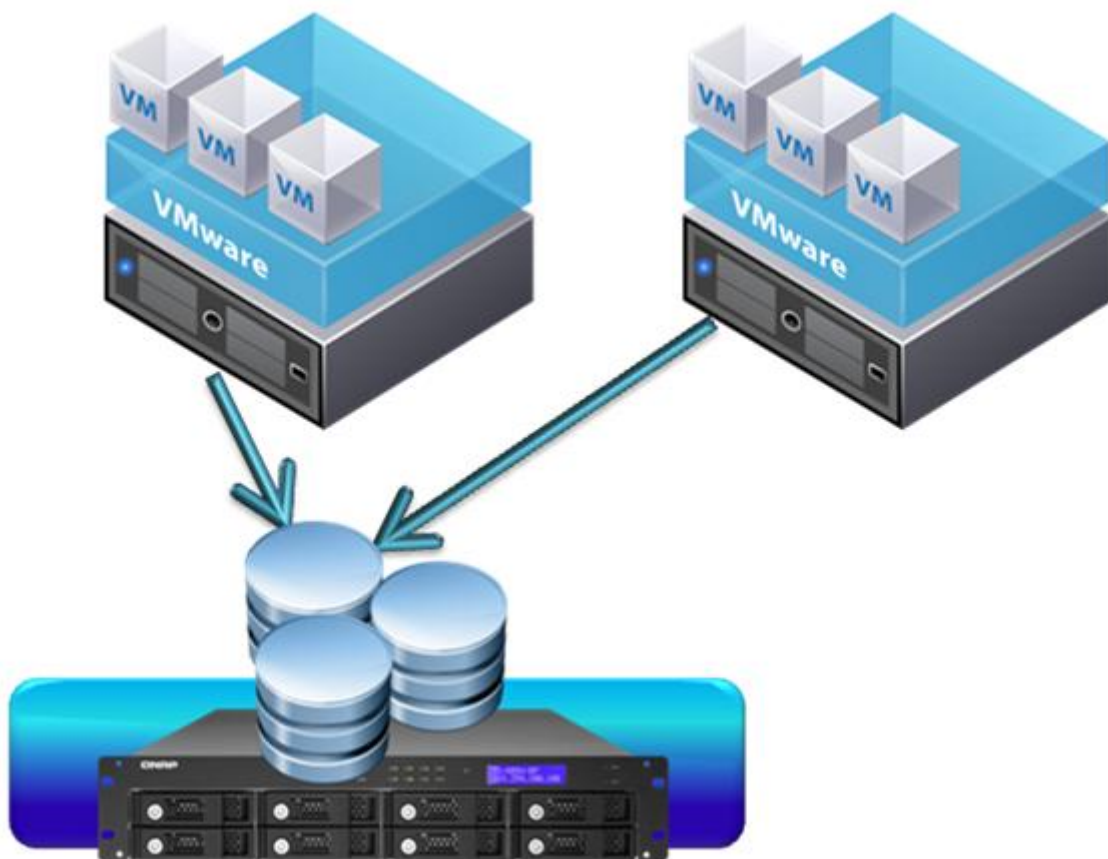

QNAP in vSphere Environment



HOW TO USE QNAP NAS AS A VMWARE DATASTORE VIA ISCSI

**Document revision history:**

Date	Version	Changes
Jan 2010	1.7	New firmware, EXT4 write cache.
Apr 2010	1.8	Add the information about how to extend a datastore to several LUNs.

Note:

Information presented is subject to change without notice.

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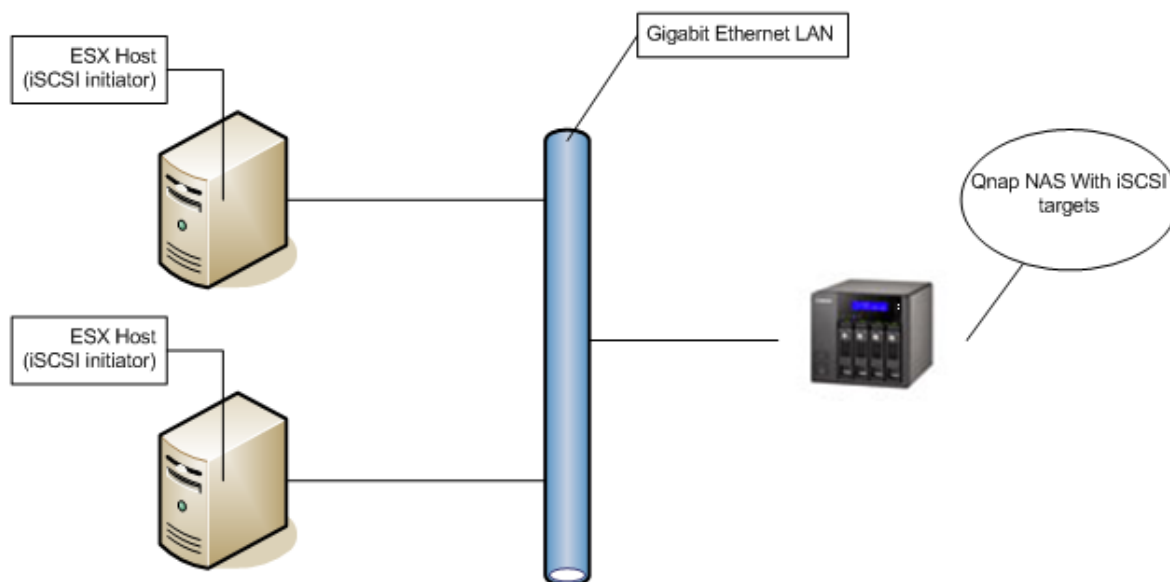
How to use the QNAP Turbo NAS as a VMware datastore via iSCSI

This document shows you how to configure the QNAP Turbo NAS as a VMware datastore for the vSphere 4.0 environment by the built-in iSCSI feature. All the x86-based Turbo NAS models (e.g. TS-x39, TS-x59, TS-509, TS-809) support this feature. Refer to the comparison table:

http://www.qnap.com/images/products/comparison/Comparison_NAS.html

The Turbo NAS allows you to set up VMware clusters using VMware HA(2) and VMware FT(3).

iSCSI is a block level storage, and iSCSI datastore is an ideal storage for block IO oriented application like databases.

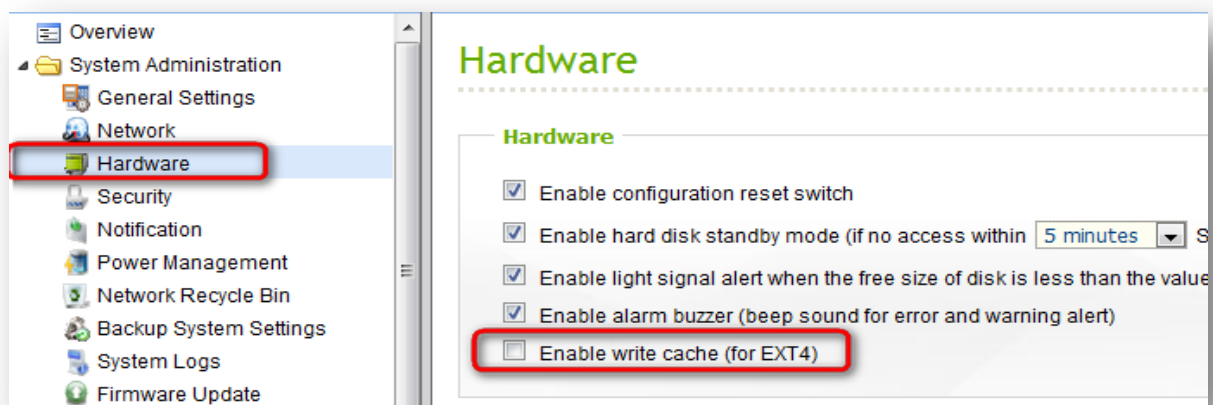


Important notice:

Requirements:

- The firmware version of the NAS must be 3.2.0 or later.
- The VMware vSphere server version must be ESX 4.0 or above OR ESXi 4.0 or above.

If your NAS is configured as an EXT4 disk volume, update the NAS firmware to version 3.2.1 build 1231 or above, and disable the write cache in "System Administration" > "Hardware".



The write cache setting is disabled by default in the NAS firmware version 3.2.1 while it is enabled by default in the previous firmware versions.

Create an iSCSI LUN on the Turbo NAS

First of all, create an iSCSI logical unit number (LUN) on your Turbo NAS and call it **ESXDataStore02**. The name of the iSCSI LUN will be:

iqn.2004-04.com:NAS:iSCSI.ESXDataStore02.BBA3D9

For the details of creating an iSCSI target and LUN, see the application note "Create and use the iSCSI target service on the QNAP NAS" on http://www.QNAP.com/pro_features.asp

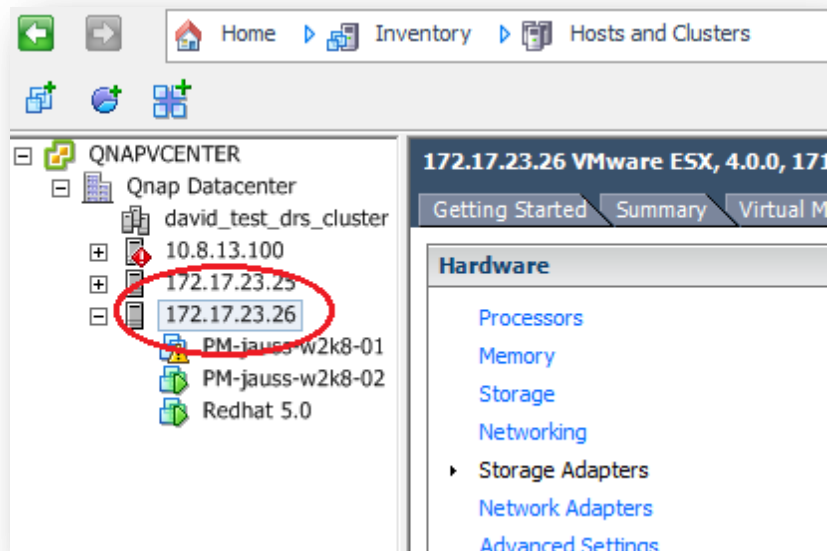
ESX 4.0 does not support LUN larger than 2TB (2048GB). Therefore, you will not be able to use a LUN larger than 2TB.

The Turbo NAS supports multiple LUN per target. This feature allows you to extend the capacity of your 2TB iSCSI datastore by adding a LUN to your target.

VMware is able to use multiple LUN for its datastores. We will use this feature to increase the capacity of the datastore to over 2TB. Refer to page 20 for more details.

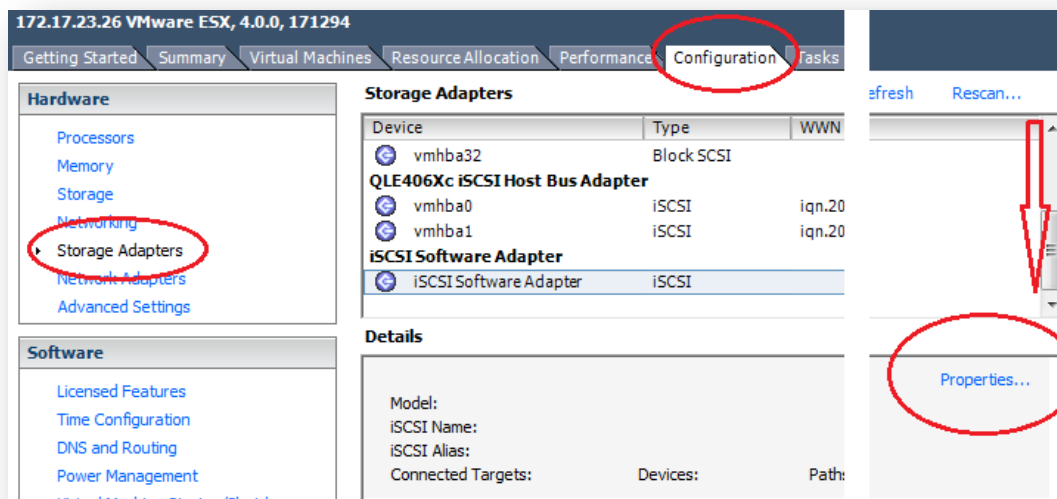
Once the LUN has been created, you can add it to your datastore as illustrated below.

Enable iSCSI software adapter in vSphere center

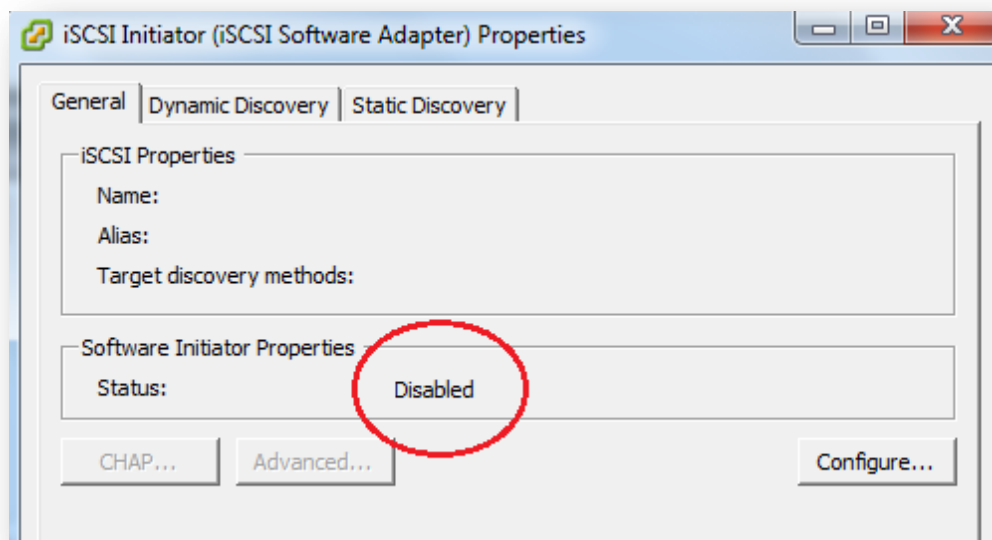


Considering that your vSphere Center is properly and minimally set up, enable the iSCSI software adapter.

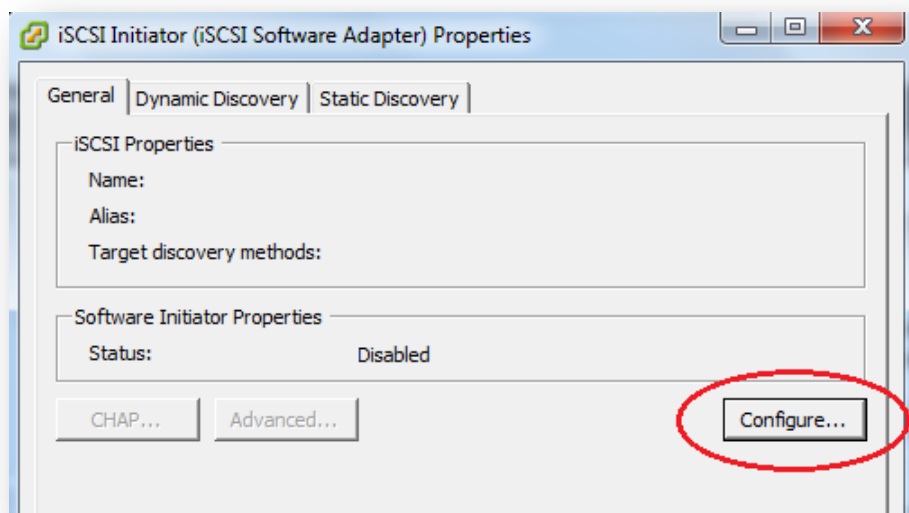
Select the host. Click the "Configuration" tab and select "Storage Adapter". Select "iSCSI Software Adapter" (scroll down to see it). Then click "Properties" in the "Details" panel.



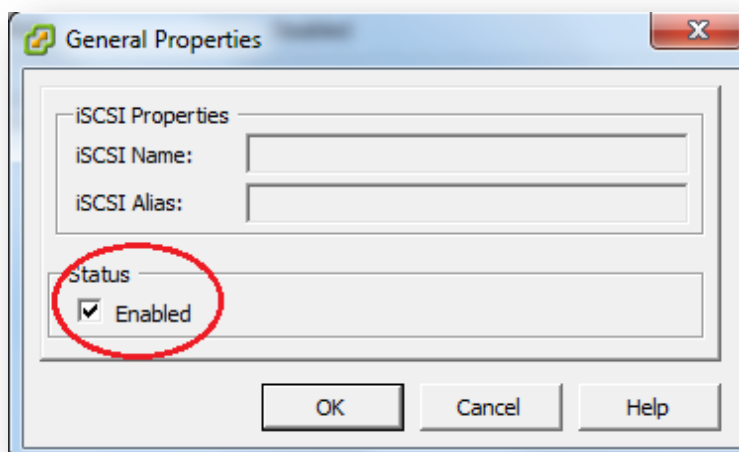
You can see that the adapter is disabled.



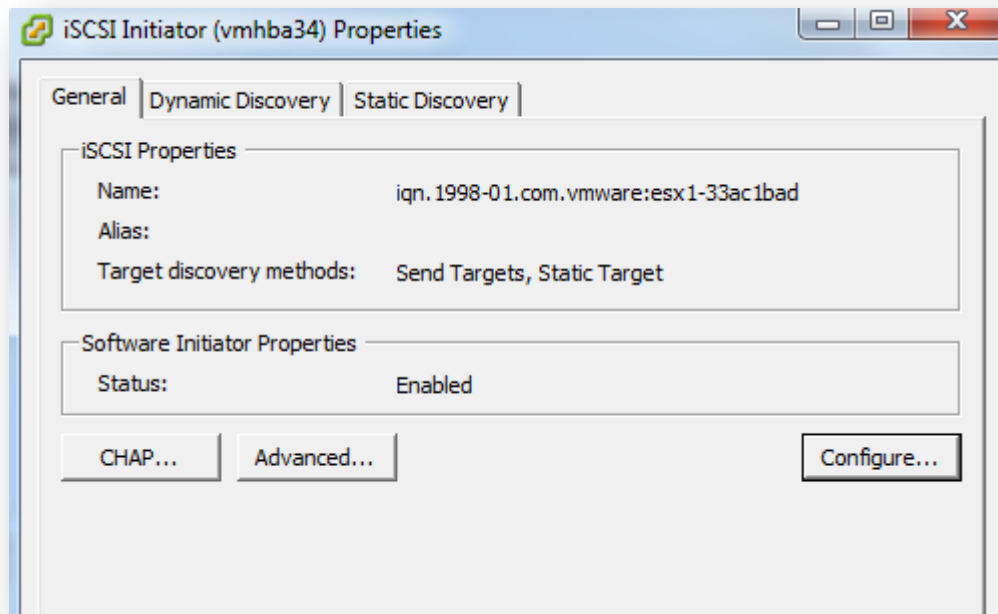
To enable the iSCSI software adapter, click "Configure".



Check the option "Enabled" and click "OK".



The iSCSI software adapter is enabled.



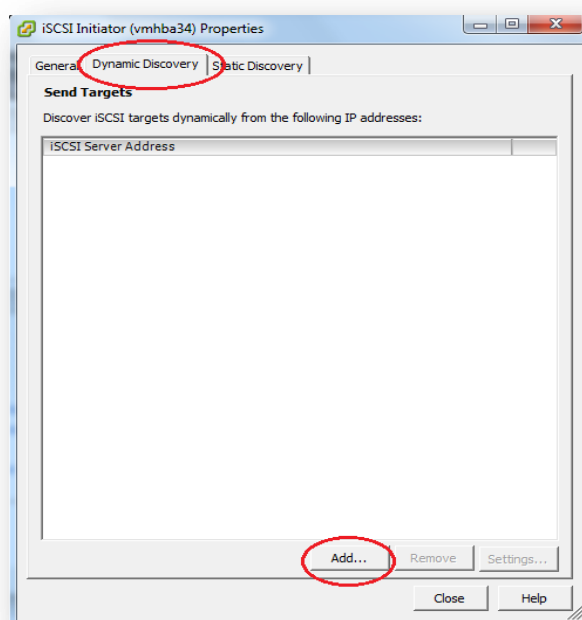
Connect your QNAP iSCSI target LUN to your VMware host

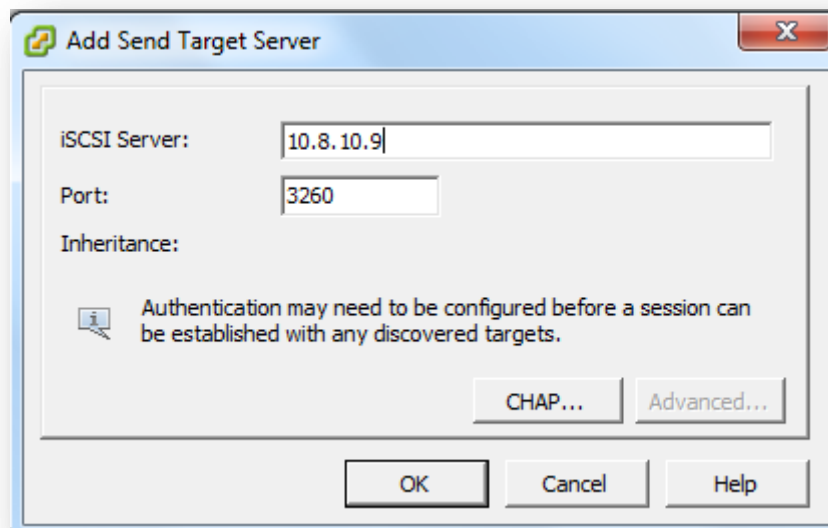
There are 2 ways to connect your iSCSI target:

- Automatic discovery: Select this option to discover and connect the iSCSI targets automatically every time you restart your VMware host. To use this option, you need a dedicated NAS for your datastore.
- Static discovery: Select this option to connect the iSCSI targets manually.

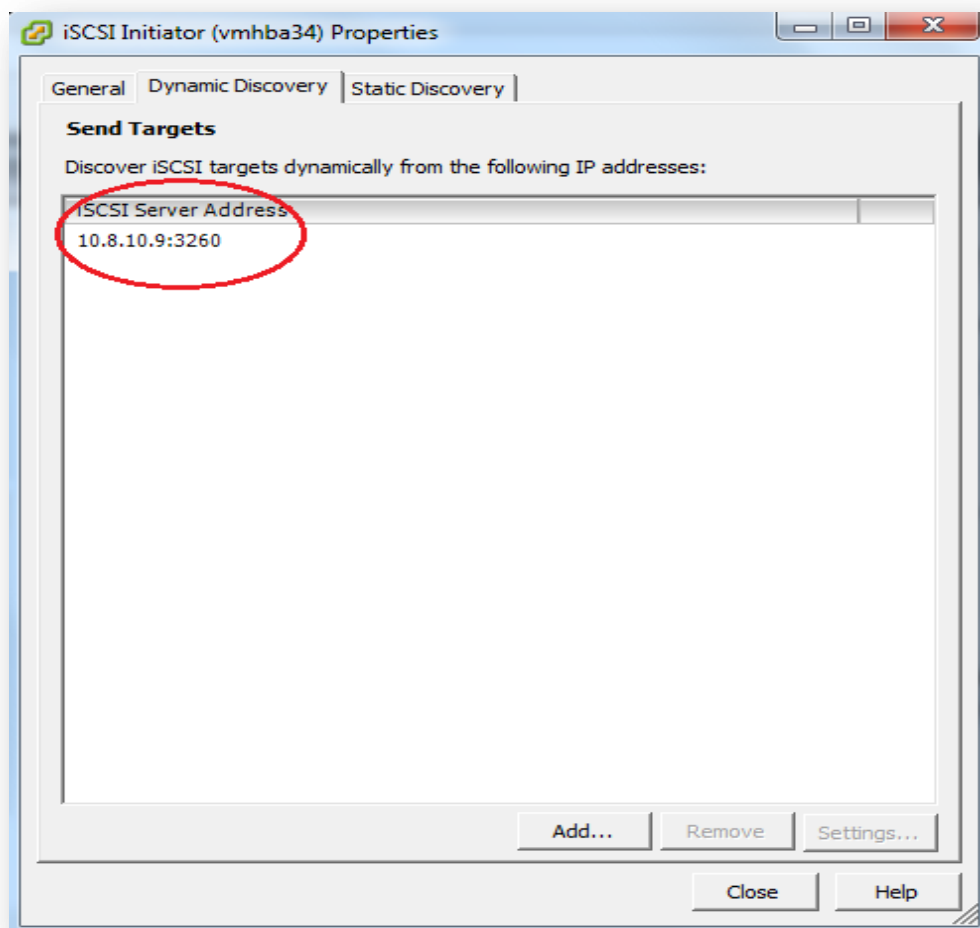
Automatic discovery (a dedicated NAS required)

For automatic iSCSI target detection, you can use Dynamic Discovery to automatically add all the LUN from the NAS. Go to the "Dynamic Discovery" tab. Click "Add" to add your NAS IP address. Then click "OK".

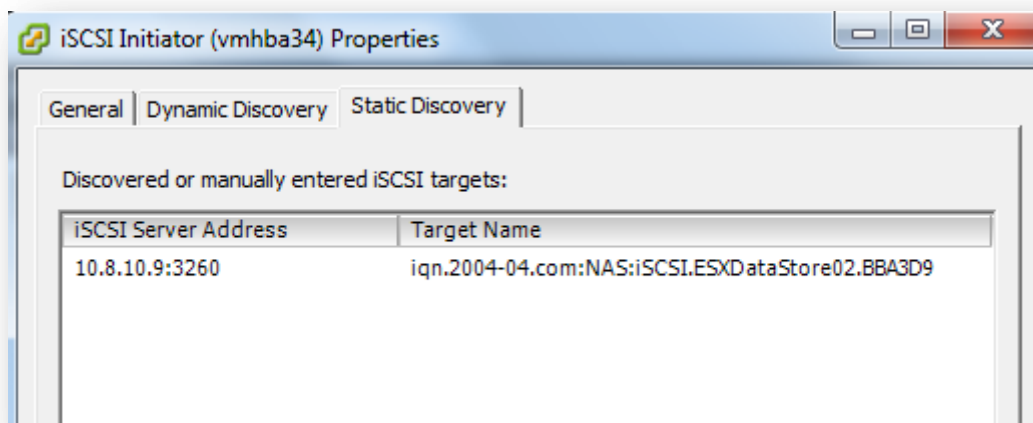




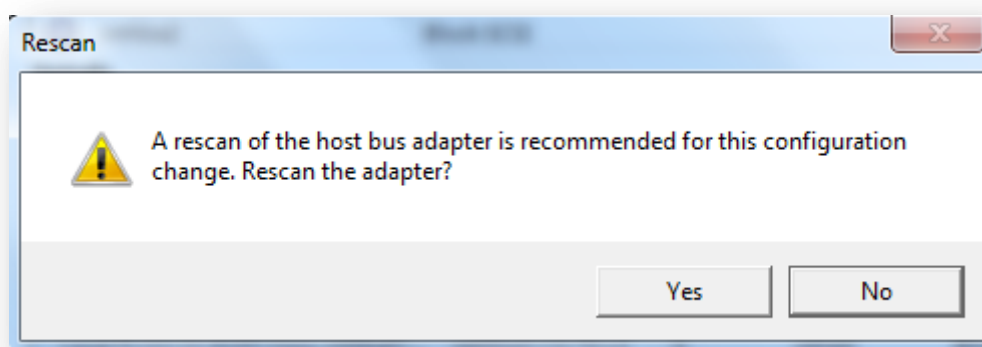
The IP address of your NAS will be shown on the list.



On the "Static Discovery" tab, you will find the iSCSI target that you have created before. Click "OK".



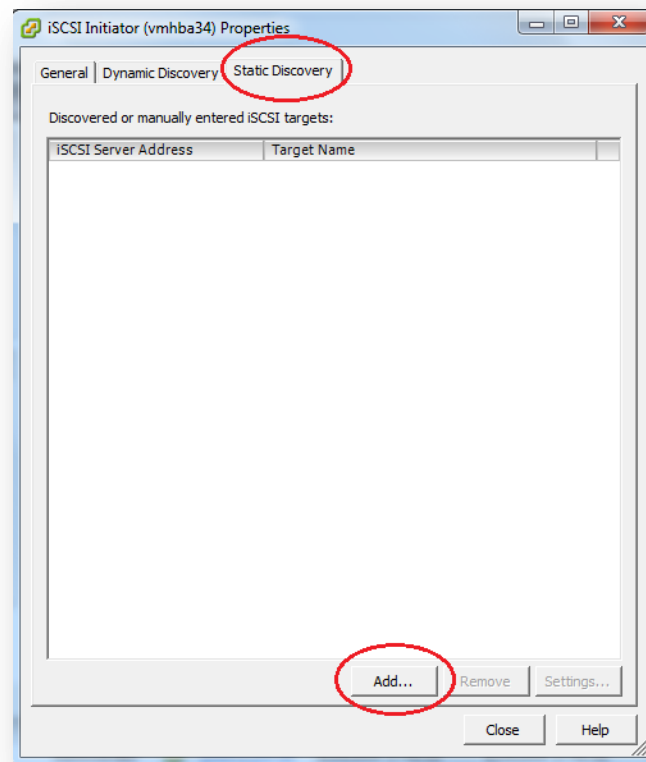
Click "Yes" to allow a rescan of the software iSCSI bus adapter.



Note from VMware "iSCSI_SAN_Configuration_Guide": Each time you remove a static target added by dynamic discovery, the target might be returned to the list the next time a rescan takes place, or the HBA is reset, or the host is rebooted.

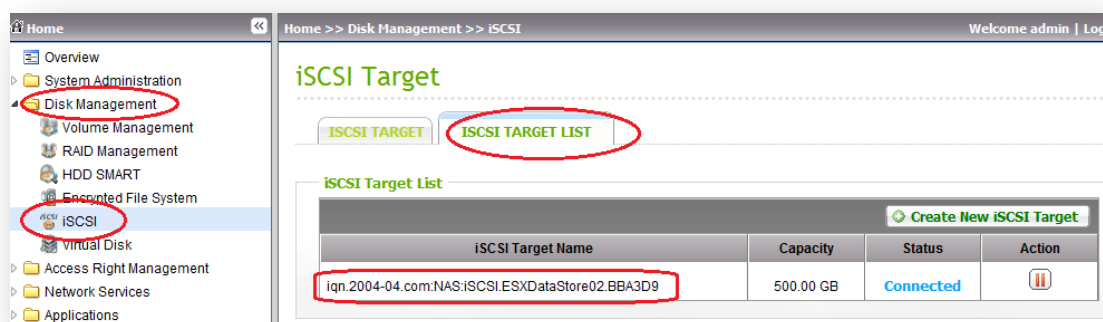
Static discovery

To add your iSCSI target manually, go to "Static Discovery" and click "Add".

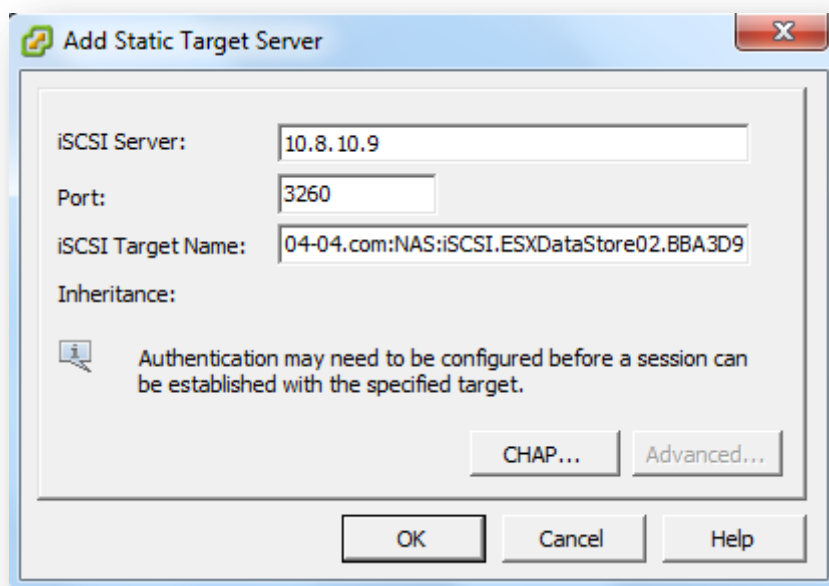


Enter the IP address of your NAS and the iSCSI target name that you created previously. In this example, enter "iqn.2004-04.com:NAS:iSCSI.ESXDataStore02.BBA3D9".

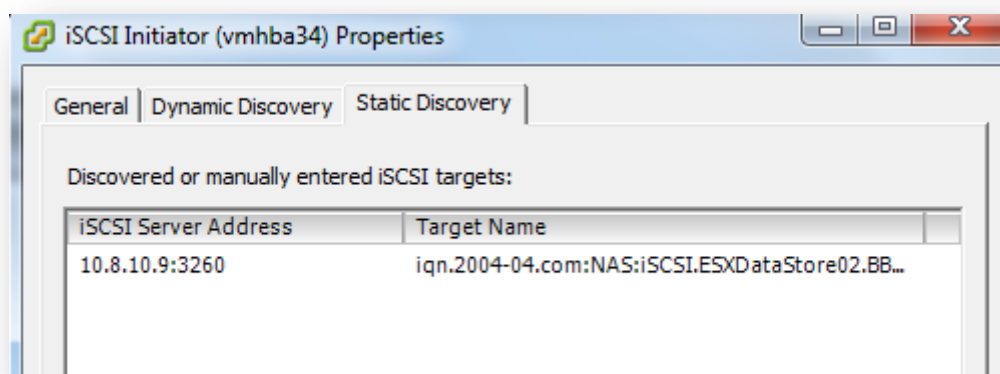
You can login the NAS and go to "Disk Management" > "iSCSI" to check the name of the iSCSI target.



After entering the details, click "OK".



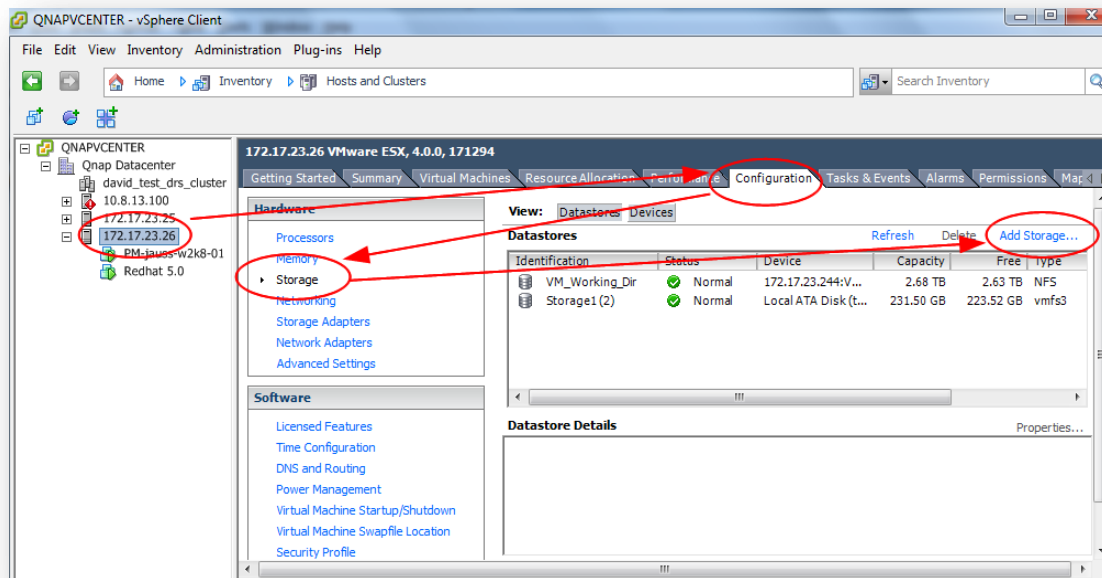
The iSCSI target LUN will be shown on the list.



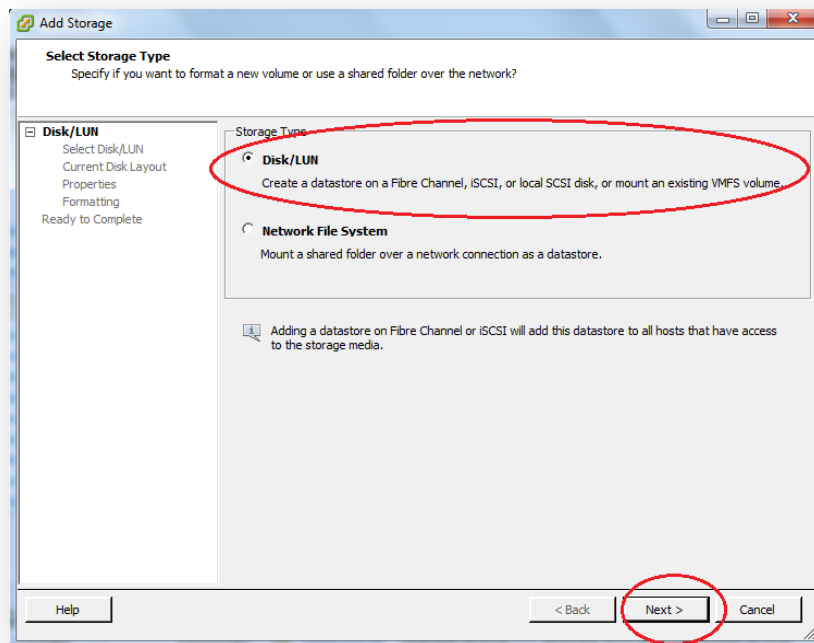
Create and enable the new datastore

Once the iSCSI target has been connected, you can add your storage on that LUN. Go to your VMware host storage management.

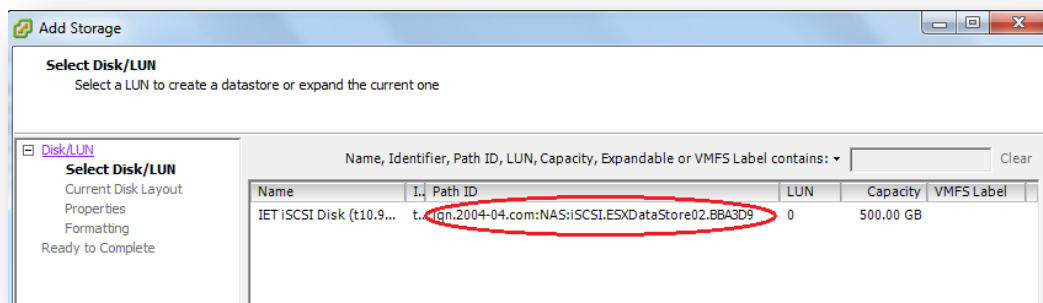
Select your host (the NAS). On the "Configuration" tab, select "Storage" and click "Add storage".



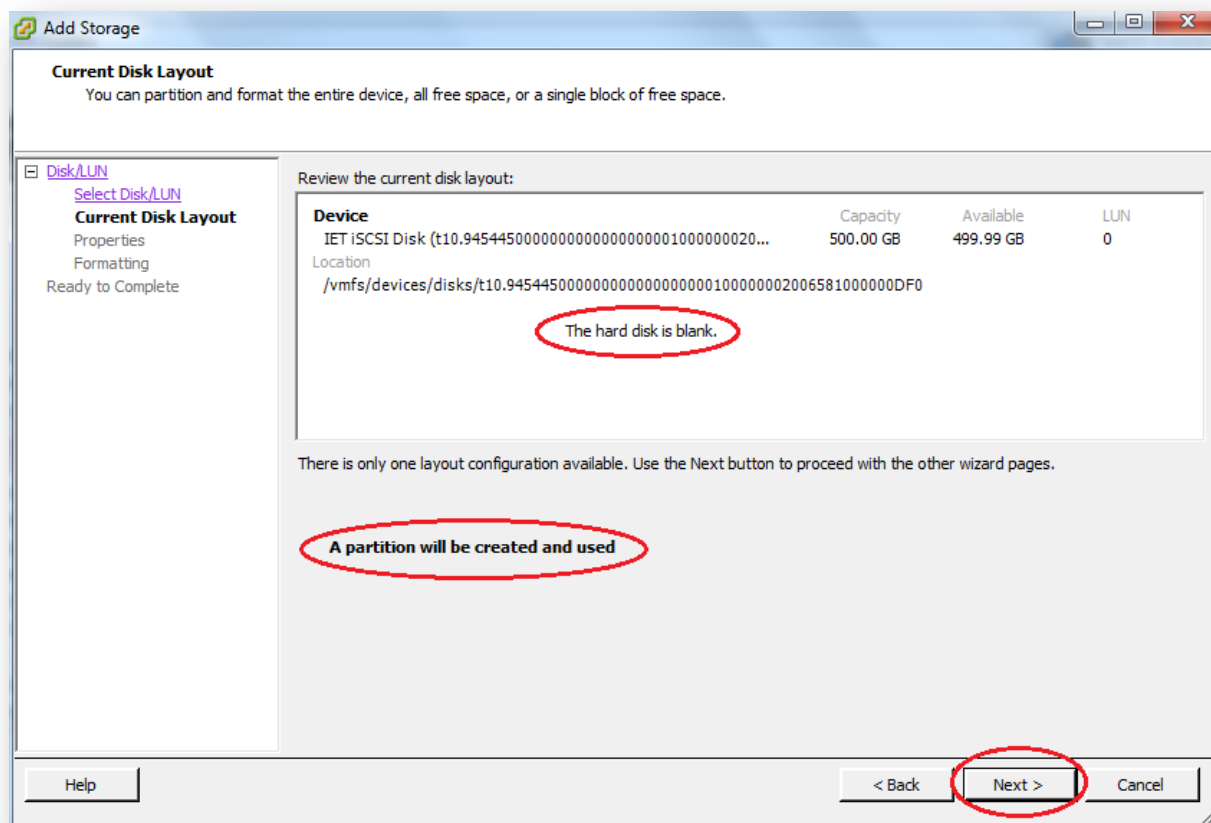
Select "Disk / LUN" and click "Next".



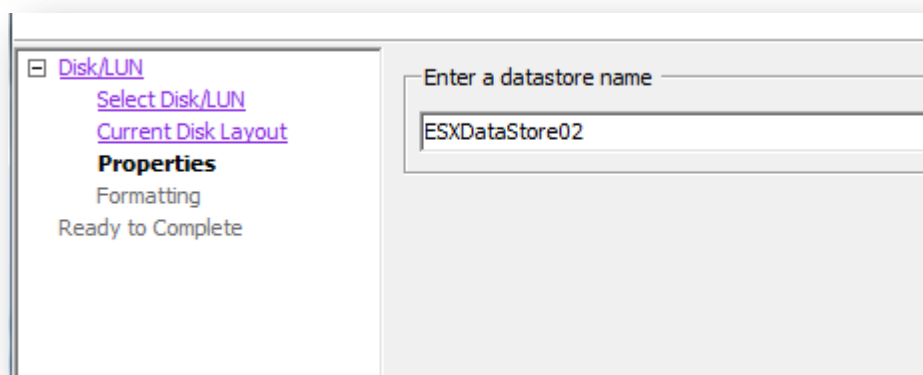
The LUN of your NAS that has been connected previously will be shown.



Select the LUN and click "Next".

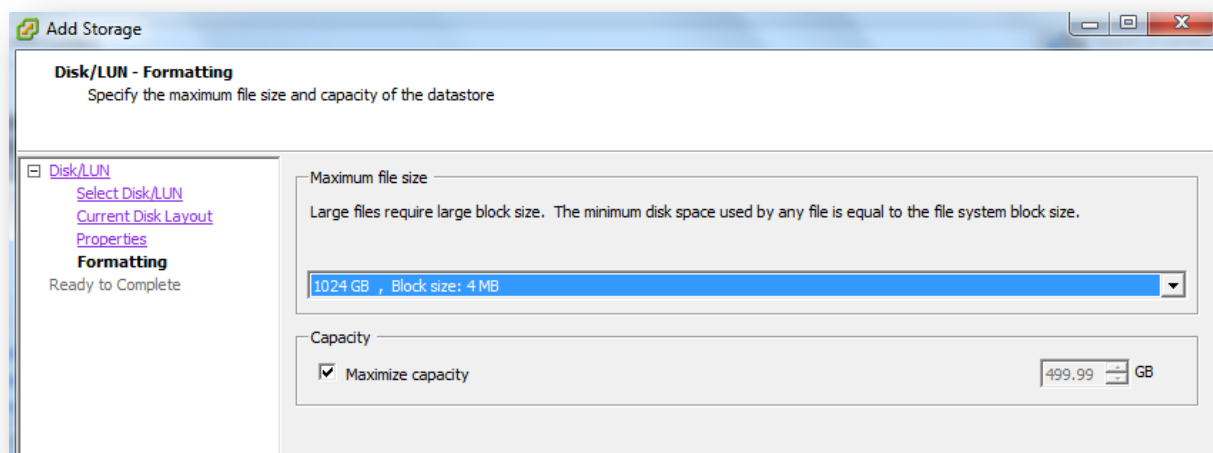


As you can see above, the disk is empty. We can read the capacity and a message that says: "A partition will be created and used". Click "Next".

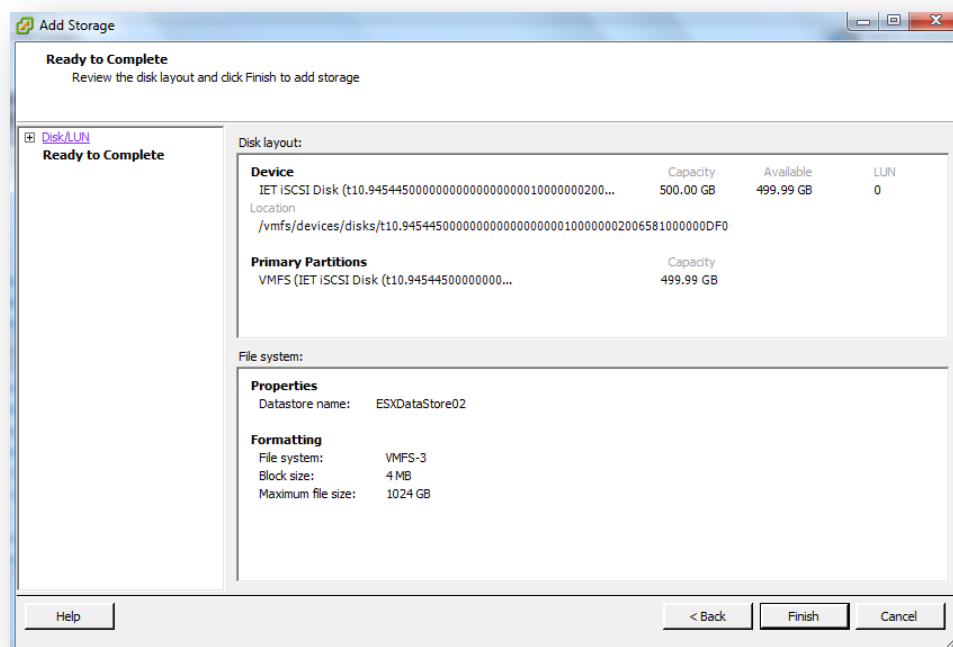


Enter the datastore name, which is "ESXDataStore02" in this example. You are free to name it as you want.

Choose your maximum file size. For example 1TB with a block size of 4 MB, depending on the size of your virtual machines.



Then, click "Next". You will see a review of all the settings.



Click "Finish" to enable the datastore.

After a few seconds, you will see your new datastore on your NAS.

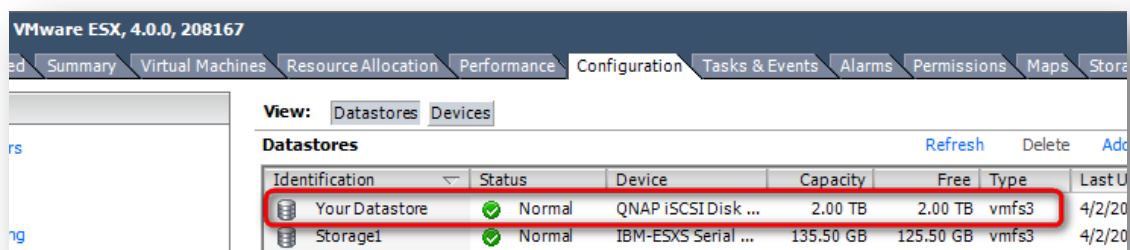
View: **Datastores** Devices

Refresh Delete Add Storage...

Identification	Status	Device	Capacity	Free	Type	Last Update
VM_Working_Dir	Normal	172.17.23.244:VM_Working_Dir	2.68 TB	2.62 TB	NFS	9/29/2009 18:28:58
ESXDataStore01	Normal	10.8.10.9:/share/ESXDataStore01	457.23 GB	441.49 GB	NFS	9/29/2009 18:28:58
Storage1(2)	Normal	Local ATA Disk (t10.ATA W...	231.50 GB	223.52 GB	vmfs3	9/29/2009 18:28:58
ESXDataStore02	Normal	IET iSCSI Disk (t10.9454450000...	499.75 GB	499.19 GB	vmfs3	9/29/2009 18:28:58

Extend your datastore to more than 2TB

This part shows you how to create an iSCSI datastore with a capacity larger than 2TB. Supposedly you have a 2TB LUN connected to your ESX, used for a datastore.



Now connect to the NAS, and create a new LUN. (You can choose to create a new target with a new LUN, or create a LUN and add it to an existing target.)

Here, we are going to add a LUN to an existing target.
Create a new LUN only:

iSCSI Quick Configuration Wizard

I want to create

- ☐ iSCSI Target with a mapped LUN
- ☐ iSCSI Target only
- ☒ iSCSI LUN only

Create an iSCSI LUN

LUN Allocation: ☐ Thin-Provisioning ☒ Instant Allocation

LUN Name:

LUN Location:

Free Size: 1499 GB






Capacity: GB

Once the LUN has been created, it will be shown on the list.

Target Management




QUICK CONFIGURATION WIZARD Quick Configuration Wizard will assist you to create an iSCSI target and LUN.


iSCSI Target List

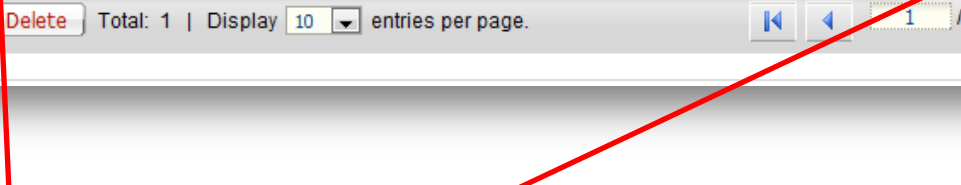
	Alias (IQN)	Status	Action
	big2 (iqn.2004-04.com.qnap:ts-809u:iscsi.big2.8d770f) id:0 - big2 (2048.00 GB)	Connected Enabled	   

Total: 1 | Display 10 entries per page.

Un-Mapped iSCSI LUN List


	Name	Capacity	Action
	splitlun	1200 GB	 

 Delete Total: 1 | Display 10 entries per page.



Select the LUN and click the up arrow on the "Action" column to map the LUN to an existing target.

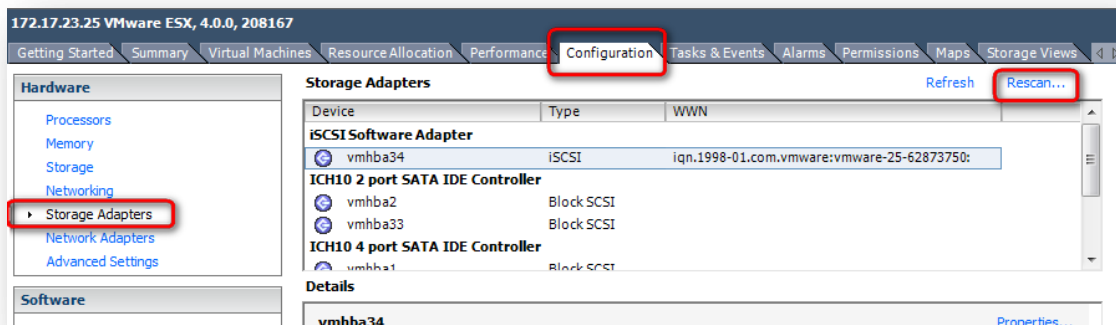
Map LUN to Target - splitlun

	Target Alias	Target IQN
	big2	iqn.2004-04.com.qnap:ts-809u:iscsi.big2.8d770f

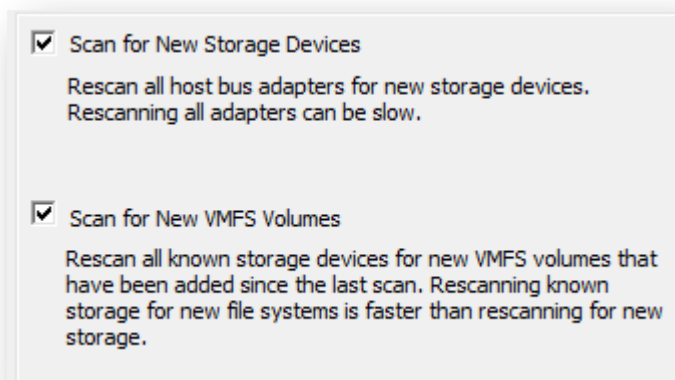


Select your target and click "APPLY".

On the vSphere client, go to "Configuration" > "Storage Adapter" and click "Rescan".



Rescan everything.



After the rescan is finished, you will be able to see the two LUNs: 2TB and 1200GB(1.17TB).

Storage Adapters

Refresh Rescan...

Device	Type	WWN
iSCSI Software Adapter		
vmhba34	iSCSI	iqn.1998-01.com.vmware:vmware-25-62873750:
ICH10 2 port SATA IDE Controller		
vmhba2	Block SCSI	
vmhba33	Block SCSI	
ICH10 4 port SATA IDE Controller		
vmhba1	Block SCSI	

Details

vmhba34

Model:

iSCSI Software Adapter

iSCSI Name:

iqn.1998-01.com.vmware:vmware-25-62873750

iSCSI Alias:

Connected Targets:

3

Devices:

6

Paths:

6

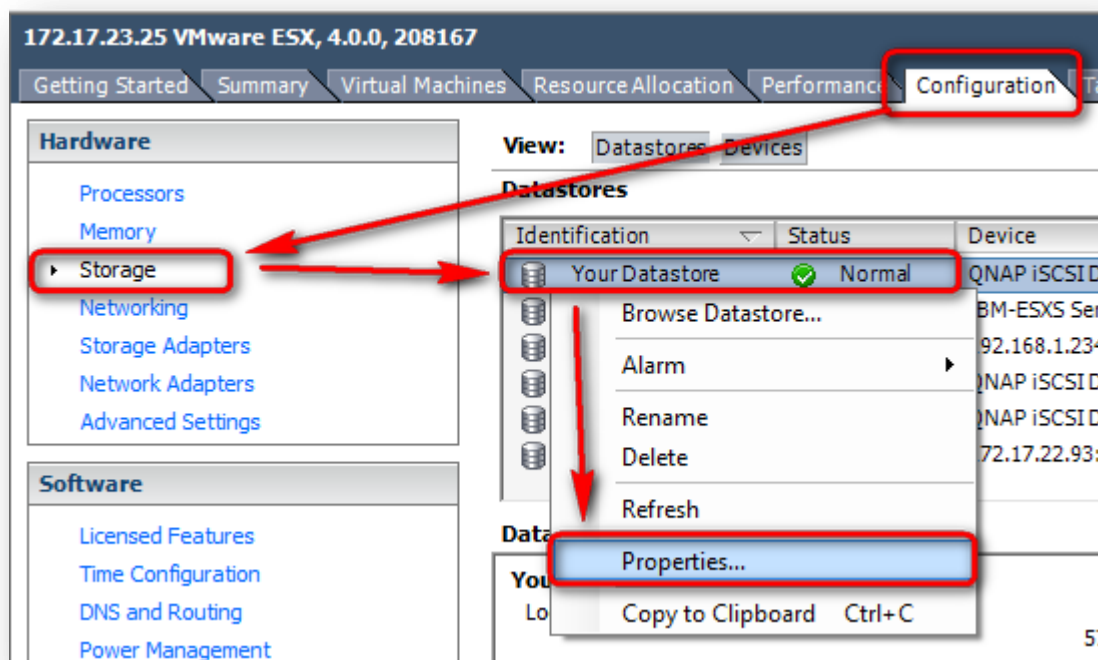
Properties...

View:

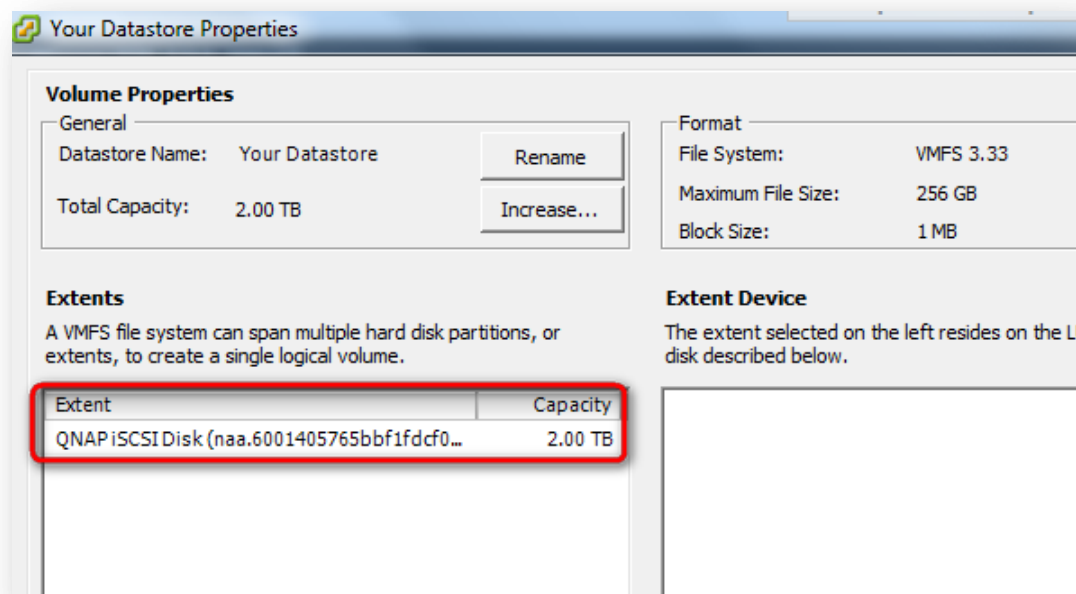
Devices Paths

	Runtime Name	LUN	Type	Transport	Capacity	Owner
#05765bbf1fdcf05d43fad90fcd8)	vmhba34:C0:T5:L0	0	disk	iSCSI	2.00 TB	NMP
#051bb2950fd7b65d4259d9792d5)	vmhba34:C0:T5:L1	1	disk	iSCSI	1.17 TB	NMP
#05ce662370db683d42d8d8a15d8)	vmhba34:C0:T3:L0	0	disk	iSCSI	500.00 G	NMP

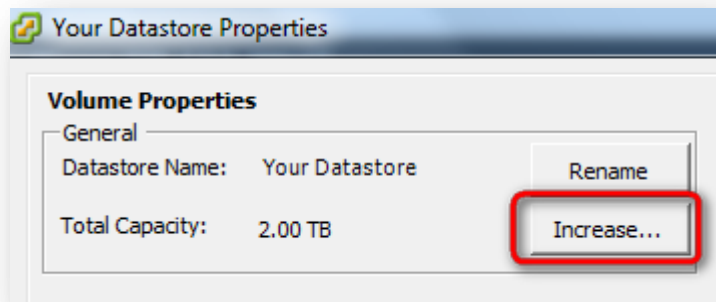
You can extend the existing datastore to that new LUN. Right click the datastore and select "Properties".



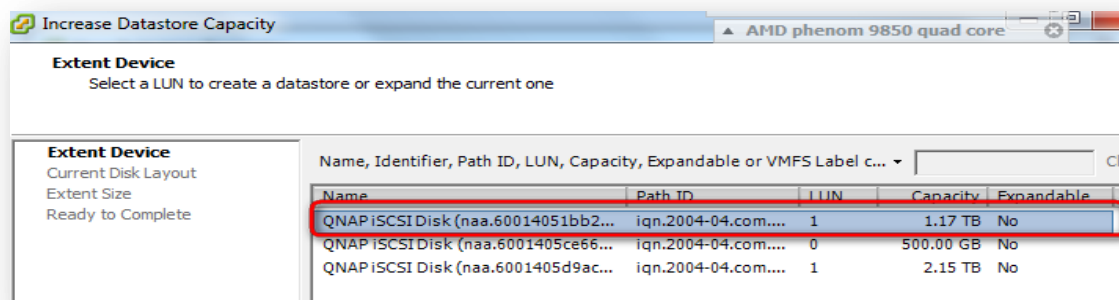
You can see the 2TB LUN.



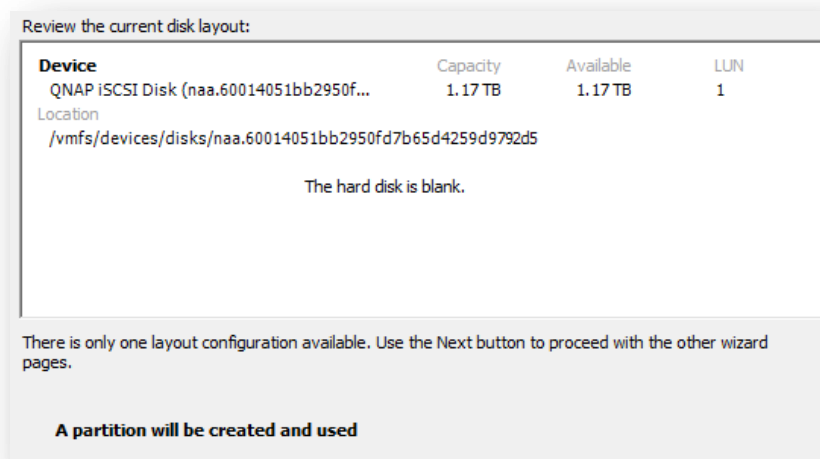
Click "Increase".



Select the LUN you have created and click "Next".



Follow the instructions to increase the volume capacity.



Capacity

☒ Maximize capacity

1200.00 GB

Review the proposed disk layout for the new extent device:

Device	Capacity	Available	LUN
QNAP iSCSI Disk (naa.60014051bb2950fd...)	1.17 TB	1.17 TB	1

Location
/vmfs/devices/disks/naa.60014051bb2950fd7b65d4259d9792d5

Primary Partitions

Primary Partitions	Capacity
VMFS (QNAP iSCSI Disk (naa.60014051bb29...))	1.17 TB

The following VMware file system will be increased as shown:

Properties	Extents
Datastore name: Your Datastore	QNAP iSCSI Disk (naa.6001405765bbf1fd)
	QNAP iSCSI Disk (naa.60014051bb2950fd)
Formatting	Total capacity: 3.17 TB
File system: VMFS-3	
Block size: 1 MB	
Maximum file size: 256 GB	

≤ Back **Finish** Cancel

The operation lasts for a couple of seconds.

When finished, the capacity of your datastore capacity has increased by the second LUN.

Volume Properties

General

Datastore Name: Your Datastore

Rename

Total Capacity: 3.17 TB

Increase...

Format

File System: VMFS 3.33

Maximum File Size: 256 GB

Block Size: 1 MB

Extents

A VMFS file system can span multiple hard disk partitions, or extents, to create a single logical volume.

Extent	Capacity
QNAP iSCSI Disk (naa.6001405765bbf1fdcf0...	2.00 TB
QNAP iSCSI Disk (naa.60014051bb2950fd7b...	1.17 TB

Extent Device

The extent selected on the left resides on the LUN or physical disk described below.

View: Datastores Devices

Datastores

Refresh

Delete

Identification	Status	Device	Capacity	Free	Type	Last Update
Your Datastore	Normal	QNAP iSCSI Disk ...	3.17 TB	3.17 TB	vmfs3	4/2/2010 15:43:38
Storage1	Normal	IBM-ESXS Serial ...	135.50 GB	125.50 GB	vmfs3	4/2/2010 15:33:45

For more details, please refer to the VMware documentation.

Advices:

- Refer to iSCSI_SAN_Configuration_Guide from VMware ("Networking Configuration for Software iSCSI Storage"), you can easily set up a Failover with Software iSCSI adapter.
- As each network connection is 1Gb/s, keep in mind that each connection you add to the NFS share will be shared with others. Depending on the requirement: idle VM will need a few of I/O whereas VM with high disk activity will need a lot of I/O.
- You can enable "Balance-alb" bonding mode or 802.3ad aggregation mode (an 802.3ad compliant switch required) to allow inbound and outbound traffic link aggregation.
- ESX 4.0 does not support a LUN with a capacity larger than 2 TB (2048 GB). Therefore, you will not be able to use a larger capacity with only 1 LUN (see "Create an iSCSI LUN on the Turbo NAS" on page 5).

SPC-3 persistent reservation: For more details, please read the FAQ.

VMware HA: High Availability. If a VM fails, it will be restarted to a new host.

VMware FT: Fault Tolerance. It provides continuous availability by having identical virtual machines running on separate hosts.

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