NEXSAN

HYPER–UNIFIED STORAGE

Nexsan Unity

VMware Best Practices Guide

Firmware Version Unity v. 6.0

Contents

About this document

- Nexsan U2G460™ Storage Expansion
- Nexsan U2G460™ Storage Expansion

This guide provides general guidelines and requirements for integrating Unity Storage Systems in a VMware environment, and provides configuration procedures for optimal performance.

Audience

This guide has been prepared for the following audience:

- IT system administrators
- Engineers
- Technicians
- Any qualified NST/Unity administrator.

Conventions

Here is a list of text conventions used in this document:

Convention	Description
<u>underlined blue</u>	Cross-references, hyperlinks, URLs, and email addresses.
boldface	Text that refers to labels on the physical unit or interactive items in the graphical user interface (GUI).
`monospace`	Text that is displayed in the command-line interface (CLI) or text that refers to file or directory names.
`monospace bold`	Text strings that must be entered by the user in the command-line interface or in text fields in the graphical user interface (GUI).
italics	System messages and non-interactive items in the graphical user interface (GUI) References to Software User Guides

Notes, Tips, Cautions, and Warnings

Note Notes contain important information, present alternative procedures, or call attention to certain items.

Tip Tips contain handy information for end-users, such as other ways to perform an action.

CAUTION: In hardware manuals, cautions alert the user to items or situations which may cause damage to the unit or result in mild injury to the user, or both. In software manuals, cautions alert the user to situations which may cause data corruption or data loss.

WARNING: Warnings alert the user to items or situations which may result in severe injury or death to the user.

Contacting Nexsan

For questions about Nexsan products, please visit the Nexsan support Web page, and the Nexsan Unity Documents & Online Help page. If you are unable to find the answer to your question there, please see our contact information below.

Service and support

Nexsan's Technical Services Group provides worldwide assistance with installation, configuration, software support, warranty, and repair for all Nexsan products. A variety of service and support programs are available to provide you with the level of coverage and availability your operation requires.

Nexsan Unity Documentation & Online Help page:
https://helper.nexsansupport.com/unt_downloads.html

Unity Online Help page:
https://helper.nexsansupport.com/unt_onlinehelp.html

Contact Nexsan Unity support:
https://helper.nexsansupport.com/unt_support

Worldwide Web site:
www.nexsan.com

Related documentation

The following Nexsan product manuals contain related information:

- Nexsan Unity Online Help
- *Nexsan Unity Hardware Reference Guide*
- *Nexsan Unity Hardware Maintenance Guide, Unity Next Generation*
- *Nexsan Unity Software User Guide*
- *Nexsan Unity nxadmin Command-line Interface Reference Guide*
- *Nexsan Unity nxcmd Command-line Interface Reference Guide*
- *Nexsan Unity Snapshots and Replication Guide*
- *Nexsan Unity Storage Expansion Reference Guide*
- *Nexsan Unity VMware Best Practices Guide*
- *Nexsan Unity NFS Interoperability*
- *Nexsan Unity Networking Best Practices Guide*
- *Nexsan Unity Performance Best Practices Guide*
- *Nexsan Unity Microsoft Best Practices Guide*

Chapter 1

VMware recommendations and requirements

This section provides specific recommendations and requirements to help you prepare for integrating Unity in a VMware environment, and provides information on VAAI hardware acceleration. Unity supports VAAI for NFS and VMware SRM.

VMware is certified for use with Unity for the following implementations:

- NAS support with VMware ESX 4.1 U2.
- NAS support with VMware ESXi 5.0U1 and 5.0.
- NAS support with VMware ESXi 5.1.

Note The examples provided in this document are based on VMware ESXi 5.1.

VAAI overview

- VAAI hardware acceleration allows the VMware ESX/ESXi host to perform VM and storage management operations faster and consume less CPU, memory, and storage fabric bandwidth.

- Leave VAAI enabled on all LUNs unless advised otherwise by Nexsan support staff.

Unity includes a built-in VAAI (vStorage APIs for Array Integration) plug-in to provide hardware acceleration on Unity when integrated into a VMware ESX/ESXi environment. VAAI hardware acceleration functionality enables the VMware ESX/ESXi host to offload specific virtual machine and storage management operations to Unity. With storage hardware assistance, the VMware ESX/ESXi host performs these operations faster and consumes less CPU, memory, and storage fabric bandwidth.

Unity supports these 4 VAAI primitives:

- Full Copy: This feature enables the storage arrays to make full copies of data within the array without the need for the VMware ESXi server to read and write the data. Instead of the server having to read and write each block of data, the server sends a single SCSI (Extended Copy) command for a set of contiguous blocks to instruct the storage array to copy the blocks from one location to another. The command across the network is small, and the actual work is performed on the storage array. This can be especially helpful when cloning a virtual machine, performing a Storage Motion, or deploying virtual machines from a template.

- Block Zeroing: This feature enables storage arrays to zero out a large number of blocks to speed up virtual machine provisioning. Instead of sending multiple redundant write commands over the network, the server uses the SCSI Write Same command to instruct the storage device to write the same data to a number of blocks. Instead of having the host wait for the operation to complete, the storage array returns to the requesting service as though the process of writing zeros has been completed. This can be especially helpful when thick-provisioning virtual disks.

- Hardware assisted locking: This feature provides an alternate means of protecting data in VMFS cluster file system environments. When a host accesses a common datastore, instead of having to lock and entire logical unit (which prevents any other hosts from accessing), the host has the ability to lock only the data it is accessing at the block level, leaving the rest of the logical unit accessible by other hosts. This also improves the scalability of large ESXi servers sharing a VMFS datastore.

- Block Unmap: This feature allows vSphere 5.0 environments using array-based thin provisioning to reclaim "dead space" by notifying the storage system of when blocks are no longer in use (such as after migrating or deleting virtual machines) and to pause virtual machines when disk space is exhausted, allowing Administrators to allocate additional space to the datastore or migrate an existing virtual machine without causing the virtual machine to fail.

You must configure and enable VAAI hardware acceleration functionality on your VMware ESX/ESXi to support for the VAAI plug-in to work. In VMware, the VAAI plug-in is visible at the datastore level. Refer to the VMware documentation for further details.

To enable the VAAI plug-in on Unity, see Enabling VMware VAAI hardware acceleration for a LUN on page 60.

Unity Storage System recommendations

To use Unity Storage Systems in a VMware environment, review these requirements and recommendations:

- Enable LACP—see Enabling LACP on page 31

- Enable jumbo frames—see Enabling jumbo frames using the nxadmin CLI on page 34

- Use SAS drives

- When you create pools, we recommend the following:

  - assign enough FASTier devices to enhance the performance of pools, with the same number of read and write cache devices (minimum of one read cache and one write cache)

  - create an even number of pools for load balancing across the two controllers (minimum of two pools).

  For the procedure, see Adding a storage pool on page 35.

- When you create LUNs, we recommend the following:

  - set the block size to match what your application uses;

  - use thick provisioning;

  - disable snapshot scheduling;

  - enable VAAI.

  For the procedure, see Creating a LUN on page 37.

  Note If you already created LUNs but the VAAI plugin is not enabled for these LUNs, follow the steps mentioned in Enabling VMware VAAI hardware acceleration for a LUN on page 60.

- When you create file systems, we recommend the following:

  - set the record size to match what your application uses;

  - disable snapshot scheduling.

  For the procedure, see Adding a file system on page 46.

  Note The VAAI plugin is not supported for Unity shares.

Block size and record size requirements

LUNs have a default block size of 8 KB. This is the default choice for transactional workloads. Large-block streaming workloads require a higher block size, such as 128 KB, to obtain better streaming read performance. Generally speaking, if you know the block size that your application typically uses, set Unity LUN block size to match.

Note A LUN's block size cannot be modified once the LUN is created.

File Systems have a default record size of 128 KB. However, this record size is somewhat dynamic and Unity will write in smaller blocks if the application would seem to benefit from it. It is not recommended to change the default record size of shares except in very specific circumstances where the application is database-driven and the database record size is precisely known.

Note The share's record size can be modified at any time.

Refer to this table for recommended block/record size according to the application used.

Application / Data type	Recommended block size
Windows / Linux Boot	64 k

Application / Data type	Recommended block size
Microsoft Exchange 2010 DB	32 k
Microsoft Exchange 2010 Log	128 k
Oracle OLTP	8 k
SQL Server	64 k
Video Streaming	128 k

To define the block size, see Step 1: Setting the LUN name and block size on page 37.

Network recommendations

To ensure that the network configuration where the NFS and iSCSI traffic will run has been designed to achieve high availability and no single point of failure:

- Isolate the storage traffic from other networking traffic. You can configure this utilizing VLAN, network segmentation, or dedicated switches for NFS and iSCSI traffic only.

- On Unity, configure at least two physical 10GbE (dual-port) NICs per head, bundled into a single channel using the IEEE 802.3ad Link Aggregation Control Protocol (LACP) with a large maximum transmission unit (MTU) and jumbo frames (9000 bytes). If you are working with a cluster configuration, configure at least two 10GbE (dual-port) NICs per head, and also use an IP network multipathing (IPMP) configuration in combination with LACP.

- With IPMP configuration you will achieve network high availability, and with link aggregation you will obtain a better network performance. These two technologies complement each other and can be deployed together to provide benefits for network performance and availability for virtual environments.

- For picking an outbound port based on source and IP addresses, use LACP L3.

- For switch communication mode, use the LACP active mode, which will send and receive LACP messages to negotiate connections and monitor the link status.

Note To configure LACP on Unity, see Enabling LACP on page 31.

CAUTION: RISK OF OUTAGE

Do not join Unity with Active Directory to Domain Controllers hosted on VMware. Domain Controllers used with Unity and Active Directory must either be a physical device or hosted externally to Unity. See the Nexsan Unity User Guide or Nexsan Online Help for details.

IP network infrastructure

We recommend that you use 10GbE IP switches with all interfaces working in 10GbE speed in full duplex mode, with MTU (jumbo frame) and Link Aggregation Control Protocol (LACP). On VMware, the default NIC teaming configuration is using active and standby interfaces mode.

Note Some third-party IP switches support a newer technology called virtual port-channel. This technology is a supported solution and also provides more redundancy of network paths as well as better performance and bandwidth for your virtualized environment.

► **IP network recommendations:**

- On VMware ESXi hosts, ensure that you have at least one dual 10GbE NIC working with 9000 MTU jumbo frame.

- Use at least two physical IP network switches.

- Ensure that you have at minimum a link aggregation of two or more 10GbE NICs attached with a physical IP network switch, configured and working with port-channel group or even virtual port-channel technologies.

- Ensure that your 10GbE IP network is properly configured and working with high availability and load balancing (without point of failure).

- Ensure that your physical IP switches or routers are not congested or saturated.

- Ensure that your storage network provides adequate throughout as well as low latency between initiators and targets.

- Isolate the traffic through different VLANs or even network segmentation. Also, work with a different VMware vSwitch.

- To achieve best performance, as well as load balance the I/O traffic between paths and failover, configure VMware to work in port binding mode.

► **NIC teaming recommendations:**

If you are working with a virtual port-channel configuration, or with more physical network cards which are members of a port-channel group, use the VMware NIC teaming configuration that includes:

- Load Balancing: Route based on IP hash

- Network Failover Detection: Link status only

- Notify Switches: Yes

- Failback: Yes

This image shows an example of two virtual switches, each connected to two physical adapters. Each adapter must be connected to Unity. This example combines port-channel, LACP, and virtual port-channel.

Recommended settings for NFS protocol

You must change the NFS and TCP/IP advanced settings prior to starting the tests or putting your VMware servers in production. These options are extremely important to ensure high availability of the NFS datastores in a failover/failback situation.

This table shows the recommended NFS settings for VMware vSphere 5.1 on Unity.

Table 1-1: Recommended NFS settings

Option	Value
NFS.HeartbeatFrequency	20
NFS.HearbeatMaxFailures	10
NFS.HeartbeatTimeout	5
NFS.HeartbeatDelta	12
NFS.SendBufferSize	264
NFS.ReceiveBufferSize	256
NFS.MaxVolumes	256

1

Figure 1-1: Advanced settings for NFS
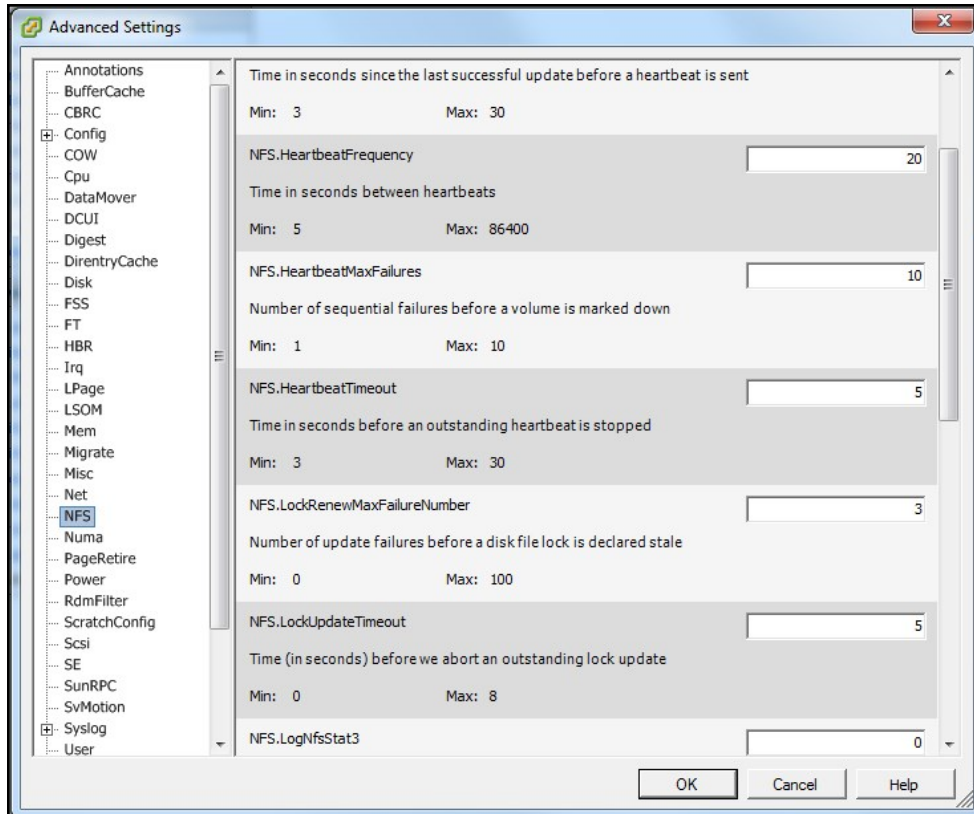
This table shows the recommended TCP/IP settings for VMware vSphere 5.1 on Unity.

Table 1-2: Recommended TCP/IP settings

Option	Value
NET.TcpipHeapMax	128
NET.TcpipHeapSize	32

Figure 1-2: Advanced Settings for TCP/IP
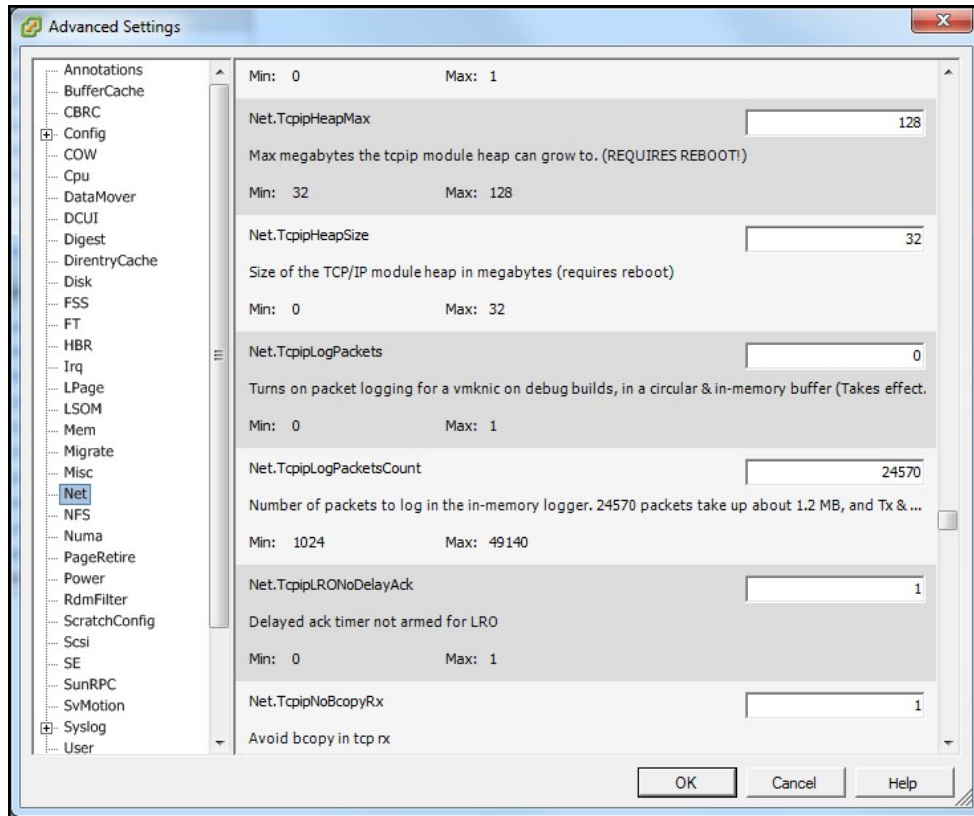
► **To change NFS and TCP/IP parameters:**

1. Go to the VMware vCenter 5.x server.

2. Select a VMware server.

3. Select the **Software** tab.

4. Click on **Advanced Settings**.

5. Select **Net** for TCP/IP or **NFS** for NFS.

Note This configuration must be performed in all VMware host members of the cluster. A reboot of each VMware host will be needed in order to activate the new settings.

If you are working with a virtual port-channel configuration, or with more physical network cards which are members of a port-channel group, use the VMware NIC teaming configuration that includes:

● Load Balancing: Route based on IP hash

● Network Failover Detection: Link status only

- Notify Switches: Yes

- Failback: Yes

The image below provides an example for an Intel Corporation 10GbE switch.

Figure 1-3: vSwitch properties—NIC teaming
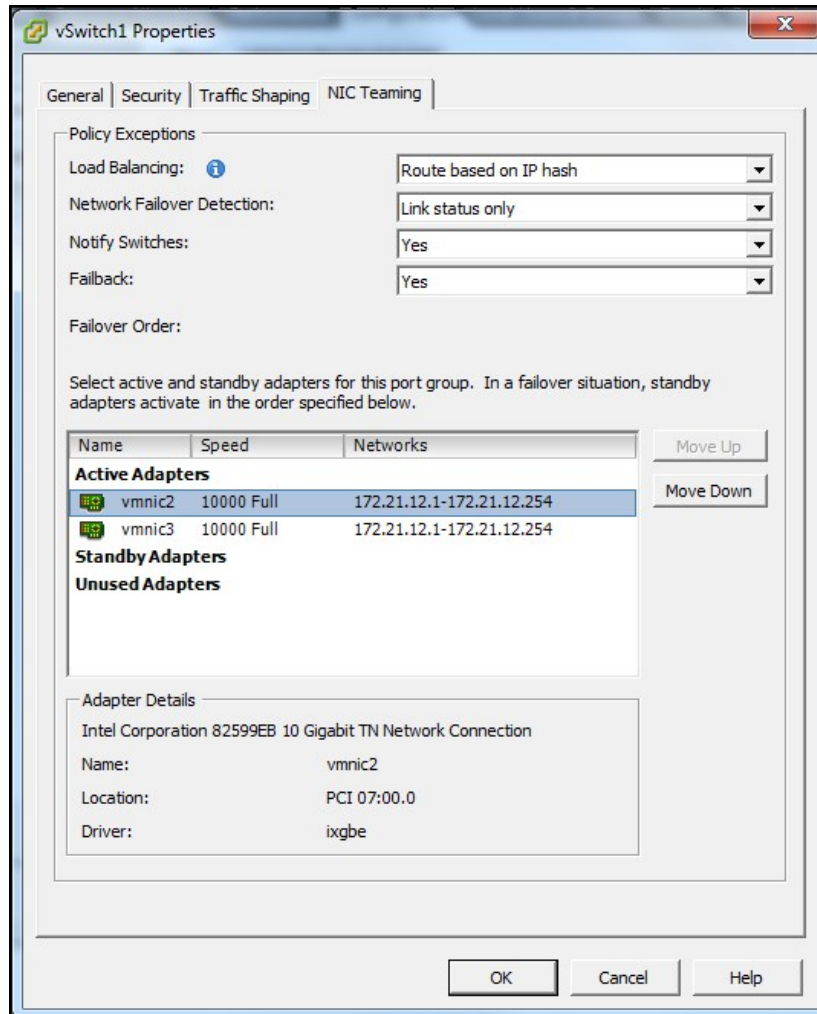
Recommended settings for iSCSI protocol

This section provides the recommended settings for VMware vSphere 5.x using the iSCSI protocol.

This table shows the recommended iSCSI settings for VMware vSphere 5.1 on Unity.

Table 1-3: Recommended iSCSI settings

Option	Value
MaxOutstandingR2T	8
FirstBurstLength	16777215
MaxBurstLength	16777215
MaxRecvDataSegLen	16777215

Figure 1-4: Advanced settings for iSCSI
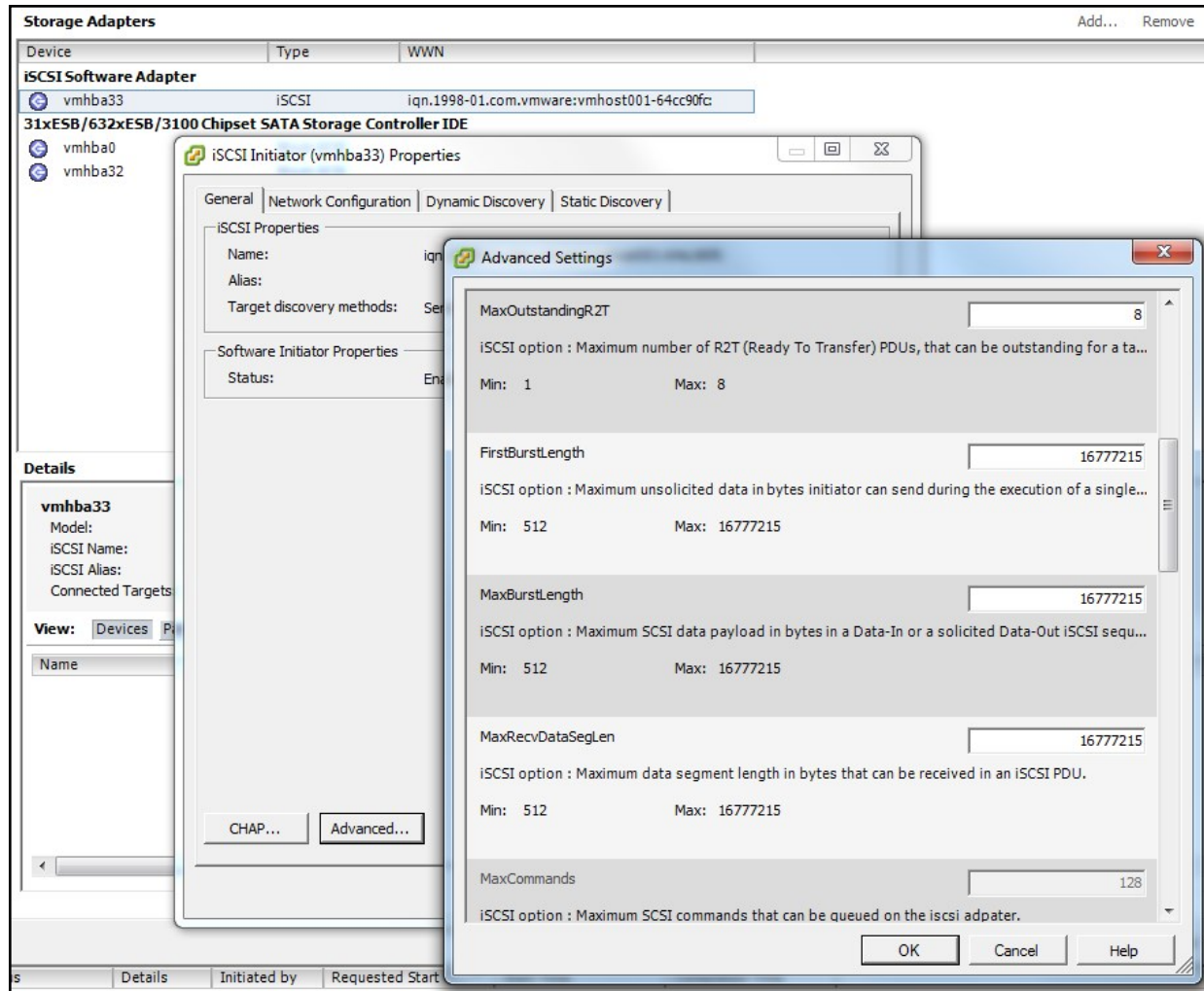
Refer to these sections to configure the iSCSI protocol:

- [Configuring vSphere in port binding mode](#) on page 19
- [Adding the software iSCSI adapter](#) on page 22

We recommend these best practices for VMware virtual machines:

- Work with VMware version 8 minimum.
- For raw devices and for LUNs with more than 2 TB, use raw device mapping (RDM).
- If you are using Unity with Microsoft Volume Shadow Copy, use RDM in physical compatibility mode.
- On Unity, it is highly recommended to host all storage pools on the same controller. The VAAI plugin does not work across controllers so operations like cloning or vMotion will not benefit from VAAI if the pools are located on different controllers.
- Install the VMware Client Tools. For more information on these tools and to install them, refer to the VMware documentation.
- When working with the Microsoft Windows platform, ensure that you have the latest service pack as well as all recommended patches installed.
- Make sure that your virtual machine is working with the right partition alignment.
- Work with a central swap datastore for all virtual machines. By default VMware creates a virtual swap file that usually is equal to the amount of memory allocated to each virtual machine. Reallocate the virtual machine swap file to a central VMware datastore; see [Configuring the central swap datastore](#) on page 26.
- To achieve better performance for virtualized applications as well as management of your virtual environment, work with a multi-pool design with multiple datastore repositories in VMware vSphere 5.x.

To configure virtual machines, see [Setting up VMware](#) on page 17.

1

Chapter 2

Setting up VMware

To use Unity in a VMware environment, you must perform these tasks. Make sure to review all recommendations and requirements before starting, as described in VMware recommendations and requirements on page 7.

Note It is assumed that you already installed vSphere ESXi, vSphere Client, and vCenter Server. For further information, refer to the VMware documentation.

2

Creating the virtual machines

This section provides general guidelines and main steps to configure vSphere client in preparation for hosting Unity.

► **To create a virtual machine:**

1. Create a data center. For details, refer to the VMware documentation.

2. Add a host to the data center. For details, refer to the VMware documentation.

3. Add storage:

   a. Select the storage adapter: choose the **Add Software iSCSI Adapter** option.

   b. Assign a network adapter (NIC) to the storage adapter. VMware creates a virtual network adapter based on the physical network adapter.

   c. Scan the environment to discover the volumes.

4. Add datastores (The volumes must be configured as datastores before they can be used by the VM). If using VMware for failover, you need two datastores. Volumes must be initialized first.

5. Choose one of these storage types:

   ● For LUNs, select **Disk/LUN**.

   ● For shares, select **Network File System**.

6. Configure network settings:

   a. Configure host Ethernet port for iSCSI or Fibre Channel (select **VMkernel** for the connection type).

   b. Configure host Ethernet ports for VMs (vSwitch—vSphere distributed switch—by default, it is called VM Network.)

7. Create a VM:

   a. Select the host, the destination storage (from the datastore created earlier),

   b. Select the guest operating system.

   c. Create a virtual disk.

   d. For LUNs, we do not recommend to select Thin Provisioning. Make sure that your LUN on Unity has the same setting; see Step 1: Setting the LUN name and block size on page 37.

8. Install the guest operating system on the virtual machine. For details, refer to the VMware documentation.

Configuring vSphere in port binding mode

▶ **Before you begin:**

Make sure to read Recommended settings for iSCSI protocol on page 15.

▶ **To configure VMware vSphere 5 iSCSI in port binding mode with Unity:**

1. Create a new vSwitch with at least two VMkernel ports and two 10GbE interfaces, each one working with 9000 MTU (jumbo frames) and VMware port binding configuration.

    This example shows `iSCSI-1` and `iSCSI-2` VMkernel ports, while the 10GbE interfaces are `vmnic2` and `vmnic3`.

Figure 2-1: vSphere standard switches

2
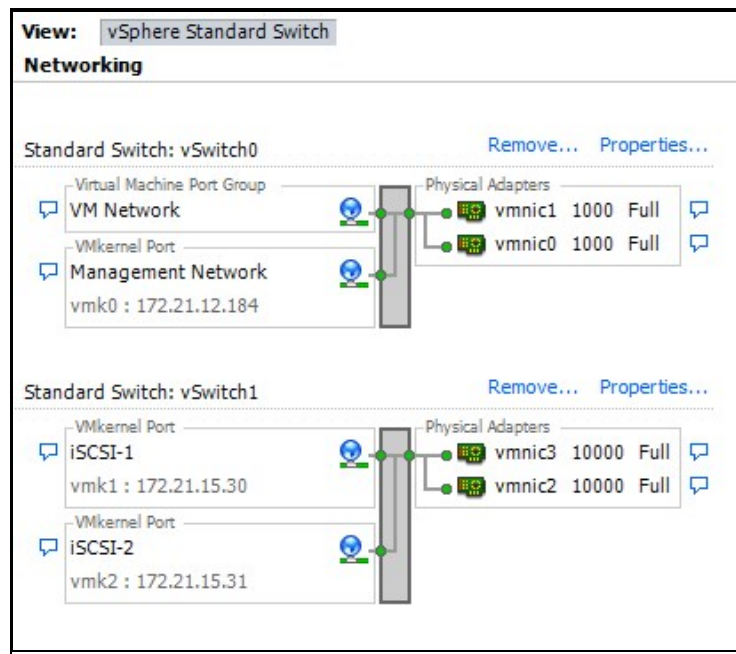
2. For each VMkernel port, enable the **Override switch failover order** option. Make sure that only one 10GbE adapter is enabled per port group. Additional cards must be moved to *Unused Adapters*.

   a. Select the ESXi host.

   b. Select the **Configuration** tab.

   c. Select **Networking** and then select **Properties...** on your iSCSI vSwitch.

   d. Select the iSCSI port group, click on **Edit**.

   e. Select the **NIC Teaming** tab.

   f. Enable the **Override switch failover order** option.

   g. Click **OK**.

Figure 2-2: VMkernel port properties: iSCSI-1
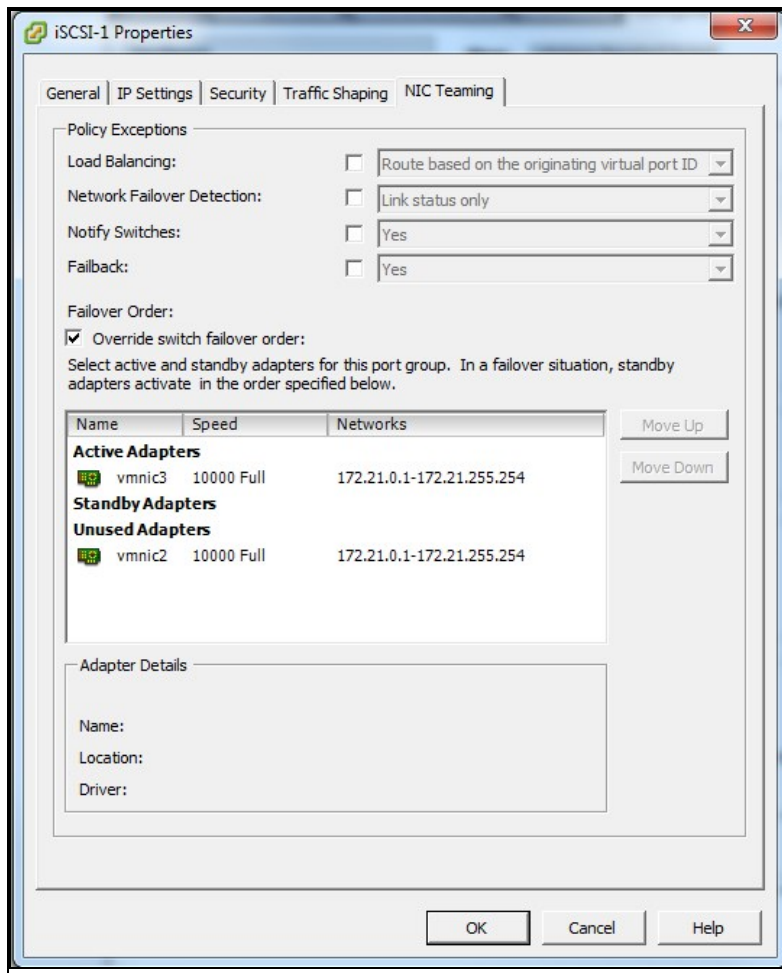
3. Repeat these steps on the second VMkernel port.

Figure 2-3: VMkernel port properties: iSCSI-2
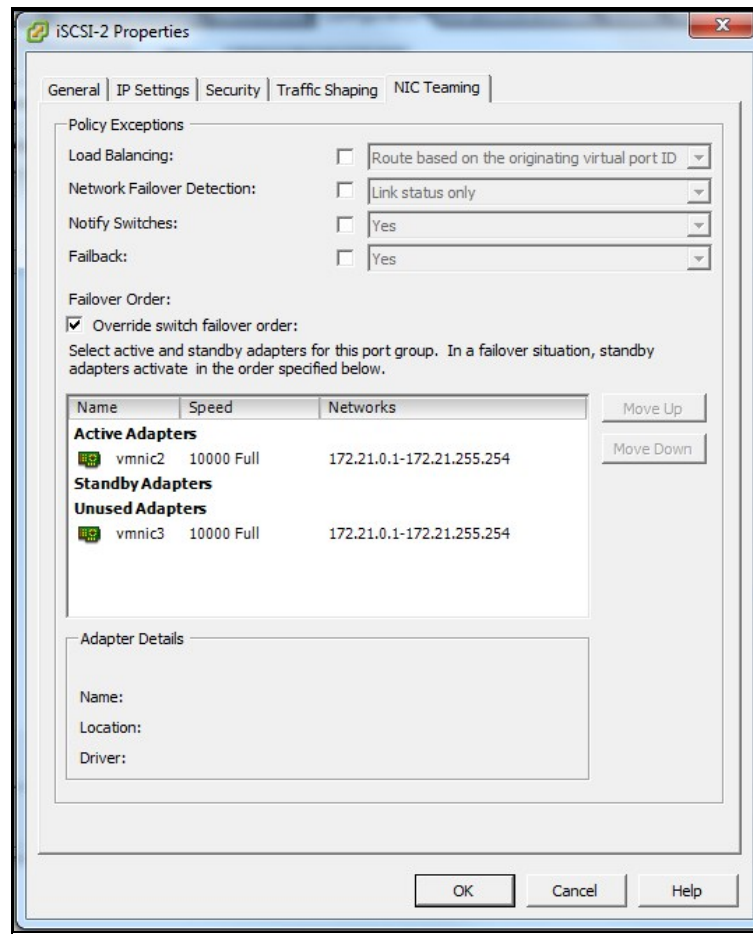
This example shows two 10GbE adapters and two different VMkernel ports. Both 10GbE adapters (`vmnic2` and `vmnic3`) are being balanced across two different port groups, with the following configuration:

- The iSCSI-1 port group has `vmnic2` adapter enabled and `vmnic3` adapter unused.
- The iSCSI-2 port group has `vminc3` adapter enabled and `vmnic2` adapter unused.

Note When working with a port binding configuration, each port group must have only one active adapter. All other adapters must be moved to *Unused Adapters*. Do not use standby mode.

► **What's Next:**

Proceed to Adding the software iSCSI adapter on the next page.

Adding the software iSCSI adapter

Once the port group configuration is ready (see Configuring vSphere in port binding mode on page 19), add the VMware iSCSI software adapter.

For additional information, see Recommended settings for iSCSI protocol on page 15.

► **To add the iSCSI adapter:**

1. Open a connection with your VMware vCenter server, select the ESXi host.

2. Select the **Configuration** tab.

3. Under the **Hardware** option, select **Storage Adapter**, then click **Add**.

4. Select **Add Software iSCSI Adapter** and click **OK**. A new iSCSI vHBA is created.

5. Under **Storage Adapter**, select your new iSCSI vHBA, then click **Properties**. The iSCSI Initiator Properties screen opens.

6. Select **Configure** and enter an iSCSI alias name for this vHBA. Click **OK**.

2

7. On the same screen, for binding the port groups to the software iSCSI adapter as well as active vmknic-based multipathing for iSCSI software, select the **Network Configuration** tab.

Figure 2-4: iSCSI initiator properties
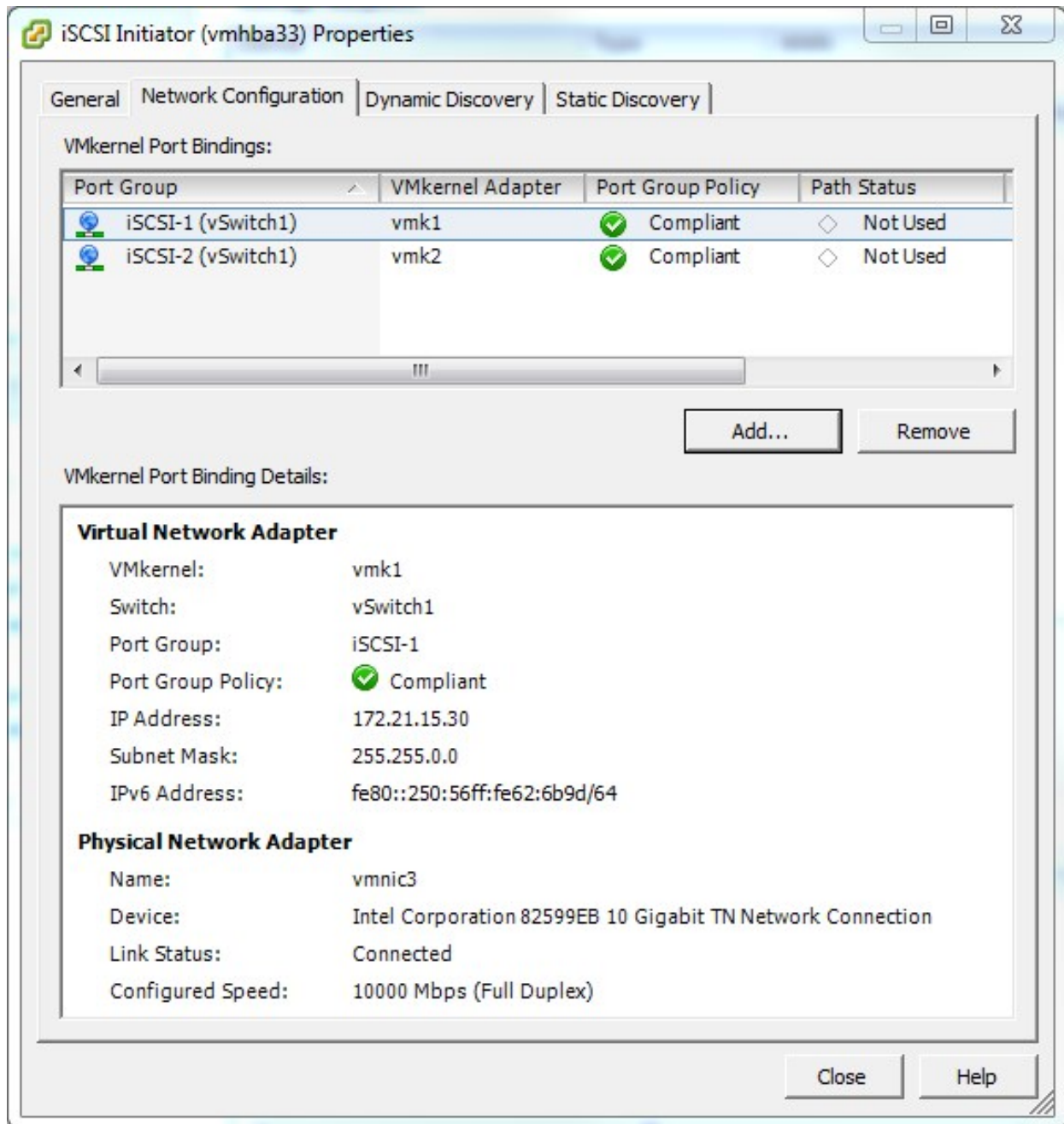
8. Click **Add**, and then select **iSCSI-1** and **iSCSI-2** port groups. Click **OK**.

9. Create a storage pool on Unity; see Adding a storage pool on page 35.

10. Add a LUN to the storage pool on Unity; Creating a LUN on page 37.

11. Create and assign an iSCSI target to the LUN on Unity; Adding an iSCSI target on page 56.

12. On the VMware ESXi host, open **iSCSI Initiator Properties**, select the **Dynamic Discovery** tab, and click **Add**.

13. In the **Add Send Target Server** screen, add the iSCSI IP address of the 10GbE link aggregation interface. Click **OK** to close.

14. Rescan the adapters to discover the iSCSI LUN you created on Unity. The LUN should be available for the two active paths' members of the port binding configuration.

Figure 2-5: iSCSI LUN paths
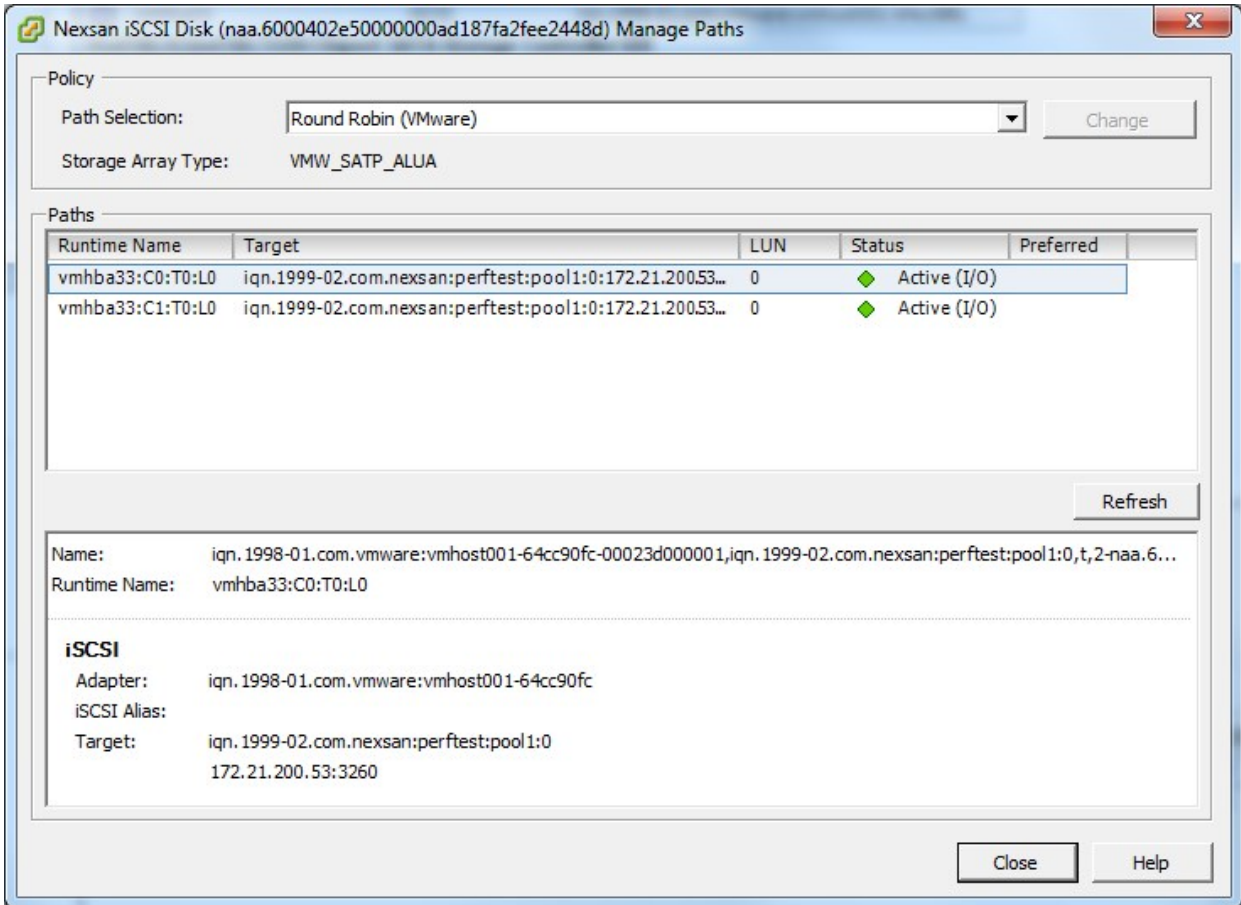
15. Make sure that the iSCSI LUN is visible and accessible by the ESXi host.

Figure 2-6: Datastores view

Configuring datastore heartbeating

With VMware vSphere 5.0, a new feature called Datastore Heartbeating provides better host management when network issues arise. A heartbeating datastore can be any datastore shared across VMware hosts. This feature allows VMware hosts to exchange heart beats using shared VMFS datastores.

Note To enable datastore heartbeating on a VMware HA cluster with two nodes, you must have at least two shared datastores.

► **To enable the datastore heartbeating feature:**

1. Right-click your VMware cluster profile.

2. Select the **Datastore Heartbeating** option on the left panel.

3. Choose the **Select only my preferred datastores** option on the right panel.

Figure 2-7: Datastore heartbeating
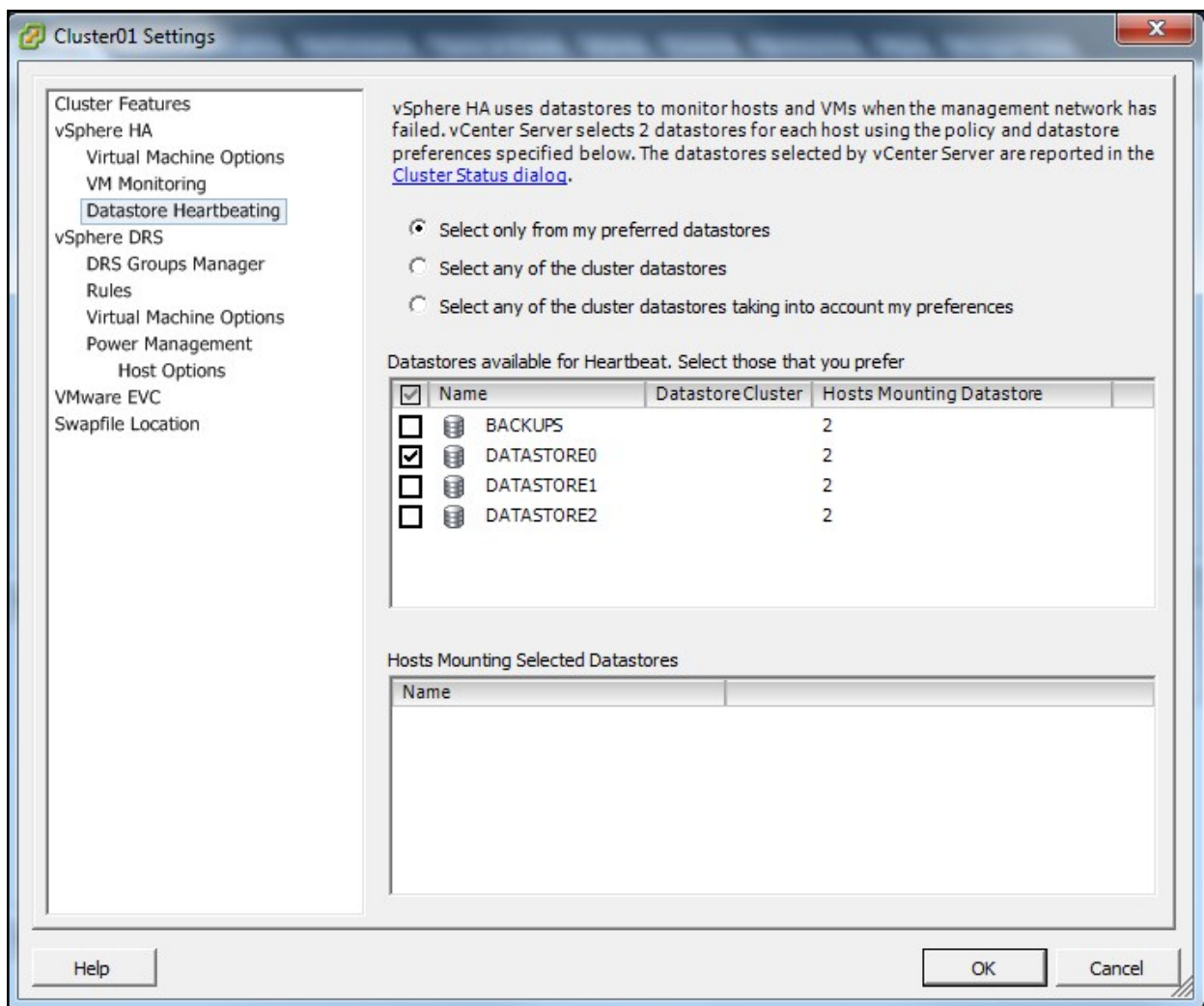
4. Select the datastore from the list.

5. Click **OK**.

Configuring the central swap datastore

By default, VMware creates a virtual swap file that is usually equal to the amount of memory allocated to each virtual machine. The vSwap file is located by default with the virtual machine files. It is used in case the ESX host is over-committing physical memory, and it is also used during vMotion activity. During those times, I/O operations are significantly increased on the storage, which could affect the virtual machines overall performance. For this reason, we recommend changing the location of the swap file to a central swap datastore.

This procedure provides examples for a cluster. For further information on swap files and datastores, refer to the VMware documentation.

► **To configure the datastore:**

1. Select your cluster in the VMware vSphere 5.x client.

2. Select the **Configuration** tab.

3. Select **Virtual Machine Swapfile Location**.

4. Click **Edit**.

2

5. Select the vSwap datastore that was configured with Datastore Heartbeating for vSphere HA; see Configuring datastore heartbeating on page 25.

Figure 2-8: Cluster settings—swapfile location
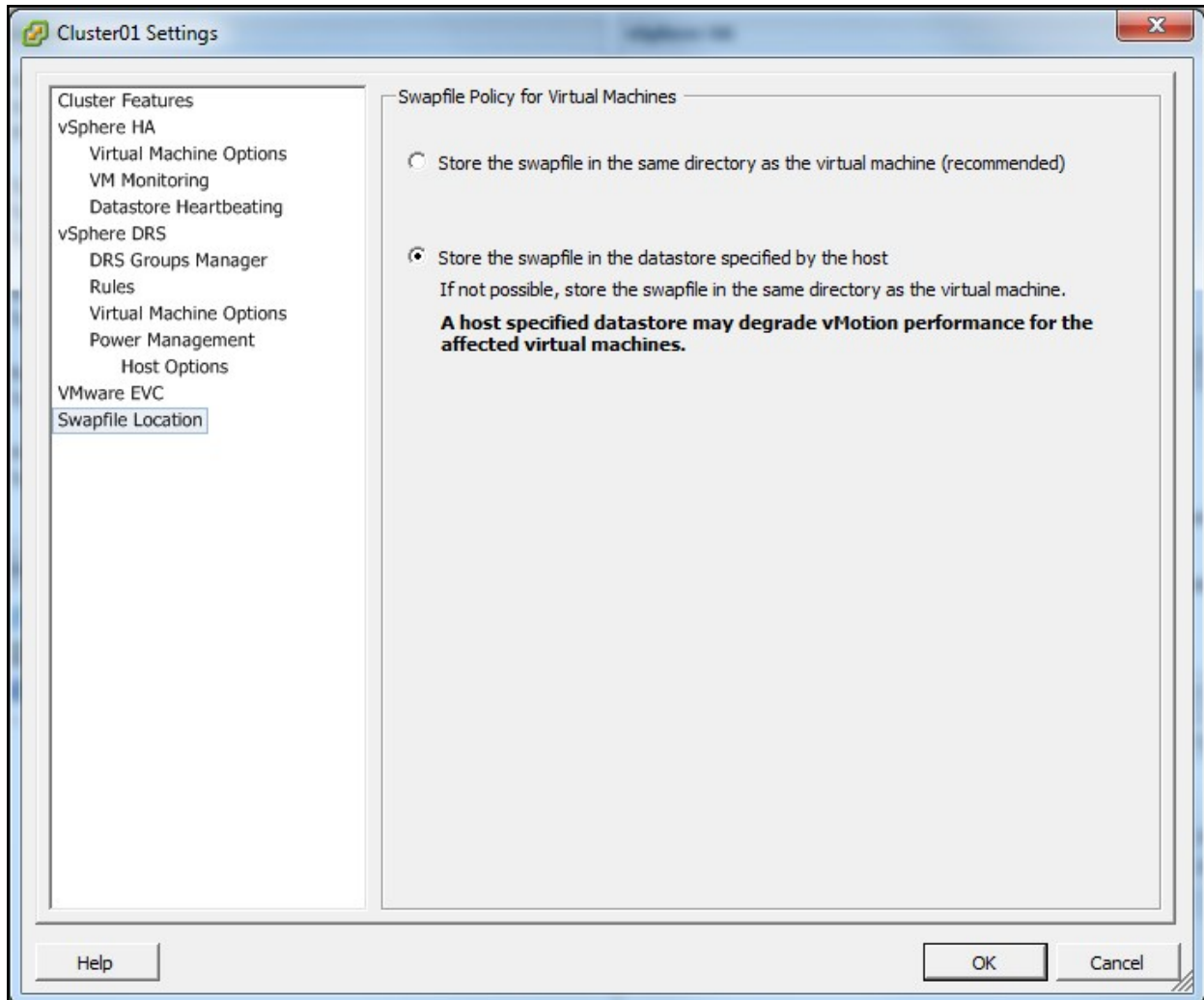
6. Click **OK**.

7. Right-click the virtual machine that will have the swap file relocated to a different datastore.

8. Click the **Options** tab, then select **Swapfile Location**.

9. Choose the **Store in the host's swapfile datastore** option and click **OK**.

Figure 2-9: Virtual Machine properties—swapfile location
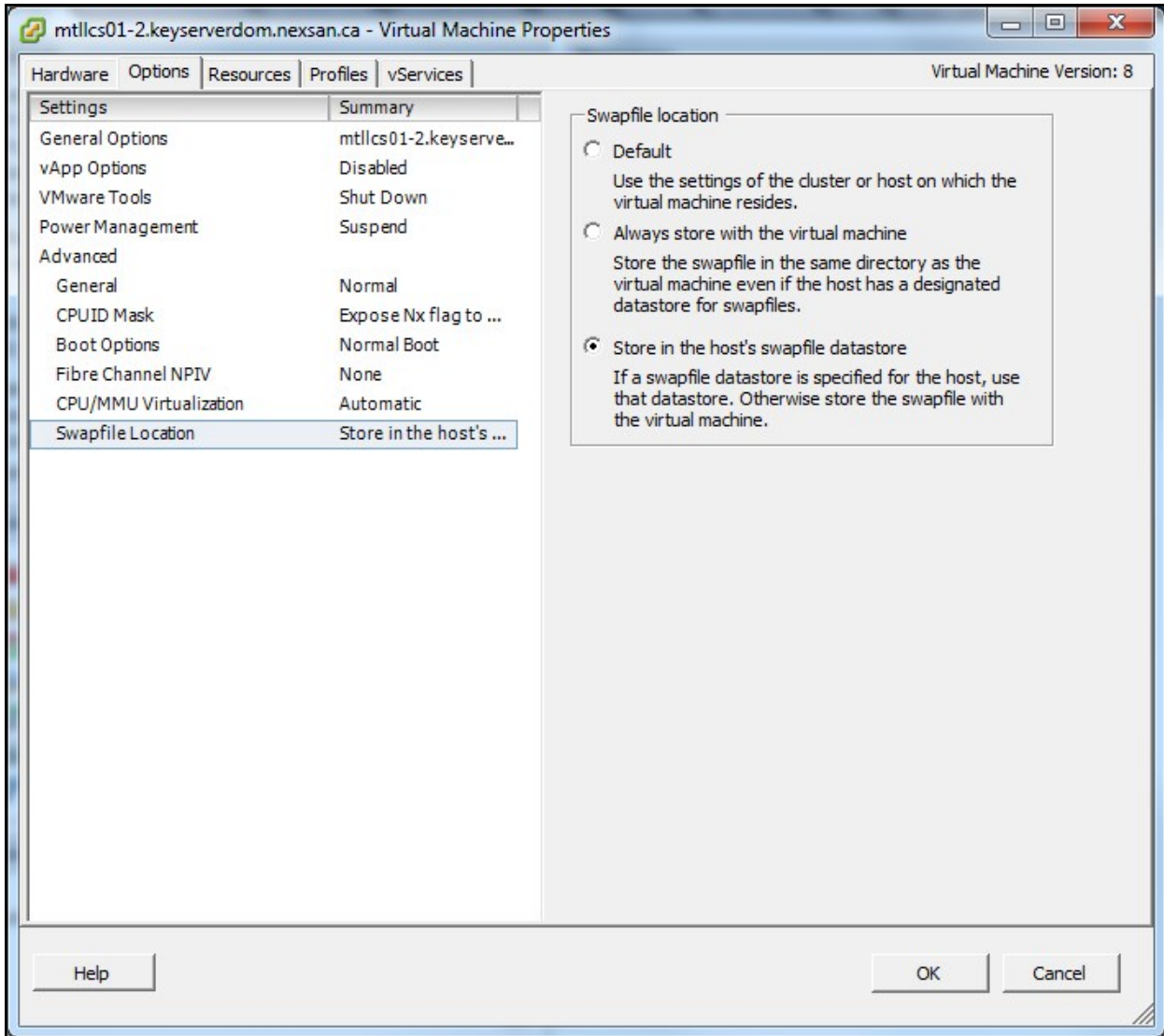
Configuring the VMware failover solution

VMware provides two types of failover solutions:

● <u>High Availability</u>—guard against physical server failures. The VM reboots on the secondary server if the primary server is down. There is downtime while the system performs failover.

● <u>Fault Tolerance</u>: There is no disruptive transition during failover. Fault tolerance is build upon High Availability.

High Availability (HA)

The main configuration steps are:

1. Create a cluster.

2. Add hosts to the cluster.

3. Enable High Availability.

Fault Tolerance (FT)

The major guidelines are:

● HA must be enabled first.

● The Protected Virtual machine must be configured for a single processor.

● Both hosts must be configured to see the same shared storage.

● ESXi versions must have identical patch levels.

The main configuration steps are:

1. Configure the vMotion NIC.

2. Configure FT logging.

3. Enable FT.

To configure HA and FT, refer to the VMware documentation.

Chapter 3

Setting up Unity for VMware

To use Unity in a VMware environment, you must perform these tasks. Make sure to review all recommendations and requirements before starting, as described in VMware recommendations and requirements on page 7.

This section includes these steps:

Enabling LACP

LACP (Link Aggregation Control Protocol) allows multiple individual Ethernet links to be aggregated to form a single logical channel. LACP enables a network device to negotiate an automatic bundling of links by sending LACP packets to the peer (directly connected device that also implements LACP).

LACP is typically used for two purposes:

1. Load balancing: bundling two or more links together provides increased throughput and a level of load balancing for when the speed of individual Ethernet lines is limited.

2. Redundancy: links in a LACP aggregation provide an automatic fallback should one of the links fail, providing enhanced resilience. All traffic is routed from the failed link to the remaining links.

The Unity Storage System supports both active and passive LACP modes:

● Active mode: places a port into an active negotiating state in which the port initiates negotiations with other ports by sending LACP packets.

● Passive mode: places a port into a passive negotiating state in which the port responds to LACP packets that it receives but does not initiate LACP packet negotiation.

This section explains how to enable and configure LACP on the Unity Storage System.

Understanding link aggregation

Link aggregation does NOT work by passing packets across all the links in an aggregate group in a round-robin fashion. When a packet arrives, LACP calculates the source and destination address hash (which can be L2, L3, or L4 policies, with L4 being the default), and automatically assigns any given source-destination

pair to one of the links in the aggregate. As a result, a single TCP connection can never achieve speeds surpassing the throughput of a single link.

For example, while you might aggregate 4x 1Gbps links into a single aggregate, you'll never get more than 1Gbps in any single data transfer. Even in the case of multiple sessions at the same time from multiple clients, 50/50 load balancing is almost never achieved in real-life implementations; around 70/30 is more common.

For more information about LACP, see:

http://en.wikipedia.org/wiki/Link_aggregation

Requirements and guidelines for implementing LACP

This section lists network and infrastructure requirements for implementing LACP, as well as guidelines/best practices for configuring the Ethernet switches for LACP.

- LACP only operates point-to-point between two partner devices connected together: for example, the Unity Storage System and the Ethernet switches.

- LACP must be enabled at both ends of the link to be operational. Refer to the Ethernet switch manufacturer's documentation for information on setting up LACP on the Ethernet switches.

- The link between the Unity Storage System and the Ethernet switch(es) must be Full-Duplex.

- Both the Unity Storage System and the Ethernet switches must be running at the same speed (1Gbps or 10Gbps).

- The Ethernet switches must support the IEEE 802.3ad Link Aggregation Standard.

- To prevent a single point-of failure in your configuration, make sure to connect each controller node to a different Ethernet switch, as explained in "Understanding network aggregation" in the *Network Configuration Guide*.

Enabling LACP using the nxadmin CLI

The Unity Storage System provides the `nic` command in the Unity Storage System's menu-based nxadmin CLI for enabling and monitoring LACP on the Unity Storage System.

► **Before you begin:**

- Enabling LACP over the network will cause disconnection. Perform these steps through KVM console, or through IPMI console. For complete details on using the nxadmin menu and CLI commands, refer to the *Nexsan Command Line Interface Reference Guide*.

- You must not enable LACP on nx99 otherwise you will lock yourself out of the system.

> **CAUTION:** On a clustered system, you must enable LACP on each controller node individually. Before you enable LACP on a controller node, however, you must transition any Pool Resource Groups and/or the System Management component to the second controller in the system. You must then repeat this process to enable LACP on the second controller.

► **To enable and configure LACP on the Unity Storage System:**

1. Access the nxadmin CLI.

2. When the NestOS Admin Menu displays, type **5** (**Run a Command**), and then press Enter.

3. At the command: prompt, type one of these command to enable LACP on the Unity Storage System, in either active or passive mode:

- Active mode:

```
nic modify-aggr -L active nx0
```

Where `nx0` represents the primary interface on the Unity Storage System. You can also enable LACP on the secondary interface, if available: to enable LACP on the secondary interface, replace `nx0` with `nx1`.

- Passive mode:

```
nic modify-aggr -L passive nx0
```

Where `nx0` represents the primary interface on the Unity Storage System. You can also enable LACP on the secondary interface, if available: to enable LACP on the secondary interface, replace `nx0` with `nx1`.

4. Press Enter. The Unity Storage System disconnects from the network.

5. Configure the Ethernet switch to set the ports that you want to combine into a logical channel. The Unity Storage System comes back online once LACP negotiation is complete.

6. Test and confirm network connectivity to the Unity Storage System.

Troubleshooting LACP

► **To detect that LACP is enabled on the switches and not on the Unity Storage System:**

- Verify that LACP is enabled on the switches as passive or active; see Enabling LACP using the nxadmin CLI on the previous page.

- Verify the Unity Storage System network interface LACP status.

► **To verify the network interface LACP status:**

1. At the command: prompt, type:

```
nic show-aggr -L
```

2. Press Enter.

You will see similar results as displayed below when the protocol is up.

```
ES200100-001-02:P:/> nic show-aggr -L
LINK          PORT          AGGREGATABLE SYNC COLL DIST DEFAULTED EXPIRED
nx0           ixgbe2        yes          yes  yes  yes  no        no
--            ixgbe3        yes          yes  yes  yes  no        no
private0      ixgbe0        yes          yes  yes  yes  no        no
--            ixgbe1        yes          yes  yes  yes  no        no
nx99          igb0          yes          no   no   no   no        no
```

Enabling jumbo frames using the nxadmin CLI

Enabling jumbo frames on the Unity Storage System can significantly increase network throughput while consuming fewer CPU cycles on the system.

► **Before you begin:**

- You must make sure to enable jumbo frames on the switch(es) that the Unity Storage System is connected to, as well as on all client systems that access it.

- You must make sure that the 10 GigE interface is set as the primary interface (nx0) on the Unity Storage System (for example: ixgbe1, ixgbe2, etc.).

- Enabling jumbo frames over the network will cause disconnection. Perform these steps through a KVM or IPMI console. Client systems and applications on the network will temporarily lose connection to the Unity Storage System during the reboot and switchover operations. Make sure that client systems with an active connection to any file systems on the Unity Storage System are disconnected; also make sure to quiesce any applications with an active connection to the Unity Storage System.

- We recommend that IPMI settings be configured for the Unity Storage System if you are connected to the Unity Storage System with a system on a separate management network.

► **To enable jumbo frames on the Unity Storage System:**

1. Access the nxadmin CLI.

2. Type this command to set the MTU for the nx0 interface to 9000 bytes (jumbo frames) and press Enter:

   ```
   nic set-linkprop -p mtu=9000 nx0
   ```

3. Repeat these steps for any other network interfaces on the Unity Storage System (such as, nx1); for example:

   ```
   nic set-linkprop -p mtu=9000 nx1
   ```

4. Restart the system or the controller node:

   a. Type **menu** and press Enter.

   b. When the NestOS Admin Menu displays, type **2** (**Shutdown and Reboot Menu**), and press Enter.

   c. Type **1**, and press Enter. The system or controller node reboots; this process may take some time to complete.

5. Once the system or controller node reboots, test and confirm network connectivity to the Unity Storage System.

6. Repeat these steps on the second controller node after you transition cluster resources back to the node you finished configuring.

Adding a storage pool

Unity provides the **Create a Storage Pool** wizard to guide you through the process of creating a storage pool.

Before you begin

If your Unity deployment is set up to use Unity authentication, consider adding user accounts to the system that you can then assign as Pool Administrators to the storage pool. You may also want to add user accounts for file system-level access; you can then configure the relevant access permissions when you create file systems.

How to allocate storage with Unity

- Take into account the number of file systems and/or LUNs that you need per storage pool, and divide the disk space in the storage pool accordingly. When allocating disk space, keep in mind that metadata and snapshots also consume storage.

- Consider future capacity requirements, particularly when allocating space usage to file systems and LUNs.

- You are not required to allocate all available volumes to the storage pool when you initially create the pool. However, keep in mind that any unallocated volumes remain unused on the system until you allocate them to the storage pool.

- Consider how you intend to expose file systems on the system: using (to Windows-based systems), (to UNIX/Linux-based systems), or using both sharing.

- Consider the users and groups that will access the file systems, as well as the file systems-level access permissions that you need to give each user and/or group.

- If your deployment includes the Unity Data Replication package, make sure the remote Unity that you intend to use as your replication site has adequate storage capacity to match the capacity on the primary site.

- If your deployment includes the Data Replication and/or Snapshots features, make sure there is enough storage capacity for both replicated data and scheduled snapshots of your data.

- If your deployment includes Nexsan storage enclosures attached externally to your Unity, make sure the system(s) is properly connected to Unity and that it is powered on.

3

► **To create a storage pool:**

1. On the **Unity navigation bar**, click **Storage > Storage Pools**.

2. In the **Storage Pools** panel, click **Add Storage Pool**. The **Create a Storage Pool** wizard opens.

3. In the **Available** listing, select a storage system or volume and click **Allocate**.

Figure 3-1: Create a Storage Pool: Properties
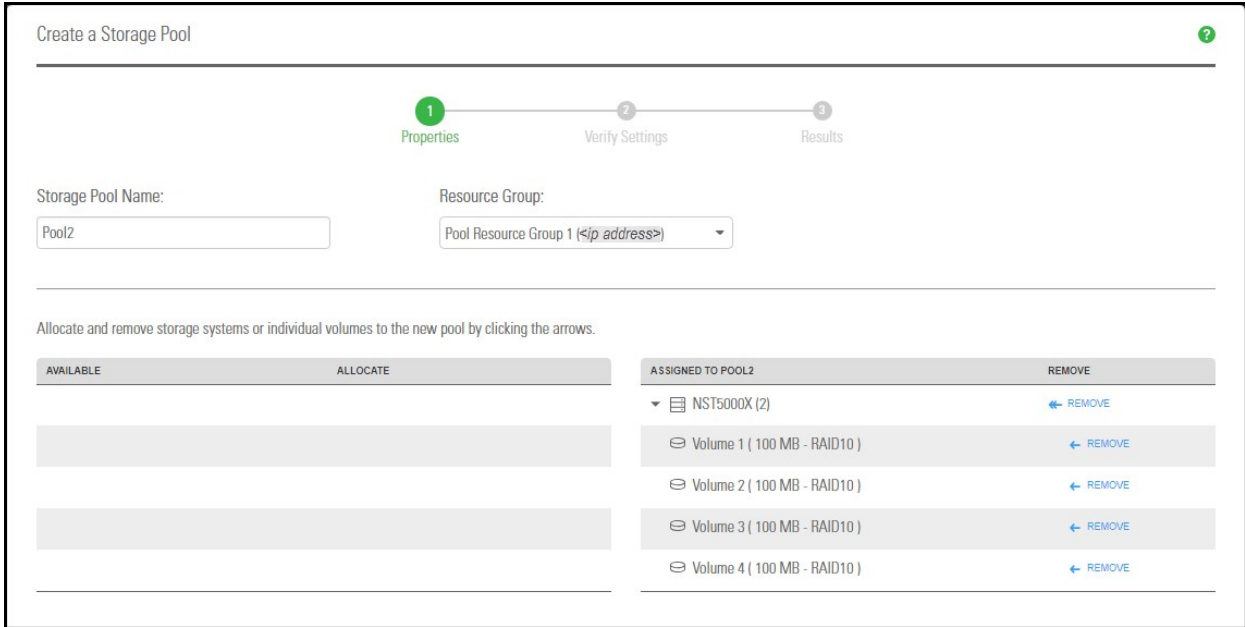
4. Optionally, change either of the following:

    a. the **Storage Pool** name.

    b. the **Resource Group** that you want to assign the storage pool to.

    Click the **Next** button.

5. If the new pool has FASTier drives, specify whether they should be used for **READ** or **WRITE** (see "Assigning FASTier devices," below). Click the **Next** button.

6. Verify your settings and click the **Create** button.

Next steps

After the pool is created, these are typical follow-on tasks:

- Creating another storage pool
- Adding a file system on page 46
- Creating a LUN on the facing page

► **Assigning FASTier cache devices:**

- You assign a read/write cache device as either read cache OR write cache.
- Unity only uses read cache devices once the RAM cache on the system is full. Read cache devices are filled only as files are read. This means that Unity uses read caching only on the second file access.

- Write-only cache devices aggregate smaller writes in one large write. They are particularly useful for many small, synchronous writes. Asynchronous writes will see no improvement.

Note Make sure to review the FASTier cache requirements for VMware—see Unity Storage System recommendations on page 9.

For more information about FASTier cache devices, please contact your Nexsan reseller or Nexsan Support Representative.

Creating a LUN

This section describes the process for adding a LUN to a storage pool on Unity, including guidelines for LUN management, and steps for setting up CHAP (Challenge Handshake Authentication Protocol) authentication. You add a LUN to a storage pool using the Create a LUN wizard; before starting the Create a LUN wizard, review the guidelines provided in the subsequent sections.

Note If you select the option to create a new iSCSI target during the LUN creation process (*step 1*), the Create a LUN wizard includes 7 steps. This section only describes the process for adding a LUN using the default, or an existing target. Unity provides the Target Setup wizard to guide you through the process for adding a target to a storage pool; for more information, see Adding an iSCSI target on page 56.

► **Before you begin:**

- If you intend to use CHAP (Challenge Handshake Authentication Protocol) authentication, you must add CHAP users to the Unity System.

- You can add one or more iSCSI targets to storage pools where you intend to add LUNs. You can create a separate target for each LUN or assign multiple LUNs to a single target; see Adding an iSCSI target on page 56.

The Create a LUN wizard guides you through the process of adding a LUN to a storage pool.

Prerequisites

To add a LUN, you must first define a storage pool.

► **To start the Create a LUN wizard:**

1. On the **Unity navigation bar**, select **LUNs**.

2. Click **Add LUN**.

This section includes these steps:

Step 1: Setting the LUN name and block size

This step of the Create a LUN wizard prompts you to specify a name for the new LUN, set block size, as well as define client-specific (initiators) settings.

Figure 3-2: Create a LUN wizard, Step 1: Setting the LUN name and block size
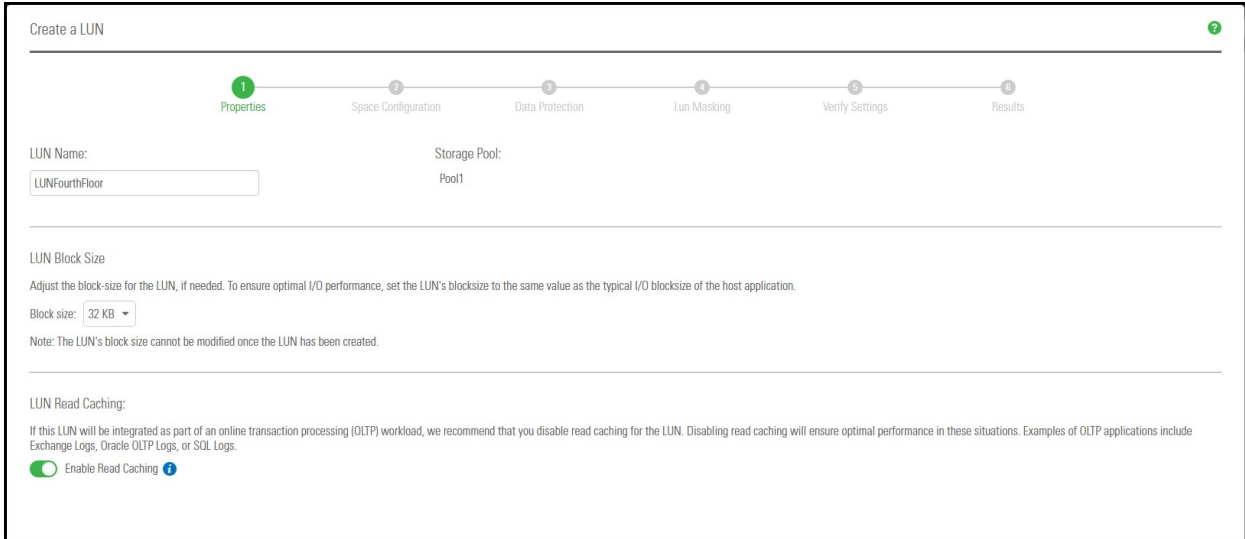
▶ **To define the LUN:**

1. Type a name for the LUN in the **LUN Name** field.

   The name must start with an (upper-case or lower-case) alphabetic; and, with the exception of the hyphen (-), and period (.), the name can only contain alphanumeric characters, without spaces.

   These characters are NOT allowed:

   ```
   " / \ [ ] : ; | = , + * ? < >
   ```

2. In the **LUN Blocksize** section, adjust the block size for the LUN, if needed.

   To ensure optimal I/O performance, set the LUN's block size to the same value as the typical I/O block size of the host application. Aligning the volume block size to the typical I/O block size from the application can significantly improve application performance.

Table 3-1: Recommended block size for the application used

Application / Data type	Recommended block size
Windows / Linux Boot	64 KB
Microsoft Exchange 2010 DB	32 KB
Microsoft Exchange 2010 Log	128 KB
Oracle OLTP	8 KB
SQL Server	64 KB
Video Streaming	128 KB

Notes:

● You CANNOT modify the LUN's block size once the LUN is created.

● The maximum block size for Unity is 128 KB.

3. (Optionally) Disable read caching for the LUN. For database OLTP LUNs, we recommend to disable read caching to increase performance.

4. Click **Next** to continue.

Step 2: Space configuration settings for the LUN

This step of the Create a LUN wizard prompts you to specify space usage settings for the LUN.

Note If you are using data replication, Nexsan recommends using thin-provisioned LUNs.

This table illustrates how Unity distributes disk space to LUNs for a storage pool of 10 TB.

Table 3-2: Distribution of disk space to LUNs

Space usage settings	Total available space in storage pool: 10 TB	
	LUN 0 (Thin-provisioned)	LUN 1 (Thick-provisioned)
Reservation	4 TB	6 TB
Virtual volume size	20 TB	N/A
Physical capacity	4 TB	6 TB
Virtual volume size as seen by initiators	20 TB	6 TB

Figure 3-3: Create a LUN wizard, Step 2: Space configuration
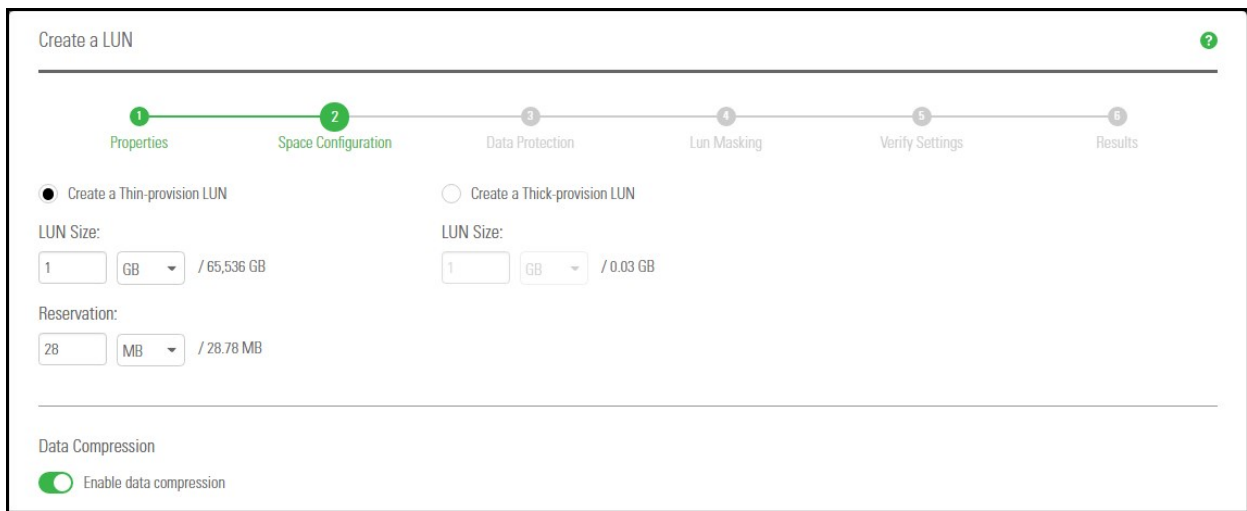
► **To configure space usage for the LUN:**

1. To use the **Thin Provisioning** feature (enabled by default): Accept or update the **LUN Size** value. This determines the disk space that clients see when they connect to the LUN.

   Notes:

   ● Once you set the virtual volume size for a LUN, you cannot decrease it; however, you can increase it at any time.

- The virtual volume size cannot be less than the reserved space.

- You cannot switch to Thick Provisioning after the LUN is created.

2. Specify the **Reservation** space for the LUN in the storage pool. This space will be reserved for the exclusive use of the LUN.

When you reserve space for a LUN, Unity allocates the specified amount of disk space in the storage pool to the LUN. If you add another LUN to the storage pool, the space available to the new LUN is the difference of the total disk space in the storage pool minus any reservations that you set for other LUNs on the system.

For example, in a storage pool with 2 LUNs and 10 TB of available disk space, if a reservation of 6 TB is allocated to one LUN, then the second LUN has 4 TB of disk space available to it.

3. Optionally, select **Create a Thick-provisioned LUN**.

Accept the default **LUN size**, or enter a value to change it. Thick Provisioning will use the specified amount of physical disk space.

Notes:

- The Unity graphical user interfaces do not support switching from thick to thin LUN provisioning after a LUN is created. Contact Nexsan Support if you need to perform a conversion.

- Once you set the minimum volume size for a LUN, you cannot decrease it; however, you can increase it as needed.

- If you intend to use snapshots with a Thick-provisioned LUN, keep in mind that each snapshot consumes disk space equivalent to the total size of the snapshot, so please make sure to plan your space consumption requirements accordingly.

For LUNs hosted in a VMware environment, we recommend using Thick-provisioned LUNs.

4. Click the **Next** button to continue.

Step 3: Enabling data replication and snapshot scheduling

This step of the Create a LUN wizard prompts you to enable data replication for the LUN, if data replication with one or more remote sites is configured for the storage pool, and also to configure the snapshots schedule and auto-deletion settings for snapshots.

Limitations

- We do not recommend enabling snapshots scheduling when using LUNs in a Hyper-V environment. You can take manual snapshots and roll back data to a snapshot.

- We do not recommend enabling snapshot scheduling when using LUNs in a VMware environment. To take manual snapshots and roll back data to a snapshot for VMware, see the *VMware Best Practices Guide* on the Nexsan Unity Documentation & Online Help page.

Figure 3-4: Create a LUN wizard: Replication and snapshots

► **To enable data replication for the LUN:**

1. Select **Enable Replication**. This option is disabled if you have not yet configured data replication for the storage pool. If you enable this option, Unity replicates the LUN to the remote site during the next scheduled data replication.

2. If you don't need to enable snapshot scheduling, click **Next** on the wizard panel to continue.

► **To configure snapshot scheduling for the LUN:**

Note There can only be one snapshot schedule per LUN.

1. Configure the snapshot schedule for the LUN:

   a. Select **Enable snapshot scheduling**. This option is selected by default. Clearing the check box disables snapshot scheduling.

   b. Specify a recurrence pattern for the schedule by typing a value in the **Recur every** field; then, select the recurrence period from the drop-down list: **Minutes(s)**, **Hour(s)**, **Day(s)**, **Week(s)**, or **Month(s)**.

      - For example, if you want Unity to take a snapshot every two hours, type 2 in the **Recur every** field and select **Hour(s)** from the recurrence type drop-down list.

      - If you select **Week(s)** from the recurrence type drop-down list, then select the day or days of the week that you want Unity to take automatic snapshots on.

      - If you select **Month(s)**, then select the month or months of the year, as well as the calendar dates that you want Unity to take automatic snapshots on.

2. Select **Enable the auto-deletion of snapshots** if you want Unity to automatically delete scheduled snapshots for the LUN when the storage pool is 80% full. Unity deletes snapshots—starting with the oldest automatic snapshot on the system—until used disk space capacity in the storage pool falls below the 80% threshold. Unity does not delete manual snapshots when you enable this option; only scheduled automatic snapshots are processed.

3. Click **Next** to continue.

Step 4: LUN Masking

This step of the Create a LUN wizard prompts you to select a LUN Mask. A LUN Mask enables you to make a LUN accessible to hosts through the selected Target(s). You can use an existing LUN Mask or create a new

one. Unity has two types of LUN Masks, one for Fibre Channel and the other one for iSCSI for each storage pool.

Note If the system is replicated, you must also create a LUN Mask on the replicated site for the LUN to be accessible when a failover occurs.

► **To select a Mask:**

1. Select one of these options:

   - **Use pre-defined Fibre Channel LUN Mask**: This mask includes the common, unique Fibre Channel target.

   - **Use pre-defined iSCSI LUN Mask**: This mask contains all iSCSI targets and is accessible to all hosts.

   - **Use an existing LUN Mask**: If you previously created one or more LUN Masks, they will display in the drop-down list.

   - **Create a new LUN Mask**: This step adds a step to the wizard for defining a LUN Mask. See the next step.

   - **None**: If you select this option, you will need to select or create a LUN Mask later to make the LUN accessible to hosts; .

Figure 3-5: Create a LUN wizard, Step 4: Selecting a Mask
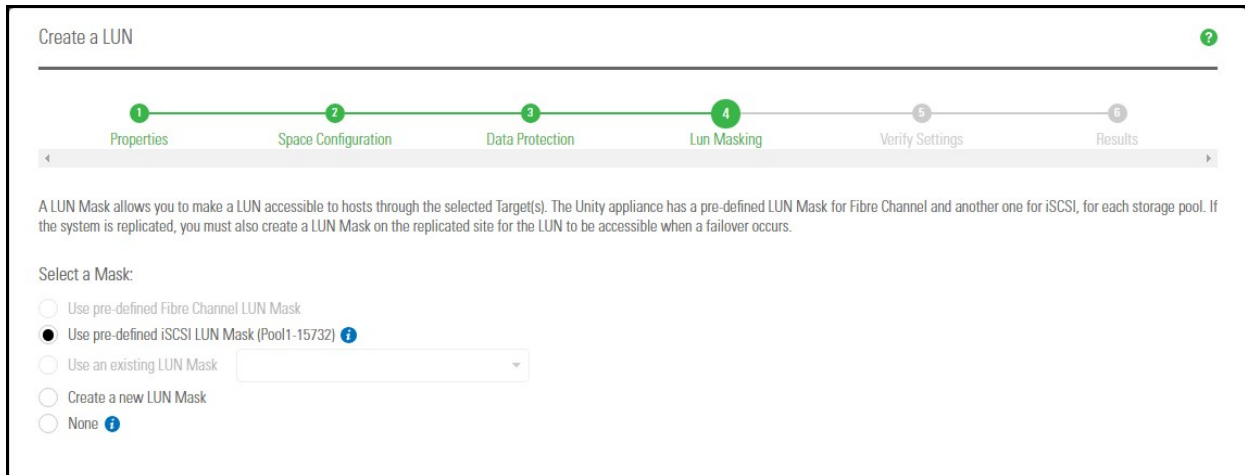
2. Click **Next** to continue. If you selected to create a new LUN Mask, the wizard will continue to Step 5: Create a new LUN Mask below.

   If you selected an existing LUN Mask, the wizard will continue to Step 6: Verifying settings on the facing page.

Step 5: Create a new LUN Mask

This step of the **Create a LUN** wizard prompts you to create a new LUN Mask if you selected that option in the previous step. The LUN mask is used to make the LUN visible to a host using the target you associate with the LUN.

When creating an iSCSI LUN, you specify the initiators you want and assign one or more of the available iSCSI targets to the LUN. If you have not created iSCSI targets yet, you must skip this step because the wizard will not let you continue. After creating the LUN, you have the possibility to associate it to a target by following the steps in . For steps to create an iSCSI target, see Adding an iSCSI target on page 56.

When creating a Fibre Channel LUN, you specify the initiators you want and then assign the unique common Fibre Channel target to the LUN.

▶ **To add a new LUN mask:**

1. Select the **Add to a new LUN Mask** option.

Figure 3-6: Create a LUN wizard, Step 5: Create LUN Mask

2. Enter a meaningful name in the **Name** field.

3. From the **Transport Type** drop-down list, select **iSCSI** or **Fibre Channel**. The **Target** selection is automatically updated with the existing target associated with the storage pool.

4. Select an Initiator Group. An initiator group must contain either Fibre Channel or iSCSI initiators. An initiator cannot be selected in multiple groups.

5. Enter a LUN ID or let Unity assign the next available number. The LUN ID is a number used to identify a LUN—from 0 to 254. Each LUN associated to the same target and the same initiators must have a unique LUN ID. However, if you associate each LUN to a different target or to different initiators (even if they are part of the same target), there is no need for the LUN IDs to be different. For LUN masking, the LUN ID has to be unique within the same mask.

6. Click **Next** to continue.

Step 6: Verifying settings

This step of the Create a LUN wizard summarizes the settings you selected for your LUN. Review the summary carefully before applying the configuration settings.

▶ **To change a LUN configuration setting:**

● Click **Previous** to go back to the corresponding configuration step.

Or

● Click the corresponding step identifier at the top of the Create a LUN wizard panel. For example, if you want to rename the LUN, click **Properties**.
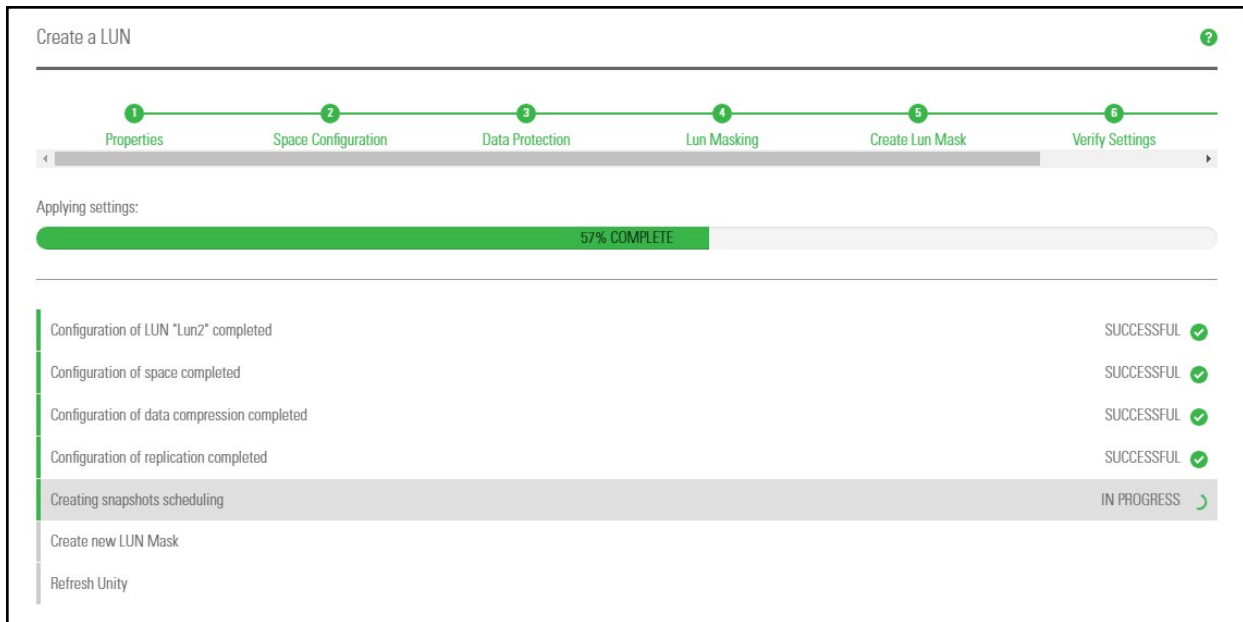
Figure 3-7: Create a LUN wizard: Verify Settings
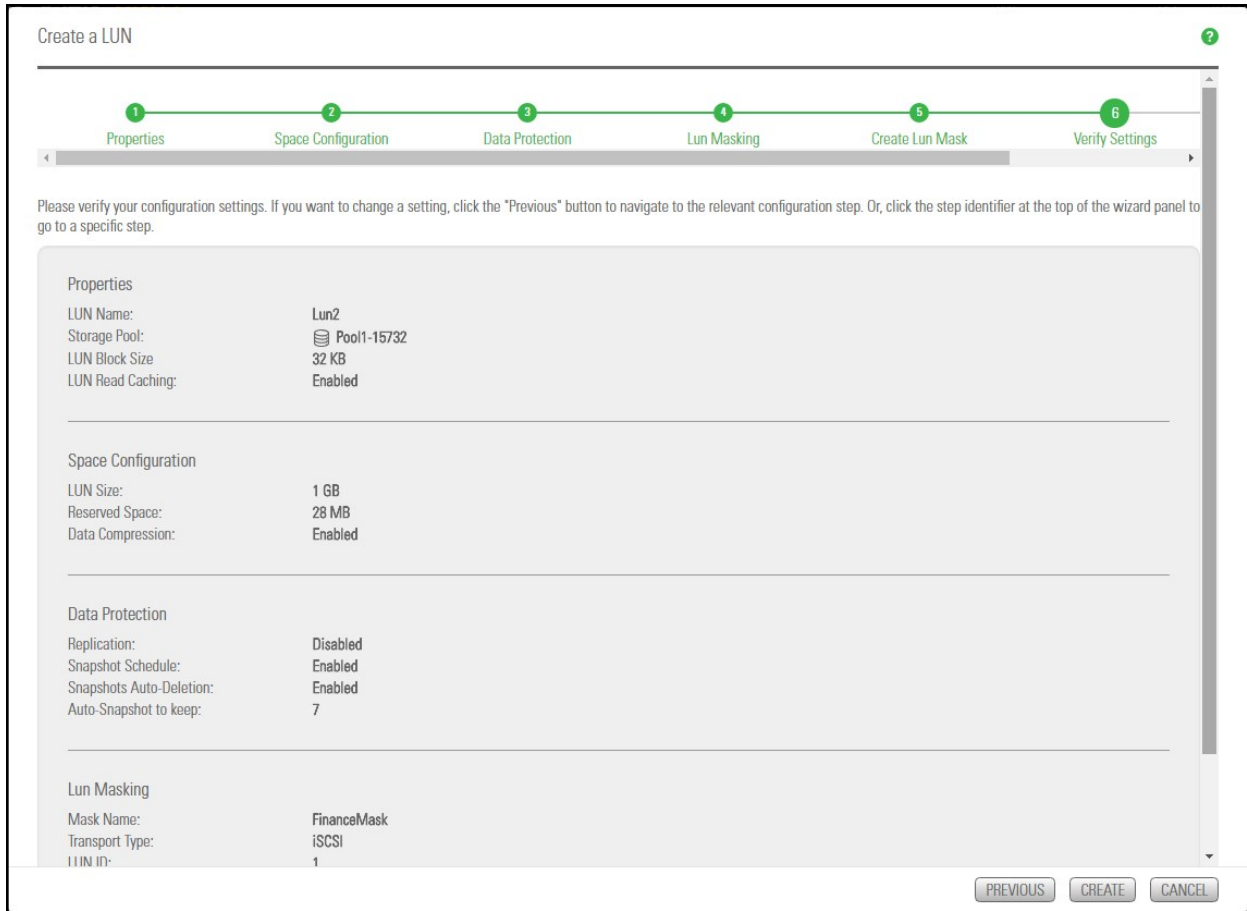
When you are satisfied with the configuration settings, click **Create** at the bottom of the panel.

Step 7: Viewing progress

In this step, the Create a LUN wizard displays progress as Unity creates the new LUN.

Figure 3-8: Create a LUN wizard: Viewing configuration results

The Create a LUN wizard displays error events that the system encounters during the LUN creation process. You can view more details about an error event by expanding the corresponding entry.

► **To view more details for an error event:**

● Click the **View Error** link corresponding to the error event.

Unity informs you when it successfully creates the LUN. It also asks you if you want to create another LUN in the storage pool.

Adding a file system

Unity provides the **Create a File System** wizard to guide you through the process of file system setup.

Before you begin

Planning the content, size, and distribution of file systems on Unity can improve performance, manageability, and overall ease-of-use of the system.

You should carefully choose the contents of a file system to avoid two common pitfalls: having too many file systems of a very specific nature, or having very few file systems of a general nature. For example, file systems for general use are easier to set up in the beginning, but can cause problems later. A better approach is to create separate file systems with a specific purpose or group of users in mind.

However, creating too many file systems also has its drawbacks. For example, it is much more efficient to create a *home* file system rather than creating separate file systems for each user's home directory. See Home Directories.

In general, by keeping the number of file systems and other resources low, the performance of Unity is optimized.

Before you add file systems to a storage pool on Unity, review these guidelines:

- Take into account the number of file systems that you need per storage pool, and divide the disk space in the storage pool accordingly. When allocating disk space, keep in mind that file system metadata and snapshots also consume storage.

- Consider future capacity requirements, particularly when allocating space usage to file system.

- Consider how you intend to expose file systems: either CIFS sharing, NFS sharing, FTP sharing (Nexsan Unity authentication only), or CIFS and/or NFS and/or FTP sharing.

- Consider the users and groups that will access the file systems as well as the share-level access permissions that you need to give each user and group.

3

Step 1: Setting the file system name and storage pool

▶ **To assign a file system name and storage pool:**

1. On the **Unity navigation bar**, select **Storage > File Systems**.

2. Click **Add File System**. The **Create a File System** wizard opens.

Figure 3-9: Step 1: Naming the File System and choosing the pool

3. You can accept or change the:

    a. **File System Name**

    b. **Storage Pool** assignment, if more than one storage pool exists. Select which pool you want to assign to the file system to.

    Click the **Next** button.

3

Step 2: Configuring space settings

In this step, configure reserved space, quota, and record size.

Figure 3-10: Step 2: Space settings
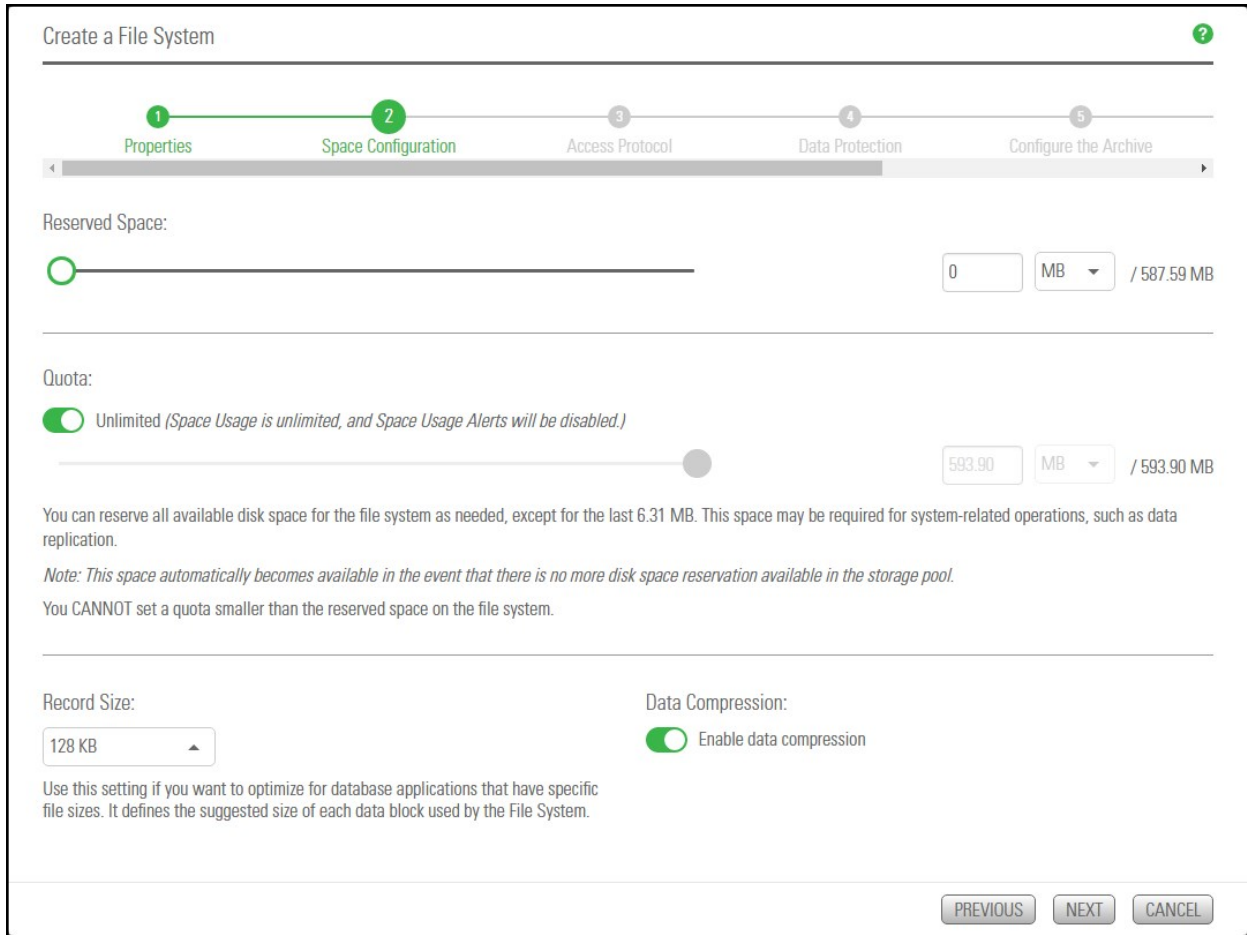
► **To configure space settings:**

1. In the wizard step 2 **Space Configuration** panel, you can specify:

Setting	Description
Reserved Space	*You can reserve a set amount of disk space in the storage pool for the exclusive use of the file system. (Read more ...)* If you add another file system to the storage pool, the space available to the new file system is the difference of the total disk space in the storage pool minus any reservations set aside for other Unity file systems. For example, in a storage pool with two file systems and 10 TB of available disk space, if a reservation of 6 TB is allocated to one file system, then the second file system has 4 TB of available disk space. ► **To reserve space for the file system in the storage pool:**

Setting	Description
	• Move the slider left or right to set the desired amount of reserved space, Or • Enter a value in the box to the right of the slider. **Note** To increase reserved space when you are using a limited quota, you must first increase the quota.

Quota	*A usage quota allows Unity to dynamically expand a file system's storage capacity. (Read more ...)*
	
	You can reserve all available disk space for the file system, if needed, except for the last 6.31 MB, which space may be required for system-related operations, such as data replication. **Note:** This space automatically becomes available in the event that there is no more disk space reservation available in the storage pool.)
	
	► **To specify the file system quota:**
	1. Click the **Quota** ⬤ button.
	2. Do one of the following:
	   • Move the **Quota** slider left or right to decrease or increase the quota limit.
	   • Enter a value in the box to the right of the slider.

Record Size	*Use this setting if you want to optimize for database applications that have specific file sizes. It defines the suggested size of each data block used by the File System. (Read more ...)* File system record size is dynamic and Unity can write in smaller blocks for applications requiring a different record size. It is not recommended to change the default file systems record size except where the application is database-driven and the database record size is precisely known. File systems have a default record size of 128 KB, which is the maximum size.
Data Compression	⚠️ **CAUTION:** If you turn on data compression for a file system, and then you turn it off before you set up replication for the file system, part of the data is compressed and the other part is not. Since the file system has not been replicated yet, the compression settings are not inherited and data compression is off at the remote site. If you set a space quota on the file system and that quota is almost full, the file system on the remote site will not have enough space to accommodate data coming from the primary file system. As a result, replication will fail. Perform one of these actions before replication: • Increase the quota to match the actual space used by data on the file system. • Set the quota to *Unlimited*. • Enable data compression on both sites.

3

| Setting	Description
	You can enable/disable compression at the file system level.
	Compression allows for better performance of the File Systems or LUNs, since the files to read/write are much smaller. However, it will also increase CPU usage. Compression can be enabled or disabled at any time.
	This setting takes precedence over the settings defined at the storage pool level. If you enabled data compression at the pool level before creating this file system, the file system already has data compression enabled. If you choose to disable data compression on the file system, only that file system will be affected.
	Compression allows for better performance of the file system since the files to read/write are much smaller. However, it will also increase CPU usage. Compression can be enabled/disabled at any time.
	Notes:
	● When you set up replication for file systems that have the compression setting enabled, file systems on the remote site inherit the compression settings.
	● Enabling or disabling data compression does not affect existing data. It will only affect data that will be written to the file system after the change.

3

2. Click the **Next** button.

Note Step 3: Configuring the access protocol below is only displayed if your Unity deployment includes Unity's Data Protection feature. For more information about Snapshots and Data Replication, please contact your Nexsan reseller or Nexsan Support Representative.

Step 3: Configuring the access protocol

Now select the **Access Protocol** for the file system.

● A file system that you expose using the CIFS sharing method can also be accessed by UNIX/Linux-based systems using a CIFS client implementation for UNIX (such as, *Samba*).

● A file system that you expose using the NFS sharing method can also be accessed by Windows-based systems using an NFS client implementation for Windows (available in *Microsoft Services for UNIX*)

● You cannot expose a file system to Windows-based systems over the CIFS protocol if Unity is connected to an LDAP Directory service; the CIFS sharing option is not available in LDAP Directory service implementations.

● If you configured LDAP Directory service as the user authentication mode for Unity: exposing a file system over the CIFS protocol in an LDAP environment is only supported with anonymous read and/or anonymous read/write access enabled for the share.

● A file system that you expose using the FTP sharing method can be accessed by UNIX/Linux-based and Windows-based systems using the FTP protocol. FTP sharing is only supported for Nexsan Unity authentication. It must be enabled at the site level beforehand.

● If the file system will be accessed over IIS, do not enable case-sensitivity for the share.

Figure 3-11: Step 3:Configuring the access method
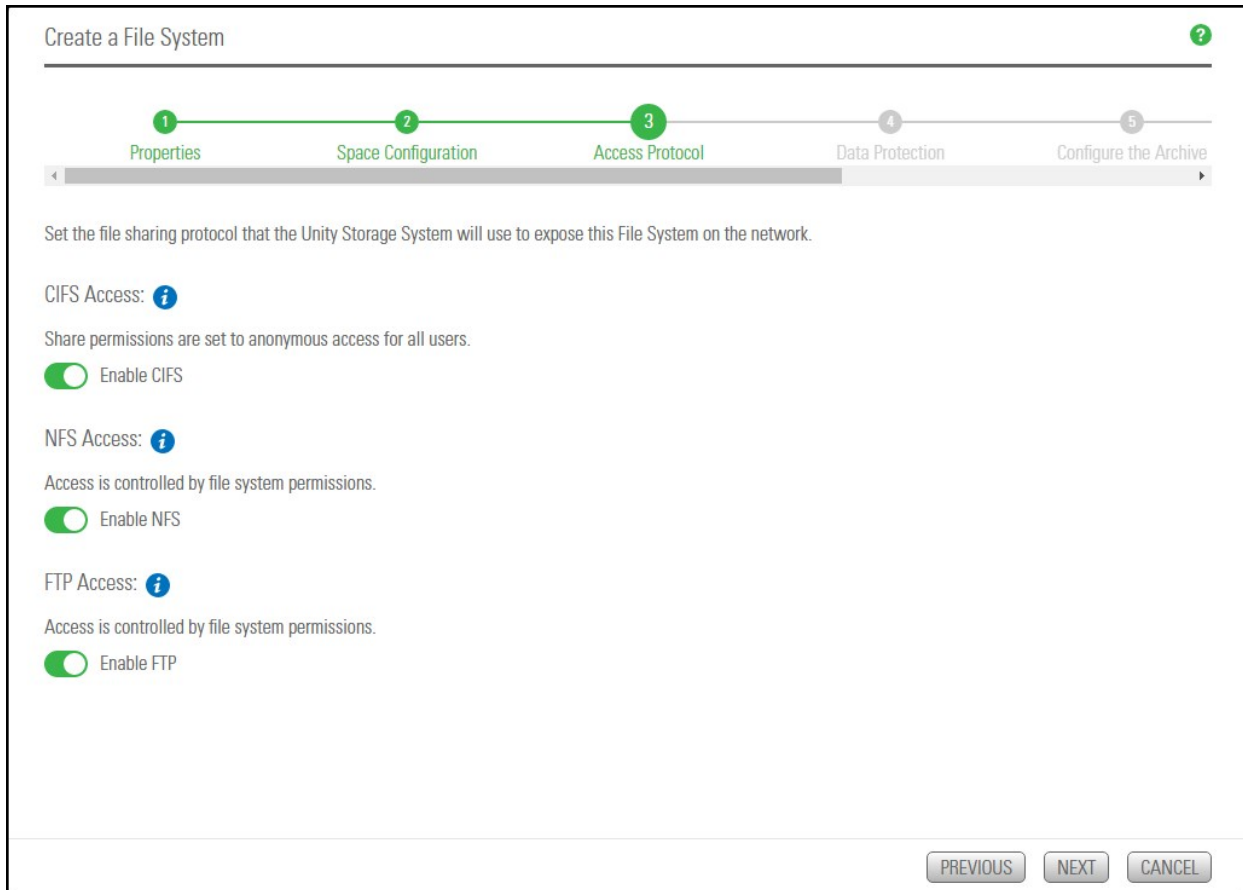
► **To configure the access protocol:**

● Choose any of the following:

Now select the **Access Protocol** for the file system.

● A file system that you expose using the CIFS sharing method can also be accessed by UNIX/Linux-based systems using a CIFS client implementation for UNIX (such as, *Samba*).

● A file system that you expose using the NFS sharing method can also be accessed by Windows-based systems using an NFS client implementation for Windows (available in *Microsoft Services for UNIX*)

● You cannot expose a file system to Windows-based systems over the CIFS protocol if Unity is connected to an LDAP Directory service; the CIFS sharing option is not available in LDAP Directory service implementations.

● If you configured LDAP Directory service as the user authentication mode for Unity: exposing a file system over the CIFS protocol in an LDAP environment is only supported with anonymous read and/or anonymous read/write access enabled for the share.

● A file system that you expose using the FTP sharing method can be accessed by UNIX/Linux-based and Windows-based systems using the FTP protocol. FTP sharing is only supported for Nexsan Unity authentication. It must be enabled at the site level beforehand.

● If the file system will be accessed over IIS, do not enable case-sensitivity for the share.

Step 4: Configuring Data Protection

Now you need to enable:

- Replication
- Snapshots scheduling

To enable replication for a file system, you need a second Unity Storage System that you can connect the current system to.

Figure 3-12: Step 4: Setting Replication and Snapshots scheduling

► **To configure data protection for the file system:**

1. If your Unity System is connected to a remote Unity System and has replication set up, select **Enable Replication**.

2. Optionally, select **Enable snapshot scheduling**. By default, automatic snapshots are enabled every day at midnight and a limit of seven snapshots are maintained.

3. Adjust the schedule for auto-snapshots to be taken, according to your requirements. You can change the number, frequency and time of day.

4. Specify the maximum number of auto-snapshots to be retained.

5. Enable auto deletion of snapshots if you want Unity to delete snapshots when the storage pool is 80% full. The threshold is configured on the **Storage Pool Advanced Settings** page.

6. Click the **Next** button.

Step 5: Configuring Active Archive

If you have **Unity Active Archive** configured, this step of the **Add File System** wizard prompts you to select the **Archive Settings** for the file system.
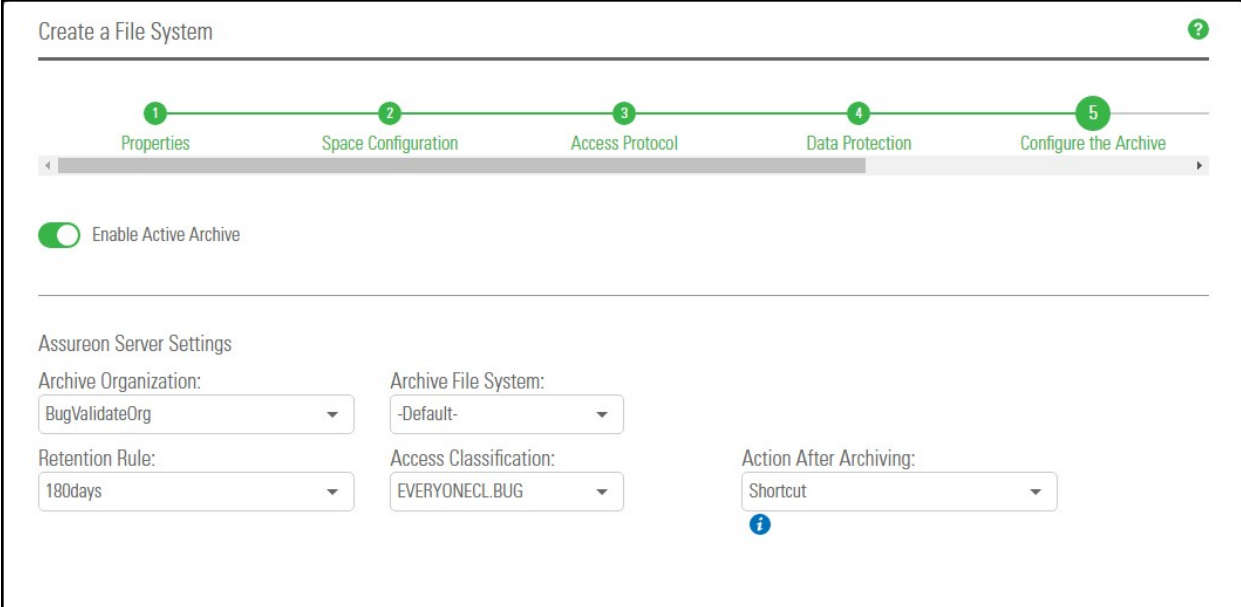
This step only appears if you have Unity Active Archive on this Unity Storage System. Unity Active Archive enables you to set data retention policies to automatically offload stale data and release primary storage. This in turn enables increase the performance of your primary storage without increasing its size.

Archiving allows you to retain data, using Nexsan's Assureon archiving capabilities.

▶ **To configure Active Archive settings:**

1. Select the **Enable Active Archive** button

Figure 3-13: Step 5: Enable Active Archive

2. The following Active Archive settings are the settings on Assureon Server by which data from your file system will be archived. The options that appear here are defined on the Assureon Server.

Table 3-3: Assureon Server Settings

Setting	Description
Archive Organization	Select the Assureon organization to be used for archiving. An organization is a group of one or more file systems which share retention rules, access classifications, and reports.
Archive File System	Select the file system in the Archive Organization to be used for archiving. A file system consists of a database, storage location (the stores), manifest and audit files as well as replication options. Think of it as a self-contained archive that shares properties with the other file systems within an organization.
Retention Rule	Select the retention rule to be used for data archived from this file system. Retention rules specify how long a file is kept under management. The default is 180 days, but the range is from 90 days to 99 years.
Access Classification	Select the access classification to be used for data archived from this file system. When a file is placed under Assureon management, it is stored using classification and sub classification information. Classifications enable you to control access to files. They also provide an intuitive way to search, audit, and dispose of files.
Action After Archiving	Define what is to happen to files once they have been archived: **Shortcut**, **Leave**, or **Remove**. **Note** Files will not be converted to shortcuts, or removed if asynchronous replication is enabled.
Sync	**Archive Files** Performs a complete archive of the file system, either manually or on a schedule. This feature does not affect Real Time Archiving. **Archive Folder Security** Performs a complete archive of the file system's folder security, either manually or following a schedule. This does not affect Real-Time archiving.
Real-Time	**Archive Files** Performs a persistent and ongoing archive of files, as changes are detected. Files are checked and archived if necessary every minute. **Archive Folder Security** Performs a persistent and ongoing archive of folder security, as changes are detected. Files are checked and archived if necessary every minute.

3. Click the **Next** button.

Step 6: Verifying settings

Now you review the summary of your settings carefully before applying the configuration settings.

► **To review your settings:**

1. Review the summary of the settings shown on screen.

2. To revise any of your settings, you can click **Previous** to go back.

   OR

3. Click any of the step numbers at the top of the panel to jump to that section of the wizard. For example, if you want to change **Properties**, click:

   ①
   Properties

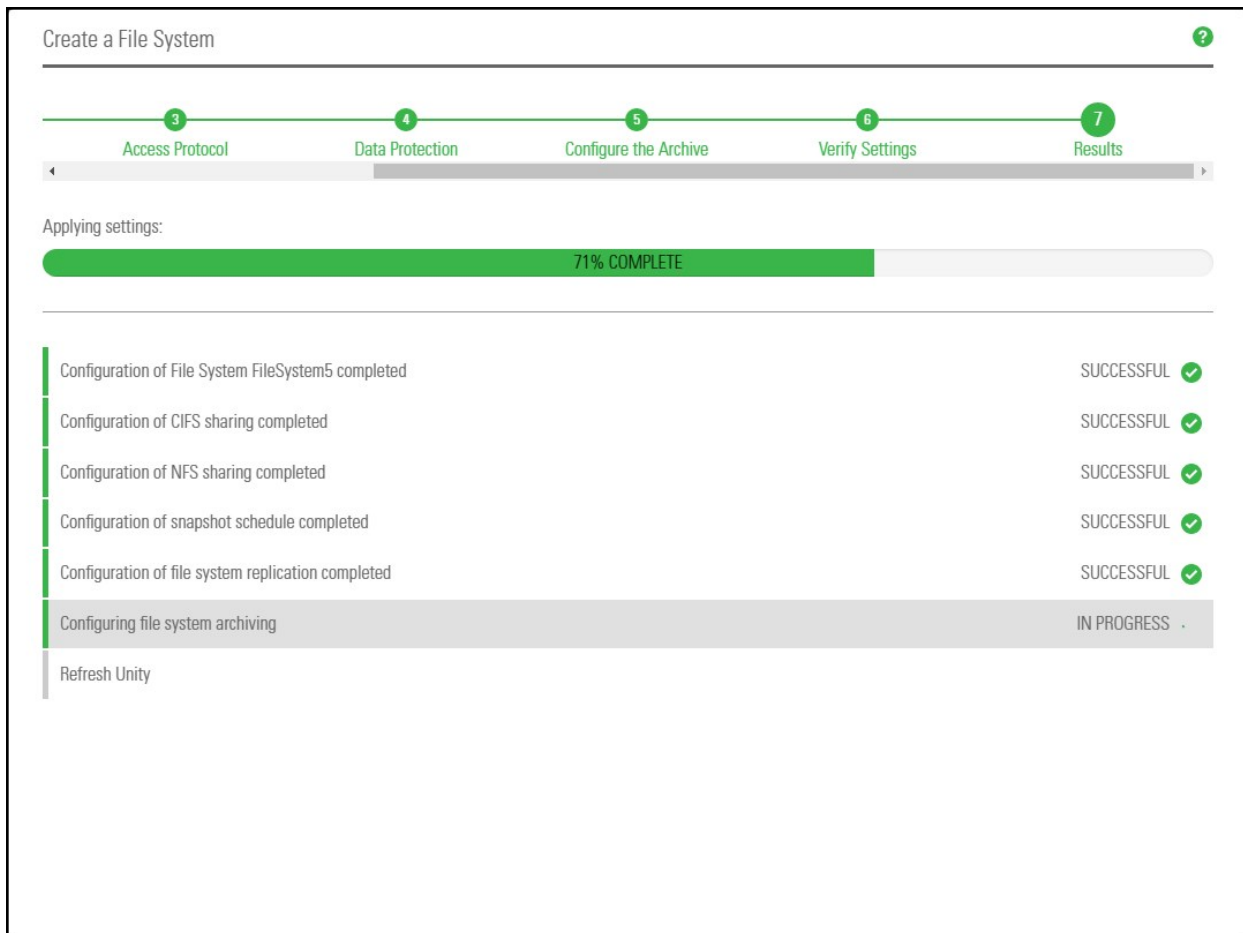4. When you are ready to proceed, click **Create**.

The wizard displays file system creation progress as it applies your settings.

Now you can **Add another file system** or click **No, I'm finished**.

Step 7: Viewing results

In this step, the wizard displays results as Unity creates the new File System.

Figure 3-14: File System wizard: Viewing configuration results

The wizard displays error events that the system encounters during the creation process. You can view more details about an error event by expanding the corresponding entry.

► **To view more details for an error event:**

● Click the **View Error** link corresponding to the error event.

Unity informs you when it successfully creates the File System. It also asks you if you want to create another File System in the storage pool.
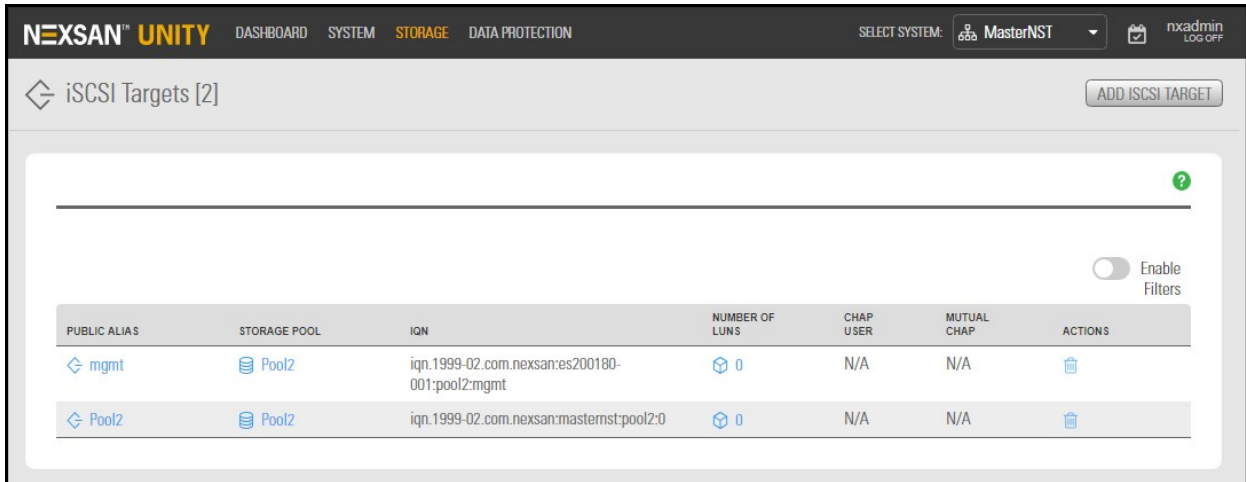
Adding an iSCSI target

Unity provides the **Create an iSCSI Target** wizard to guide you through the process of adding a target to a storage pool.

Note For complete details on managing iSCSI targets on Unity, refer to the *Nexsan Unity Software User Guide*.

► **To add an iSCSI target:**

1. On the **Unity navigation bar**, select **Storage > iSCSI targets**.

Figure 3-15: iSCSI targets panel

2. Click the **Add iSCSI Target** button.

The **Create an iSCSI Target** wizard guides you through the process of adding a target to a storage pool.

This section includes these steps:

Step 1: Setting iSCSI target properties below

Step 2: Verifying settings on the facing page

Step 3: Viewing results on page 58

Step 1: Setting iSCSI target properties

Step 1 of the **Create an iSCSI target** wizard prompts you to select a pool, public alias, and target IQN.

● IQN: an IQN (iSCSI qualified name) is the unique identifier of a device in an iSCSI network. iSCSI uses the form iqn.date.authority:uniqueid for IQNs. For example, Unity uses this IQN to identify iSCSI targets:

```
iqn.1999-02.com.nexsan:<site name>:<pool name>:<unique ID>
```

This name indicates that this is an iSCSI device from Nexsan, which was registered as a company in February of 1999. The naming authority is simply the DNS name of the company reversed; in this case, com.nexsan. Following this is the Unity Storage System (site) name, the storage pool name where the target exists, and a unique ID that you must specify to identify the target.

Note IQN is always forced to lower case by Unity, in accordance with RSF conventions.

- <u>Public alias</u>: this is a symbolic name that you can assign to a target on the Unity. The public alias is seen by some iSCSI initiators; it can help you identify the target. You can change a target's public alias at any time.

Figure 3-16: Create an iSCSI target wizard, Step 1: Specifying properties

▶ **To specify the Storage Pool, IQN and public alias for the iSCSI target:**

1. Select an available pool from the **Storage Pool** list.

2. Type a public alias for the target in the **Public alias** text box. The public alias can contain up to a maximum of 16 characters, and it must start with an (upper-case or lower-case) alphabetic character; with the exception of the underscore (_), hyphen (-), and period (.), the public alias can only contain alphanumeric characters.

3. Type a unique ID in the text box next to the **IQN:** field. The ID must start with an (upper-case or lower-case) alphabetic or numeric character; spaces are not allowed.

4. Once you specify the IQN and public alias for the target, click **Next** to continue to Step 2: Verifying settings below to Step 3: Viewing results on the next page.

Step 2: Verifying settings

Step 2 of the **Create an iSCSI target** wizard prompts you to verify your settings before you create the target..

Figure 3-17: Create an iSCSI target wizard: Verifying Settings
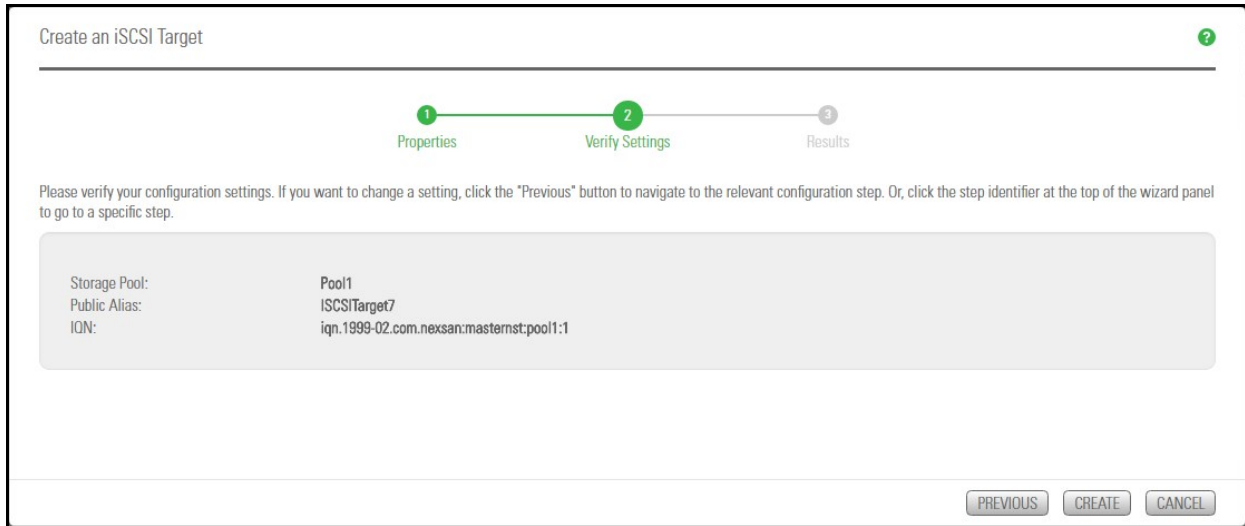
► **To verify settings for the target:**

1. Review your settings from the wizard step 1.

2. Do one of the following:

    a. Click **Previous** to make changes.

   b. Click **Create** to begin the creation process. See Step 3: Viewing results below

Step 3: Viewing results

The last step of the **Create an iSCSI target** wizard displays progress as Unity creates the new iSCSI target.
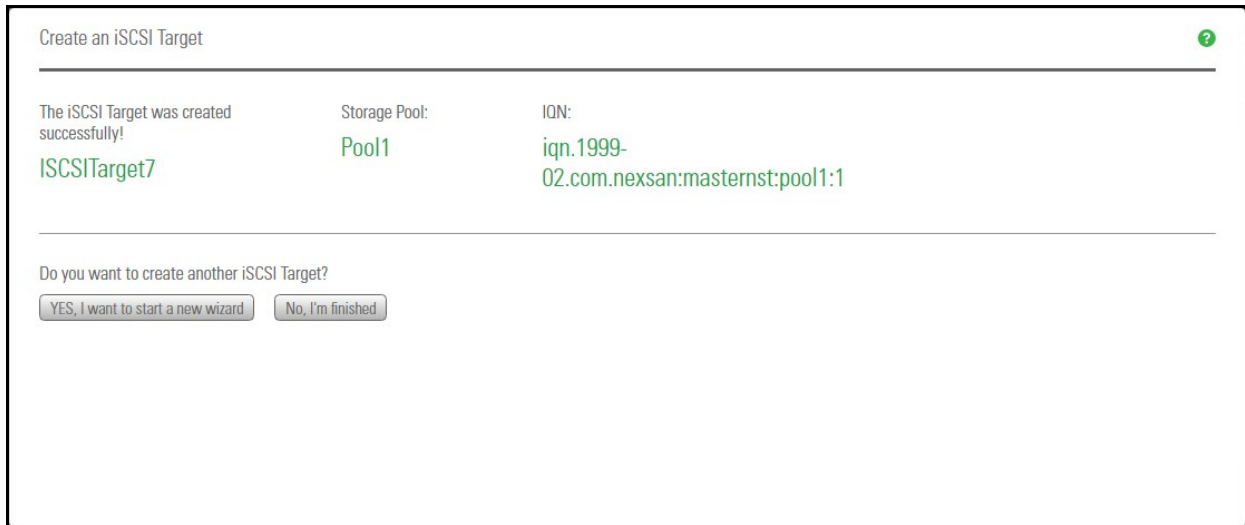
► **To view more details for an error event:**

• Click the **View Error** link next to the error in the **Results** panel.

Figure 3-18: Create an iSCSI target wizard, Step 3: Viewing progress
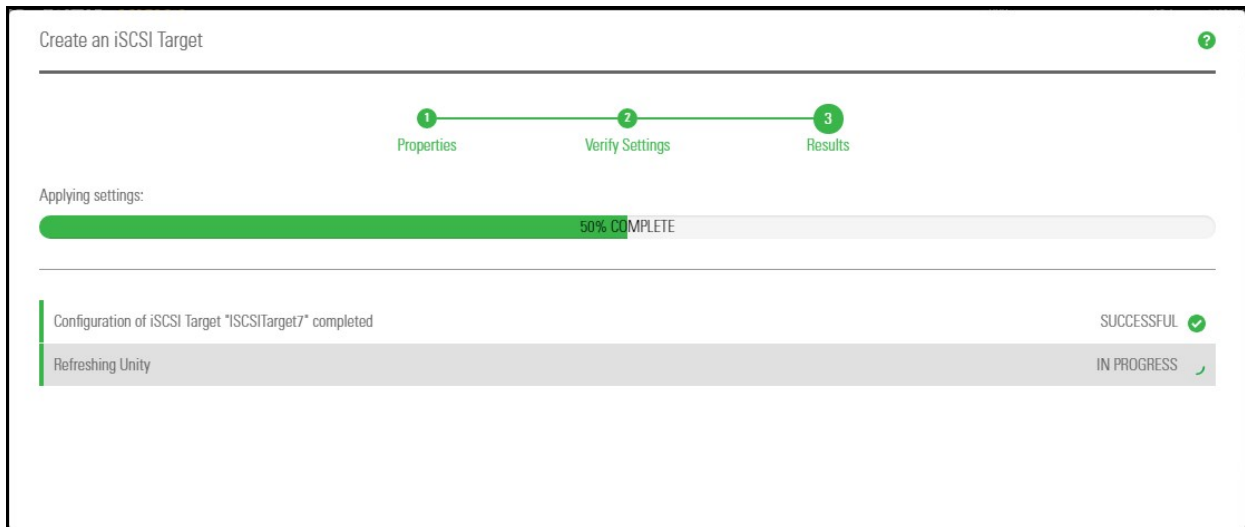
Unity informs you when it successfully creates the target. It also asks you if you want to create another target in the storage pool:

Create an iSCSI Target

The iSCSI Target was created
successfully!

ISCSITarget7

Storage Pool:

Pool1

IQN:

iqn.1999-
02.com.nexsan:masternst:pool1:1

Do you want to create another iSCSI Target?

[YES, I want to start a new wizard]   [No, I'm finished]

▶   **What's Next:**

Proceed to discovering the devices in VMware; see Step 12 On the VMware ESXi host, open iSCSI Initiator Properties, select the Dynamic Discovery tab, and click Add. on page 24.

3

Enabling VMware VAAI hardware acceleration for a LUN

You must configure and enable VAAI hardware acceleration functionality on your VMware ESX/ESXi support for the VAAI plug-in on Unity to work; for more information, please refer to the VMware documentation. If you already created LUNs but the VAAI plugin is not enabled for these LUNs, follow the steps mentioned in this section.

Note The VMware VAAI plug-in is always enabled disabled by default when you create a LUN.

► **To enable the VAAI plug-in for a LUN:**

1. On the **Unity navigation bar**, click **Storage > LUNs**.

2. Click the LUN that you want to enable the VAAI plug-in for.

3. Click **Summary > Client-side (Host) Settings**.

4. Click the **Enable the VMware VAAI plugin** button.

Figure 3-19: LUN Client-side (Host) Settings
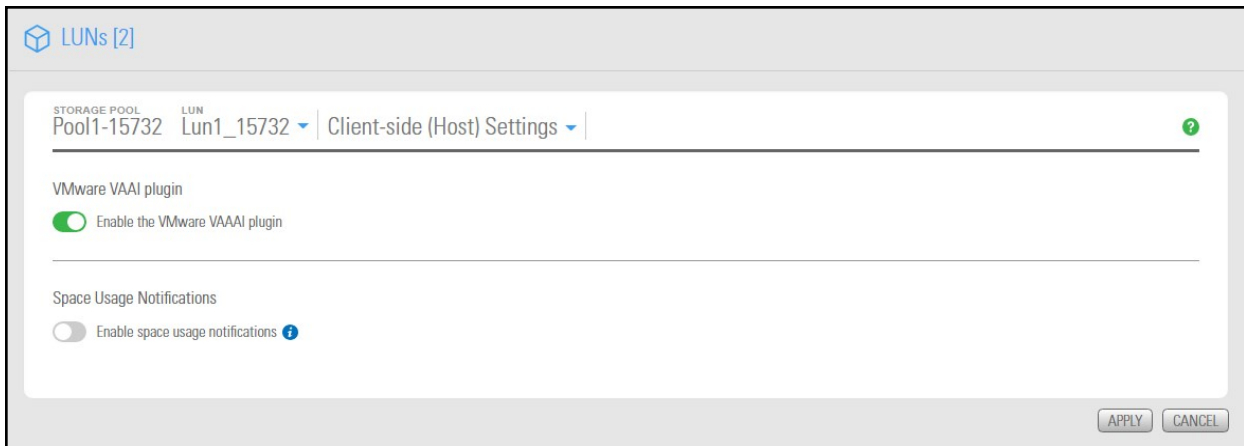
5. Click the **Apply** button.

Enabling FTP support

Unity enables you to use FTP sharing to expose file systems for access by UNIX-, Linux-, and Windows-based systems.

If a user has access (either via anonymous access or explicit permission), that user can access the file system via FTP.

Note Enabling FTP support will create additional folders in the `/var/opt/nest/users/` directory. For proper FTP behavior, do not modify these folders.

► **Limitations of FTP sharing:**

● FTP sharing is only supported for Nexsan Unity authentication in the user interface.

● Only nxadmin and site administrators can enable FTP at the site level. Pool administrators can enable FTP at the file system level if FTP is enabled at the site level.

● FTP support is not supported for IP restrictions.

● You cannot browse a replicated file system over FTP.

● FTP support is enabled for the primary site only; it is not replicated to the remote site. You must enable it manually on the remote site.

Prerequisites

● FTP support must be enabled at the Unity System level before you can expose file systems over FTP. Enabling FTP support opens port 21 by default.

▶ **To enable FTP support for the Unity System:**

1. On the **Unity navigation bar**, select **System > Unity Systems**.

2. Click the link to the Unity System that you want to enable FTP support for.

3. Click **Summary > FTP**.

Figure 3-20: Unity Systems FTP panel
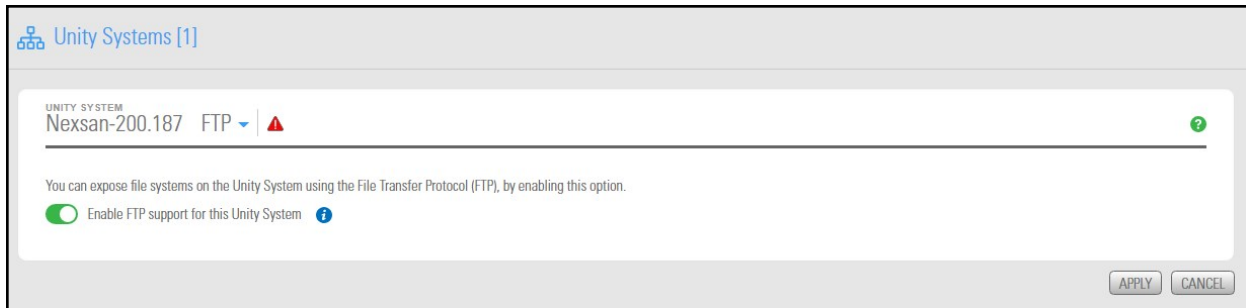
1. Select the **Enable FTP support for this Unity System** option.

2. Click the **Apply** button to save your changes.

▶ **Related topics:**

Step 3: Configuring the access protocol on page 50

Chapter 4

Monitoring and troubleshooting

This section provides procedures to monitor performance for NFS, iSCSI, and Fibre Channel protocols. It also gives troubleshooting tips for known issues when working with Unity in a VMware environment.

4

Viewing and recording performance metrics

Unity displays live and historical performance information in graphical format in the Performance Monitor. The Performance Monitor provides a visual display of built-in performance counters, featuring graphical and tabular views of the data.

Metric selection

You can view performance measurements for the following Unity components:

Site

- CPU usage: Performance counter values for CPU usage for each controller over the specified time interval. The table includes current, minimum, maximum, and average CPU usage values in percent.

- Memory usage: Performance counter values for memory usage for each controller over the specified time interval. The table includes current, minimum, maximum, and average memory usage values in percent.

- Network usage: Performance counter values for the site network I/O in KB/s over the specified time interval. This includes read and write I/O statistics for each controller. The table includes current, minimum, maximum, and average network usage values in KB/s.

Pool

- Latency: Performance counter values for the average delay of response time for disks in the storage pool. Latency is displayed in microseconds (µs) over the specified time interval. The table includes current, minimum, maximum, and average network usage values.

Storage device

- I/O statistics: Performance counter values for device I/O at the specified time interval in KB/s. This includes read and write I/O statistics for all disks and storage systems connected to Unity, including any FASTier cache devices.

  You can filter the display to show only I/O statistics for the disks/devices currently allocated to a specific storage pool on the system, including the devices reserved for the Unity Storage System's operating system pool, and the system pool (on Clustered systems).

  Each slot of a Unity storage device and each storage device volume is represented in a different color. The table includes current, minimum, maximum, and average storage device usage values in KB/s.

File system

- I/O and IOPS statistics: Performance counter values for file system I/O at the specified time interval. This includes read and write I/O statistics. You can filter the display to show only statistics for a specific file system. The table for file system I/O values includes current, minimum, maximum, and average in KB/s.

  The counter values for input/output operations per second (IOPS) are displayed at the specified time interval. This includes read/write CIFS operations per second.

  The table includes current, minimum, maximum, and average network usage values.

  Note Monitoring of NFS performance metrics is disabled by default. You can enable NFS measurement using the `perfmon` command in the nxadmin CLI, as follows: `perfmon -c enable -a nfs`. Please note that the process for collecting NFS performance metrics may significantly impact system performance.

LUN

- <u>LUN I/O and IOPS statistics</u>: Performance counter values for LUN I/O over the specified time interval. This includes read and write I/O statistics. You can filter the display to show only I/O statistics for a specific LUN. LUN I/O values include current, minimum, maximum, and average for read and write operations, measured in KB/s.

  The counter values for LUN input/output operations per second (IOPS) are displayed over the specified time interval. This includes read and write operations. The table for LUN I/O and IOPS values includes current, minimum, maximum, and average.

  LUN IOPS values include current, minimum, maximum, and average for read and write operations, measured in IOPS.

FASTier

- <u>I/O, IOPS, and access statistics</u>: Performance counter values for FASTier cache devices installed on Unity. FASTier I/O and Access values include current, minimum, maximum, and average, measured in KB/s.

  Performance data can be I/O statistics for FASTier Read cache and FASTier Write cache at the specified time interval, the number of input/output operations per second (OPS) for FASTier Read cache and FASTier Write cache at the specified time interval, as well as hit and miss access operations for FASTier Read cache.

Notes:

- Read I/O refers to the bandwidth of all read I/O operations sent to the storage pools or devices (including metadata requests), expressed as kilobytes per second (KB/s).

- Write I/O refers to the bandwidth of all write I/O operations sent to the storage pools or devices (including metadata requests), expressed as kilobytes per second (KB/s).

- For historical performance data, the time interval is 10 seconds by default and then data is aggregated for display in the historical view.

This section includes these topics:

4

Starting the Performance Monitor

This section explains how to start the Performance Monitor to display real-time performance information for Unity.

► **To start the Performance Monitor:**

● From the Unity navigation bar, select **System > Performance Monitor**.

The Performance Monitor opens, displaying live statistics for the Site and CPU usage for controllers 1 and 2.

The Performance Monitor includes a graphical chart and a table for each of the following Unity components:

Table 4-1: Performance metrics and types

Metric	Type
LUN	I/O
	IOPS
File System	I/O
	IOPS
Pool	Latency
Unity System	CPU Usage
	Memory Usage
	Network
Devices	I/O
FASTier	I/O (read and write cache)
	IOPS (read and write cache)
	Access (read cache)

Figure 4-1: Performance Monitor—Live view
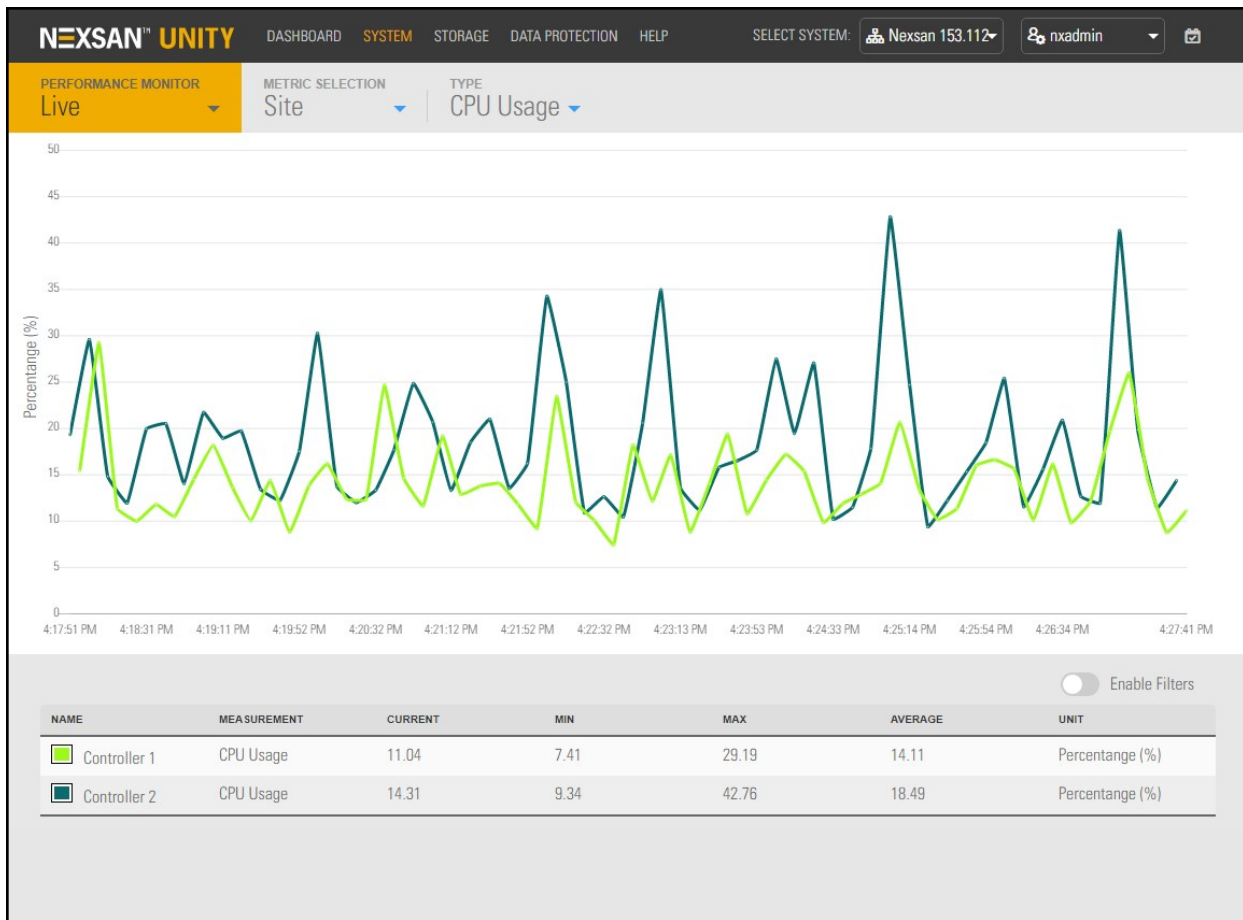
When the Performance Monitor opens, only the graphical chart and table for CPU performance is shown. You can open the graphical chart and table for another performance metric by selecting it from the title bar.

By default, the sampling interval is set to every 10 seconds. This means that the Performance Monitor collects performance statistics at 10-second intervals, and updates the graphical charts in real-time accordingly. The timeline at the bottom of each graphical chart indicates the current sampling interval. You can modify the sampling period in the Performance Monitor **Options**; see *the Nexsan Unity Software User Guide*.

Filtering live performance metrics

The Performance Monitor enables you to filter the graphical charts to display only metrics for a specific storage pool, LUN, share, device, or controller (depending on the performance metric selected).

This procedure provides an example of how to filter CPU usage performance metrics for controller 1 on a Unity System, or site.

► **To filter performance information:**

1. Start the Performance Monitor; see .

2. Select the down arrow ▼ on the **Performance Monitor** tab (**Live** opens by default).

3. Select **Historical**, and then choose your **Metric selection**, **Type**, and **Date**.
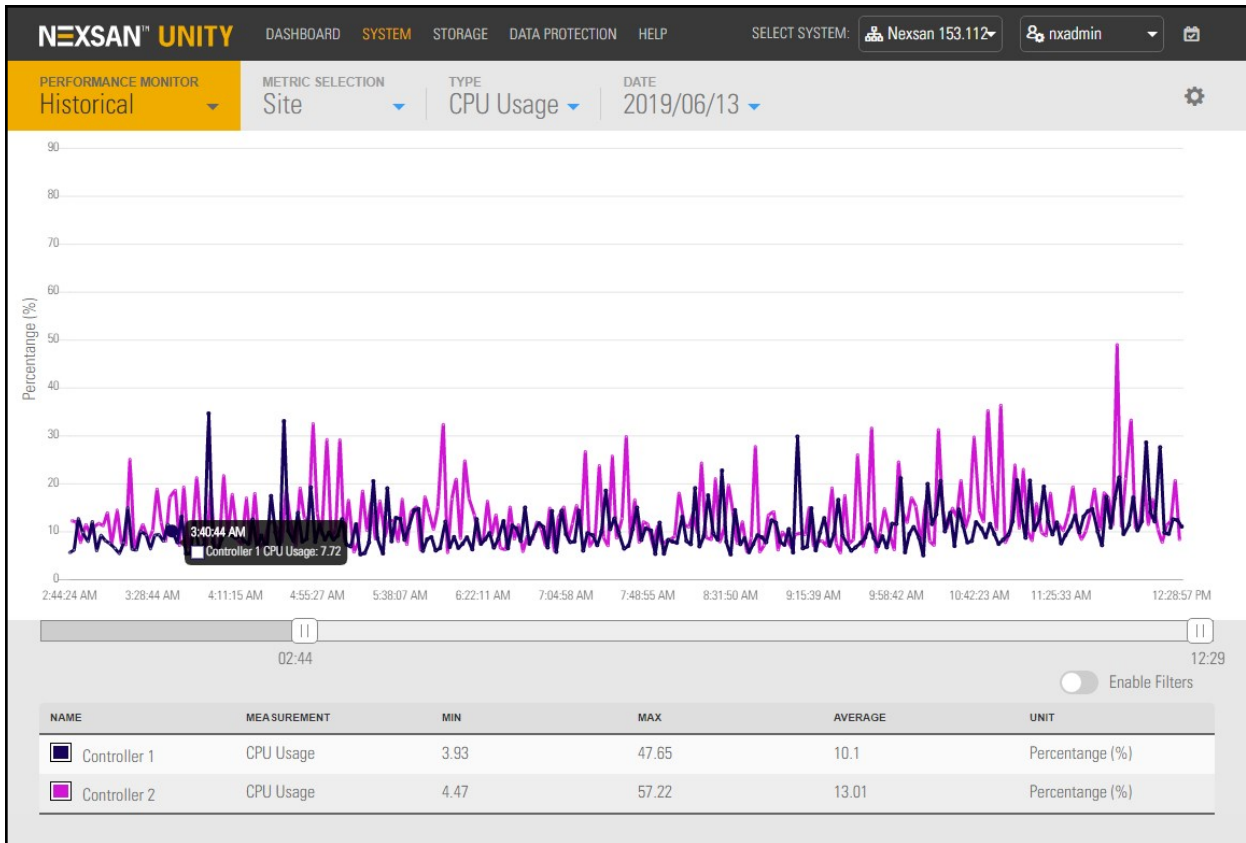
4. Select **Enable Filters** ⬤ at the bottom right of the graphical chart.

5. In the table at the bottom of the panel, select the component that you want to filter performance information for. For example, select controller 1 in the table.

Figure 4-2: Filtering performance metrics

6. Use the sliders under the graph to narrow the time span for the data during the current day.

   Tip You can hover the mouse pointer over the graph to display a popup with data for a specific time of day.

   The graphical chart automatically adjusts to display performance statistics for the selected component.

Monitoring Fibre Channel and iSCSI performance on VMware

This section provides examples on how to use ESXTOP command to monitor VMware Fibre Channel and iSCSI LUNs as well as datastore and HBA performance and throughput.

ESXTOP is a VMware monitoring tool that is used at the ESXi host level to monitor performance and resource usage of the virtual environment. This tool enables you to identify potential bottlenecks, I/O performance issues, and network degradation as well as throughput levels.

Note For interpreting VMware ESXTOP statistics, read VMware DOC-9279 at the following URL: http://communities.vmware.com/docs/DOC-9279.

▶ **To monitor VMware Fibre Channel or iSCSI LUNs:**

1. Open a SSH connection.

2. Type `esxtop` and then press `n` .

3. Press **s 2** to change the update time to every 2 seconds.

4. Press Enter.

```
4:43:21pm up 6 days 17:43, 350 worlds, 1 VMs, 4 vCPUs; CPU load average: 0.02, 0.01, 0.01

DEVICE                           PATH/WORLD/PARTITION DQLEN WQLEN ACTV QUED %USD  LOAD    CMDS/s  READS/s WRITES/s MBREAD/s MBWRTN/s DAVG/cmd KAVG/cmd GAVG/cmd QAVG/cmd
naa.600144f0c36f708b000050a142dc0003           -      64     -    3    0    4  0.05 13708.87 6810.97 6897.90    53.00    53.69     0.92     0.01     0.92     0.00
naa.600144f0c36f708b000050a143010004           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a162d40009           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a1633c000c           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a172cf000f           -      64     -    0    0    0  0.00     0.46    0.00    0.46     0.00     0.00     0.94     0.05     1.00     0.02
naa.600144f0c36f708b000050a177b20010           -      64     -    0    0    0  0.00     0.46    0.00    0.46     0.00     0.00     1.60     0.03     1.62     0.01
naa.600144f0c36f708b000050a17bad0011           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a17bc40012           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a17be00013           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a1b21a0014           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a1b2310015           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a1b2440016           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a1b2790017           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a1b2970018           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a1b2ba0019           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a1b2cf001a           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a1b421001b           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a1b43c001c           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a1b457001d           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a1b476001e           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a1b498001f           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a1b4c30020           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a1b4e70021           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a1b4fd0022           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a1b5150023           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a1b52d0024           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a1b54a0025           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a1b55e0026           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a1b5900027           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a1b5a80028           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a1b5c90029           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
naa.600144f0c36f708b000050a1d7db002a           -      64     -    0    0    0  0.00     0.00    0.00    0.00     0.00     0.00     0.00     0.00     0.00     0.00
```

▶ **To monitor virtual HBAs:**

1. Open a SSH connection.

2. Type **esxtop** and then press **f** to choose different monitoring options.

3. Press **d** for disk view option (HBA mode).

4. Press **s 2** to change the update time to every 2 seconds.

5. Press Enter.

```
5:12:03pm up 6 days 18:12, 350 worlds, 1 VMs, 4 vCPUs; CPU load average: 0.02, 0.02, 0.02

ADAPTR PATH          NPTH    CMDS/s   READS/s WRITES/s MBREAD/s MBWRTN/s DAVG/cmd KAVG/cmd GAVG/cmd QAVG/cmd
 vmhba0 -               0      0.00      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
 vmhba1 -               0      0.00      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
 vmhba2 -               0      0.00      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
 vmhba3 -               0      0.00      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
vmhba32 -               0      0.00      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
vmhba33 -               0      0.00      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
vmhba34 -               0      0.00      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
vmhba35 -               0      0.00      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
vmhba36 -               1      0.00      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
vmhba37 -               0      0.00      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
vmhba38 -               0      0.00      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
 vmhba4 -               0      0.00      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
 vmhba5 -               0      0.00      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
 vmhba6 -              64   6897.43   3471.61  3425.83    26.99    26.66     0.91     0.00     0.91     0.00
 vmhba7 -              64   6896.97   3416.58  3480.39    26.62    27.09     0.91     0.00     0.92     0.00
```

6. Make sure the virtual HBAs (vmhbas) are correctly balancing the I/O.

Monitoring NFS performance on VMware

This section provides examples on how to use ESXTOP command to monitor NFS datastores' utilization and performance as well as the IP network. For a definition of ESXTOP, see Monitoring Fibre Channel and iSCSI performance on VMware on the previous page.

▶ **To monitor NFS datastores:**

1. Open a SSH connection.

2. Type **esxtop** and then press **u** .

3. Press **s 2** to change the update time to every 2 seconds.

4. Press Enter.

```
DEVICE                     PATH/WORLD/PARTITION DQLEN WQLEN ACTV QUED %USD  LOAD   CMDS/s  READS/s WRITES/s MBREAD/s MBWRTN/s DAVG/cmd KAVG/cmd
{NFS}NFS_Performance_Tests          -            -     -     2    -    -     -   6713.40 3357.87 3355.54   25.46    25.57      -       -
{NFS}linux-os                       -            -     -     0    -    -     -      0.00    0.00    0.00    0.00     0.00      -       -
{NFS}ms-exchangedb                  -            -     -     0    -    -     -      0.00    0.00    0.00    0.00     0.00      -       -
{NFS}ms-log                         -            -     -     0    -    -     -      0.00    0.00    0.00    0.00     0.00      -       -
{NFS}oltp-db                        -            -     -     0    -    -     -      0.00    0.00    0.00    0.00     0.00      -       -
{NFS}vdi_vsphere_nfs                -            -     -     0    -    -     -      0.47    0.00    0.47    0.00     0.00      -       -
{NFS}vswap (1)                      -            -     -     0    -    -     -      0.00    0.00    0.00    0.00     0.00      -       -
{NFS}winboot                        -            -     -     0    -    -     -      0.00    0.00    0.00    0.00     0.00      -       -
```

► **To monitor virtual machines:**

1. Open a SSH connection.

2. Type **esxtop** and then press **v** .

3. Press **s 2** to change the update time to every 2 seconds.

4. Press Enter.

Using Unity snapshots in VMware

For LUNs or shares hosted on VMware, you must perform specific steps when creating snapshots and rolling back data to these snapshots. If you follow the procedures mentioned in the *Nexsan Unity Software User Guide*, the operation may not work and data loss may occur.

Taking a manual LUN snapshot

You can take manual snapshots of a LUN at any time, even if you have scheduled snapshots enabled. This mechanism enables you to record a copy of the contents of a LUN at any point in time.

► **To take a manual snapshot:**

1. Power off all virtual machines hosted on the LUN.

2. On the **Unity navigation bar**, select **Storage > LUNs**.

3. Under **Actions**, click the **Take a Snapshot** button in the row associated with the LUN you need the snapshot for.

Figure 4-3: LUN panel - Take a Snapshot button
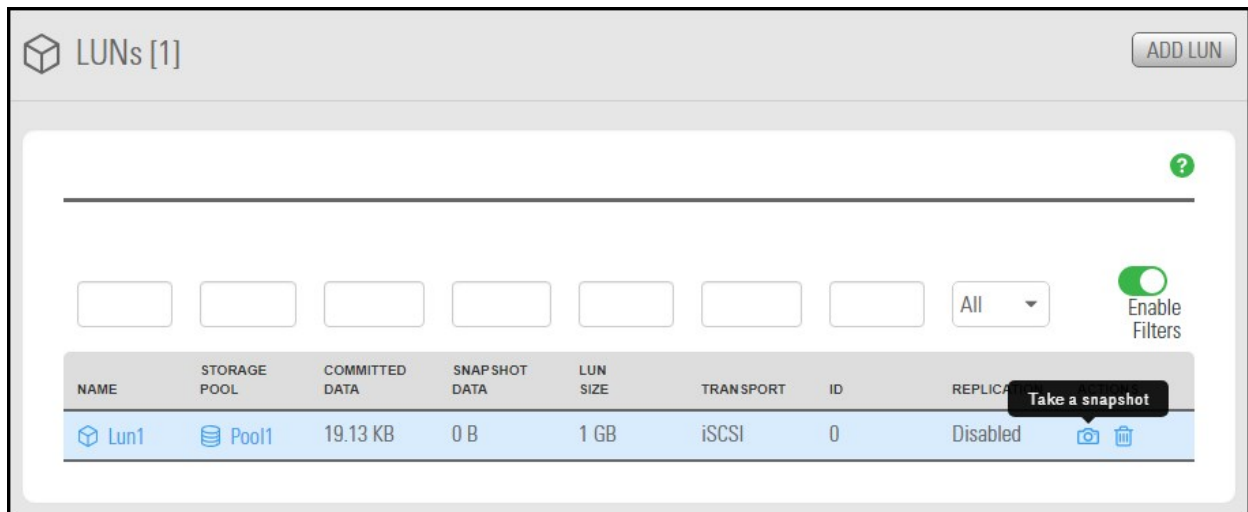
4. The **Take a Snapshot** popup window opens.

Figure 4-4: Take a Snapshot popup

Do one of the following:

To...	Do this
specify a name for the manual snapshot	a. Clear the **Automatically assign a name** option (selected by default). b. Type a name for the snapshot in the **Snapshot name** field. When setting a name for a manual snapshot, the same naming restrictions apply as when you specify a name for a LUN. c. Click the **Take a Snapshot** button to set the name and close the window. Unity immediately takes a snapshot and adds it to the snapshots grid.
allow Unity to automatically assign a name to the manual snapshot	a. Use the default name. b. Click the **Take Snapshot** button to close the window. Unity immediately takes a snapshot of the LUN and adds the manual snapshot to the snapshots grid. The snapshot is assigned a default name that is prefixed with `manual_` and includes the date and time the manual snapshot is recorded; for example: if you take a manual snapshot on May 15, 2013 at 1:01PM, Unity assigns this name to the snapshot: `manual_ 2013-06-15-130101`

5. Power on the virtual machines hosted on the LUN.

Rolling back to a snapshot

The rollback function reverts the contents of a file system or LUN to what they were at the time the snapshot was taken, including all file- and folder-level permission settings and access-level attributes. This function also automatically deletes all snapshots that are newer than the snapshot that you roll back to, including all manual snapshots of the file system or LUN and snapshots that have browsing enabled.

> **CAUTION:** Unity rolls back all the data in the file system to the contents of the snapshot. This includes all file- and folder-level permission settings and file system-level access attributes as they were when the snapshot was recorded. Additionally, Unity deletes all snapshots that are newer than the snapshot that you roll back to, including all manual snapshots of the file system and snapshots that have browsing enabled.

► **To roll back the data to a point-in-time snapshot:**

1. Power off all virtual machines hosted on the share/LUN.

2. On the **Unity navigation bar**, select **Storage > File Systems**.

3. Select the file system where you want to browse snapshots.

4. Select **Summary > Snapshots**.

5. Click the **Roll back Snapshot** icon

6. Type **Rollback** in the Stop Browsing Snapshot window to confirm.

7. Click the **Rollback** button to complete the operation.

8. Rescan the datastores:

    a. Right-click the IP address of each datastore.

    b. Select **Rescan for datastores**.

    c. Click **OK** when prompted to confirm the action.

9. Power on the virtual machines hosted on the LUN.

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