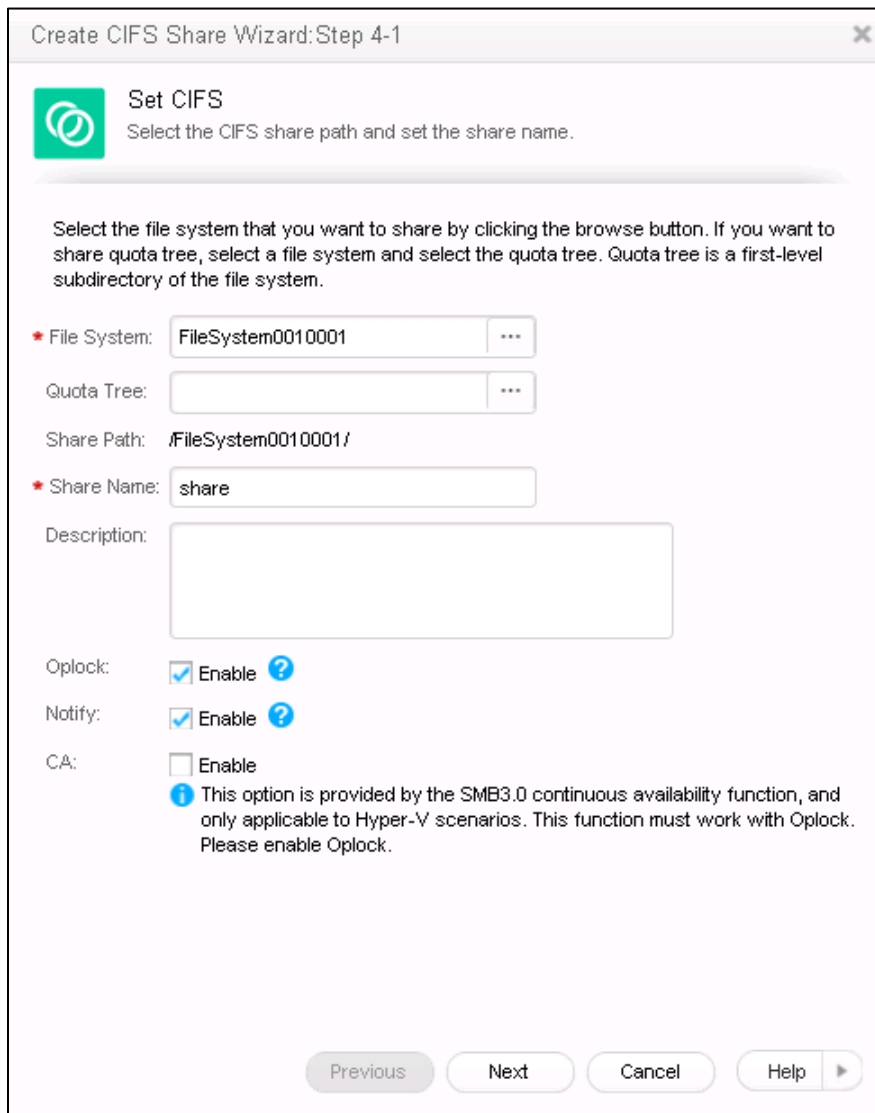
In OceanStor DeviceManager, choose "Provisioning" then click on "Share" under "File Storage Service". Click "Create" under the "CIFS (Windows/MAC)" tab.



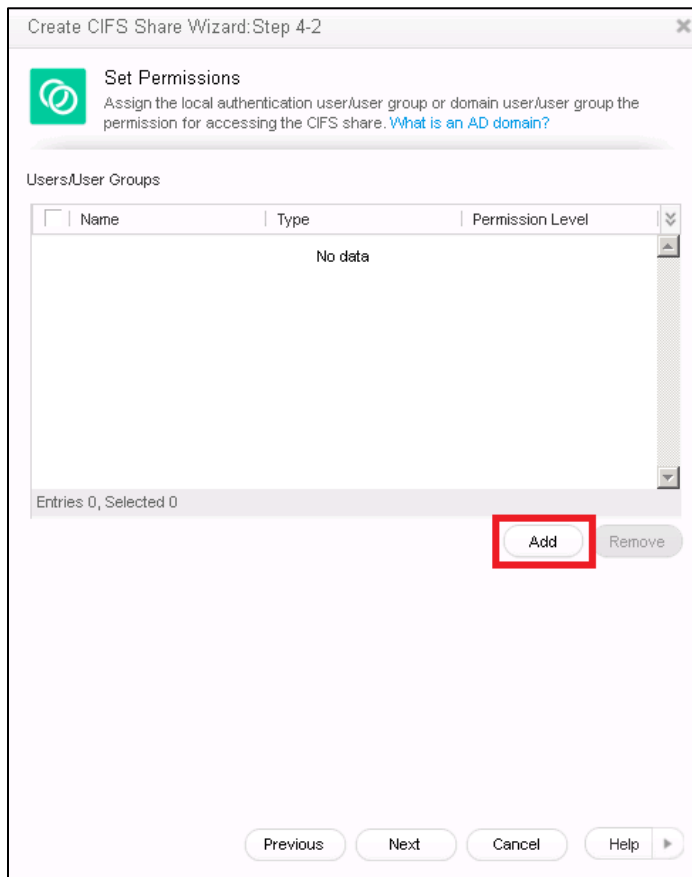
In the "Create CIFS Share Wizard", choose the file system that you want to share from the "File System" option.

Key in the "Share Name" as "share".

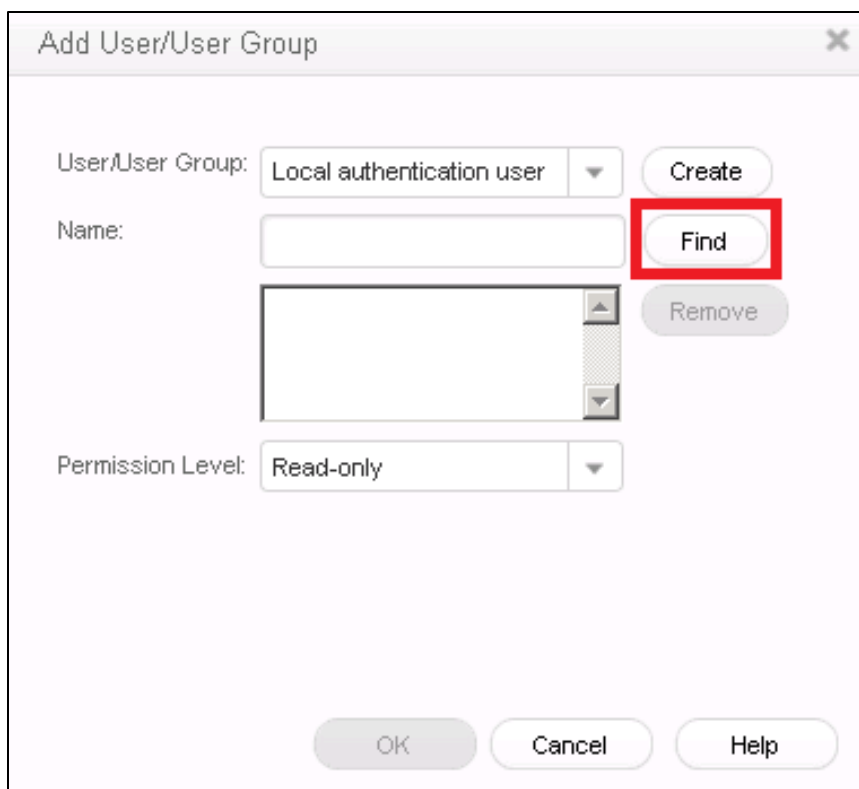
Leave other settings at its default value and click "Next".



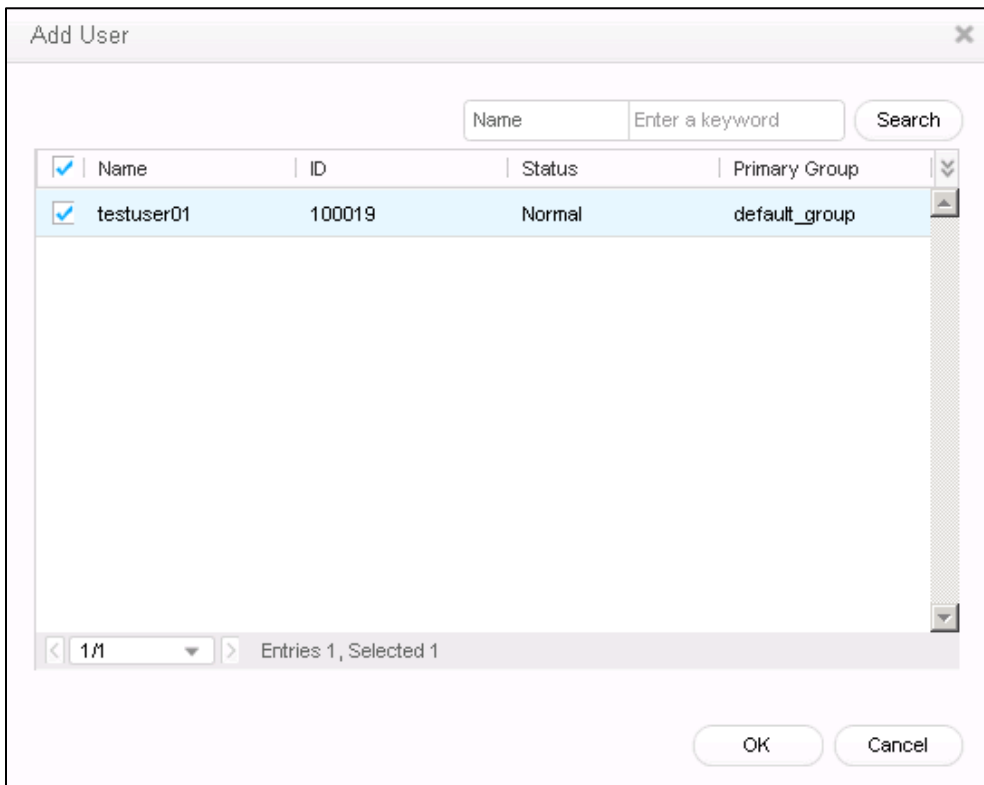
In the "Set Permission" screen, click the "Add" button to set the permission of the share.



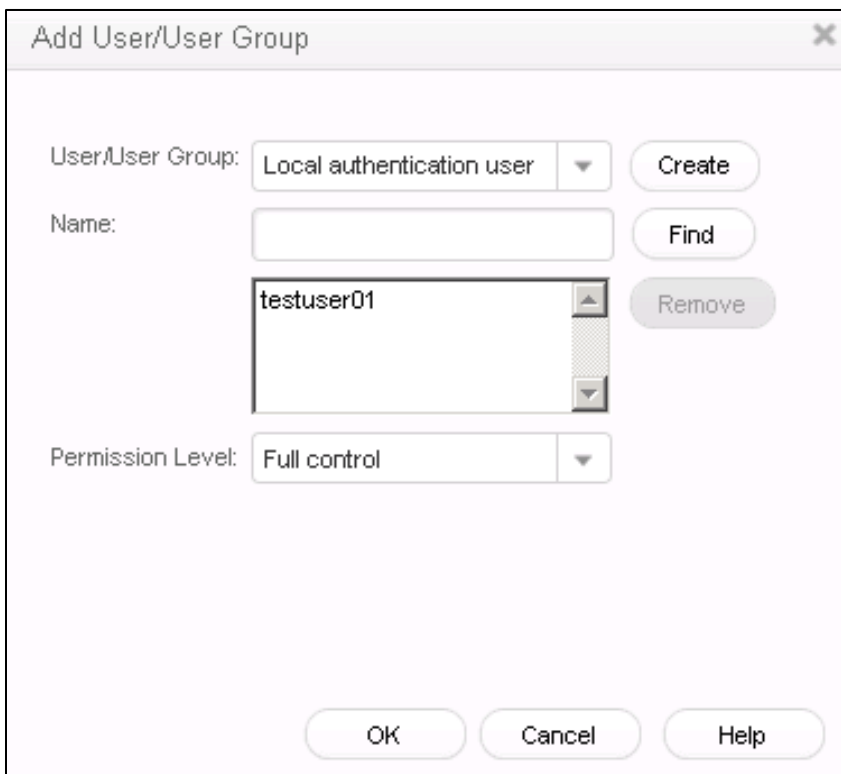
Click on the "Find" button.



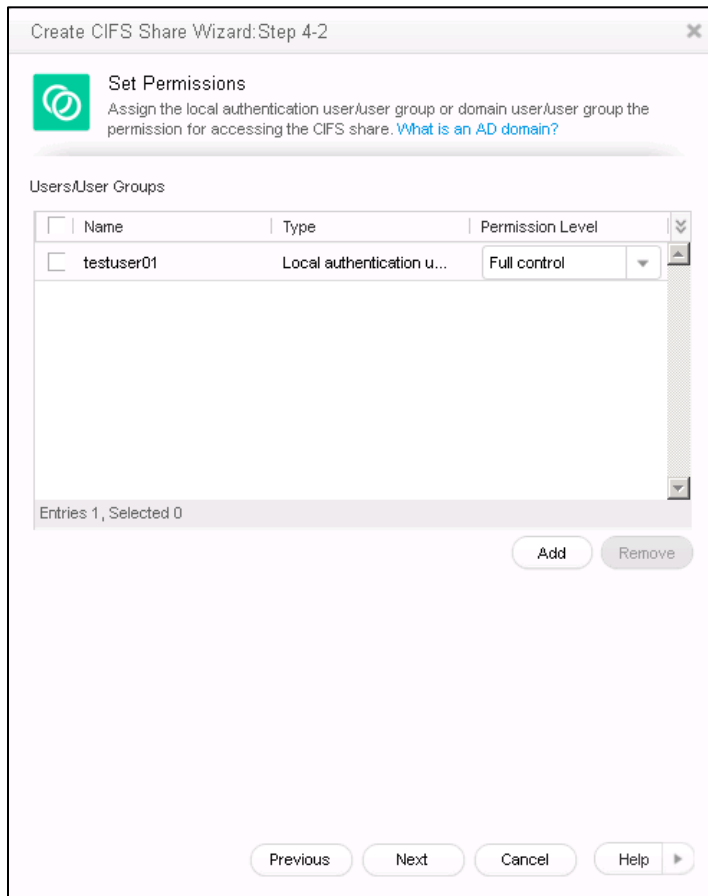
Click "OK" after selecting the available user from the list.



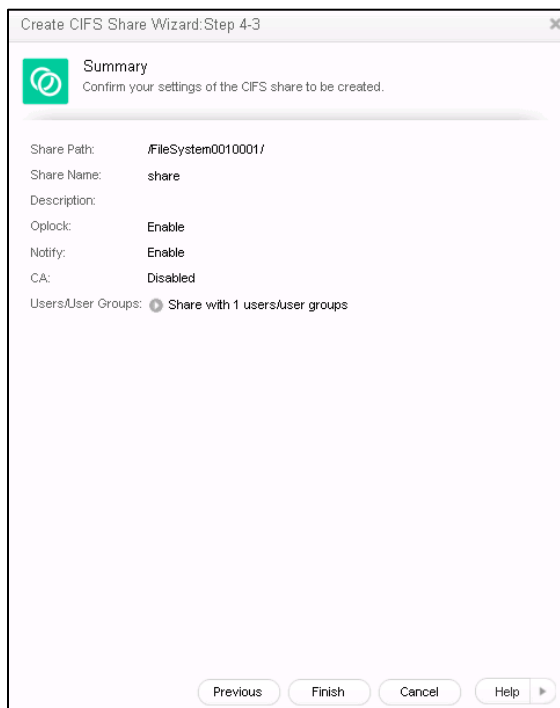
The following picture shows that the user is successfully added, set the "Permission Level" as "Full Control" and click "OK".



Check whether the user information exists in the “User/User Groups” list, then click “Next” to proceed.



Check if the information within the “Summary” is correct and then click “Finish”.

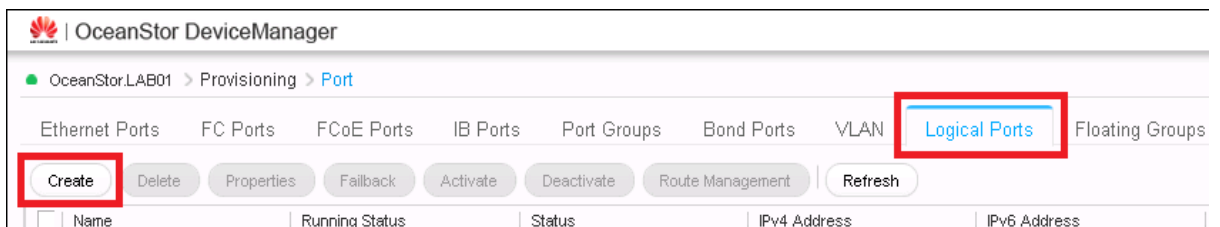


The following execution results shows that the CIFS Share creation is successful, click "Close".

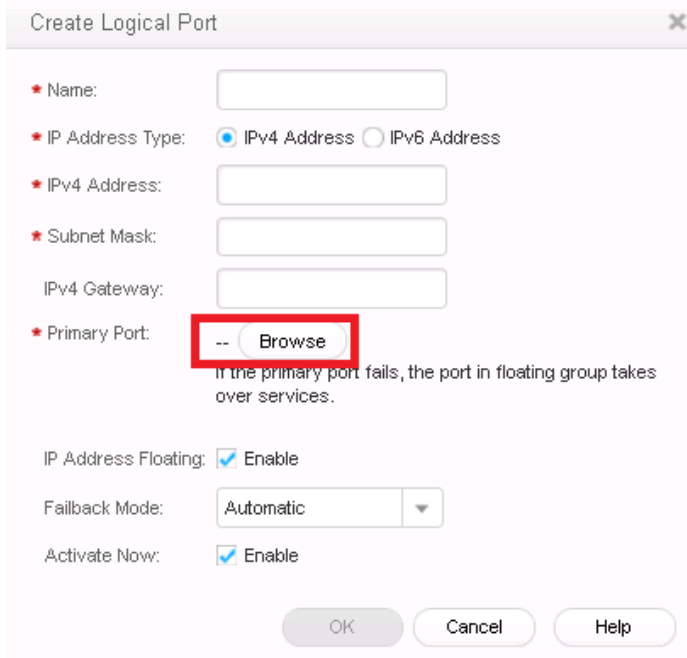


Step 6. Configure Logical Ports

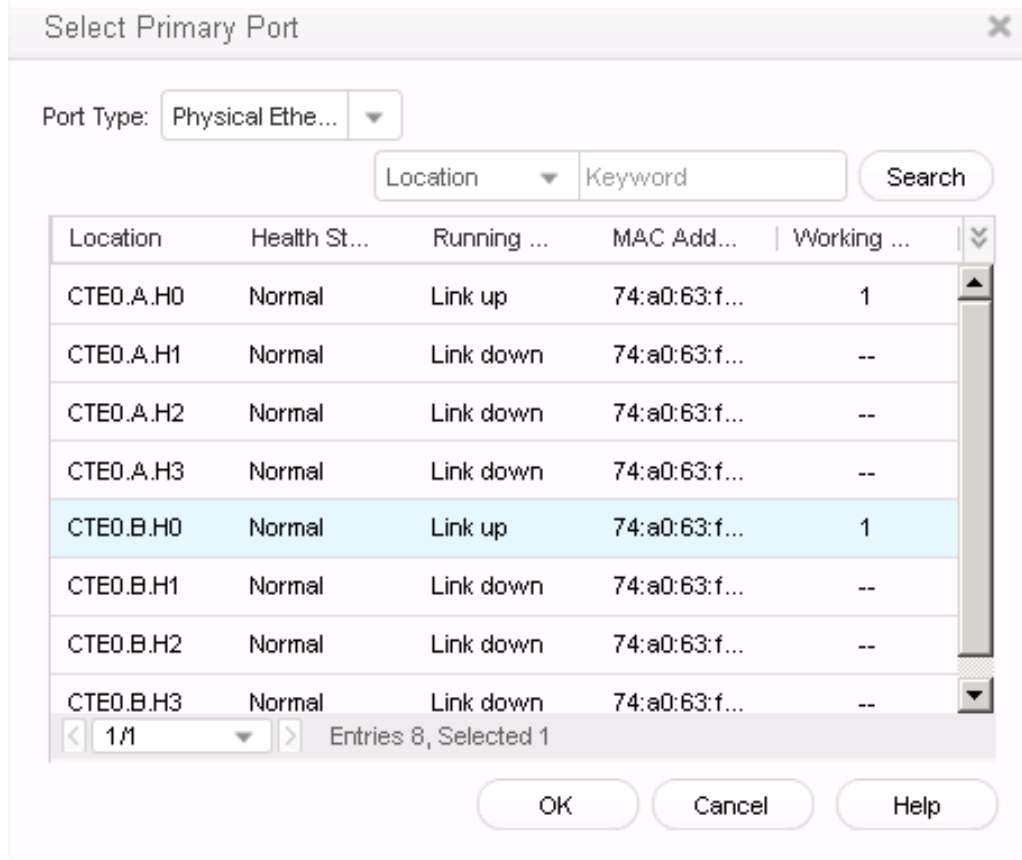
In OceanStor DeviceManager, choose "Provisioning > Port > Logical Ports", and click the "Create" button.



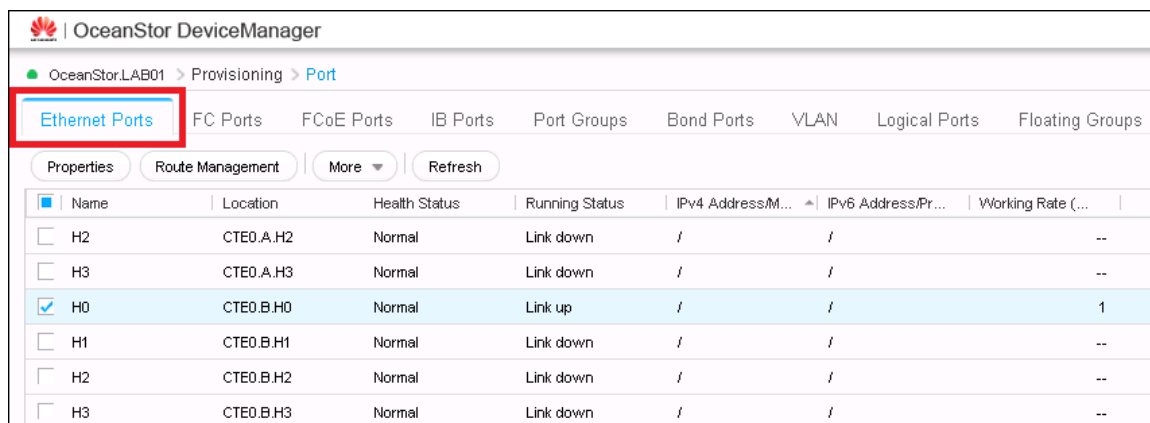
Key in all the relevant information marked with * asterisk, the IP address here are custom defined and should not conflict with other IP within the network. Click "Browse" to choose the "Primary Port" that handles the traffic for this logical port.



In the “Port Type”, you may choose “Physical Ethernet port”. Select the service network port that has not been configured with a service IP and shows “Link up” in its “Running Status”.



Note: You may check in the “Ethernet Ports” tab of the main ports management interface to see which service network ports have the “Link up” running status and has no IP address configured. For example, the network port CTE0.B.H0 as shown in the picture below:



Click "OK" after you have selected the valid "Primary Port".

Create Logical Port

* Name: huaweiport

* IP Address Type: IPv4 Address IPv6 Address

* IPv4 Address: [Redacted]

* Subnet Mask: [Redacted]

IPv4 Gateway: [Empty]

* Primary Port: CTE0.B.H0
If the primary port fails, the port in floating group takes over services.

IP Address Floating: Enable

Failback Mode: Automatic

Activate Now: Enable

Click "OK" on the success dialog box that appears to indicate successful operation.

Success

Operation succeeded.

9.3 Results Verification

9.3.1 Verification of the NFS Share

Prerequisite: The logical port on the storage array has been already configured. The shared directory can only be accessed through the logical ports.

Run the command: **showmount -e ipaddress** to check all the existing NFS shares within the storage system.

```
tc18167:~ # showmount -e [Redacted]  
Export list for [Redacted]:  
/FileSystem001 001 [Redacted]
```

Mounting the shared directory:

```
tc18167:~ # mkdir mnt
tc18167:~ # ls
.ICEauthority      .gconf             .local             .xsession-errors
.Xauthority        .gconfd           .nautilus          .xsession-errors.old
.bash_history      .gnome2           .pulse             Desktop
.config           .gnome2_private   .pulse-cookie      Documents
.dbus              .gnupg            .recently-used.xbel autoinst.xml
.dnrc              .gstreamer-0.10   .skel              bin
.esd_auth          .gvfs             .ssh               inst-sys
.exrc              .kbd              .viminfo           mnt
```

Run the command: **mount -t nfs -o vers=*n*,proto=*m*,rsize=*o*,wsize=*p*,hard,intr,timeo=*q* ipaddress:filesystem /mnt** to mount the NFS shared file system. (Change the word “ipaddress” here to the actual IP address of the storage array)

Explanation:

vers is the NFS protocol version, replace **n** with either 3 or 4 based on actual scenario.

NFS v4 sharing protocol may cause service interruption during single controller switchover, thus it is recommended to use NFS v3 in high reliability environment scenarios.

proto is the transmission protocol method, choose either **tcp** or **udp** based on actual scenario.

rsize is the size of the transmission block during read operation, the unit is byte, the recommended value is “1048576”, and the recommended value for Redhat 7 is “16384”.

wsize is the size of the transmission block during write operation, the unit is byte, the recommended value is “1048576”.

timeo is the timeout period, the unit is in milliseconds, and the recommended value is “50”.

filesystem is the path for the NFS share that was created in the storage system.

Example: `mount -t nfs -o vers=3,proto=tcp,rsize=16384,wsize=1048576,hard,intr,timeo=50 "IP Address":FileSystem001_001 /mnt`

```
tc18167:~ # mount -t nfs -o vers=3,proto=tcp,rsize=16384,wsize=1048576,hard,intr,timeo=50
:/FileSystem001_001 /mnt
```

Run the **mount** command to verify whether the NFS shared file system is mounted to the local system.

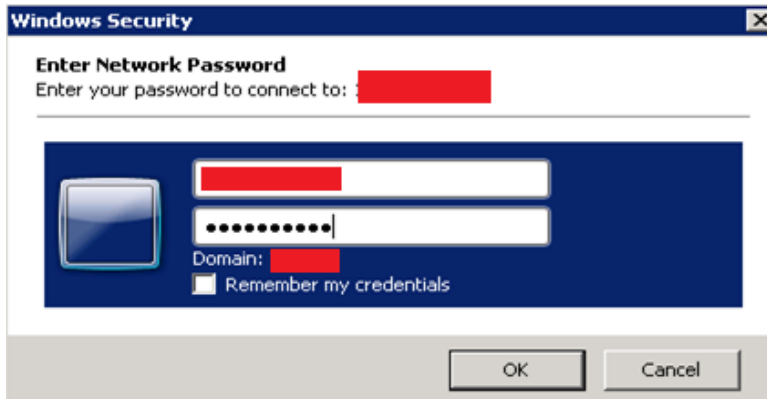
```
tc18167:~ # mount
/dev/sda2 on / type ext3 (rw,acl,user_xattr)
proc on /proc type proc (rw)
sysfs on /sys type sysfs (rw)
devtmpfs on /dev type devtmpfs (rw,mode=0755)
tmpfs on /dev/shm type tmpfs (rw,mode=1777)
devpts on /dev/pts type devpts (rw,mode=0620,gid=5)
fusectl on /sys/fs/fuse/connections type fusectl (rw)
securityfs on /sys/kernel/security type securityfs (rw)
:/FileSystem001_001 on /mnt type nfs (rw,vers=3,proto=tcp,rsize=16384,wsize=1048576,hard,intr,timeo=50,addr=
tc18167:~ #
```

At the end of the lab, please delete all the data within the mounted directory, and unmounts the shared directories. You may use the **umount** command or reboot the system to complete the unmounting procedure.

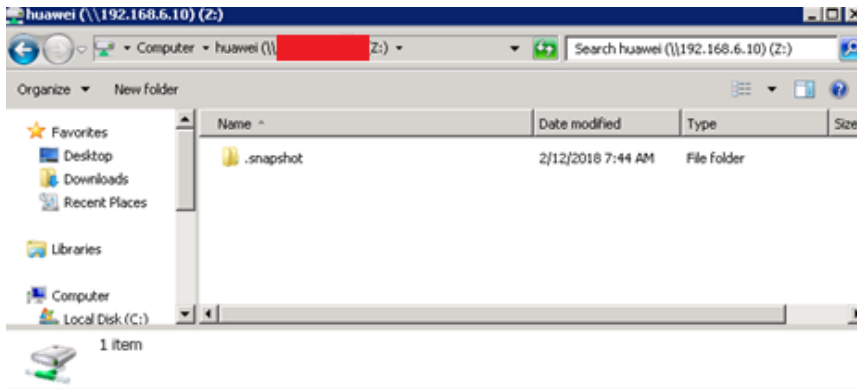
9.3.2 Verification of CIFS Share

Prerequisite: The logical port on the storage array has been already configured. The shared directory can only be accessed through the logical ports.

Open "Windows Explorer", key in [\\IP Address](#) at the address bar and click "Enter". Key in the local authentication username and password to access the share.



If the following window is shown where the shared directory is accessible, then the share creation is successful.



9.4 Configuration Reference

Please refer to the configuration steps.

9.5 Questions

Does NFS Share supports authentication using user name and password?

—End of Lab 9.

10 SmartQuota Configuration and Usage

10.1 Lab Introduction

10.1.1 Lab Objective

This lab helps you to configure quota in file services, we will create a quota tree and quota, activate and delete a quota tree, modify and delete quotas.

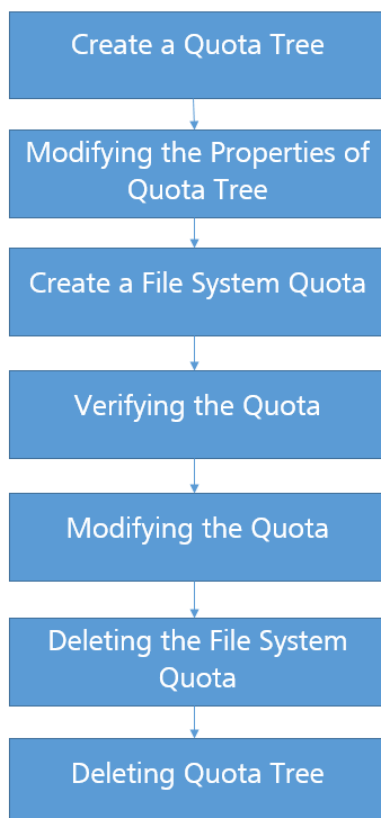
10.1.2 Networking and Service Description

The networking is the same as the NAS networking in Lab 9.

Restrict the amount of data that can be written in a certain file system through the configuration and usage of SmartQuota.

10.2 Lab Configuration Task

10.2.1 Configuration Roadmap

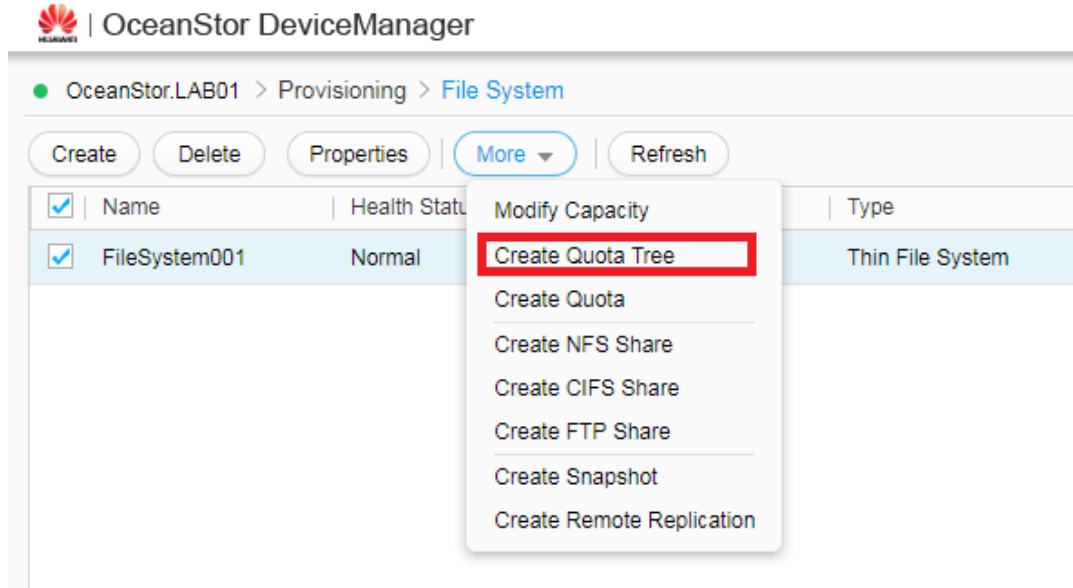


10.3 Configuration Steps

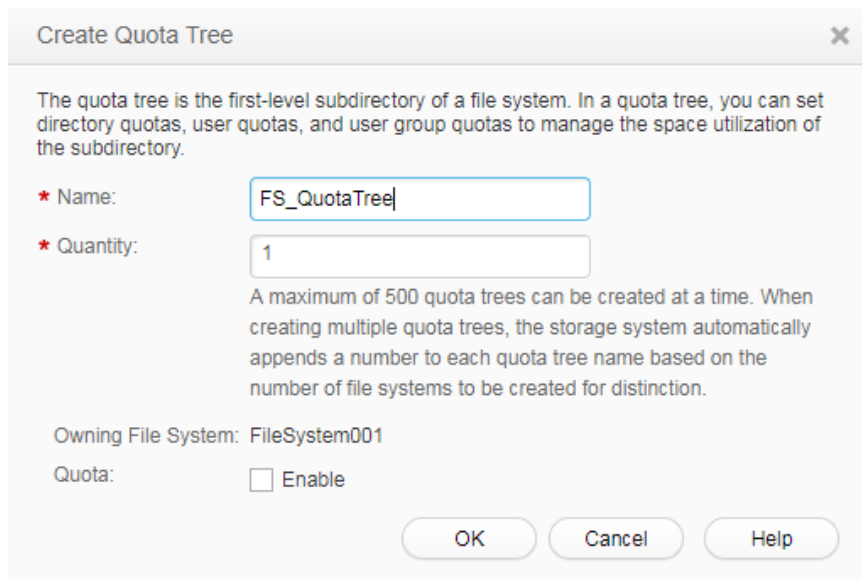
Step 1. Create a Quota Tree

Before beginning this lab, create a file system called "FileSystem001".

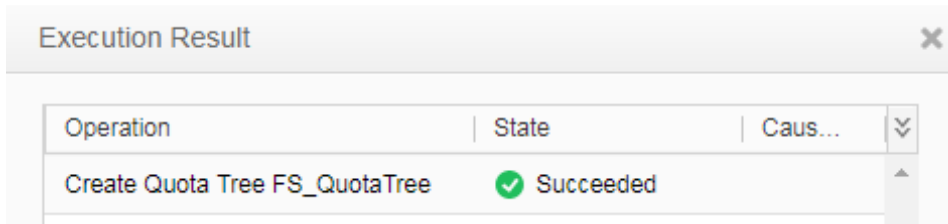
In OceanStor DeviceManager, choose "Provisioning > File System" then select the file system that you wish to create quota tree on, click "More > Create Quota Tree".



In the "Create Quota Tree" dialog box that appears, key in the "Name" and "Quantity", do not choose "Enable" and click "OK".

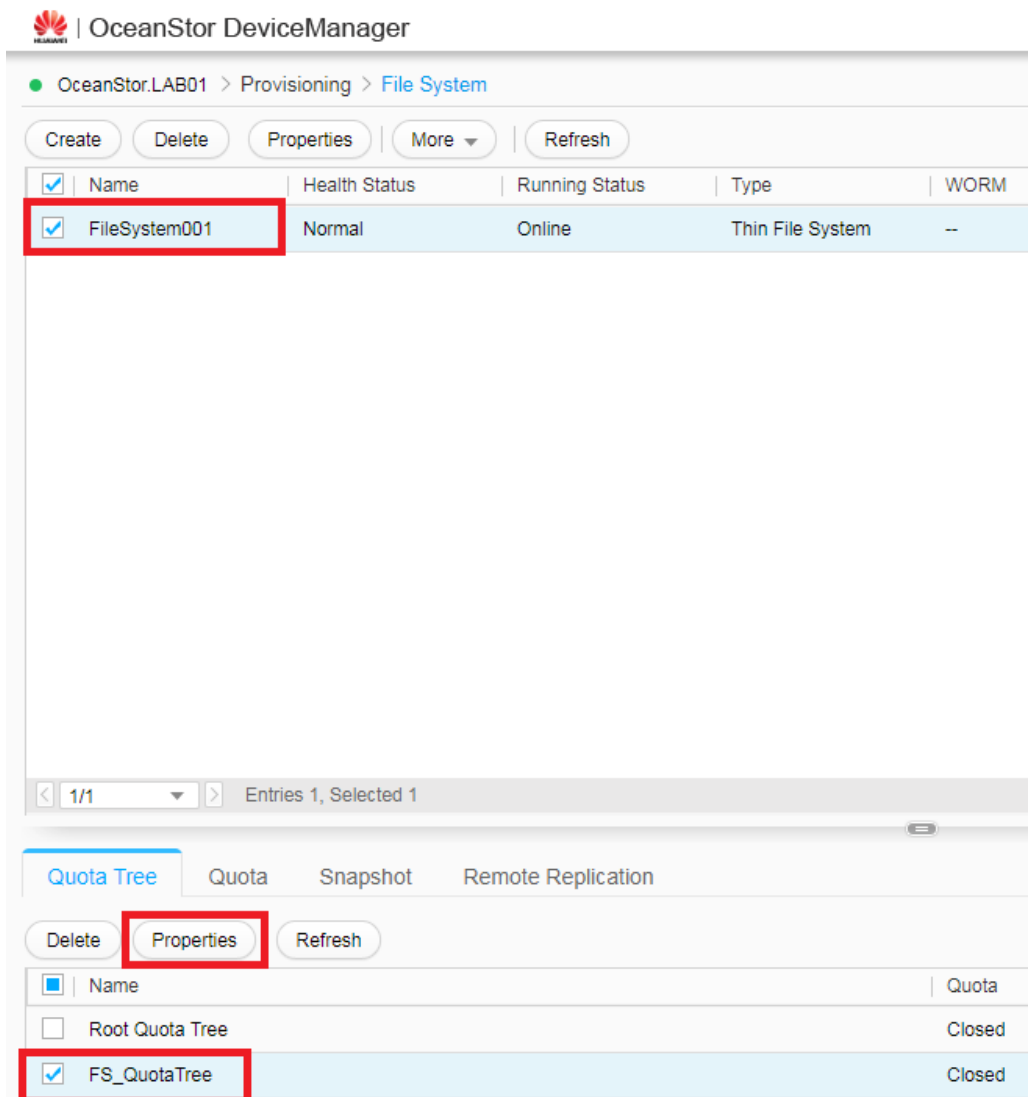


The execution result dialog box will appear to indicate successful operation.

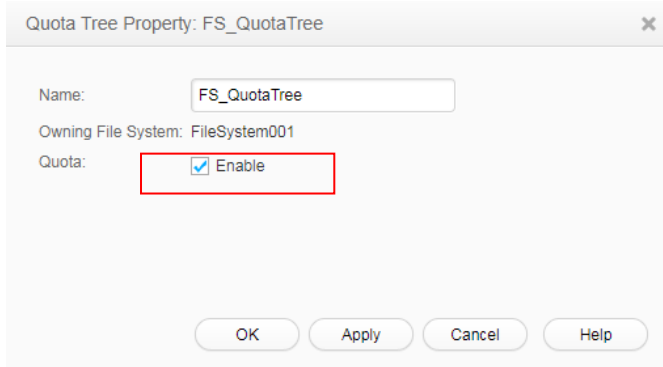


Step 2. Modifying the Properties of Quota Tree

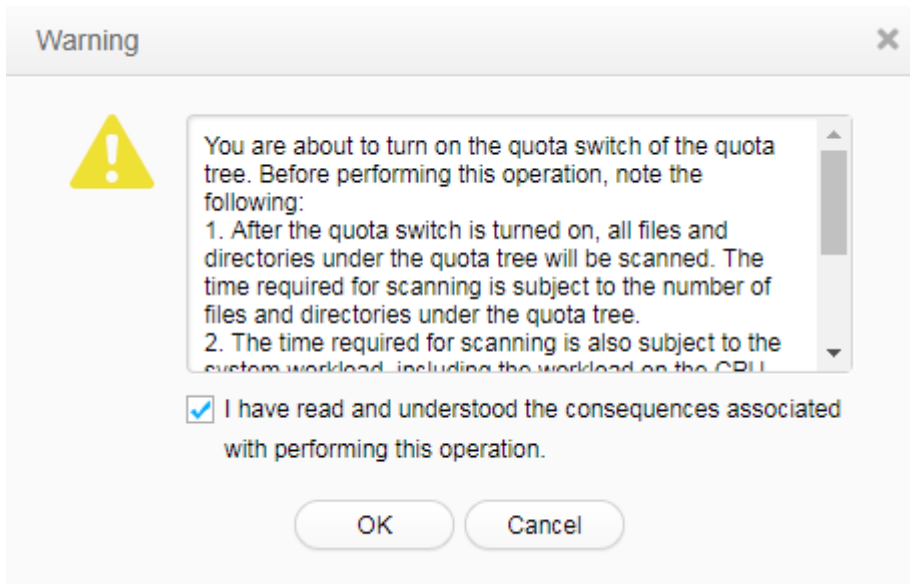
In OceanStor DeviceManager, choose "Provisioning > File System" then select the file system that you wish to modify the quota tree. In the detailed information region below, click on the "Quota Tree" tab and select the quota tree that you wish to modify, then click the "Properties" button.



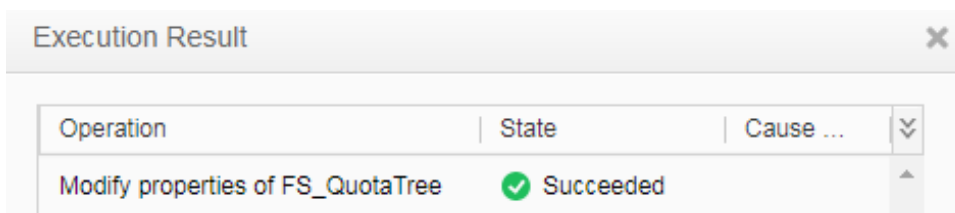
In the “Quota Tree Property” dialog box that appears, tick on “Enable” and click “OK”



A warning dialog box will appear, read the contents carefully and tick “I have read and understood the consequences associated with performing this operation” to confirm the operation and click “OK”.

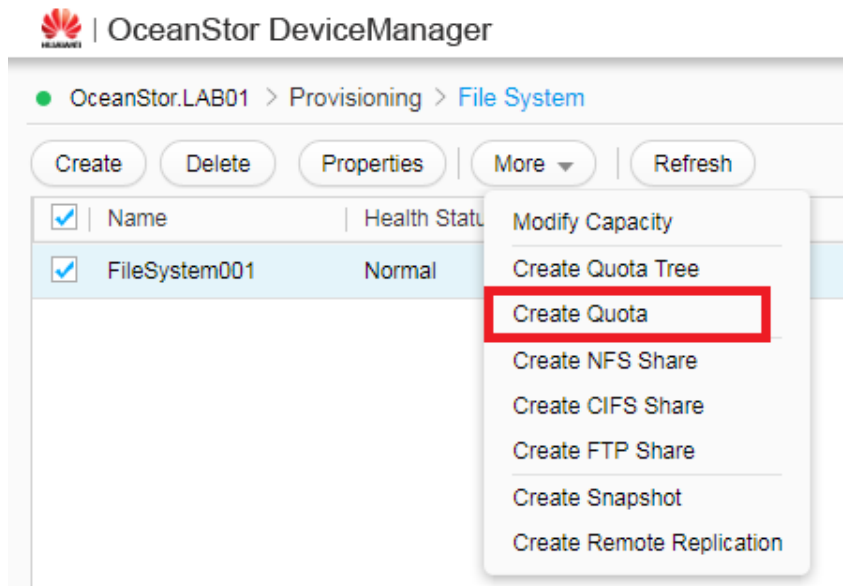


The execution result dialog box will appear to indicate successful operation.

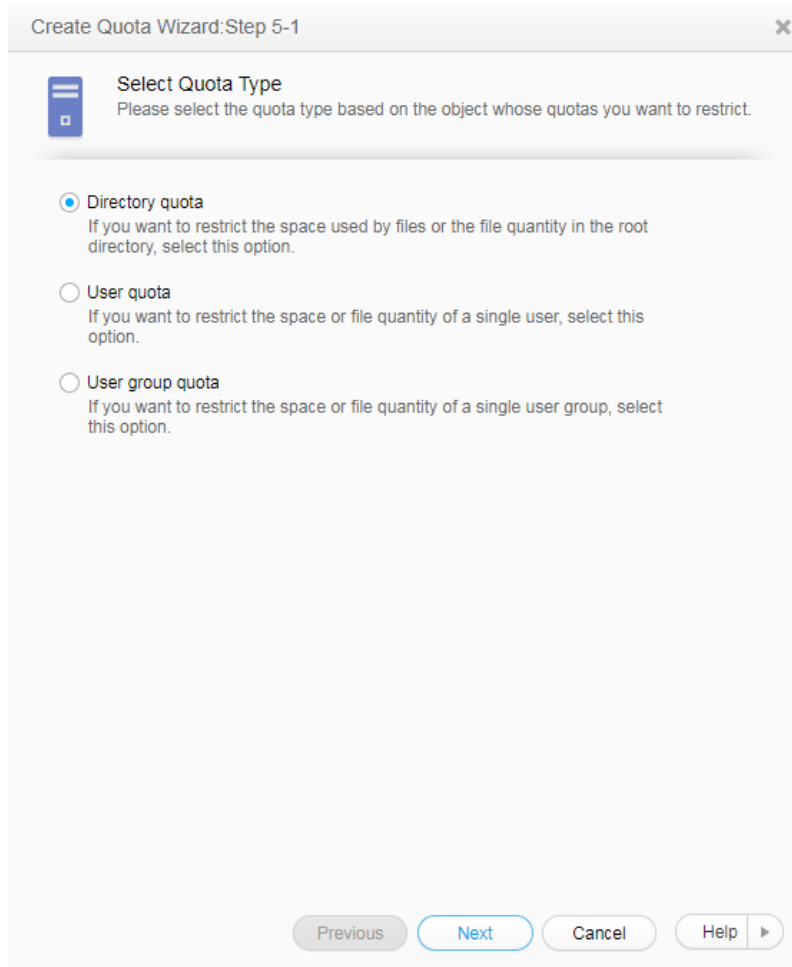


Step 3. Create a File System Quota

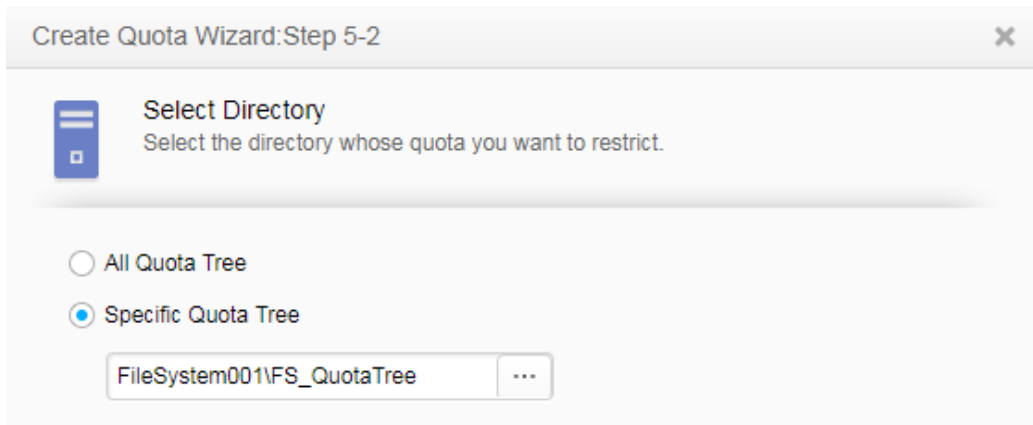
Login to OceanStor DeviceManager, choose "Provisioning > File System" then select the file system that you wish to create quota, click "More > Create Quota".



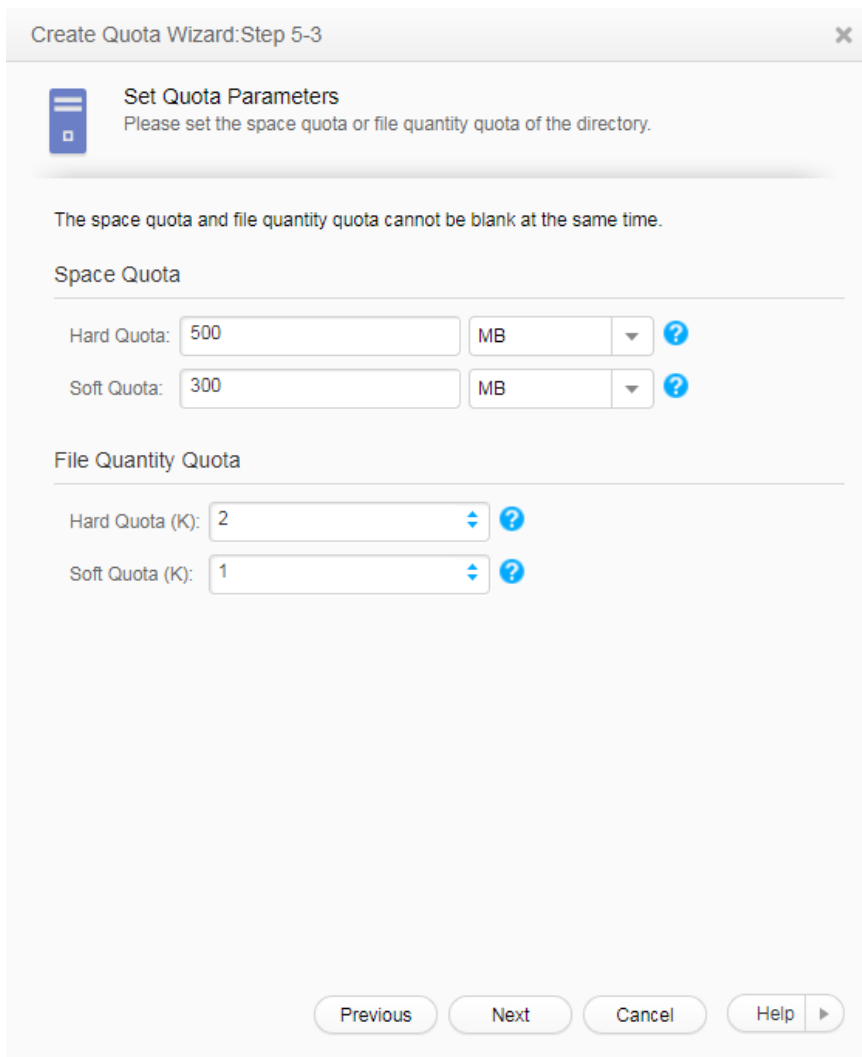
In the "Create Quota Wizard", choose "Directory Quota" in the select quota type interface and click "Next".



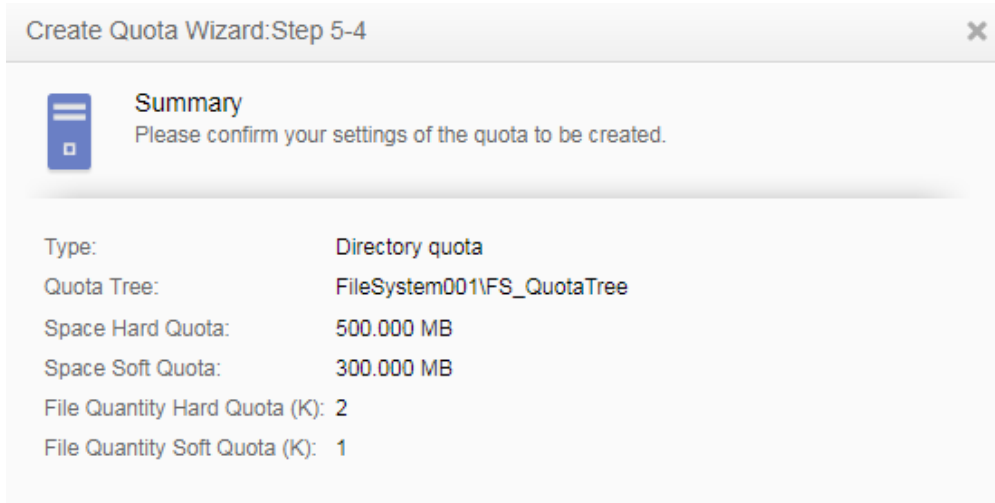
In the “Select Directory” interface, choose the quota tree that you created earlier in the “Specific Quota Tree” option and click “Next”.



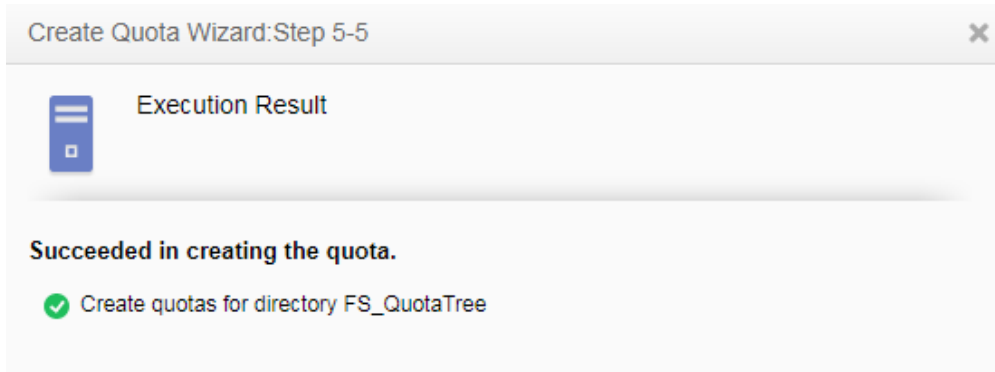
Set the “Hard Quota” as 500MB, “Soft Quota” as 300MB within the “Space Quota” section, and set “Hard Quota (K):” as 2 and “Soft Quota(K):” as 1 within the “File Quantity Quota” section. Click “Next” to proceed.



Confirm all the quota information within the “Summary” dialog box and click “Finish”.

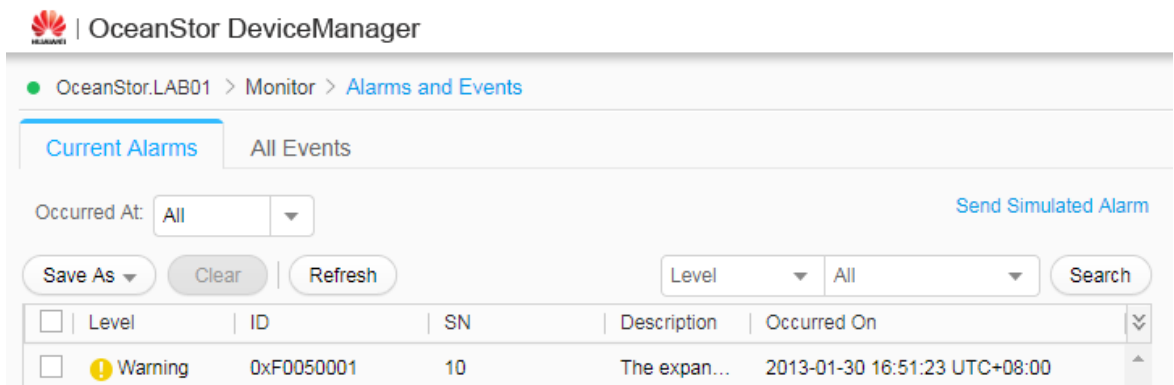


The execution result dialog box will appear to indicate successful operation.

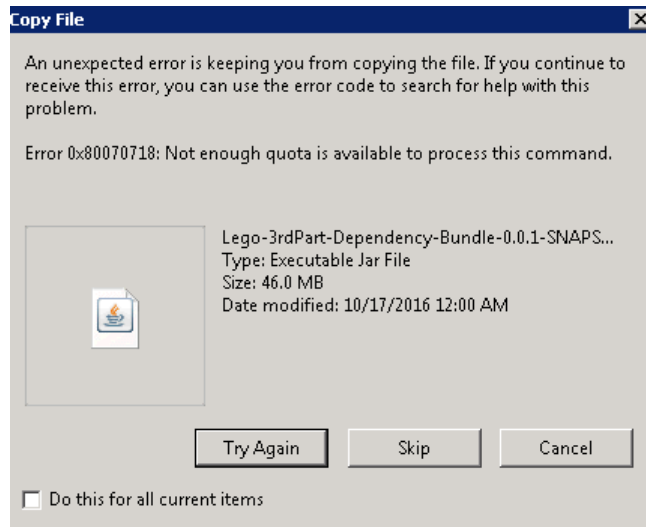


Step 4. Verifying the Quota

Copy some files to the FS_QuotaTree directory, when the file size exceeds the configured soft quota of 300MB, the OceanStor DeviceManager system will send out a major warning.

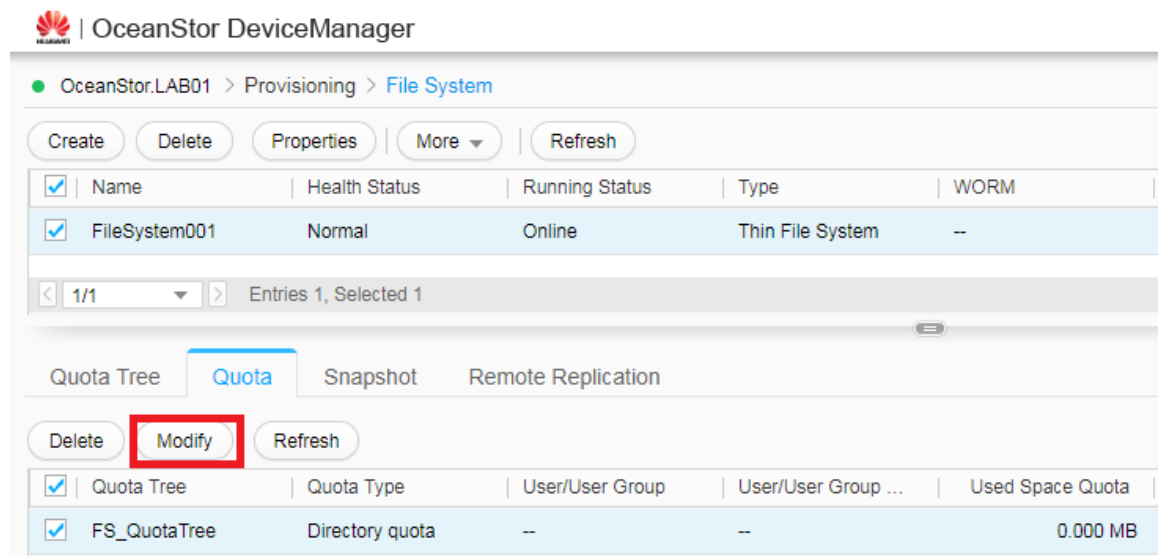


When the size of the copied data exceeds the hard quota, the Windows operating system will show an error: 0x80070718: Not enough quota is available to process this command.

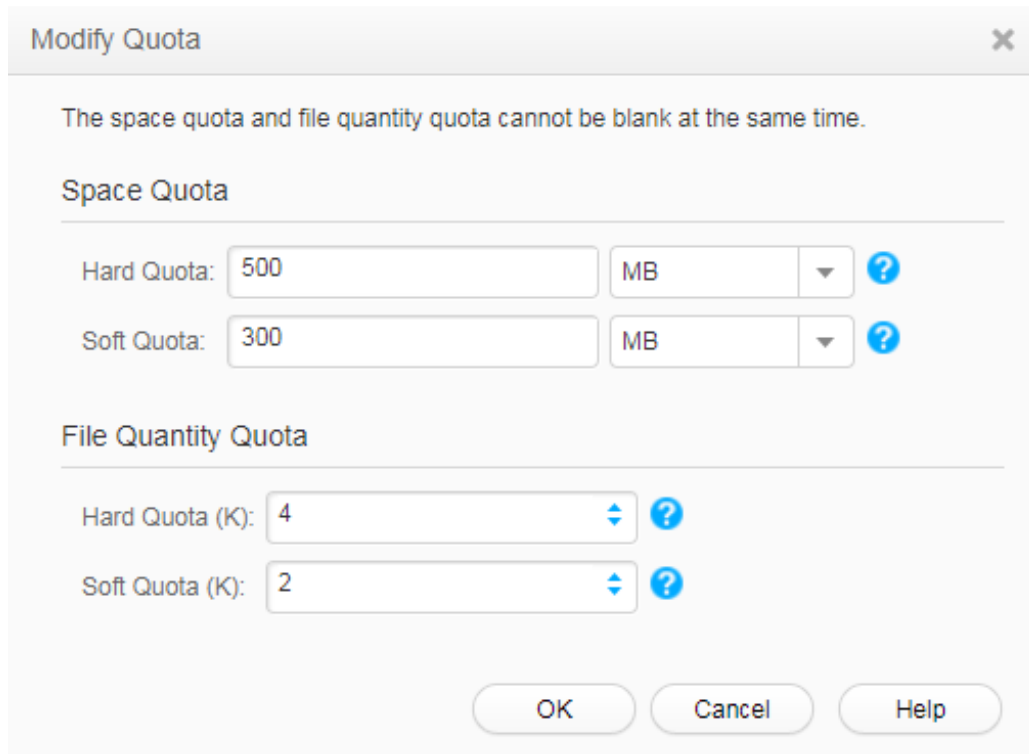


Step 5. Modifying the Quota

In OceanStor DeviceManager, choose "Provisioning > File System" then select the file system that you wish to modify the quota. In the detailed information region below, click on the "Quota" tab and select the quota that you wish to modify its properties, then click the "Modify" button.



In the "Modify Quota" dialog box that appears, change the "Hard Quota (K)" as 4 and "Soft Quota (K)" as 2, then click "OK".



Modify Quota

The space quota and file quantity quota cannot be blank at the same time.

Space Quota

Hard Quota: 500 MB

Soft Quota: 300 MB

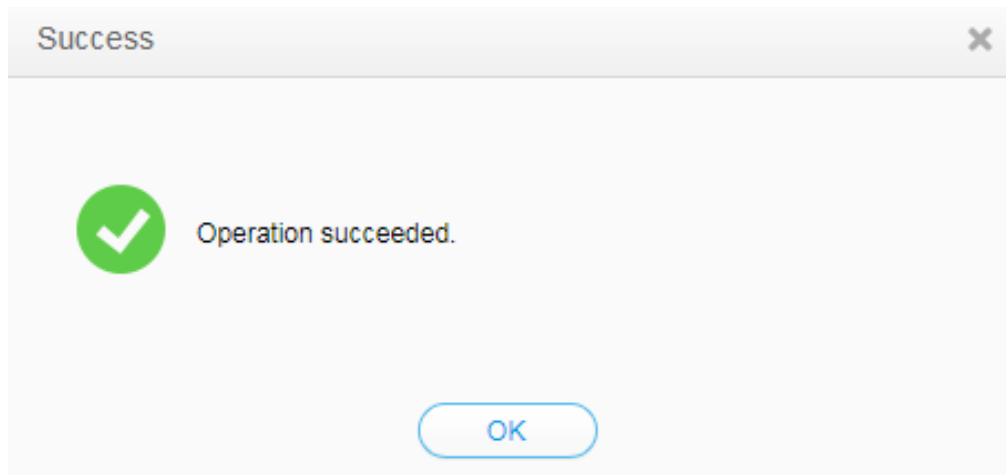
File Quantity Quota

Hard Quota (K): 4

Soft Quota (K): 2

OK Cancel Help

The success dialog box will appear to indicate successful operation.



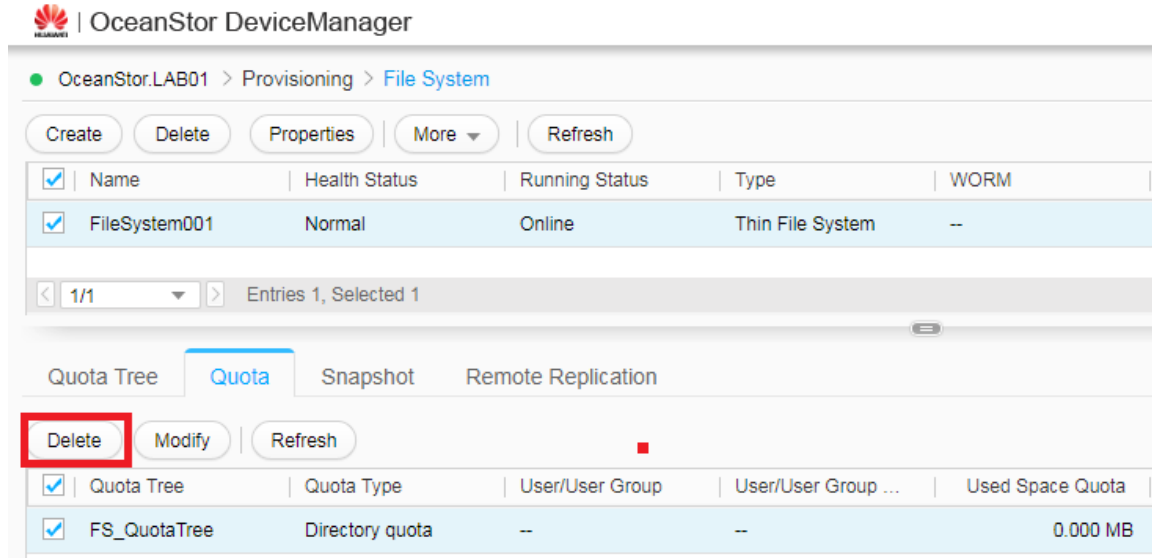
Success

Operation succeeded.

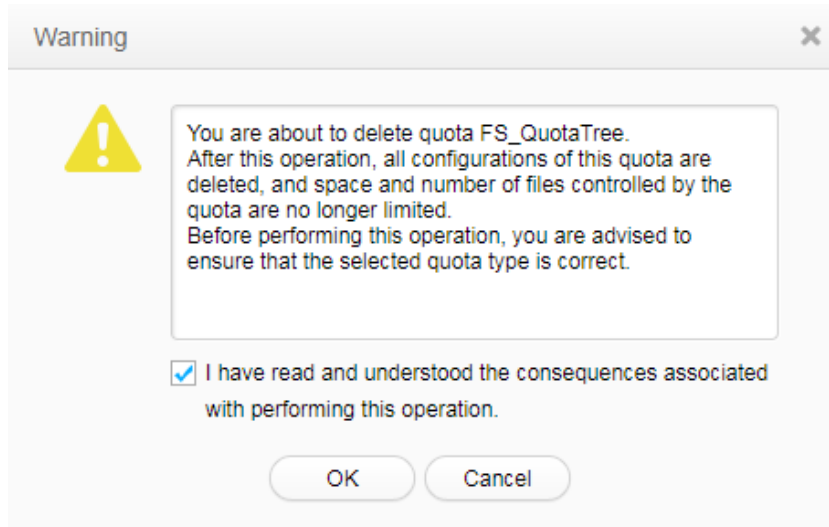
OK

Step 6. Deleting File System Quota

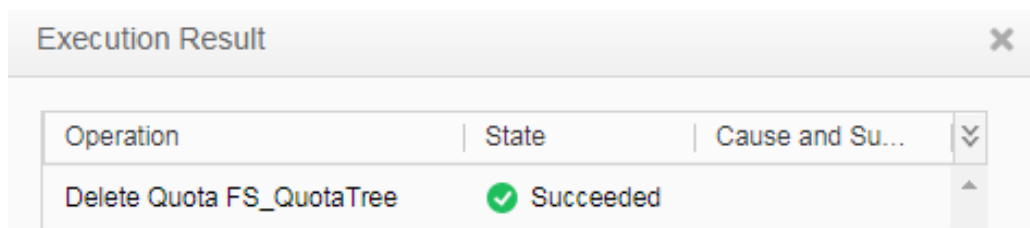
In OceanStor DeviceManager, choose "Provisioning > File System" then select the file system that you wish to delete the quota. In the detailed information region below, click on the "Quota" tab and select the quota that you wish to delete, then click the "Delete" button.



A warning dialog box will appear, read the contents carefully and tick "I have read and understood the consequences associated with performing this operation" to confirm the operation and click "OK".

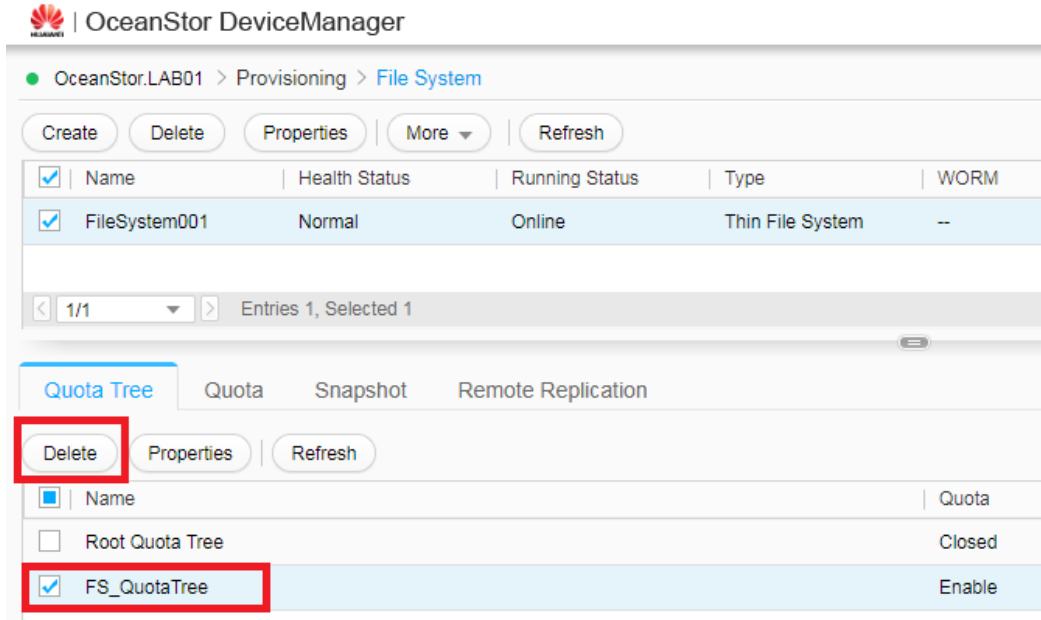


The execution result dialog box will appear to indicate successful operation.

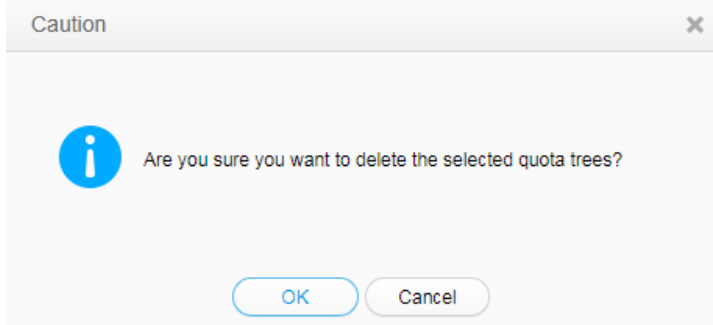


Step 7. Deleting Quota Tree

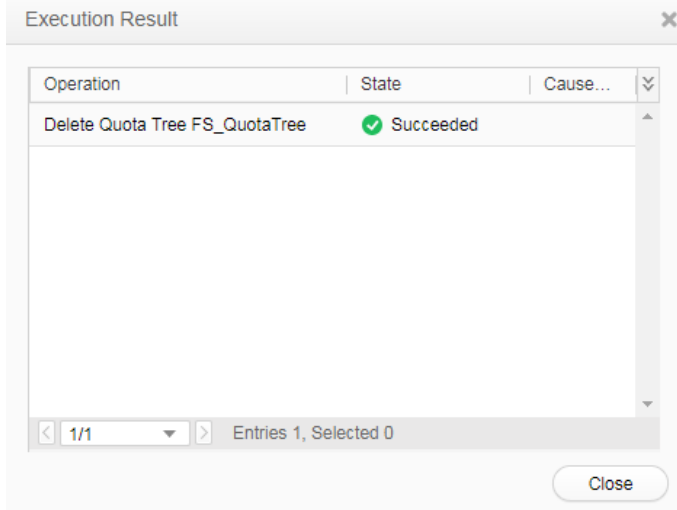
In OceanStor DeviceManager, choose "Provisioning > File System" then select the file system that you wish to delete the quota tree. In the detailed information region below, click on the "Quota Tree" tab and select the quota tree that you wish to delete, then click the "Delete" button.



Click "OK" on the caution dialog box that appears to proceed.



The execution result dialog box will appear to indicate successful operation



10.4 Results Verification

Please refer to the quota verification process shown in Step 4.

10.5 Configuration Reference

Please refer to the configuration steps.

10.6 Questions

If SmartQuota generated an alarm, how do you handle and clear the alarm?

—End of Lab 10.

11 HyperSnap (FS) Configuration and Usage

11.1 Lab Introduction

11.1.1 Lab Objective

This lab allows you to grasp the knowledge of snapshot operation in file systems (FS) and achieve data recovery through implementation of snapshots in file systems.

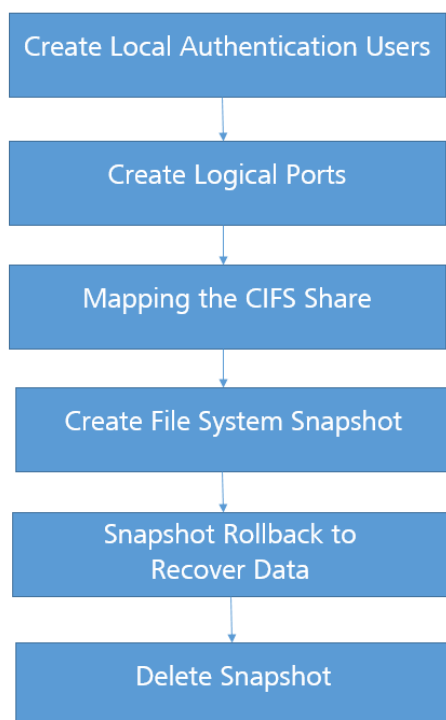
11.1.2 Networking and Service Description

The networking is the same as the NAS networking in Lab 9.

Understand snapshot operation and its functions by creating snapshots of mapped file system (FS) that contains data, perform snapshot rollback after deleting the data, and observe the effects of snapshot rollback, and perform snapshot activation and deletion operation

11.2 Lab Configuration Tasks

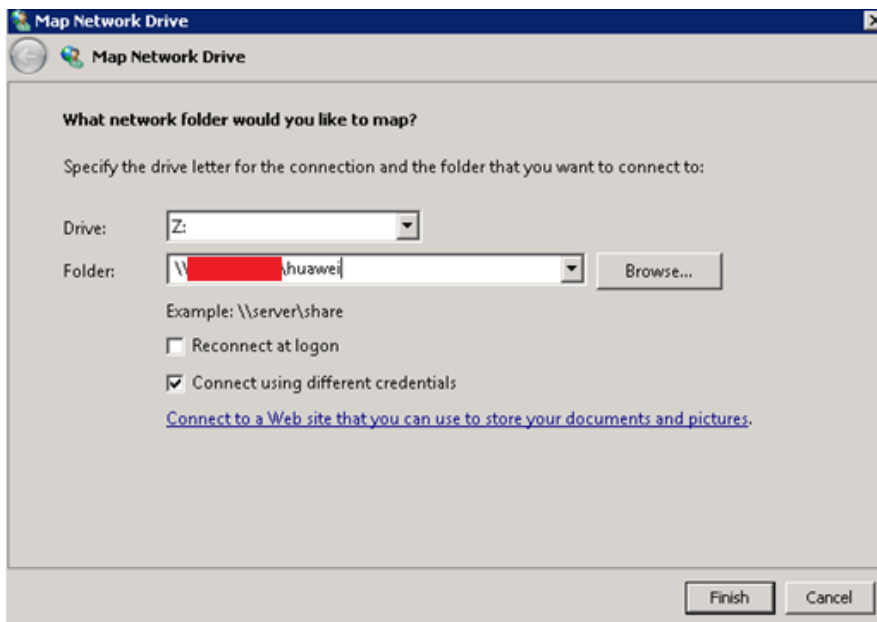
11.2.1 Configuration Roadmap



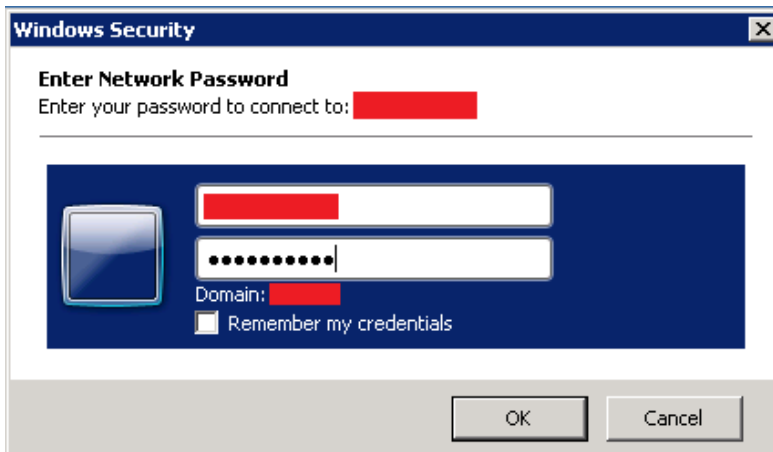
11.2.2 Configuration Steps

Step 1. Mapping the CIFS Share

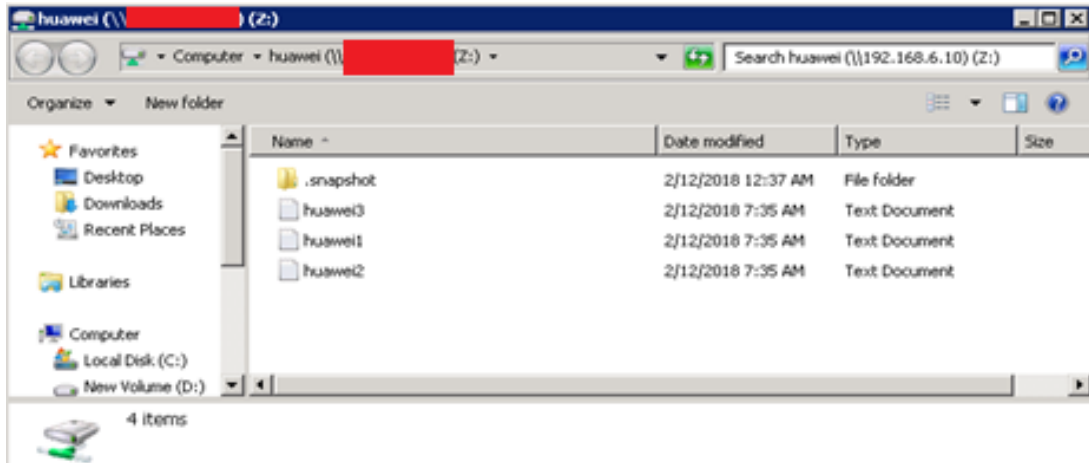
In the Windows client, right click "Computer", choose "Map network drive", key in the path for the shared directory in the "Folder" field and choose "Connect using different credentials". The format for the folder path is in the form of "\\logical ip address\sharename". The logical ip address refers to the logical port IP which was previously configured during the CIFS share lab, meanwhile the sharename refers to the name of the CIFS share that was previously configured. Click "Finish"



In the "Windows Security" dialog box, key in the local user authentication username and password that was previously configured in the storage system and click "OK".

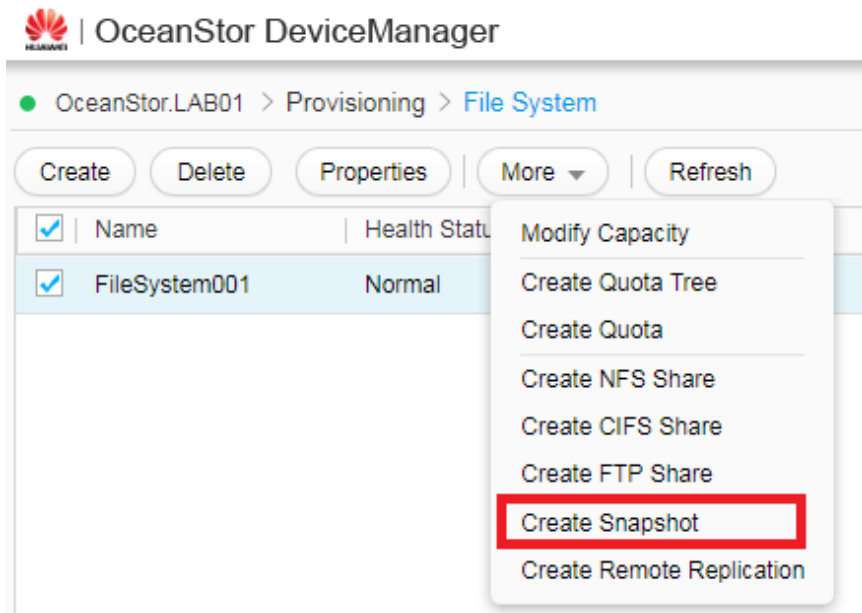


Open the CIFS shared directory using Windows Explorer, and create 3 files within the directory.

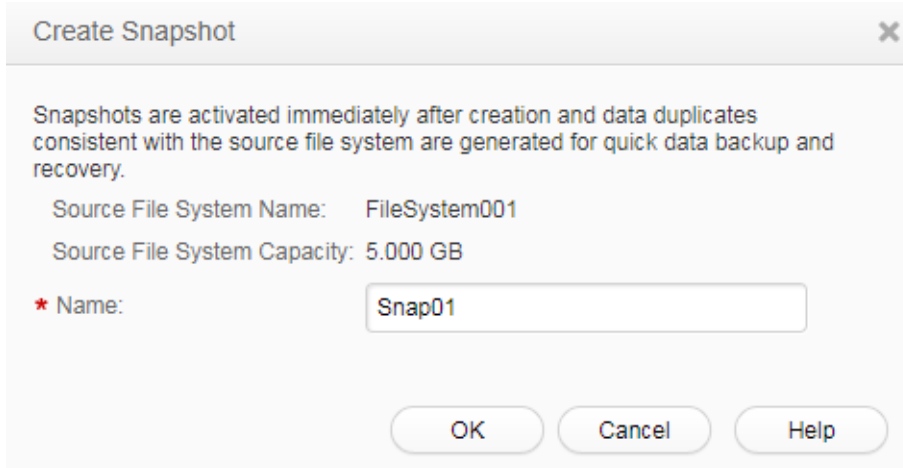


Step 2. Create File System Snapshot

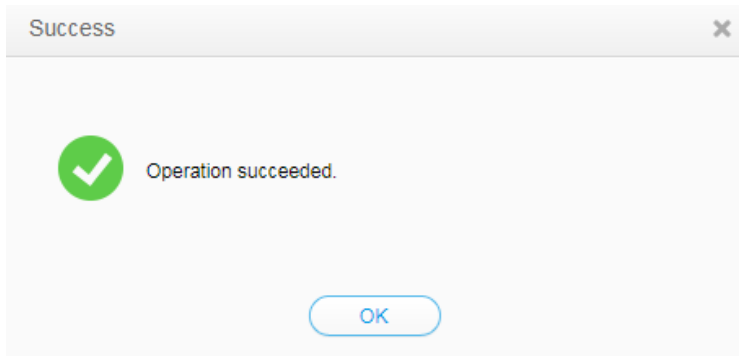
In OceanStor DeviceManager, choose "Provisioning > File System", choose the file system that you wish to create a snapshot for, click "More > Create Snapshot" in the menu.



In the "Create Snapshot" dialog box, key in the "Name" of the snapshot, and click "OK".

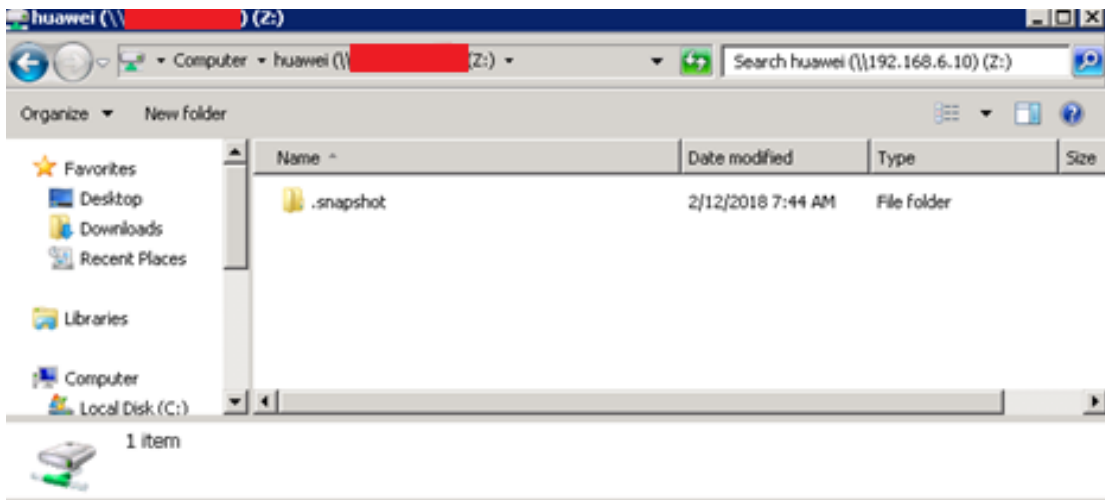


The success dialog box will appear to indicate successful operation.

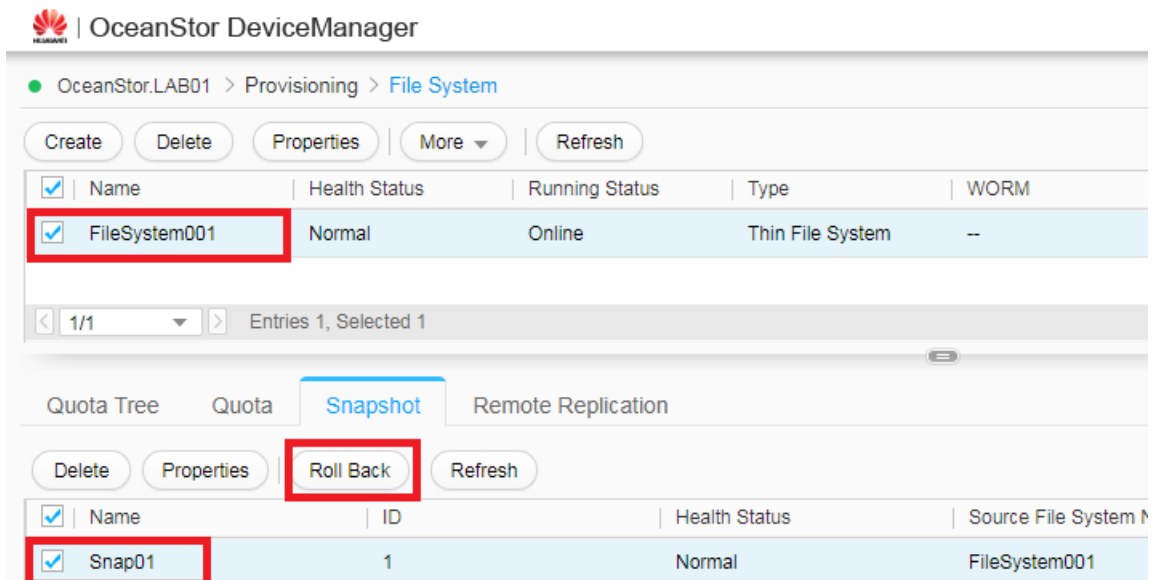


Step 3. Snapshot Rollback to Recover Data

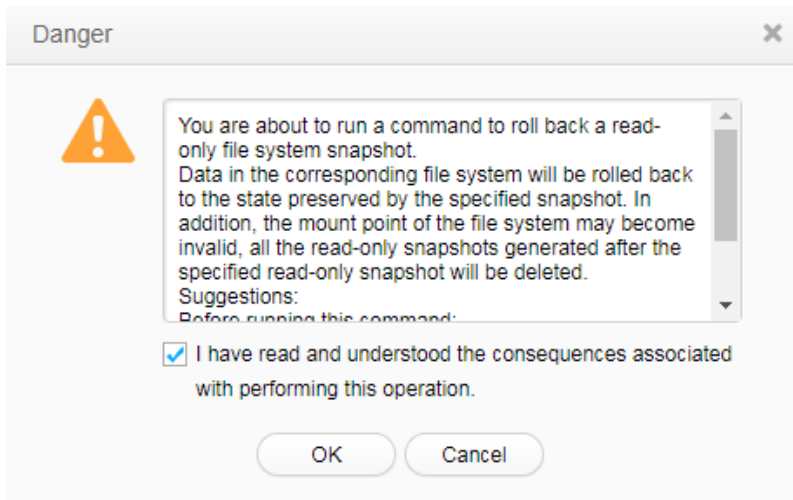
After creating the snapshot, delete some of the data within the mapped CIFS share.



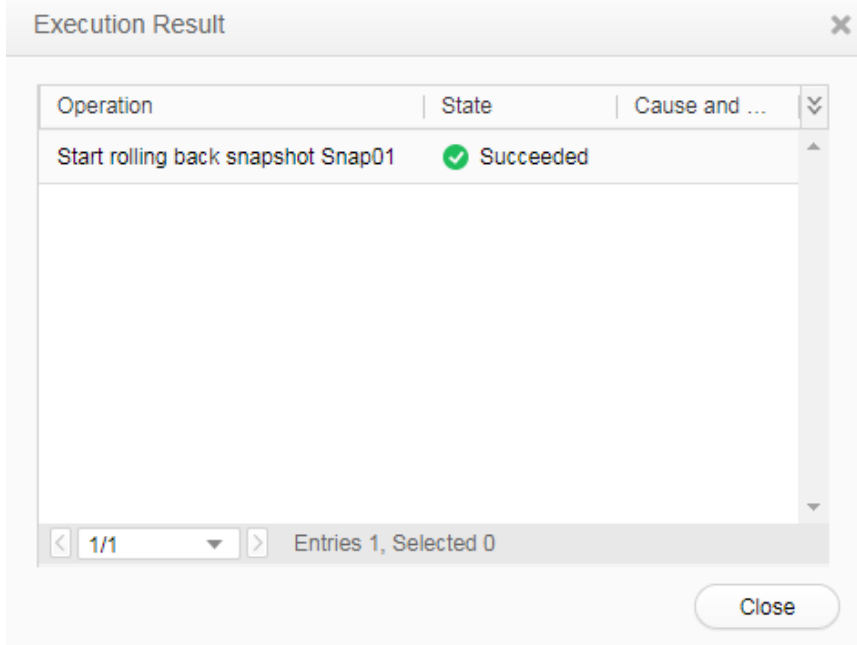
In OceanStor DeviceManager, choose "Provisioning > File System", choose the file system that you wish to perform snapshot rollback, click on the "Snapshot" tab in the information panel below, choose the snapshot that that you wish to rollback, and then click "Roll Back".



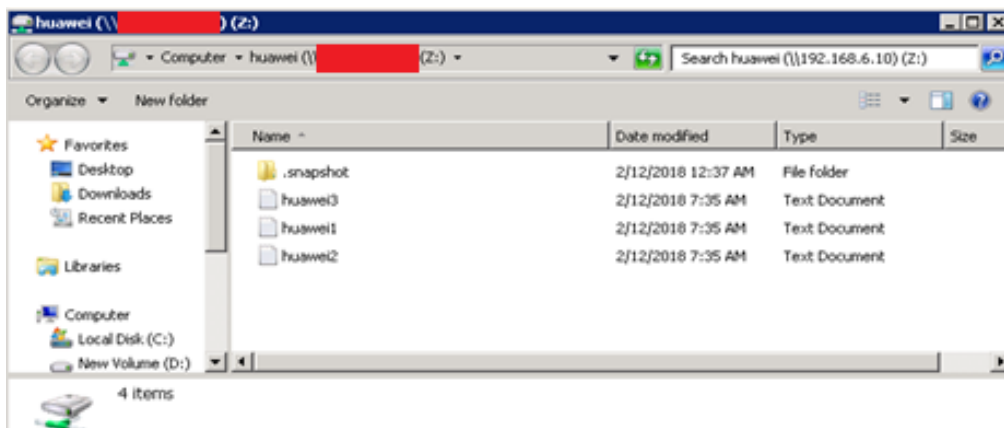
A danger dialog box will appear, read the contents carefully and tick "I have read and understood the consequences associated with performing this operation" to confirm the operation and click "OK".



The execution result dialog box will appear to indicate successful operation.

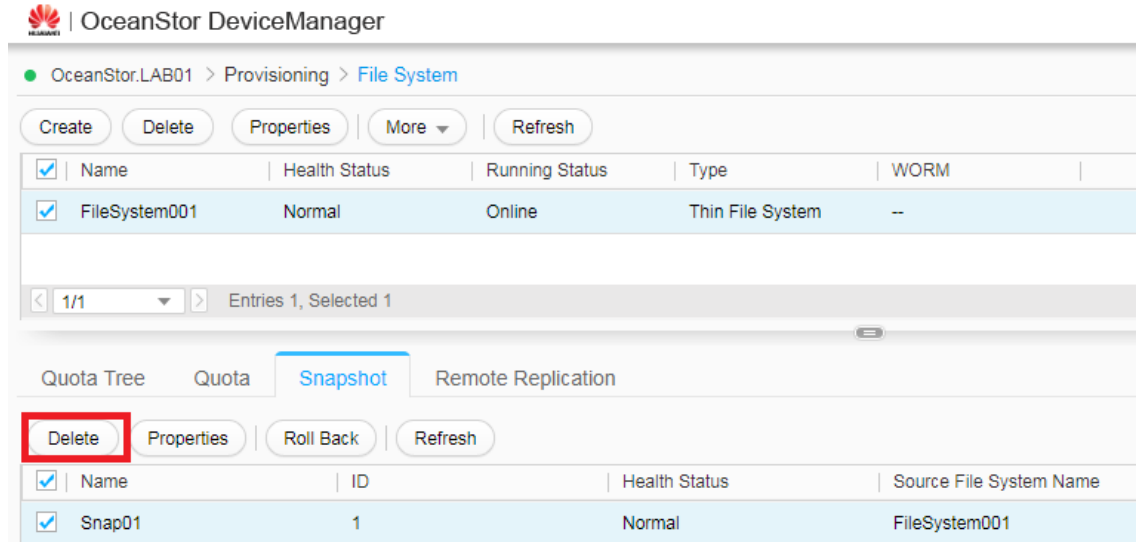


Check whether the CIFS share data recovery is successful in the Windows operating system.

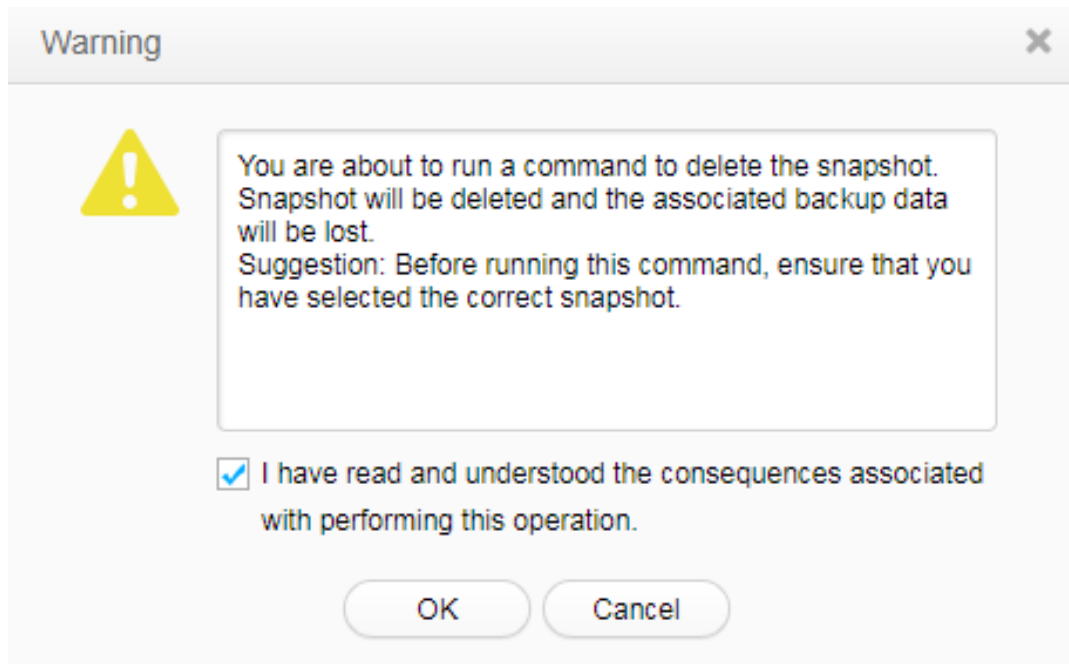


Step 4. Deleting Snapshot

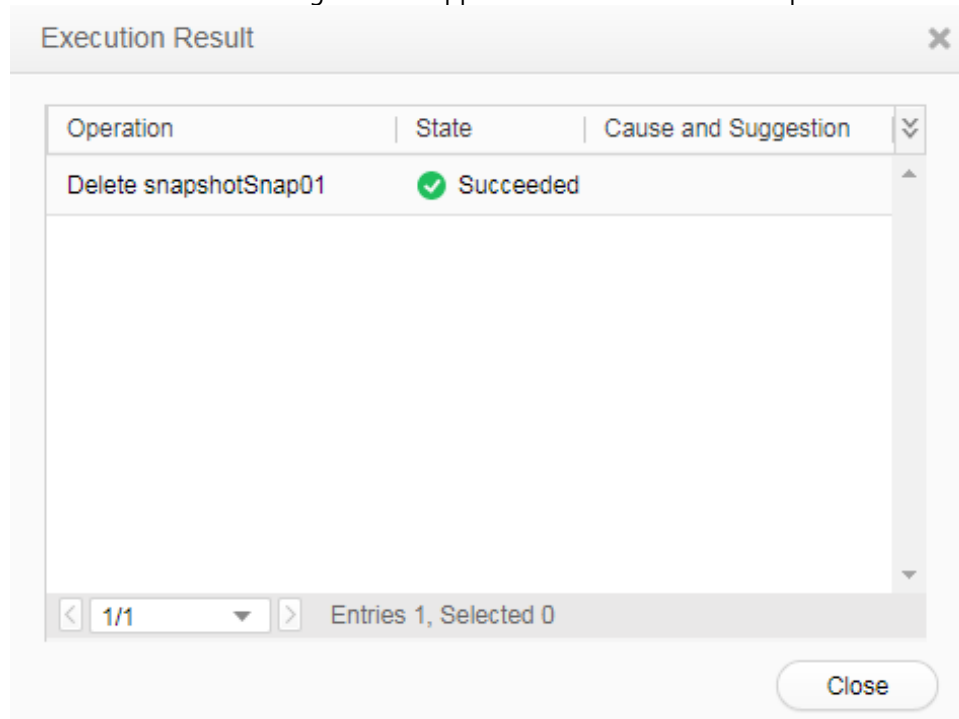
In OceanStor DeviceManager, choose "Provisioning > File System", choose the file system that you wish to perform snapshot deletion, click on the "Snapshot" tab in the information panel below, choose the snapshot that that you wish to delete, and then click "Delete".



A warning dialog box will appear, read the contents carefully and tick "I have read and understood the consequences associated with performing this operation" to confirm the operation and click "OK".



The execution result dialog box will appear to indicate successful operation.



11.3 Results Verification

Please refer to Step 3 for snapshot rollback and data recovery, delete a portion of the data and then recover it back through snapshot rollback.

11.4 Configuration Reference

Please refer to the configuration steps.

11.5 Questions

Do the File System (FS) snapshot rollback require Windows to stop the services?

—End of Lab 11.

12 Daily Maintenance of Storage System

12.1 Lab Introduction

12.1.1 Lab Objective

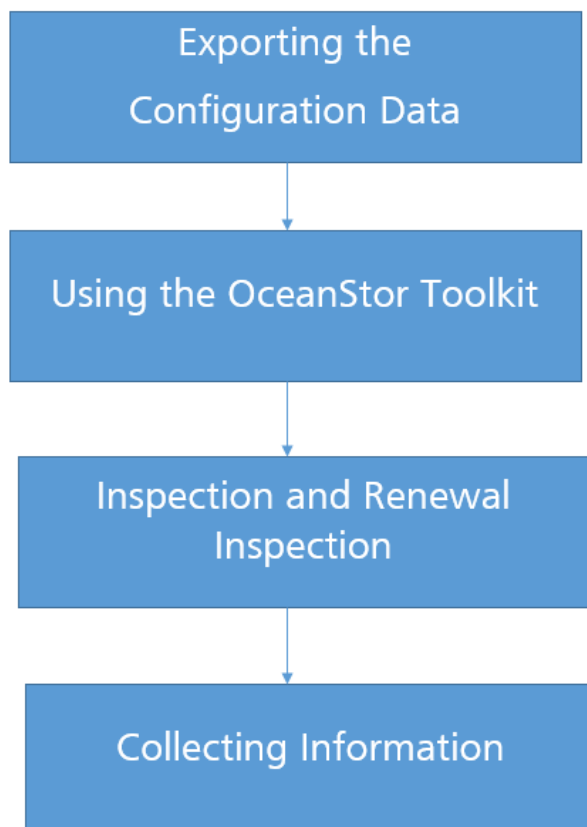
Upon completing this lab, you will be able to learn the methods to collect and save different type of errors and diagnostics information. This lab uses OceanStor 5300 V3 as the example.

12.1.2 Networking and Service Description

The networking is the same as the IP-SAN or FC-SAN network in the 3rd Lab.

12.2 Lab Configuration Tasks

12.2.1 Configuration Roadmap



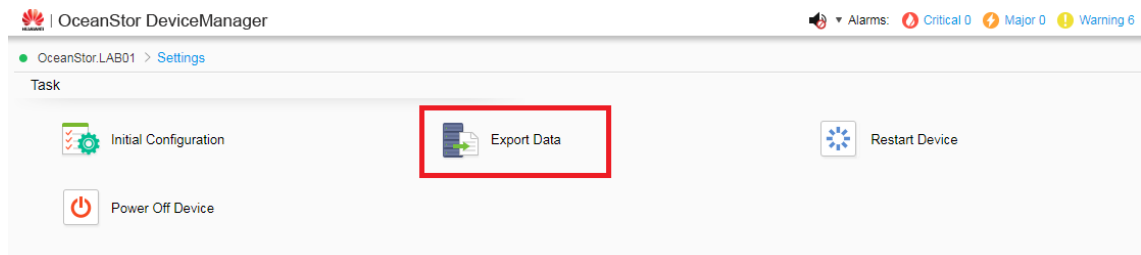
12.2.2 Configuration Steps

Step 1. Exporting Configuration Data

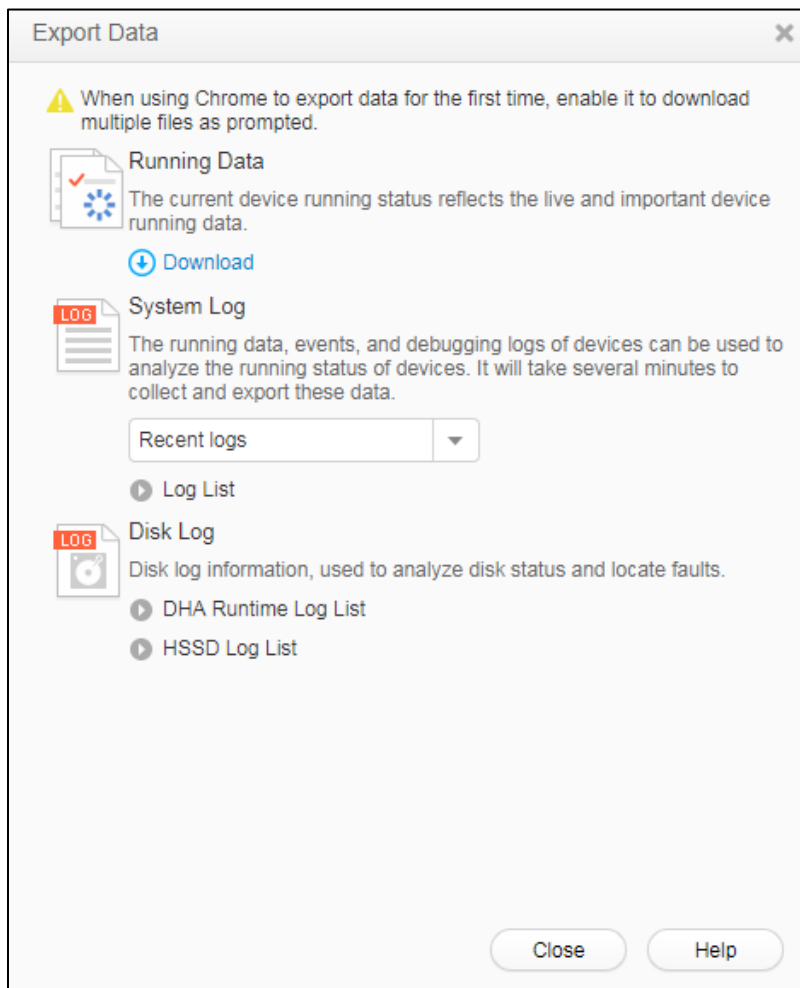
Login to OceanStor DeviceManager.

Click "Settings" on the navigation bar on the right.

At the "Task" region, click on "Export Data".



In the "Export Data" dialog box, click on the "Download" button under the "Running Data" to download all the current running configuration.



Similarly, click on the "Log List" under the "System Log" section to download the logs of the storage system.

Click on the "DHA Runtime Log List" or "HSSD Log List" under the "Disk Log" section to download the log files for the disks in the storage system.

Click "Close".

Step 2. Using the OceanStor Toolkit

This lab uses OceanStor Toolkit.

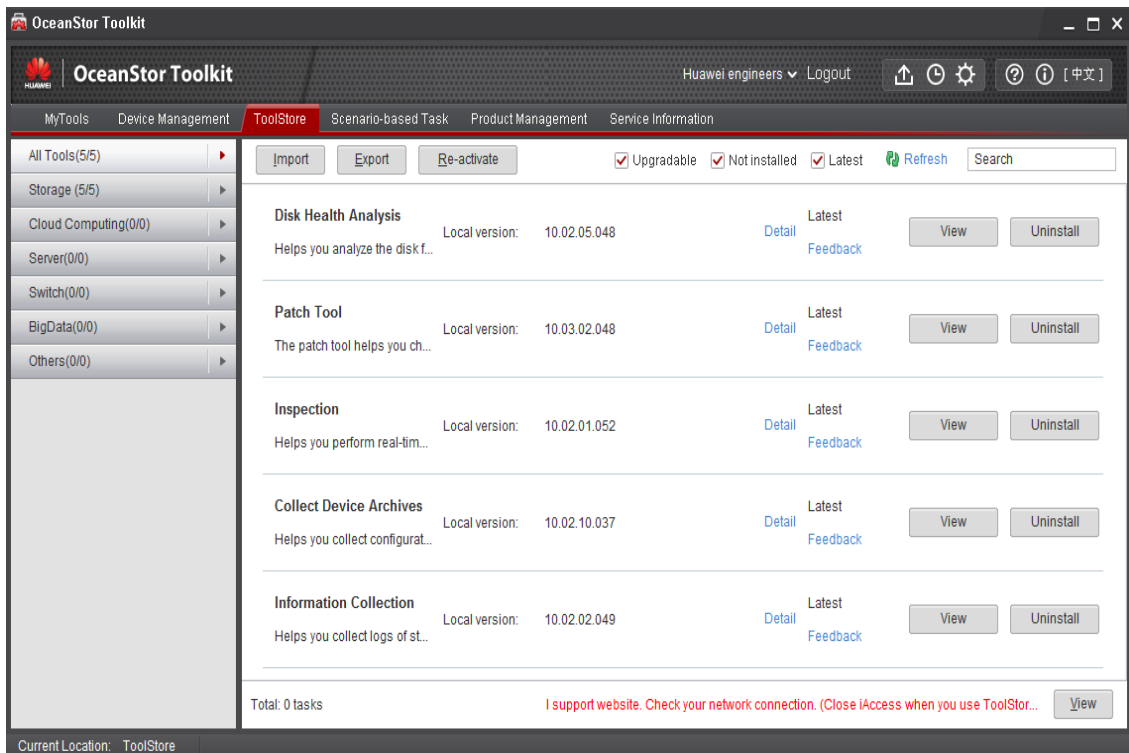
If you are using the Huawei E-LAB environment, you may obtain the Toolkit through the following method:

Remote E-LAB Environment FTP Server Link: ftp://10.158.180.10--->admin1/admin1---->01 Storage Tools.

(Note: The IP address for the FTP server may differ in the actual scenario or E-LAB, always refer to the correct IP address based on the networking information for your E-LAB or actual network scenario.)

Install the OceanStor Toolkit using the default values in the settings during installation, click "Next" to proceed.

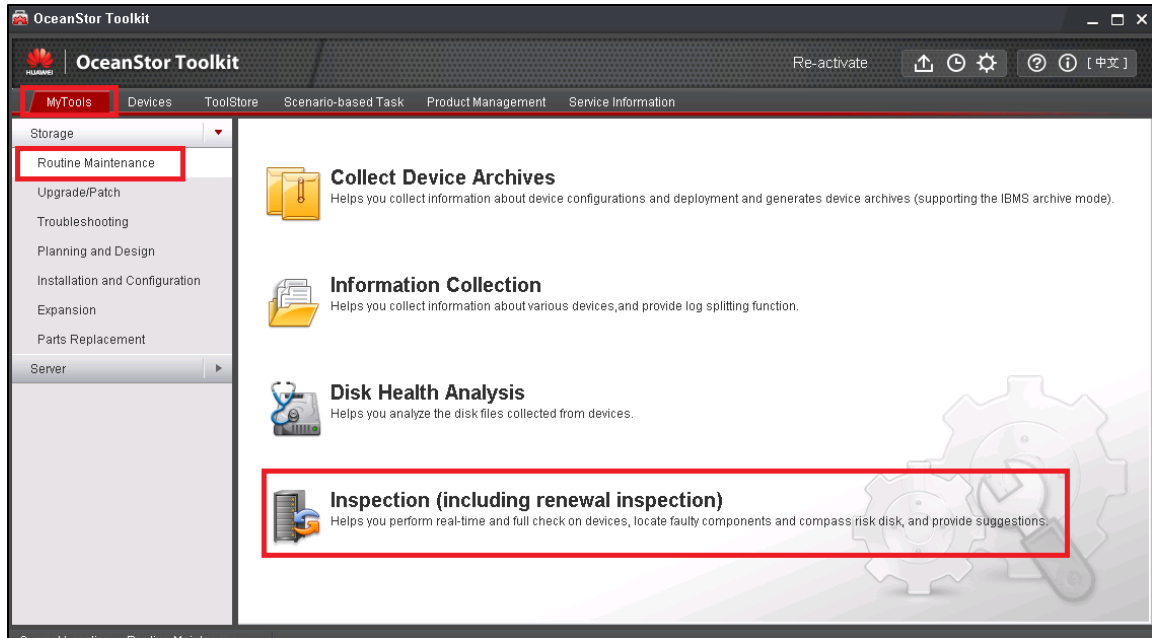
Start the OceanStor Toolkit. Click on "ToolStore", choose the tools that you wish to use and then perform custom installation of the tools.



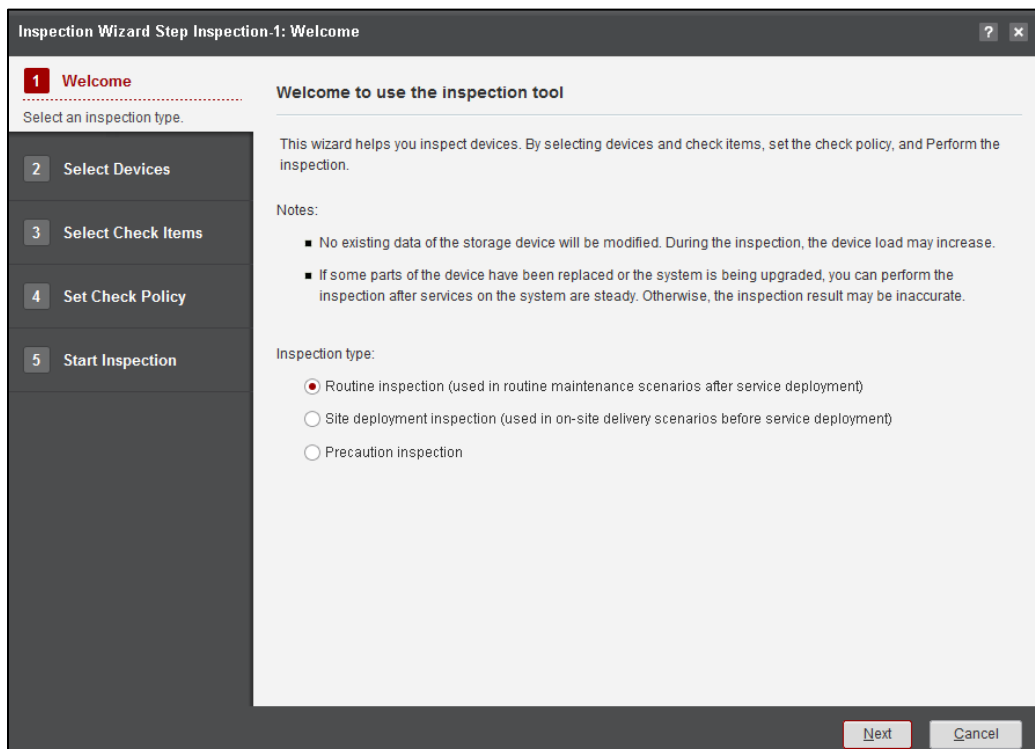
Step 3. Inspection and Renewal Inspection

This portion of the lab will involve performing real-time and full inspection of the storage device. Start the OceanStor Toolkit.

Click on “MyTools” then choose the “Routine Maintenance” tab.



Click on “Inspection” and the “Inspection Wizard” dialog box will appear.



Click “Next”, the “Select Devices” tab will be displayed.

Click on “Add Device” and key in all the relevant information of the storage device and click “Next”.

Add Device Step 2-1: Basic Information

Basic Information
Please input the IP address or proxy for login. IPv6 is supported.

Device Type: Storage

Add Policy

Specify IP Address (add a device by the IP address)

IP Address:

Specify IP Segment (add devices by the IP segment)

Start IP Address:

End IP Address:

Select Proxy

No Proxy

SSH Forward ▼ Config

Socks5 ▼ Config

Customize Authentication

Next
Cancel

If the device shows up in the list of inspection device, then it means that the device is added successfully.

Inspection Wizard Step 5-2: Select Devices

1 Welcome

2 **Select Devices**

3 Select Check Items

4 Set Check Policy

5 Start Inspection

Select the devices to be inspected in the following table. If no device exists, [Add Device](#).

Ensure that the current device is in the [Supported Devices List](#), if the desired device is not found, please upgrade the tool to the latest version. Otherwise, the inspection will fail.

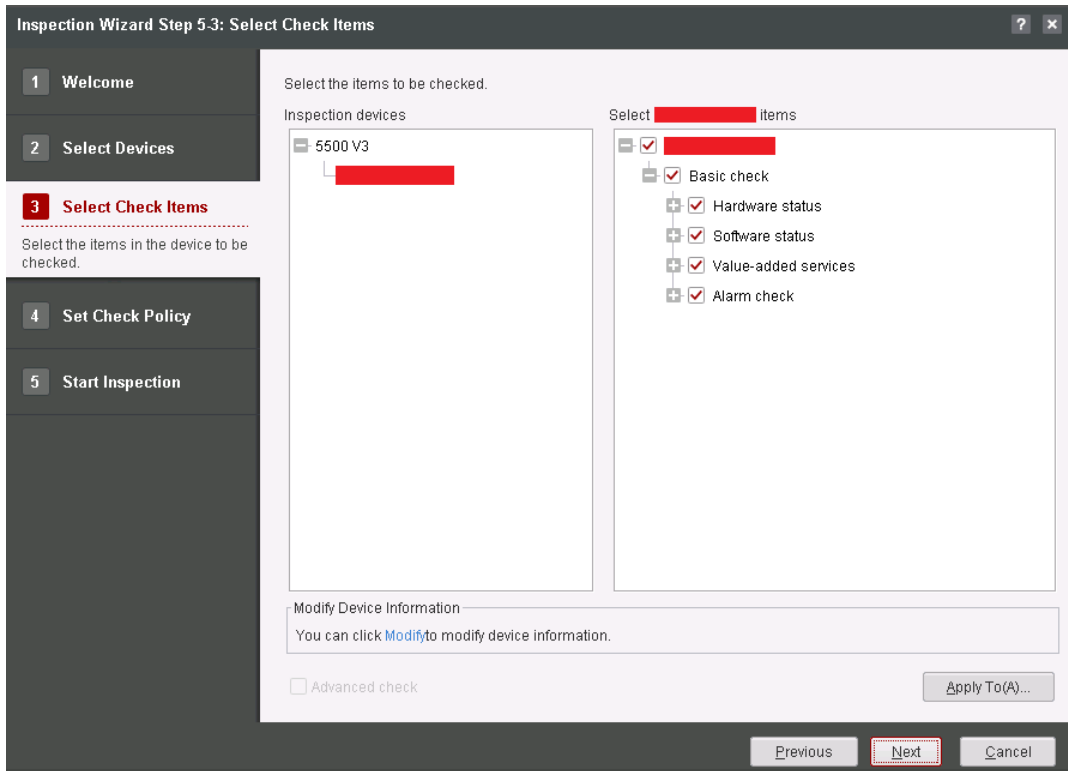
Items: 1 Selected: 1

	Model	Version Number	Name	IP Address	User Name
<input checked="" type="checkbox"/>	5500 V3	V300R003C00SPC100	MGTCIT_S5500...		admin

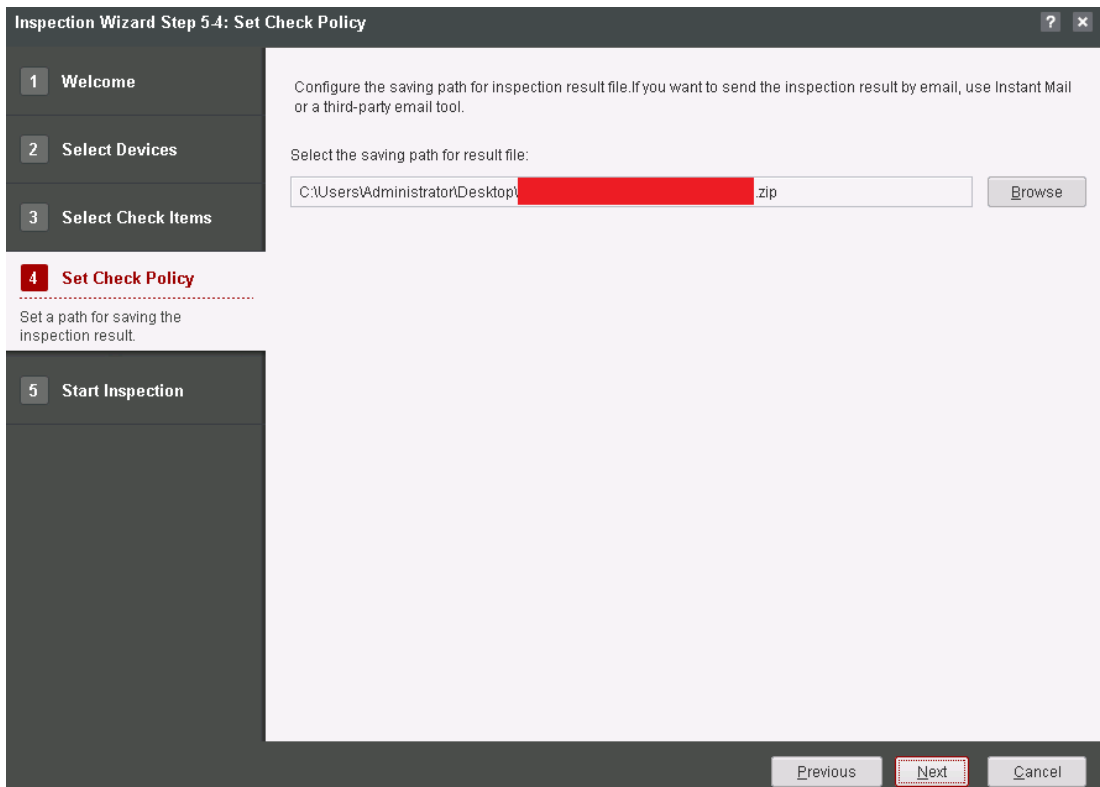
Previous
Next
Cancel

Choose the recently added device, and click "Next".

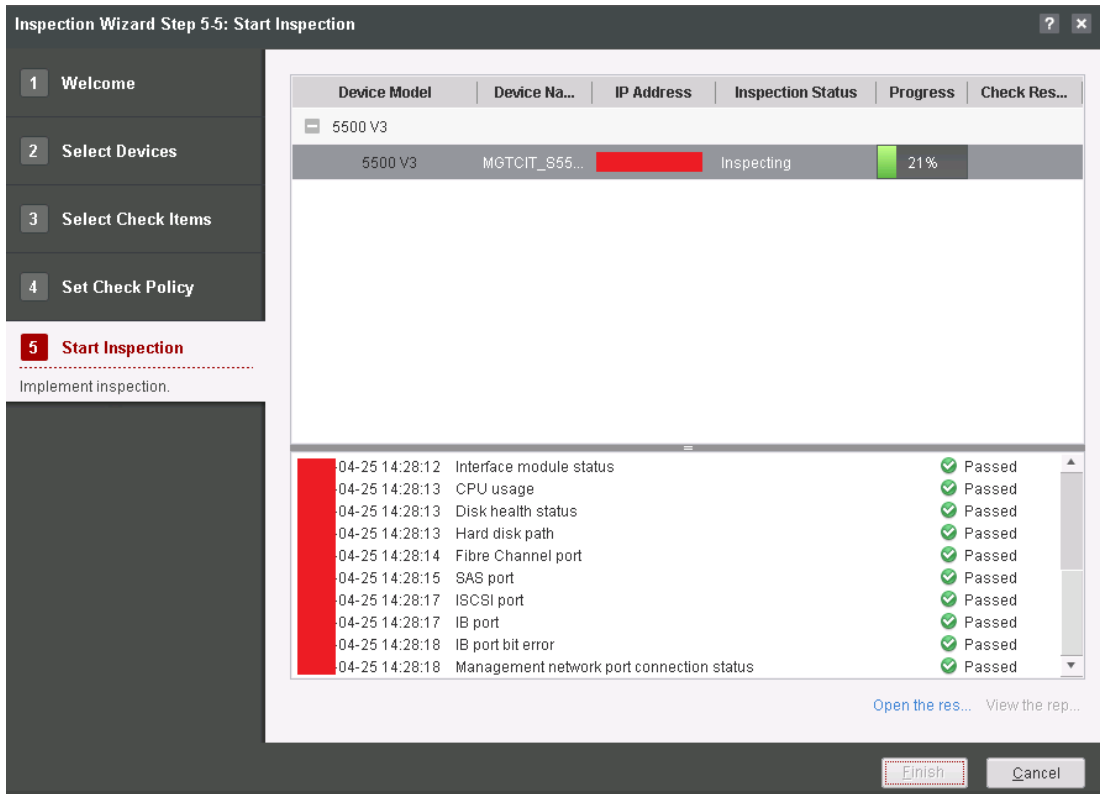
Choose all the items that you wish to inspect within the "Inspection Items" tab and click "Next".



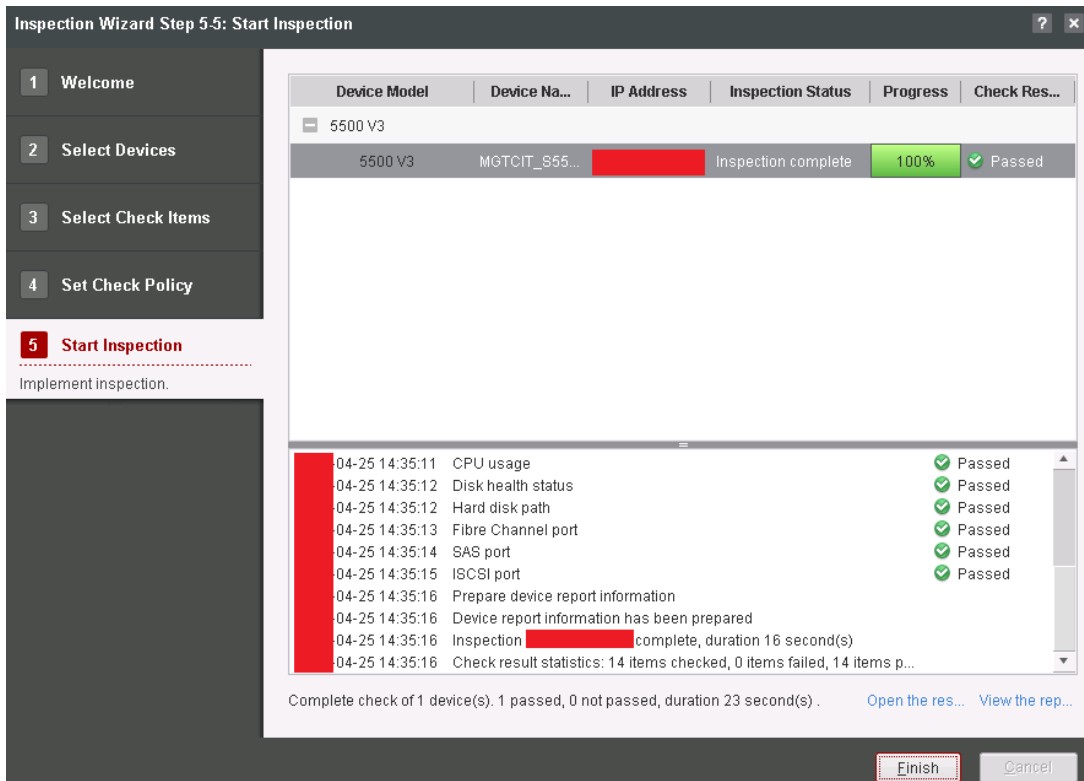
Configure the inspection policy in the "Set Check Policy" tab.



Click "Next" to start the inspection process.



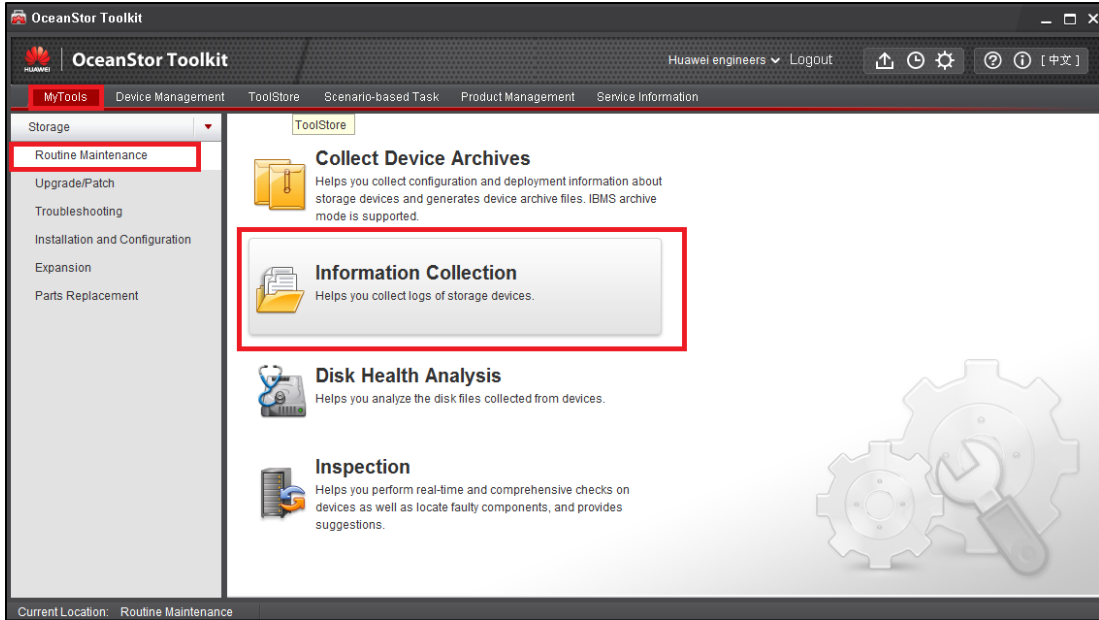
After the inspection is complete, immediately handle all the items that failed during the inspection, then click "Finish".



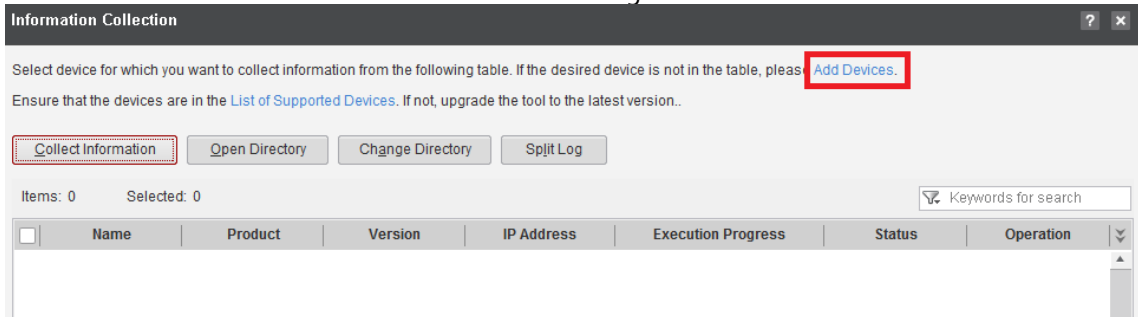
Step 4. Collecting Information

This lab allows you to learn how to collect different kinds of information of the storage device. Start OceanStor Toolkit.

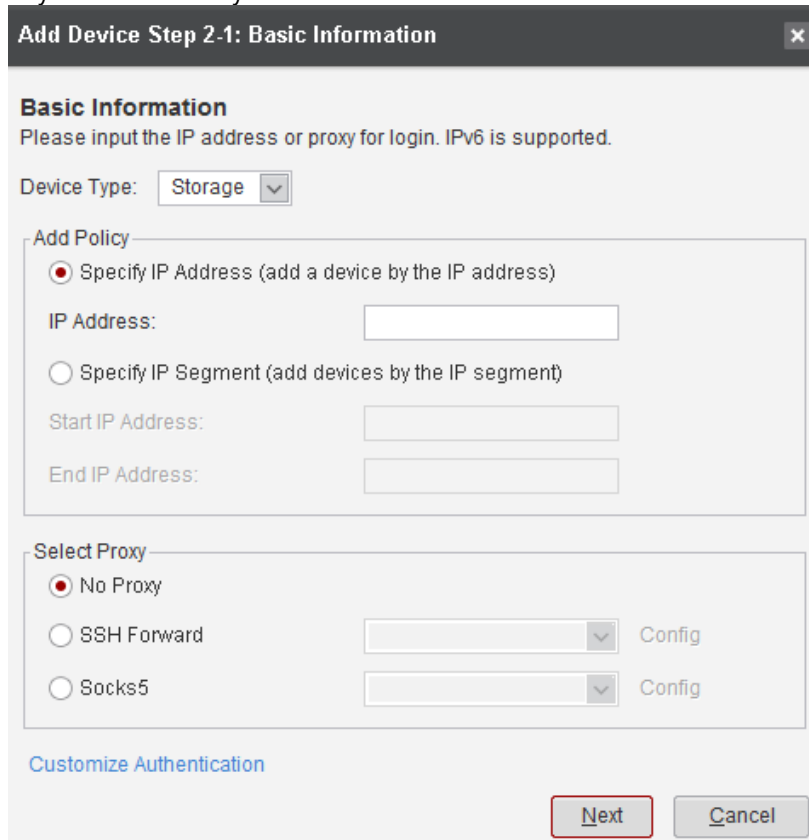
Click on “MyTools”, choose “Information Collection” in the “Routine Maintenance” tab. The information collection dialog box will be displayed.



Click “Add Device” in the information collection dialog box.



Key in the necessary information such as the “IP Address” for the device



Add Device Step 2-1: Basic Information

Basic Information
Please input the IP address or proxy for login. IPv6 is supported.

Device Type:

Add Policy

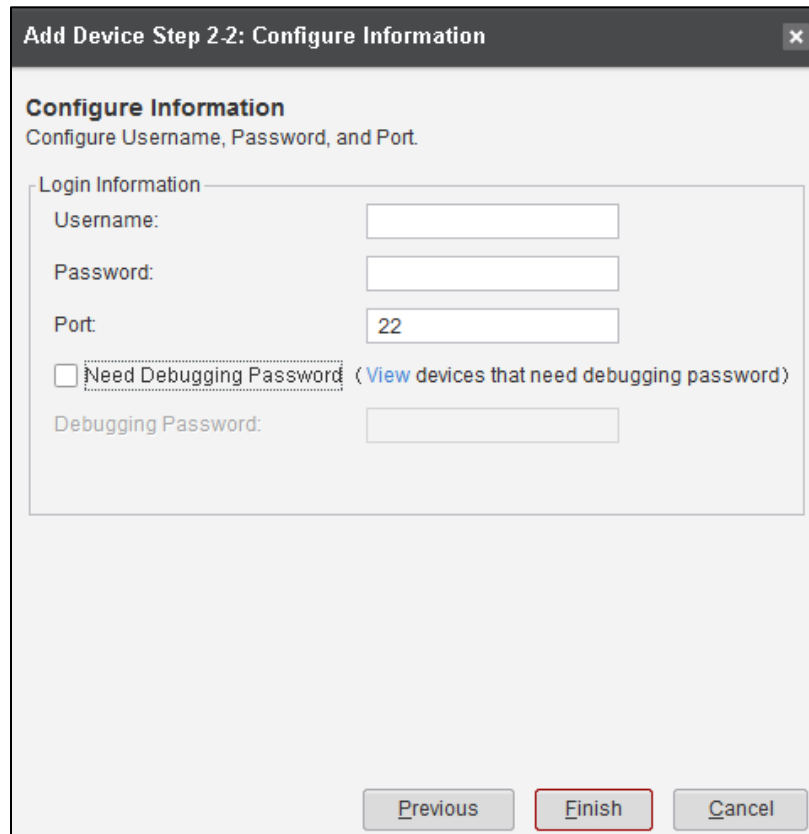
- Specify IP Address (add a device by the IP address)
IP Address:
- Specify IP Segment (add devices by the IP segment)
Start IP Address:
End IP Address:

Select Proxy

- No Proxy
- SSH Forward
- Socks5

[Customize Authentication](#)

Key in the “Username” and “Password” for the device that is added.



Add Device Step 2-2: Configure Information

Configure Information
Configure Username, Password, and Port.

Login Information

Username:

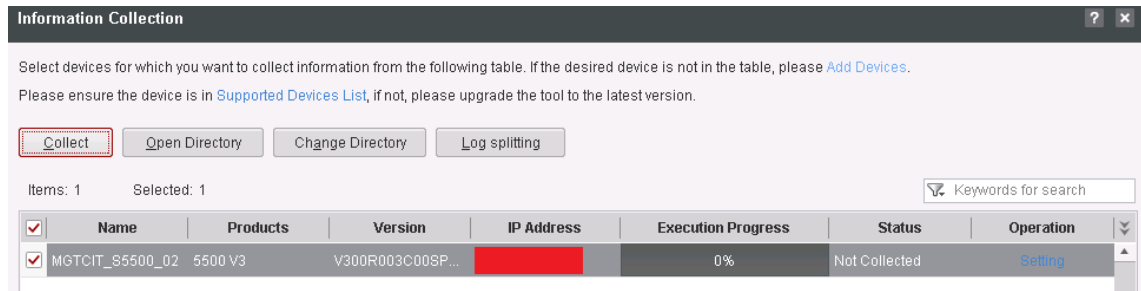
Password:

Port:

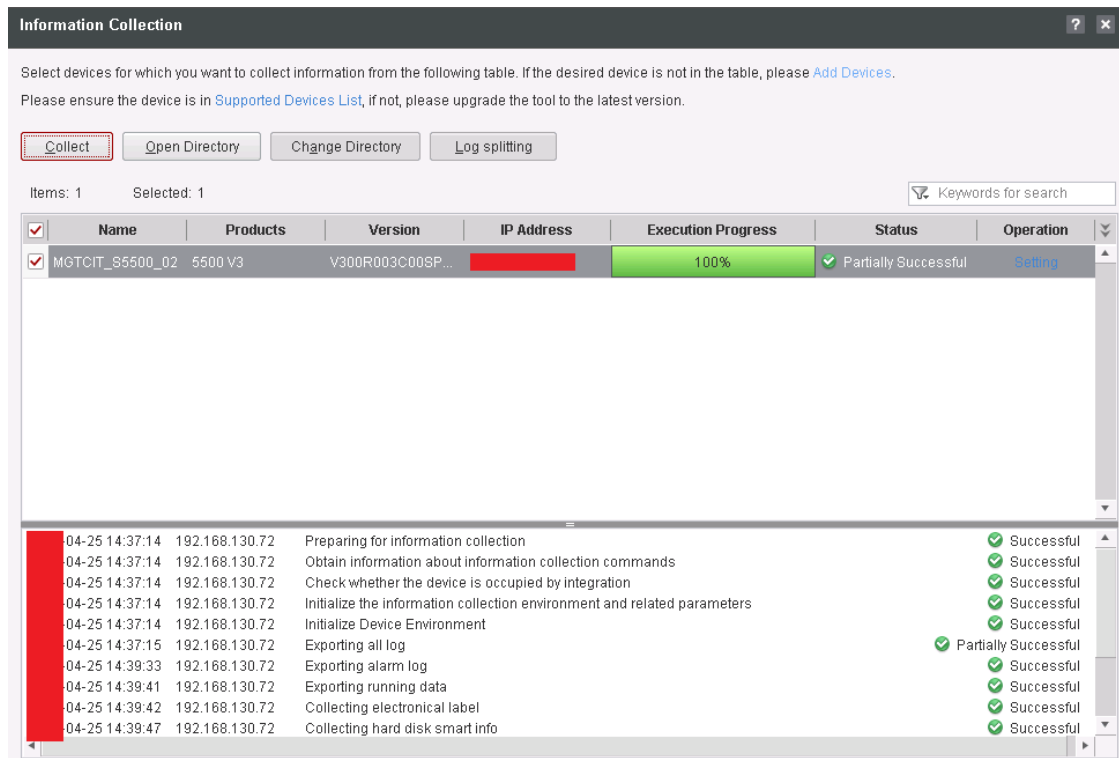
Need Debugging Password ([View devices that need debugging password](#))

Debugging Password:

Choose the devices that you wish to collect information, click on “Collect Information” button, and the OceanStor Toolkit will start to collect device information.



After the information collection is complete, the progress bar will reach 100%, and display a message stating information collection is successful. If there are items that failed during the information collection process, please handle it immediately.



12.3 Results Verification

After performing the inspection and information collection, you can obtain the inspection results and log information in the target path specified.

12.4 Configuration Reference

Please refer to the configuration steps.

12.5 Questions

Can OceanStor Toolkit perform periodic inspection?

—End of Lab 12.

Appendix: Answers for End of Lab Questions

1. Refer to the Step 3 and Step 4 in the 1st lab.
2. Creating Storage Pool is the prerequisite of creating LUN. A Storage Pool can contain multiple LUNs but a LUN can only belong to a single Storage Pool
3. Hot_add is not a native Linux command, it is a command that belongs to Huawei UltraPath.
4. No, Windows supports online expansion, but based on actual service scenario, offline expansion is more secure.
5. Yes.
6. Besides "Auto Migration" method which follows the SmartTier data activity level monitoring and migration rules, the remaining 3 migration policies which are "No Migration", "Migrate to Higher-Performance Tier", and "Migrate to a Lower-Performance Tier" are data migration policies that has specified migration tier which they are named after.
7. Yes.
8. Bandwidth and IOPS.
9. No, it uses IP Address or Device Name for authentication.
10. Discuss with the customer to see whether it is possible to delete unused data or expand the quota.
11. Yes.
12. No.

<End of Lab Manual>