

# NETGEAR® ReadyDATA® and VMware

Configuring ReadyDATA for VMware ESXi Using NFS

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## INTRODUCTION

ReadyDATA® is enterprise-class technology that's absolutely liberating for SMB.

For most small and medium businesses, building a virtualization solution that provides scalability, reliability, and data protection is a difficult task that requires managing both cost and complexity. Every ReadyDATA ships with a full suite of advanced features, such as block-level replication, unlimited snapshots, and SSD caching, designed to remove the complexity typically associated with scalability, reliability, and data protection. With a maximum capacity of 240TB and the dramatic performance boost that comes from storage tiering of SSD, SAS and SATA drives, ReadyDATA redefines the concept of storage for virtualized server environments in small and medium businesses, remote offices/branch offices (ROBO), and departments within enterprise organizations. End-to-end data integrity and protection are critical in virtualized environments. ReadyDATA delivers continuous data protection with unlimited block-based snapshots and clones of virtual machines allowing administrators to create and track multiple versions and restore any point of time with a single click.

**Need to restore a file that was recently modified?** No problem. Use clones to explore your virtual machines as they existed in the past without downtime.

**Want to protect against a site outage?** Designing simple, cost-effective disaster recovery plans is easy with ReadyDATA block-level replication. By sending only changed blocks for shares & LUNs, bandwidth demands and replication time are dramatically reduced. ReadyDATA also replicates snapshots along with files and data—complete copies of data sets from a specific point in time you can easily access and restore.

**Worried that high performance storage for VMware environments won't fit your budget?** Combine SATA and SSD drives in one volume with read and write caching to balance performance, capacity, and cost. While 15,000 RPM SAS are recommended for high performance storage applications, SATA and SSD drives can be combined in one volume with read and write caching. ReadyDATA excels with these hybrid configurations—allowing you to configure write-optimized and read-optimized SSD drives to act as a performance cache and boost the performance of low-cost, high-capacity SATA drives. Dual 10GbE ports on the ReadyDATA 5200 and virtual network interface support on all models ensure that even in I/O intensive virtual environments, network bottlenecks are a thing of the past.

**Having growing pains?** ReadyDATA adds automatic—and on-the-fly—volume expansion, making overhead protection and capacity scaling both simple and powerful. This instant expansion capability allows for large amounts of storage capacity expansion without downtime, wait time, or risk.

**Need to be sure of interoperability?** ReadyDATA is certified with top hypervisor platforms, including VMware, Hyper-V, and XenServer.

**Concerned about durability and support?** ReadyDATA comes with a five year warranty and three years of next business day (NBD) hardware replacement at no extra charge. Around the clock worldwide support and a dedicated support number in North America (1-855-RDYDATA) ensures you'll quickly reach ReadyDATA experts if you need assistance.

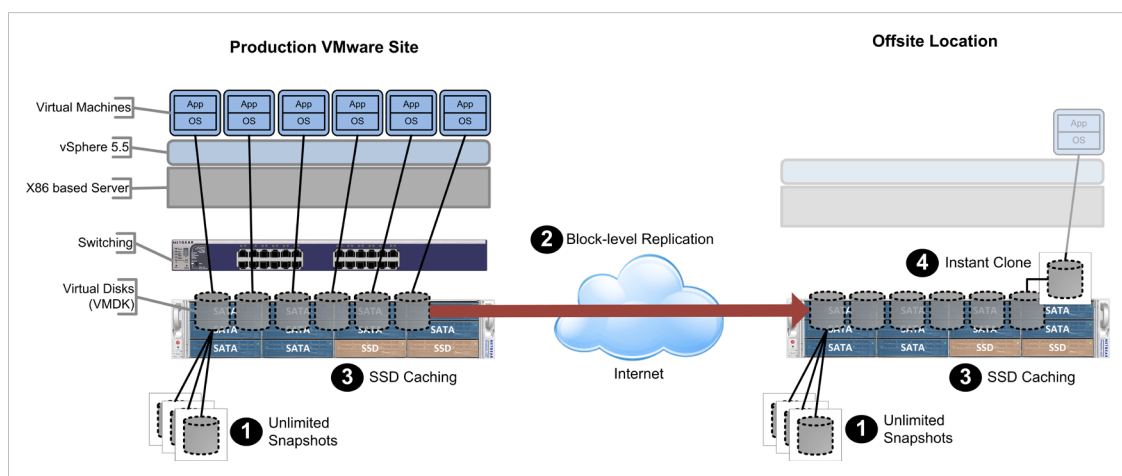
Virtualized environments require storage that offers more than support for iSCSI and NFS. They also require flexibility, scalability, performance, and protection. Follow this Application Note to address all of these requirements for VMware using ReadyDATA.

## CONCEPTS

NETGEAR® ReadyDATA is a certified VMware storage platform and can be used to facilitate running Virtual Machines. This document shows the configuration steps required to create an NFS share on the ReadyDATA and use it as a datastore on an ESXi server. We recommend NFS as the SAN protocol of choice due to ease of management and flexibility. In virtualization deployments we recommend creating a dedicated storage VLAN for VM traffic. In this example we will use VLAN 51 as our storage VLAN. Also in this document we will configure redundant links between the ReadyDATA and a switch and the ESXi server.

The solution leverages four key ReadyDATA features:

1. Snapshots are space efficient, point-in-time copies of LUN (block) and file data.
2. Block-level replication enables disaster recovery and ensures protection of data from remote or branch office locations.
3. SSD caching boosts read and write performance in virtualized environments by dynamically caching frequently used data.
4. Instant clones allow administrators to create a writable copy of a LUN or NFS share at no cost to storage. For virtualization, administrators can register the clone and boot the VM inside to restore files or conduct testing with production data.



While this guide focuses on setup of VMware at the production site, a key benefit of ReadyDATA's block-level replication is offsite data protection. A powerful disaster recovery solution can be built by pre-mounting replicated NFS shares at the offsite location. An administrator can "pre-inventory" replicated VMs by temporarily allowing read/write access to VMware on the replicated share. Doing so reduces recovery time if workload must be moved to the offsite location.

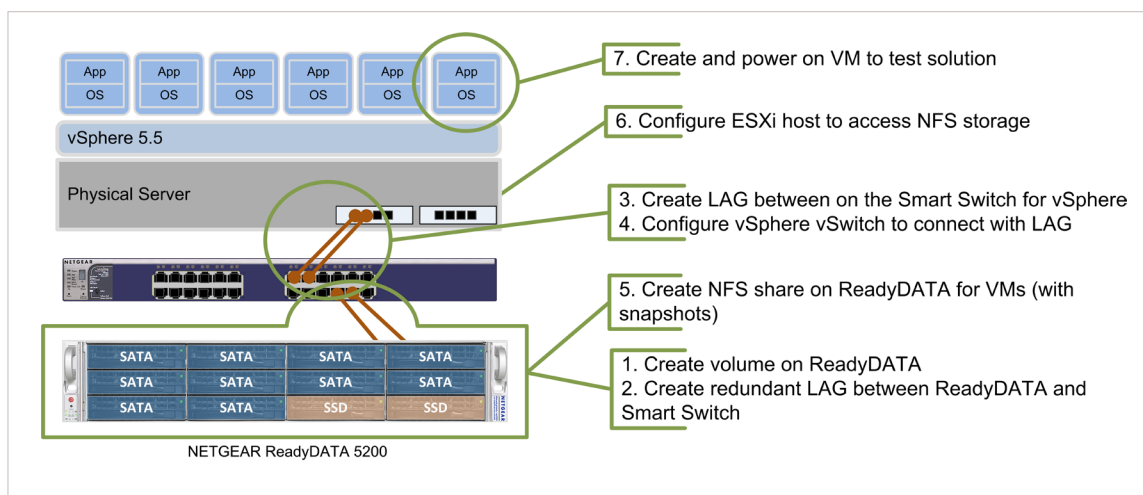
Note: Pre-inventory of a replicated VM can only be accomplished when using NFS shares and is not possible with iSCSI. Destination shares in a replication pair should be made read/write only temporarily. After the inventory is complete, the share should be made read-only.

## COMPONENTS

Product	Model/Release	Version
NETGEAR ReadyDATA	516, 5200	Firmware 1.0 and above
VMware 5	ESXi	5.0 and above
LAG and VLAN Capable NETGEAR Switch	M5300 Series managed switch (e.g M5300-52G) *Any NETGEAR smart or managed switch will work but we recommend the M5300 Series switches because they offer iSCSI traffic prioritization. The XSM7224S or XSM7224 is recommended for 10 Gigabit deployments.	n/a

This document also assumes that there is an existing ReadyDATA on the network and at least one VMware ESXi host. It will also use the VMware VSphere client to configure the ESXi host.

## CONFIGURATION STEPS



## Create a Redundant Link (LAG) Between the ReadyDATA and Switch

Since virtual machines require permanent access to network storage to stay online, the network connection between the hypervisor (VMware) and the storage is mission critical. Link aggregation is one way to achieve higher redundancy for this connection. For this app note we will be creating port trunks of two for each device (switch, ReadyDATA, and ESXi server). This will provide our virtualization infrastructure with the end-to-end network redundancy to endure a link failure. In this section, we will be creating a LAG between the ReadyDATA and switch.

### Order of Configuration

The order in which the LAGs are created is important, as changing the order outlined below might result in a loss of connectivity to the ReadyDATA management UI. In the event that you lose connectivity to the ReadyDATA, you can reset its network configuration by using a special boot sequence found in the link below:

[http://kb.netgear.com/app/answers/detail/a\\_id/23044](http://kb.netgear.com/app/answers/detail/a_id/23044)

## Switch Side Configuration

Before we get into LAG configuration, be sure to create a dedicated storage VLAN. In the management interface of the switch, go to **Switching -> VLAN** and create the VLAN (In our example it is VLAN 51 and we name it NFS Storage).

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VLAN | STP | Multicast | Address Table | Ports | LAG

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### VLAN Configuration

**Reset**  
Reset Configuration ☐

**Internal VLAN Configuration**  
Internal VLAN Allocation Base: 4093  
Internal VLAN Allocation Policy: Ascending Descending

	VLAN ID	VLAN Name	VLAN Type	Make Static
<input type="checkbox"/>				Disable
<input type="checkbox"/>	1	Default	Default	Disable
<input type="checkbox"/>	20	Deployment	Static	Disable
<input type="checkbox"/>	50	Production	Static	Disable
<input type="checkbox"/>	51	NFS Storage	Static	Disable
<input type="checkbox"/>	52	VMotion	Static	Disable
<input type="checkbox"/>	60	DMZ	Static	Disable
<input type="checkbox"/>	70	ReadyDATA	Static	Disable
<input type="checkbox"/>	99	Interconnect	Static	Disable
<input type="checkbox"/>	500	NETGEAR	Static	Disable

After creating the storage VLAN, go to **Switching -> LAG**. You will see the different port channels available on the switch. Select a channel that is unused (in this example it is ch5) and check the box next to it. At the top row, enter in the details such as **LAG Name and Admin mode**. Make sure the **Enable** option is selected in **Admin Mode**. This determines whether the LAG is enabled or not. For this particular port channel we will also set **Static Mode** as **Disable** as we will be using LACP rather than just a static LAG.

### LAG Configuration

	LAG Name	Description	LAG ID	Admin Mode	Hash Mode	STP Mode	Static Mode	Link Trap	Configured Ports	Active Ports	LAG State
<input type="checkbox"/>	RD-VMware			Enable	Src/Dest IP and TCP/UDP Port fields	Enable	Disable	Enable	1/0/13,1/0/15	1/0/15,1/0/13	UP
<input type="checkbox"/>	RD10		lag 1	Enable	Src/Dest MAC, VLAN, EType, incoming port	Enable	Disable	Enable	1/0/13,1/0/15	1/0/15,1/0/13	UP
<input type="checkbox"/>	RD11		lag 2	Enable	Src/Dest MAC, VLAN, EType, incoming port	Enable	Disable	Enable	1/0/17,1/0/19	1/0/19,1/0/17	UP
<input type="checkbox"/>	RD12		lag 3	Enable	Src/Dest IP and TCP/UDP Port fields	Enable	Disable	Enable	1/0/5,1/0/7	1/0/5,1/0/7	UP
<input type="checkbox"/>	test		lag 4	Enable	Src MAC, VLAN, EType, incoming port	Enable	Disable	Enable	1/0/38,1/0/40		DOWN

Now click **Apply**.

### LAG Configuration

	LAG Name	Description	LAG ID	Admin Mode	Hash Mode	STP Mode	Static Mode	Link Trap	Configured Ports	Active Ports	LAG State
<input type="checkbox"/>											
<input type="checkbox"/>	RD10		lag 1	Enable	Src/Dest MAC, VLAN, EType, incoming port	Enable	Disable	Enable	1/0/13,1/0/15	1/0/15,1/0/13	UP
<input type="checkbox"/>	RD11		lag 2	Enable	Src/Dest MAC, VLAN, EType, incoming port	Enable	Disable	Enable	1/0/17,1/0/19	1/0/19,1/0/17	UP
<input type="checkbox"/>	RD12		lag 3	Enable	Src/Dest IP and TCP/UDP Port fields	Enable	Disable	Enable	1/0/5,1/0/7	1/0/5,1/0/7	UP
<input type="checkbox"/>	test		lag 4	Enable	Src MAC, VLAN, EType, incoming port	Enable	Disable	Enable	1/0/38,1/0/40		DOWN
<input type="checkbox"/>	RD-VMware		lag 5	Enable	Src/Dest IP and TCP/UDP Port fields	Enable	Disable	Enable			DOWN

The LAG **RD-VMware** is now created.

Next, we will add ports to this LAG. Go to **Switching -> LAG -> LAG Membership**. In the **LAG ID** field, select the Lag that we just configured. Once you have that selected, click on the **Unit 1** button to display the ports on the switch and select the ports you wish to add to the LAG. In our example we add ports 49 and 50 as members of the LAG.

**LAG Membership**

**LAG ID** Lag 5 **LAG Name** RD-VMware

**LAG Description** LAG for VM Storage

**Admin Mode** Enable **Link Trap** Enable

**STP Mode** Enable **Static Mode** Disable

**Hash Mode** Src/Dest IP and TCP/UDP Port fields

**Port Selection Table**

Unit 1

Port	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
	49	50	51	52																				
	✓	✓																						

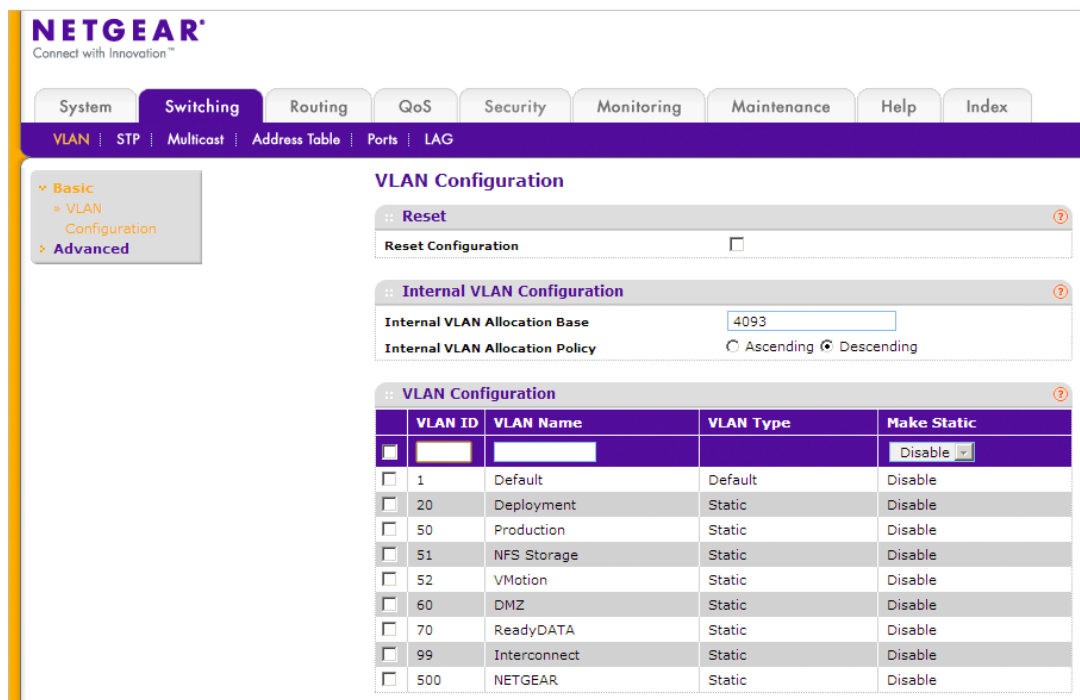
Finally, click **Apply**.

**LAG Configuration**

	LAG Name	Description	LAG ID	Admin Mode	Hash Mode	STP Mode	Static Mode	Link Trap	Configured Ports	Active Ports	LAG State
<input type="checkbox"/>											
<input type="checkbox"/>	RD10		lag 1	Enable	Src/Dest MAC, VLAN, EType, incoming port	Enable	Disable	Enable	1/0/13,1/0/15	1/0/15,1/0/13	UP
<input type="checkbox"/>	RD11		lag 2	Enable	Src/Dest MAC, VLAN, EType, incoming port	Enable	Disable	Enable	1/0/17,1/0/19	1/0/19,1/0/17	UP
<input type="checkbox"/>	RD12		lag 3	Enable	Src/Dest IP and TCP/UDP Port fields	Enable	Disable	Enable	1/0/5,1/0/7	1/0/5,1/0/7	UP
<input type="checkbox"/>	test		lag 4	Enable	Src MAC, VLAN, EType, incoming port	Enable	Disable	Enable	1/0/38,1/0/40		DOWN
<input type="checkbox"/>	RD-VMware	LAG for VM Storage	lag 5	Enable	Src/Dest IP and TCP/UDP Port fields	Enable	Disable	Enable	1/0/49,1/0/50	1/0/50,1/0/49	UP

As you can see above, the LAG **RD-VMware** has been assigned ports and its **LAG State** is **UP**.

The next step will be to add the LAG to our storage VLAN (VLAN 51). Go to **Switching -> VLAN**.



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### VLAN Configuration

**Reset** ⓘ

Reset Configuration ☐

**Internal VLAN Configuration** ⓘ

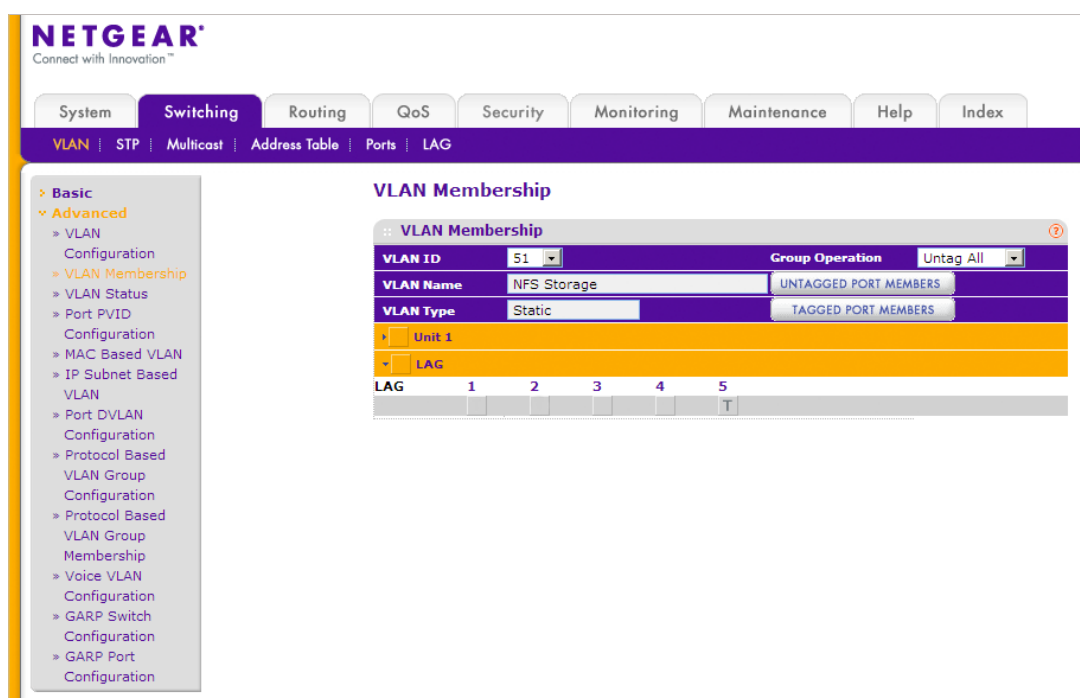
Internal VLAN Allocation Base: 4093

Internal VLAN Allocation Policy: ☐ Ascending ☒ Descending

**VLAN Configuration** ⓘ

	VLAN ID	VLAN Name	VLAN Type	Make Static
<input checked="" type="checkbox"/>				Disable
<input type="checkbox"/>	1	Default	Default	Disable
<input type="checkbox"/>	20	Deployment	Static	Disable
<input type="checkbox"/>	50	Production	Static	Disable
<input type="checkbox"/>	51	NFS Storage	Static	Disable
<input type="checkbox"/>	52	VMotion	Static	Disable
<input type="checkbox"/>	60	DMZ	Static	Disable
<input type="checkbox"/>	70	ReadyDATA	Static	Disable
<input type="checkbox"/>	99	Interconnect	Static	Disable
<input type="checkbox"/>	500	NETGEAR	Static	Disable

Here you can see our storage VLAN – NFS Storage VLAN 51. On the menu to the left, go to **Advanced-> VLAN Membership**. In the **VLAN ID** drop down menu, select **51**. At the bottom, find the checkbox for **LAG 5** and left click on it until it shows **"T"** (which stands for tagged). Click **APPLY**.



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IP Subnet Based VLAN  
Port DVLAN  
Configuration  
Protocol Based VLAN Group  
Configuration  
Protocol Based VLAN Group Membership  
Voice VLAN  
Configuration  
GARP Switch  
Configuration  
GARP Port  
Configuration

### VLAN Membership

**VLAN Membership** ⓘ

VLAN ID: 51 Group Operation: Untag All

VLAN Name: NFS Storage UNTAGGED PORT MEMBERS

VLAN Type: Static TAGGED PORT MEMBERS

Unit 1

LAG

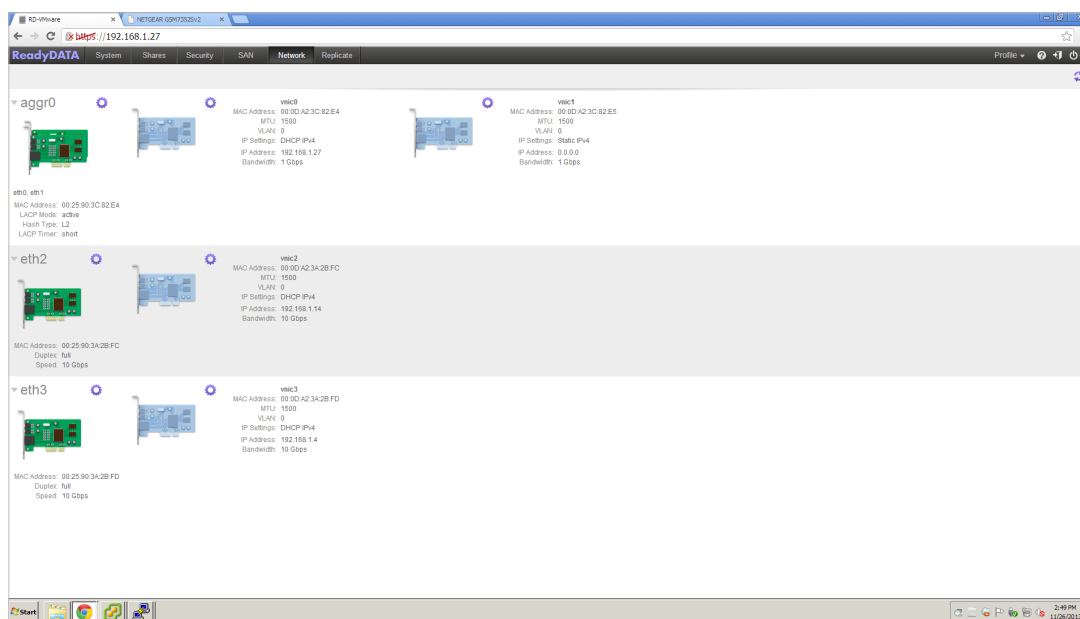
LAG	1	2	3	4	5
					T

The LAG on the switch side is now properly configured.

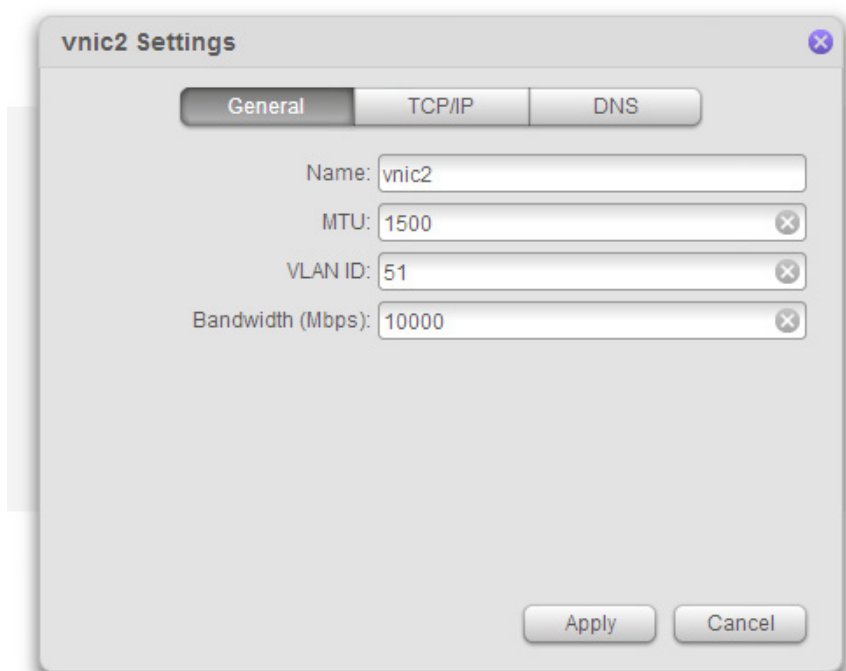


## ReadyDATA Side Configuration

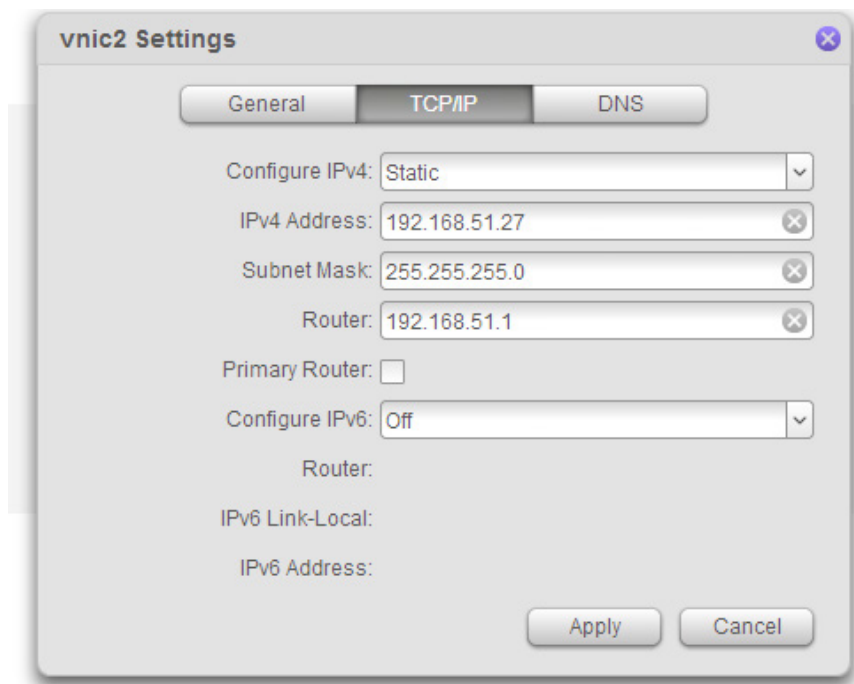
We are now ready to configure a LAG on the ReadyDATA side of things. Login to the GUI and go to **Network**. What we are going to do here is to configure a vnic for the storage VLAN and then bond that NIC and another NIC together. For this example we will bond the two 10 Gigabit NICs (eth2 and eth3) on the ReadyDATA. Note that we already have **eth0** and **eth1** in a LAG (**aggr0**) on the default VLAN for management purposes.



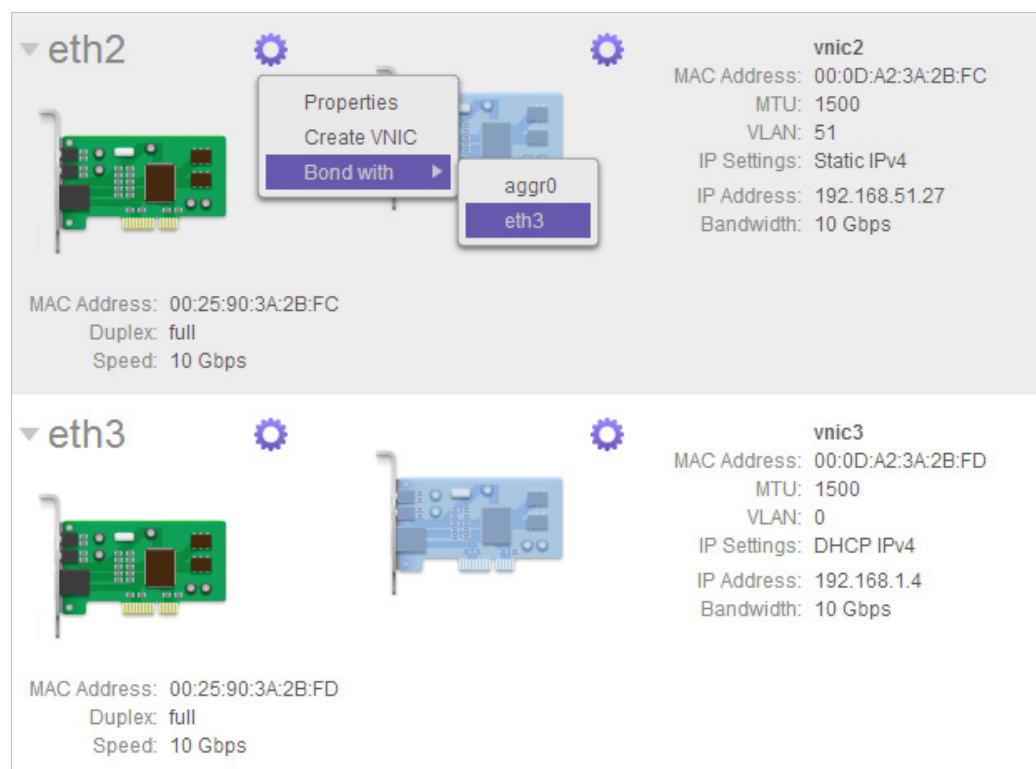
First, left click on the gear icon for vnic2. This will bring up a popup window. Change the **VLAN ID** to **51**.



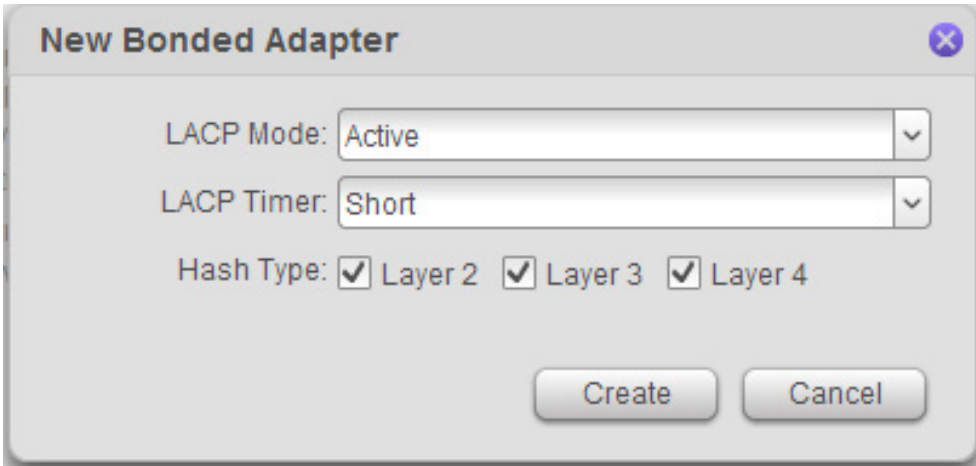
Next, click on the **TCP/IP** tab. We will now give vnic 2 a static IP address so in the **Configure IPv4** drop down menu select **Static**. Now enter the IP address for the vnic (in our example it is 192.168.51.27). Finally, click **Apply**.



Now, left click on the gear icon for **eth2**. This will bring up a drop down menu. Select the **Bond** with option and then **eth3** in the next menu level down.




Once you click on **eth3** you will see a new popup window to help configure your LACP settings. Set the **LACP Mode** as **Active** and **LACP Timer** as **Short**. For **Hash type**, in general to achieve even traffic distribution between physical links within the LAG, it's best to have more variables or layers to enter into the hashing algorithm. In our example we will check the Layer 2, Layer 3 and Layer 4 boxes to correspond to the hashing method we chose on the switch. Finally, click **Create**.



The image shows a 'New Bonded Adapter' configuration window. It contains three dropdown menus: 'LACP Mode' set to 'Active', 'LACP Timer' set to 'Short', and 'Hash Type' with three checked options: 'Layer 2', 'Layer 3', and 'Layer 4'. At the bottom right are 'Create' and 'Cancel' buttons.

We've now successfully created a port trunk with **eth2** and **eth3** named **aggr1** and configured a LAG between the ReadyDATA and switch.



The image displays a network configuration summary for three interfaces: **aggr1**, **vnic2**, and **vnic3**. Each interface is represented by a network card icon and a list of configuration details.

Interface	MAC Address	MTU	VLAN	IP Settings	IP Address	Bandwidth
aggr1 (eth2, eth3)	00:25:90:3A:2B:FC	-	-	LACP Mode: active Hash Type: L3,L4 LACP Timer: short	-	-
vnic2	00:0D:A2:3A:2B:FC	1500	51	Static IPv4	192.168.51.27	10 Gbps
vnic3	00:0D:A2:3A:2B:FD	1500	0	Static IPv4	0.0.0.0	10 Gbps

## Create a Redundant Link (LAG) Between the Switch and ESXi Host

Next we'll create a LAG between the ESXi host and our switch. We will start with the configuration on the switch.

### Switch Side Configuration

Login to the NETGEAR managed switch and go to **Switching -> LAG**. Select a channel that is unused and check the box next to it. At the top row, enter in the details such as **LAG Name and Admin mode**. Make sure the **Enable** option is selected in **Admin Mode**. This determines whether the LAG is enabled or not. For this particular port channel we will also set **Static Mode** as **Enable** as a static LAG is the recommended setting by VMware. Now click **Apply**.

**Note:** With the VMware vSphere Web Client it is now possible to create a LAG with LACP enabled. In such cases the setting here would be to set **Static Mode** to **Disable**.

LAG Configuration									
LAG Configuration									
	LAG Name	Description	LAG ID	Admin Mode	Hash Mode	STP Mode	Static Mode	Link Trap	Configured Ports
<input checked="" type="checkbox"/>	toDellR515MGMT		lag 4	Enable	6 Src/Dest IP and TCP/UDP Port fields	Enable	Enable	Disable	1/0/13, 1/0/14
<input type="checkbox"/>	toXSM7224S		lag 1	Enable	3 Src/Dest MAC, VLAN, EType, incoming port	Enable	Disable	Disable	1/0/25, 1/0/26
<input type="checkbox"/>	to4200mgmt		lag 2	Enable	3 Src/Dest MAC, VLAN, EType, incoming port	Enable	Disable	Disable	1/0/1, 1/0/2
<input type="checkbox"/>	toDellR515SAN		lag 3	Enable	6 Src/Dest IP and TCP/UDP Port fields	Enable	Enable	Disable	1/0/5, 1/0/6
<input checked="" type="checkbox"/>	toDellR515MGMT		lag 4	Enable	6 Src/Dest IP and TCP/UDP Port fields	Enable	Enable	Disable	1/0/13, 1/0/14
<input type="checkbox"/>	ch5		lag 5	Enable	3 Src/Dest MAC, VLAN, EType, incoming port	Enable	Disable	Disable	

Next, we will add ports to this LAG. Go to **Switching -> LAG -> LAG Membership**. In the **LAG ID** field, select the Lag that we just configured. Once you have that selected, click on the Unit 1 button to display the ports on the switch and select the ports you wish to add to the LAG. In our example we add ports 13 and 14 as members of the LAG.

Finally, click **Apply**.

LAG Membership																									
LAG Membership																									
LAG ID	Lag 4										LAG Name	toDellR515MGMT													
LAG Description	toESXi																								
Admin Mode	Enable										Link Trap	Disable													
STP Mode	Enable										Static Mode	Enable													
Hash Mode	Src/Dest IP and TCP/UDP Port fields																								
Port Selection Table																									
Unit 1																									
Port	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
													✓	✓											
	25	26	27	28																					

The LAG on the switch is now properly configured.

LAG Configuration											
LAG Configuration											
	LAG Name	Description	LAG ID	Admin Mode	Hash Mode	STP Mode	Static Mode	Link Trap	Configured Ports	Active Ports	LAG State
<input checked="" type="checkbox"/>											
<input type="checkbox"/>	toXSM7224S		lag 1	Enable	3 Src/Dest MAC, VLAN, EType, incoming port	Enable	Disable	Disable	1/0/25, 1/0/26	1/0/25, 1/0/26	UP
<input type="checkbox"/>	to4200mgmt		lag 2	Enable	3 Src/Dest MAC, VLAN, EType, incoming port	Enable	Disable	Disable	1/0/1, 1/0/2	1/0/1, 1/0/2	UP
<input type="checkbox"/>	toDellR515SAN		lag 3	Enable	6 Src/Dest IP and TCP/UDP Port fields	Enable	Enable	Disable	1/0/5, 1/0/6	1/0/5, 1/0/6	UP
<input type="checkbox"/>	toDellR515MGMT		lag 4	Enable	6 Src/Dest IP and TCP/UDP Port fields	Enable	Enable	Disable	1/0/13, 1/0/14	1/0/13, 1/0/14	UP

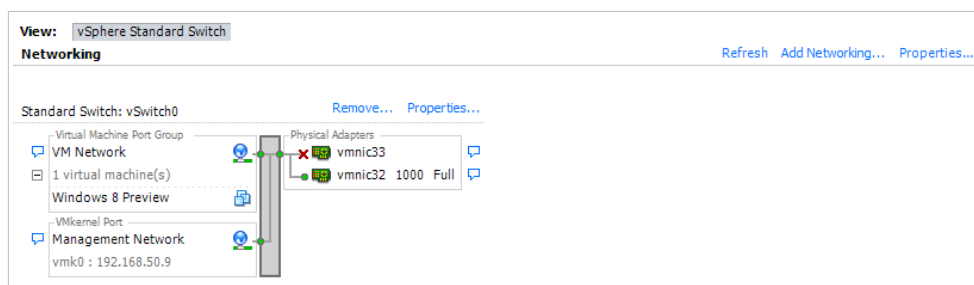
## VMware Side Configuration

Now we will create a LAG using two previously unused physical adapters on the ESXi host. For this purpose we will create a dedicated vSwitch from the two unused physical adapters for storage traffic with a VLAN ID of 51.

First, login to the ESXi host with the vSphere client and go to the **Networking Adapters** option on the **Configuration** tab. On our server vmnic3 and vmnic2 are currently not allocated to any vSwitch. We will use those two in our new vSwitch.

Device	Speed	Configured	Switch	MACAddress	Observed IP Ranges	Wake
<b>Broadcom Corporation NetXtreme II BCM57810 10 Gigabit Ethernet</b>						
vmnic3	10000 F...	Negotiate	None	00:0a:f7:10:d2:82	192.168.50.21-192.168.50....	Yes
vmnic2	10000 F...	Negotiate	None	00:0a:f7:10:d2:80	192.168.50.21-192.168.50....	Yes
<b>Broadcom Corporation Broadcom NetXtreme II BCM5716 1000Base-T</b>						
vmnic33	Down	Negotiate	vSwitch0	e8:9a:8f:84:20:34	None	Yes
vmnic32	1000 Full	Negotiate	vSwitch0	e8:9a:8f:84:20:33	192.168.50.21-192.168.50....	Yes

Now that we've identified the physical adapters to use, go to **Networking** on the **Configuration** tab. Here, you will see the existing vSwitch0 used for management. Now click on the **Add Networking...** link.



You will be taken to an **Add Network Wizard**. Select **VMkernel** and click **Next**.

Add Network Wizard

**Connection Type**  
Networking hardware can be partitioned to accommodate each service that requires connectivity.

**Connection Type**

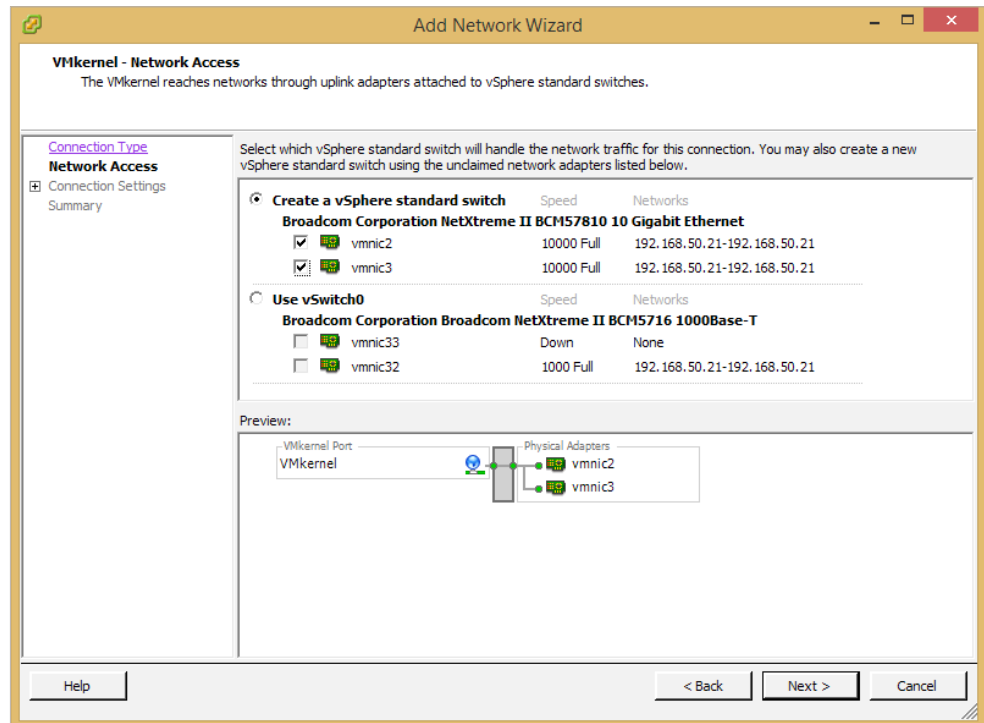
- Network Access
- Connection Settings
- Summary

Connection Types

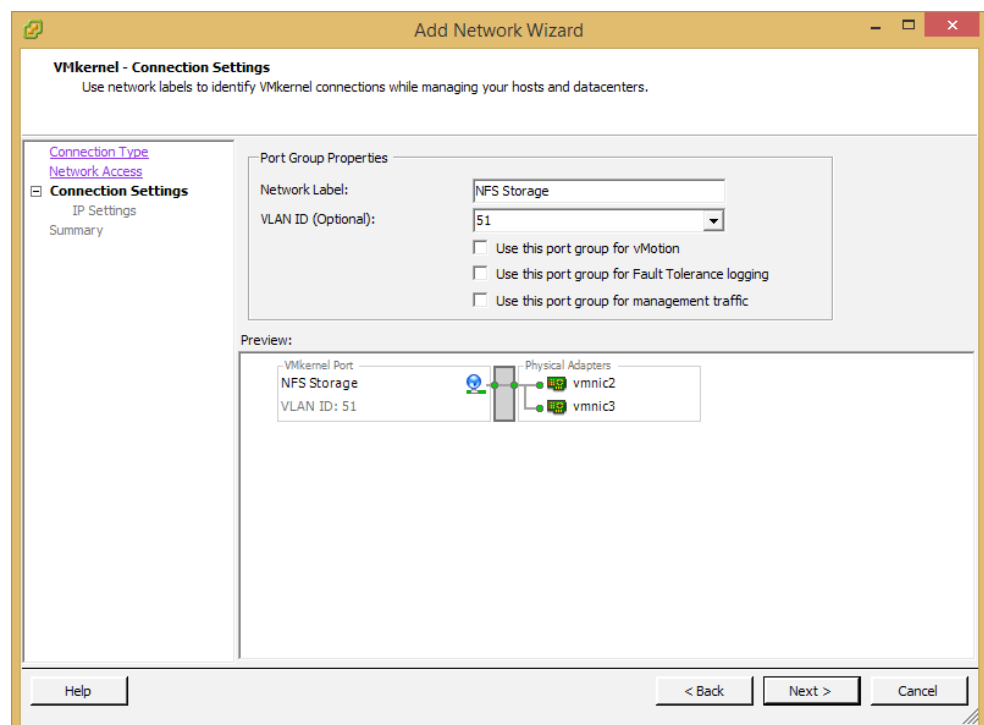
- ☐ Virtual Machine  
Add a labeled network to handle virtual machine network traffic.
- ☒ VMkernel  
The VMkernel TCP/IP stack handles traffic for the following ESXi services: vSphere vMotion, iSCSI, NFS, and host management.

Help < Back Next > Cancel

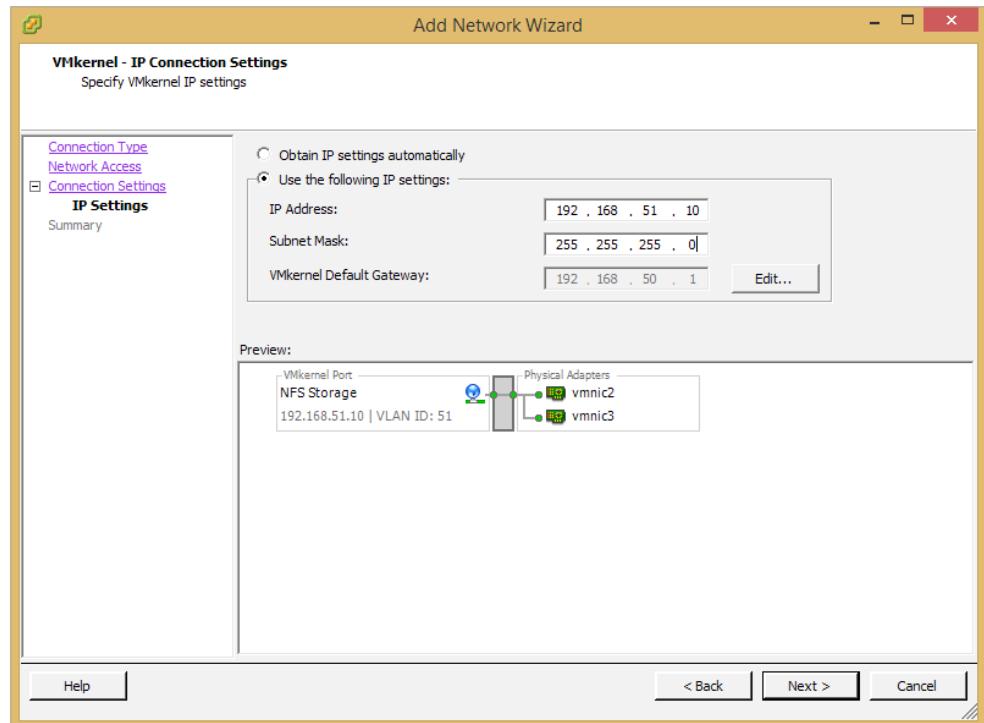
In this step, select the **Create a vSphere standard switch** option and check the boxes for **vmnic2** and **vmnic3**. Click **Next**.



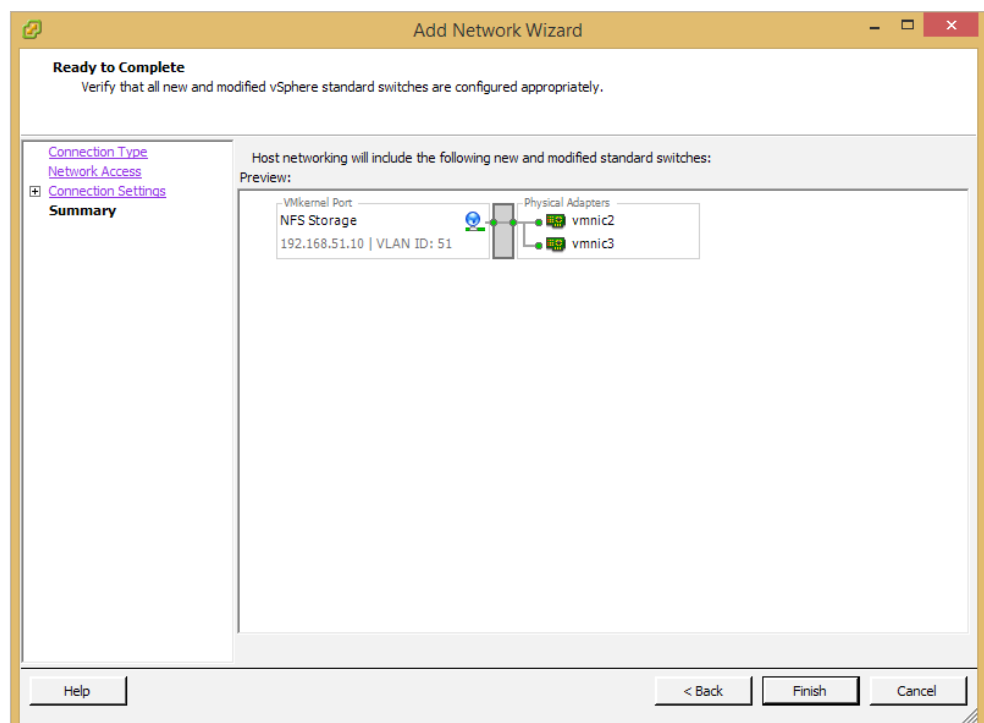
In this step, give the network a label. In this example we will name this network **NFS Storage** and give it a VLAN ID of **51**. Click **Next**



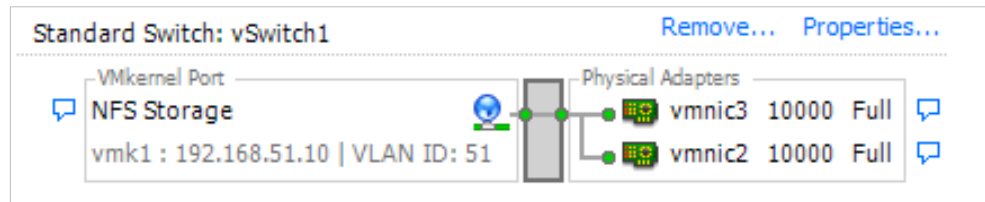
In the **IP Settings** step, we will give the VMkernel port a static IP on the port range of VLAN 51 (192.168.51.x). We will give it an IP address of **192.168.51.10**. Obviously your settings may vary. Click **Next**.



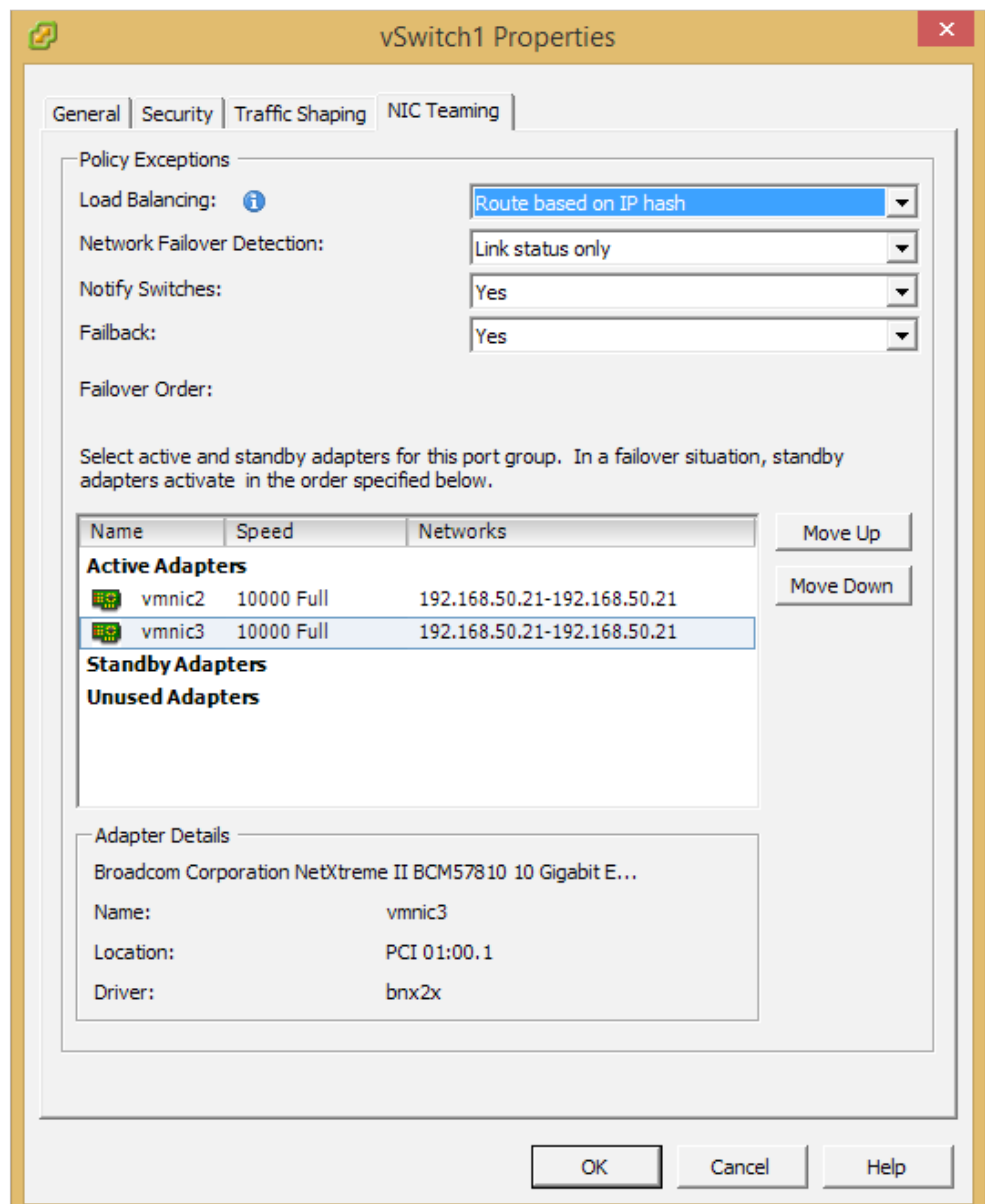
Review the settings and click **Finish**.



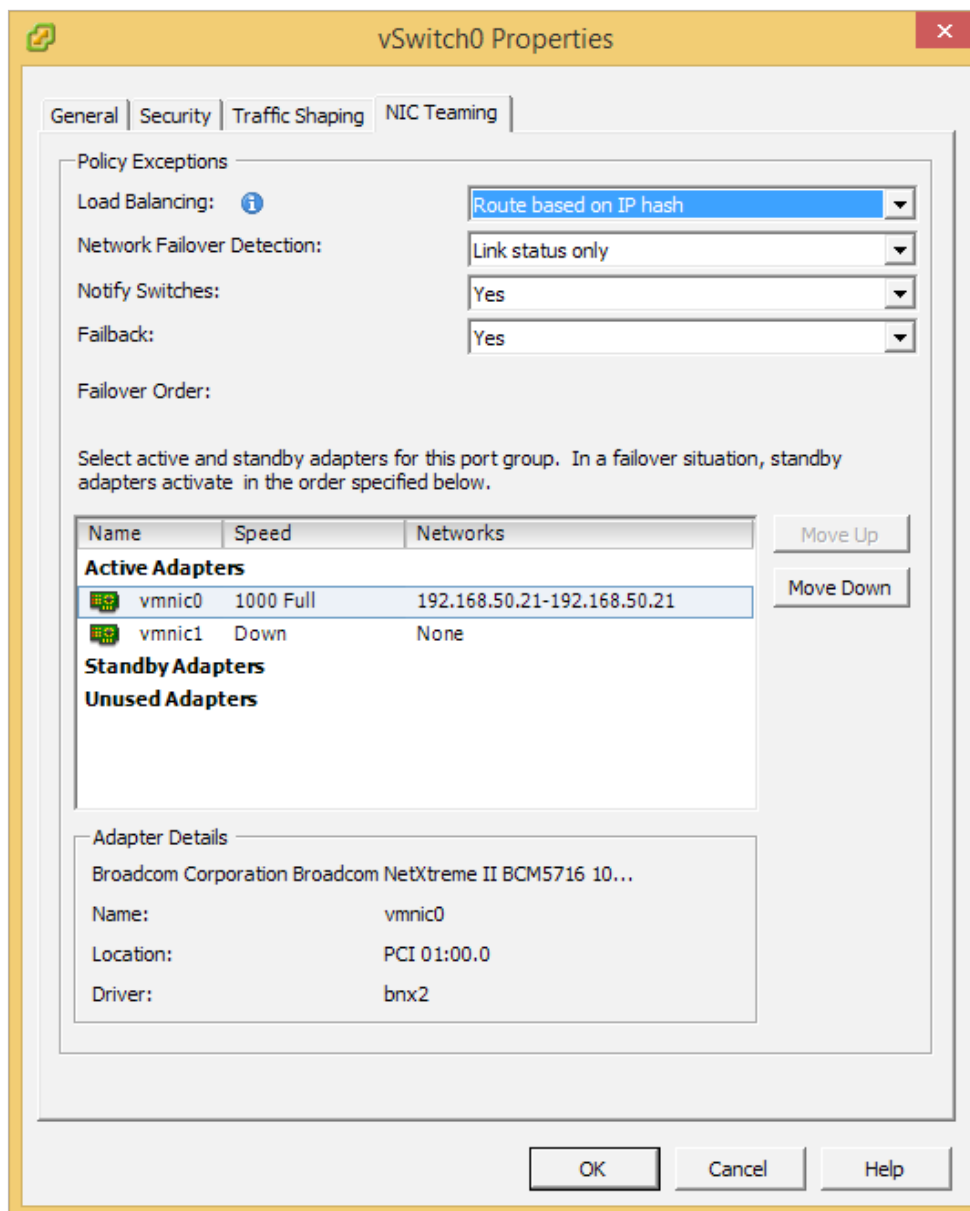
Our new vSwitch1 for storage traffic has now been created. Next, we will configure the two physical ports to run as a LAG. Click **Properties...**



On the **vSwitch1 Properties** page, find the **NIC Teaming** tab. To enable link aggregation we must change the **Load Balancing** setting to **Route based on IP hash**. Make sure both vmnic2 and vmnic3 are Active A Adapters. Click **Ok**.







Log back into the switch and go to the **Switching -> LAG** page and make sure the **LAG state** is **UP**.

Configured Ports	Active Ports	LAG State
1/0/25, 1/0/26	1/0/25, 1/0/26	UP
1/0/1, 1/0/2	1/0/1, 1/0/2	UP
1/0/5, 1/0/6	1/0/5, 1/0/6	UP
1/0/13, 1/0/14	1/0/13, 1/0/14	UP

## Create a Volume on the ReadyDATA

Once we have the network side of things taken care of the next step will be to create an NFS data set on the ReadyDATA. The first step to doing this is to (if you haven't already) create a volume on the ReadyDATA.

**Note:** In order to preserve your settings, you must create at least one volume on the ReadyDATA.

We highly recommend RAID10 in virtualization deployments as this type of workload is random I/O intensive. It is also recommended to have fewer large volumes, rather than many small volumes. The reason for this is that sharing I/O across volumes is not possible.

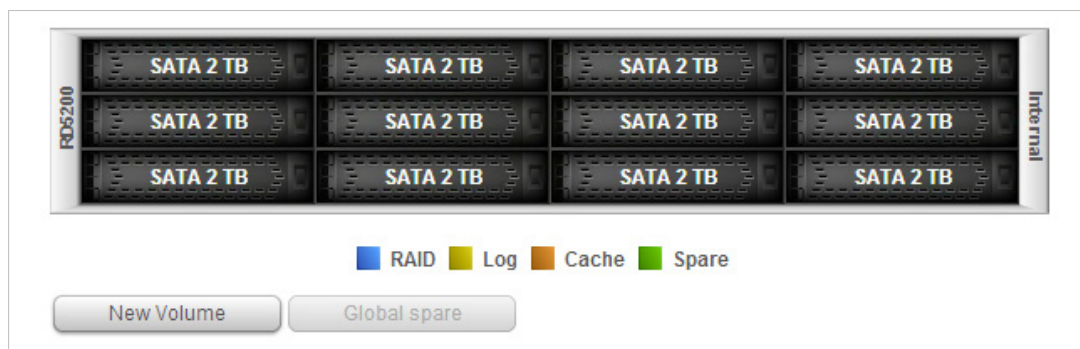
In this example we are going to configure one large volume in RAID10. SAS drives are strongly recommended for virtualization, while hybrid disk configurations (SSD + SATA) can be used when performance requirements are lower. RAID10 should always be used for virtualization deployments.

To create a volume:

Login to the ReadyDATA GUI and go to **System -> Storage**. You will see a graphical representation of the ReadyDATA system and populated drives at the middle-top of this page.



Click on the drives you wish to create the new volume with and click on the **New Volume** button.

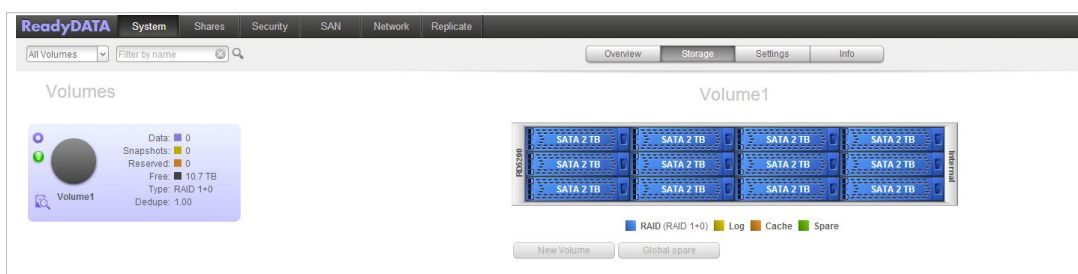


Name your new volume and select the RAID level. The available RAID levels will automatically adjust according to the number of drives you have selected for this new volume. In this example we've selected 12 drives and will create a volume with a RAID level of 10 (or 1+0).



Click **Create**.

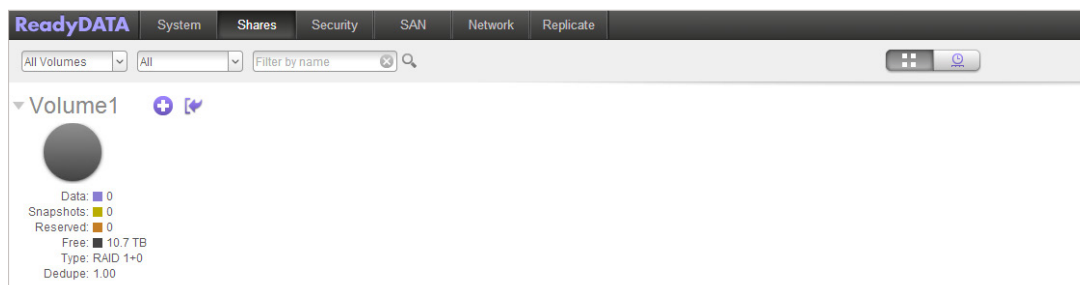
Within a few seconds, our new RAID10 volume is ready to use.



## Create an NFS Data Set on the ReadyDATA

After you have created at least one volume on the ReadyDATA, you can create data sets. These are logical storage containers that can be purposed as NAS shares or SAN LUNs. For this app note we will create an NFS data set to be used as the VMware datastore. We recommend using NFS over iSCSI for VMware due to ease of ongoing management and deployment flexibility.

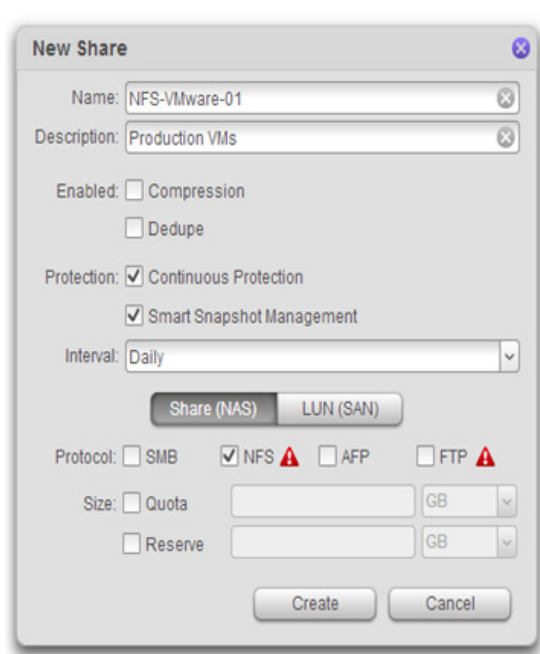
First, go to the **Shares** page and click on the “+” sign on your volume.



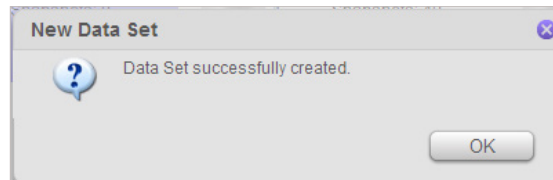
You will now see a New Share window. Enter in the Name, Description, and Protection settings for this data set. For this example we will name our data set **NFS-VMware-01**. Now check the **NFS** box and click **Create**.

**Note:** If you have not enabled the NFS service on the ReadyDATA you will see a warning icon next to the NFS checkbox as shown in the screenshot below. We will enable the service in the next step.

As a reminder, ReadyDATA features **Continuous Protection** via unlimited snapshots that should be utilized as an essential added layer of protection for your data. These are block level snapshots that will track changes to your data continuously. If you happen to accidentally delete a file or multiple files or folders, this feature can help you recover your data within a matter of seconds.



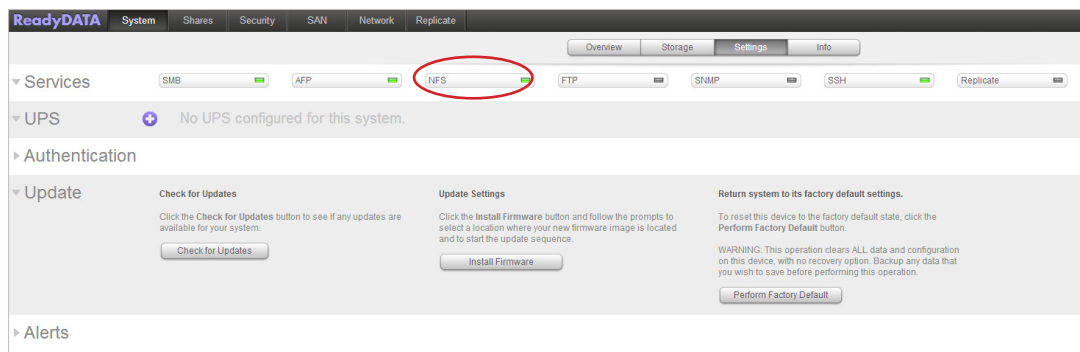
You will see the following message.



We have now successfully created a NFS data set.

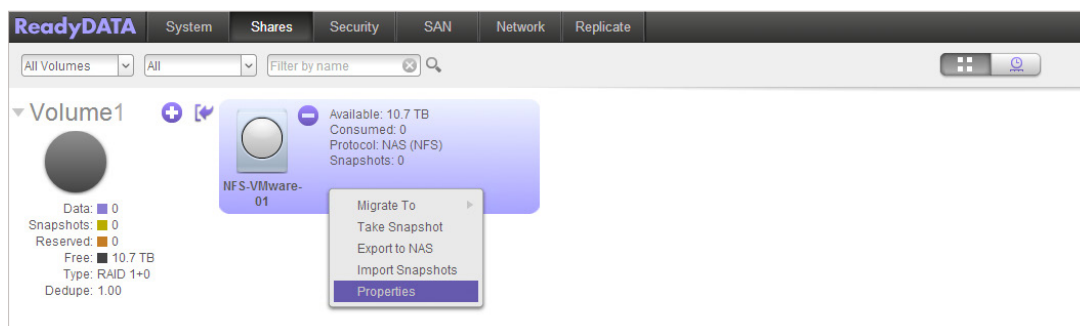


If the NFS service has not already been enabled on your ReadyDATA, go to **System -> Settings** and in the **Services** section click on the **NFS** button so that the status is green.

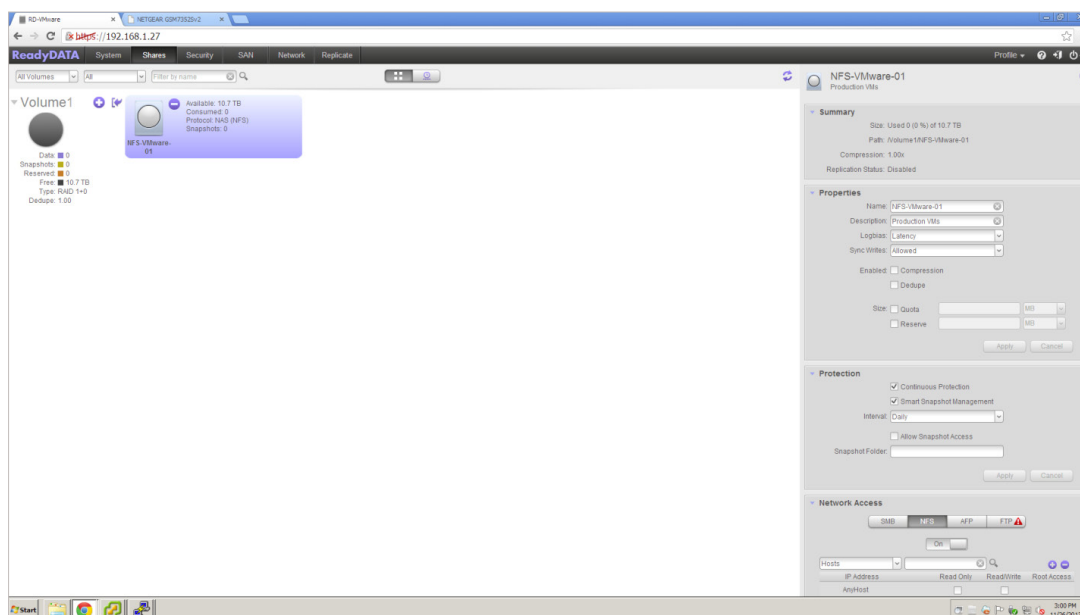


Now, let's go back to the Shares page.

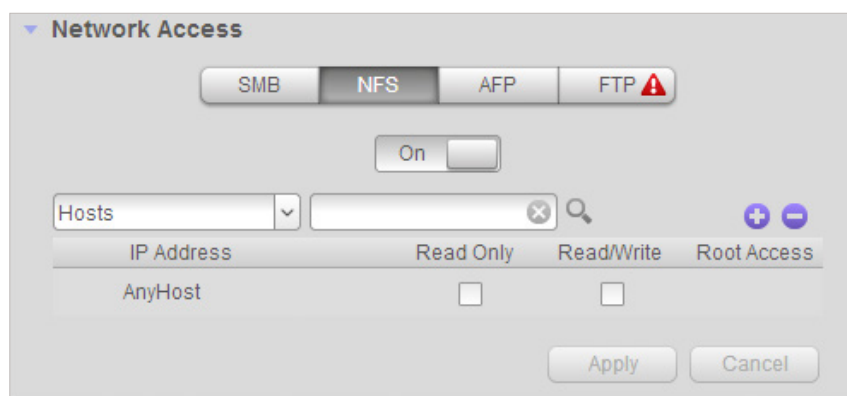
Upon creation, no hosts will be allowed to access this new data set. We will now go in and configure the proper access rights. Right click on the **NFS-VMware-01** icon and select **Properties**.



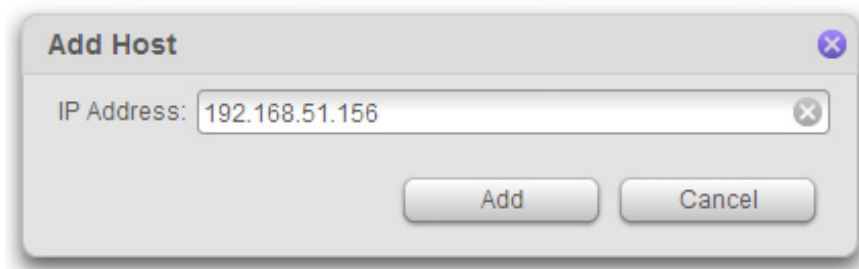
You'll now see the properties section for the NFS-VMware-01 data set on the right hand side.



Scroll down to the **Network Access** section. Select the **NFS** tab to configure NFS related settings. Once on the NFS tab, we will now configure permissions so that access from our ESXi host (192.168.51.156) is allowed. Click on the "+" button.

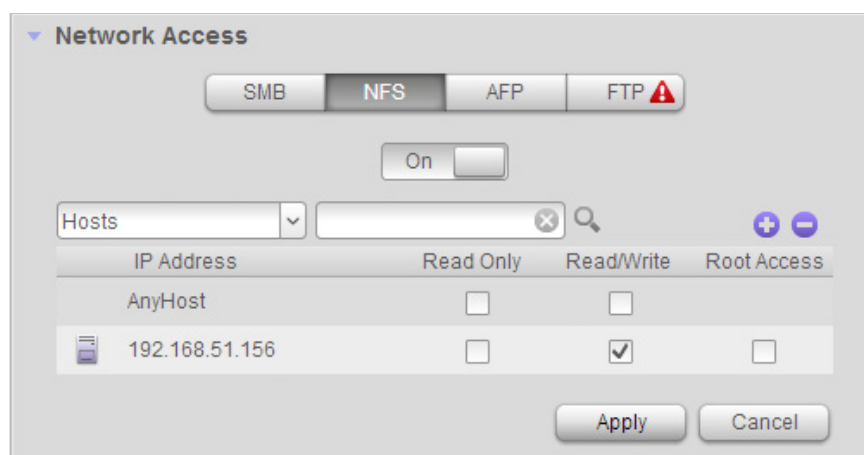


You will see a new **Add Host** window. Enter in the IP address of your ESXi host and click **Add**.



The 'Add Host' dialog box has a title bar with a close button. It contains a text field labeled 'IP Address:' with the value '192.168.51.156'. Below the text field are two buttons: 'Add' and 'Cancel'.

Once the host has been added, make sure the **Read/Write** checkbox is checked for that host. Click **Apply**.



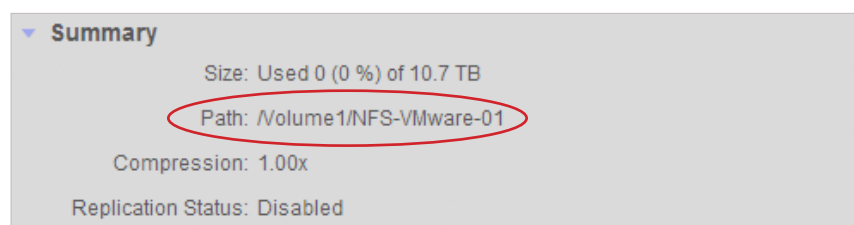
The 'Network Access' window shows tabs for SMB, NFS, AFP, and FTP. The 'NFS' tab is selected. Below the tabs is an 'On' toggle switch. A search bar labeled 'Hosts' is present. Below the search bar is a table with the following columns: IP Address, Read Only, Read/Write, and Root Access.

IP Address	Read Only	Read/Write	Root Access
AnyHost	<input type="checkbox"/>	<input type="checkbox"/>	
192.168.51.156	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

At the bottom of the window are 'Apply' and 'Cancel' buttons.

And we're done with the ReadyDATA end of the configuration. We will now move on to the ESXi side.

One other thing to take note is that under **properties** in the **Summary** section, remember to write down the **Path** for this NFS data set. The **Path** will be used in the next section.



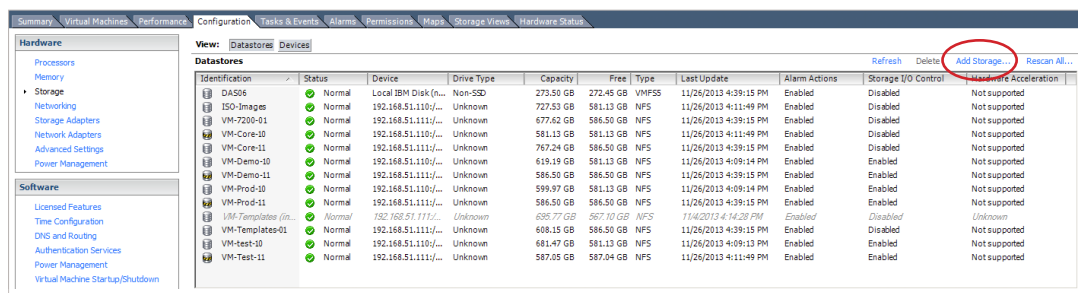
The 'Summary' section shows the following information:

- Size: Used 0 (0 %) of 10.7 TB
- Path: /Volume1/NFS-VMware-01 (circled in red)
- Compression: 1.00x
- Replication Status: Disabled

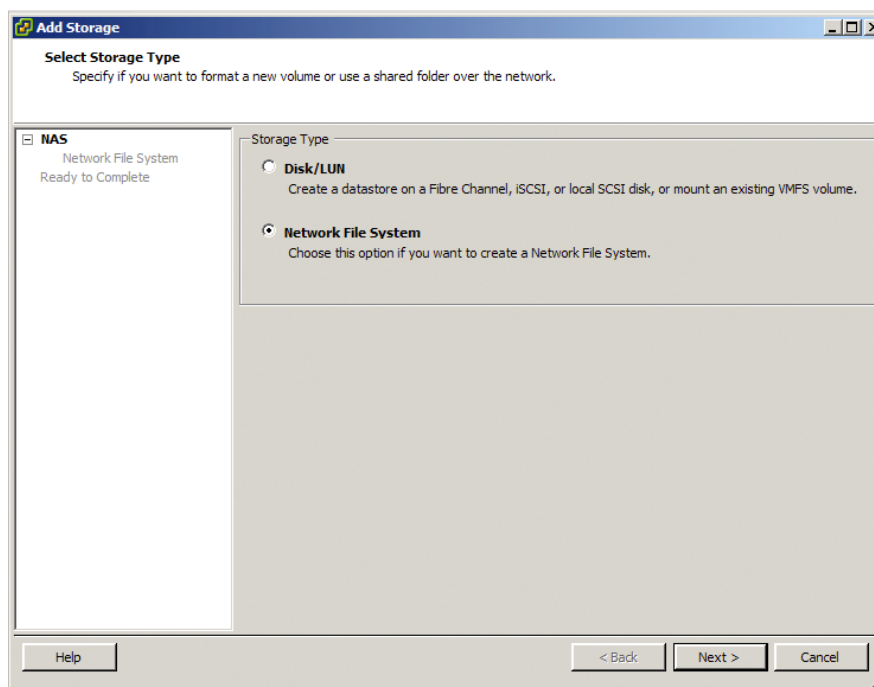
## Connecting VMware ESXi Host to NFS Data Set on ReadyDATA

In this section we will connect the ESXi host with the NFS data set we just created.

The first step is to login to the ESXi host with the vSphere client. Once logged in, go to the **Storage** section on the **Configuration** tab and click on the **Add Storage...** button.



From there, you will be taken to an **Add Storage** wizard. Because we are using NFS, select the **Network File System** option and click **Next**.





Remember the Path for the NFS-VMware-01 data set we wrote down in the previous section? Here is where the wizard will ask for that path.

▼ **Summary**

Size: Used 0 (0 %) of 10.7 TB

Path: /Volume1/NFS-VMware-01

Compression: 1.00x

Replication Status: Disabled

In this step, enter the IP address of the ReadyDATA in the **Server** field and the Path (in our example it is **/Volume1/NFS-VMware-01**, yours should be similar) into the **Folder** field. Also be sure to give your Datastore a name. Then click **Next**.

**Add Storage**

**Locate Network File System**  
Which shared folder will be used as a vSphere datastore?

**NAS**  
Network File System  
Ready to Complete

**Properties**

Server: 192.168.51.127  
Examples: nas, nas.it.com, 192.168.0.1 or  
FE80:0:0:0:2AA:FF:FE9A:4CA2

Folder: /Volume1/NFS-VMware-01  
Example: /vols/vol0/datastore-001

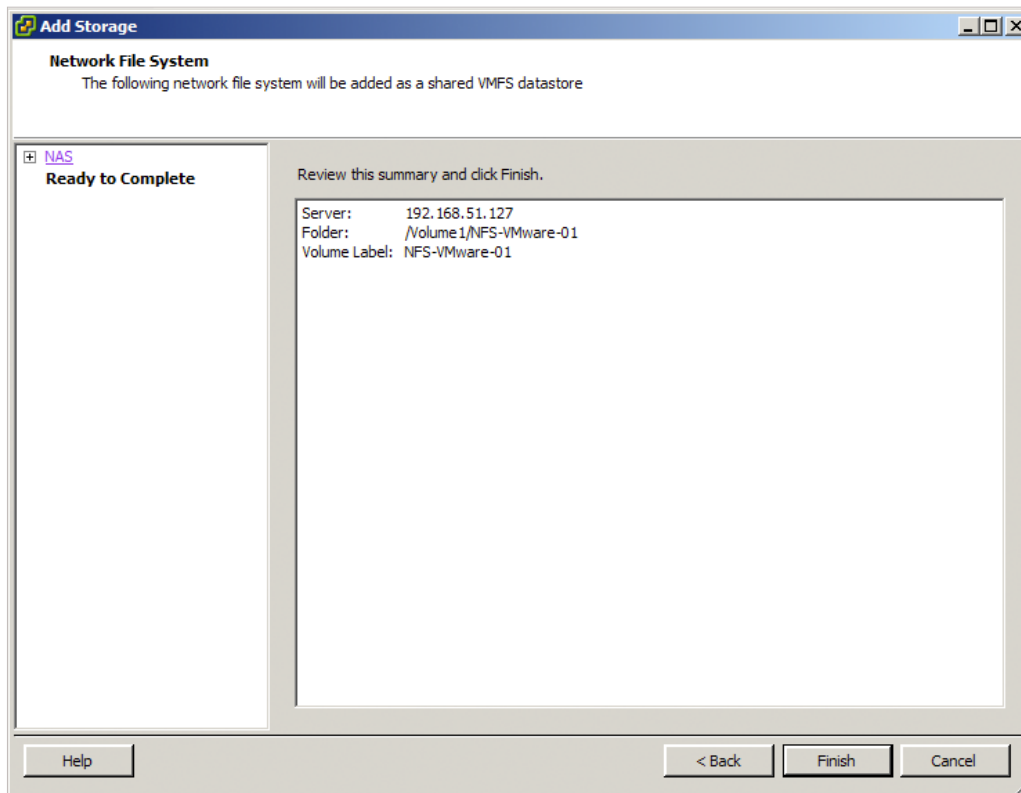
☐ Mount NFS read only

⚠ If a datastore already exists in the datacenter for this NFS share and you intend to configure the same datastore on new hosts, make sure that you enter the same input data (Server and Folder) that you used for the original datastore. Different input data would mean different datastores even if the underlying NFS storage is the same.

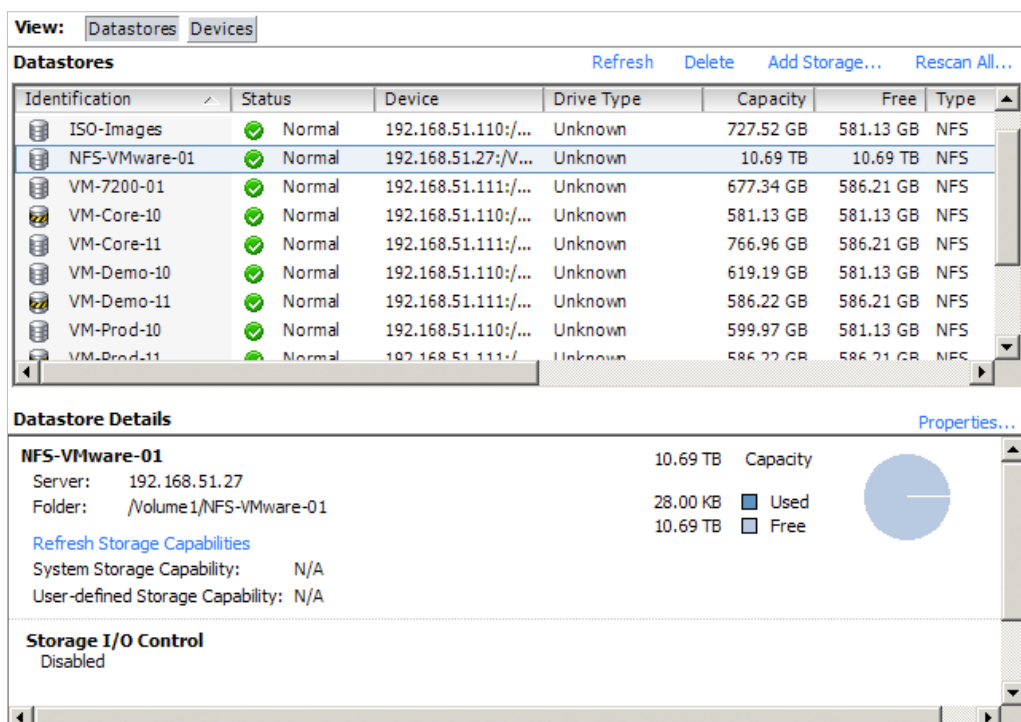
Datastore Name  
NFS-VMware-01

Help < Back Next > Cancel

Review and click **Finish**.

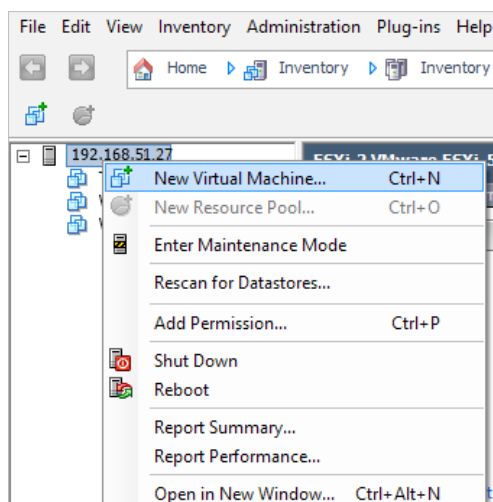


Back in vSphere, you will see the new Datastore being displayed and ready to use.

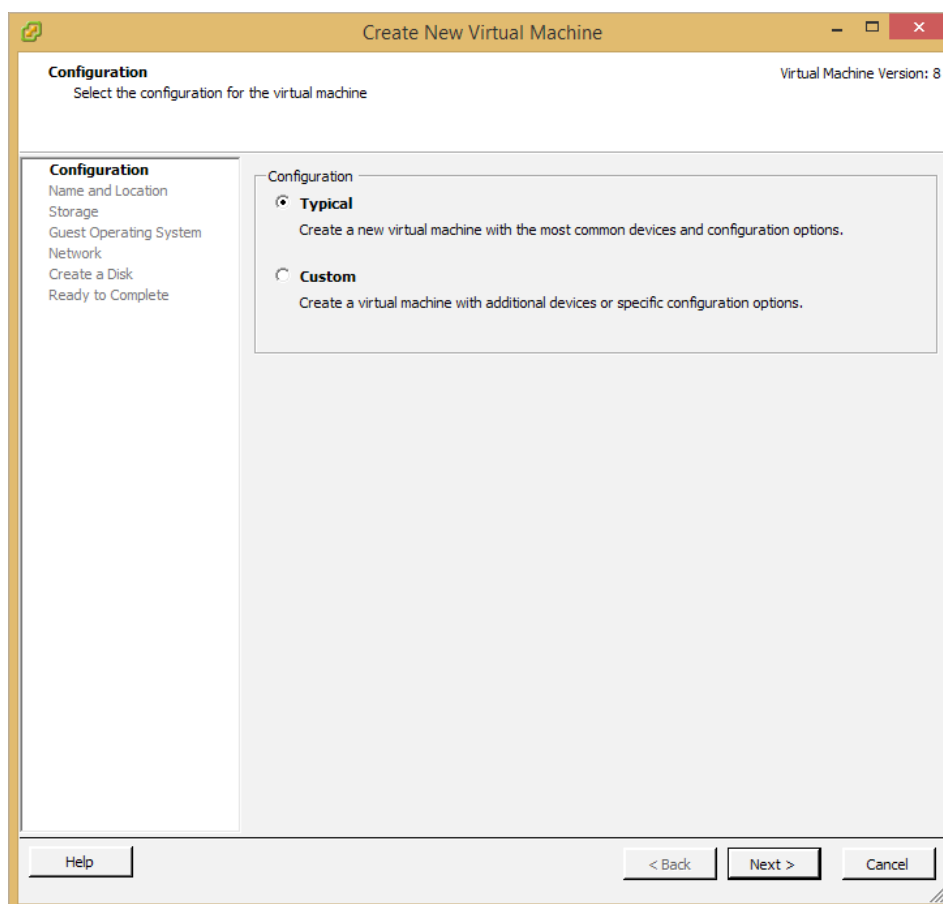


And that's it! The NFS data set on the ReadyDATA is now being used by VMware ESXi host as a Datastore.

Next, we will create and power on a virtual machine that is stored on the datastore we just created. In vSphere, right click on your host and select **New Virtual Machine**.



You'll be taken to a Create New Virtual Machine wizard. For our example we will create a virtual machine that will be used to host a Windows 7 64bit OS. Select Typical and click **Next**.



Next, give your virtual machine a name and click **Next**.

**Create New Virtual Machine**

**Name and Location** Virtual Machine Version: 8  
Specify a name and location for this virtual machine

[Configuration](#)  
**Name and Location**  
Storage  
Guest Operating System  
Network  
Create a Disk  
Ready to Complete

Name:  
New Virtual Machine

Virtual machine (VM) names may contain up to 80 characters and they must be unique within each vCenter Server VM folder.  
VM folders are not viewable when connected directly to a host. To view VM folders and specify a location for this VM, connect to the vCenter Server.

Help < Back Next > Cancel

Now select which datastore to store the virtual machine files. We will use the NFS datastore **NFS-VMware-01** we created earlier in the application note. Select it and click **Next**.

**Create New Virtual Machine** Virtual Machine Version: 8

**Storage**  
Select a destination storage for the virtual machine files

[Configuration](#)  
[Name and Location](#)  
**Storage**  
Guest Operating System  
Network  
Create a Disk  
Ready to Complete

Select a destination storage for the virtual machine files:

Name	Drive Type	Capacity	Provisioned	Free	Type	Thin Provi
NFS-VMware-01	Unknown	10.69 TB	36.00 KB	10.69 TB	NFS	Supporte
Vmware5	Non-SSD	499.75 GB	4.62 GB	495.13 GB	VMFS5	Supporte

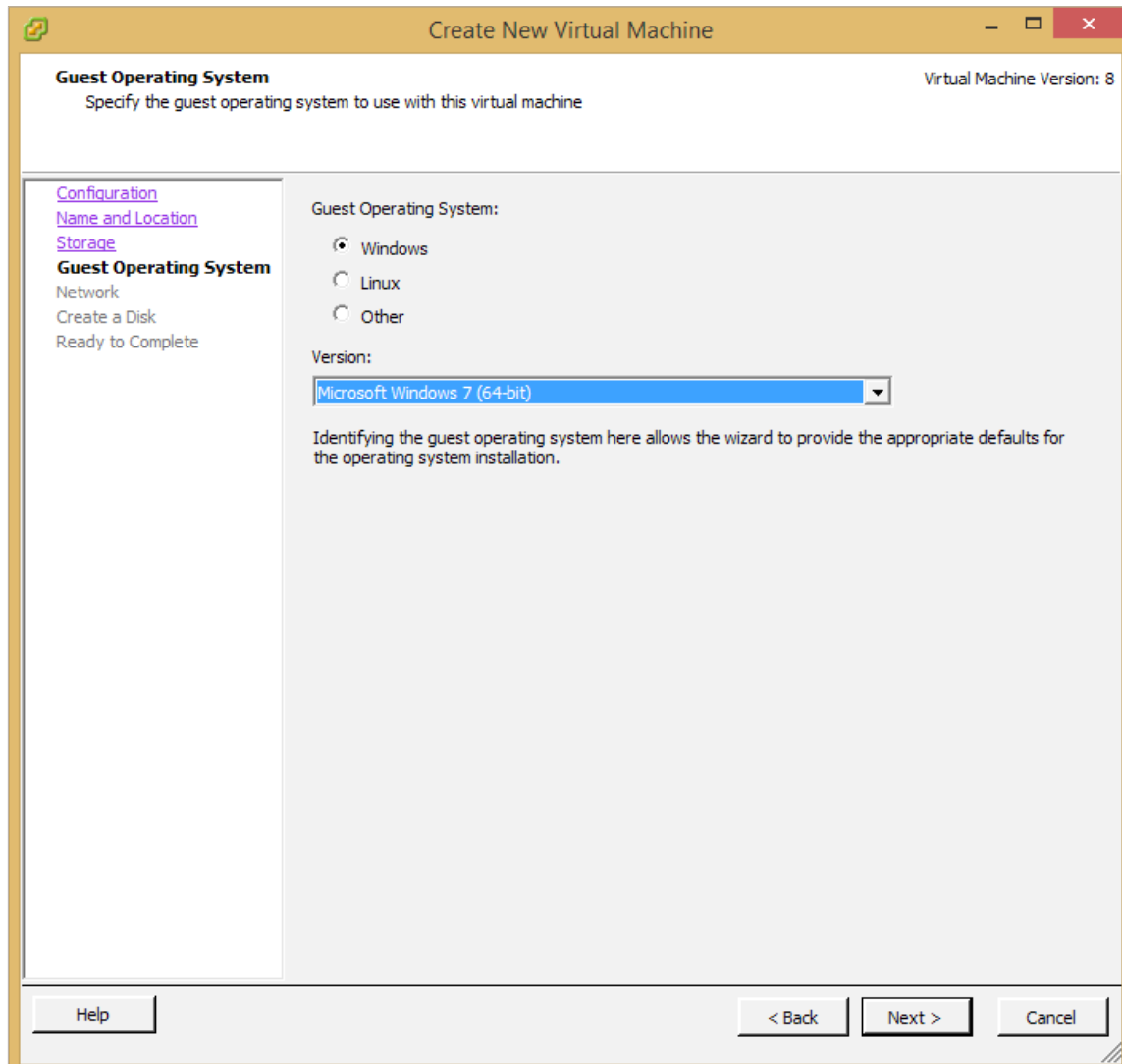
☐ Disable Storage DRS for this virtual machine

Select a datastore:

Name	Drive Type	Capacity	Provisioned	Free	Type	Thin Provi
------	------------	----------	-------------	------	------	------------

Help < Back Next > Cancel

Since we are creating a virtual machine for a Windows 7 64bit OS, select Windows, in the **Version** drop down menu choose **Microsoft Windows 7 (64bit)** and click **Next**.



For this step, configure your NICs and click **Next**.

The screenshot shows the 'Create New Virtual Machine' dialog box, specifically the 'Network' configuration step. The title bar reads 'Create New Virtual Machine'. The main heading is 'Network', and the subtitle is 'Which network connections will be used by the virtual machine?'. In the top right corner, it says 'Virtual Machine Version: 8'. On the left side, there is a sidebar with links: 'Configuration', 'Name and Location', 'Storage', 'Guest Operating System', and 'Network' (which is highlighted). Below these links are the options 'Create a Disk' and 'Ready to Complete'. The main area is titled 'Create Network Connections'. It asks 'How many NICs do you want to connect?' with a dropdown menu set to '1'. Below this, there is a table with three columns: 'Network', 'Adapter', and 'Connect at Power On'. The first row, labeled 'NIC 1:', shows 'VM Network' in the 'Network' column, 'E1000' in the 'Adapter' column, and a checked checkbox in the 'Connect at Power On' column. Below the table, there is an information icon and text: 'If supported by this virtual machine version, more than 4 NICs can be added after the virtual machine is created, via its Edit Settings dialog.' Another paragraph follows: 'Adapter choice can affect both networking performance and migration compatibility. Consult the VMware KnowledgeBase for more information on choosing among the network adapters supported for various guest operating systems and hosts.' At the bottom, there are three buttons: 'Help', '< Back', and 'Next >', and a 'Cancel' button on the right.

**Create New Virtual Machine**

**Network** Virtual Machine Version: 8

Which network connections will be used by the virtual machine?

[Configuration](#)  
[Name and Location](#)  
[Storage](#)  
[Guest Operating System](#)  
**Network**  
Create a Disk  
Ready to Complete

**Create Network Connections**

How many NICs do you want to connect? 1

	Network	Adapter	Connect at Power On
NIC 1:	VM Network	E1000	<input checked="" type="checkbox"/>

*If supported by this virtual machine version, more than 4 NICs can be added after the virtual machine is created, via its Edit Settings dialog.*

Adapter choice can affect both networking performance and migration compatibility. Consult the [VMware KnowledgeBase](#) for more information on choosing among the network adapters supported for various guest operating systems and hosts.

Help < Back Next > Cancel

Now enter how large your virtual disk size will be and click **Next**. In this example we will enter 80GB.

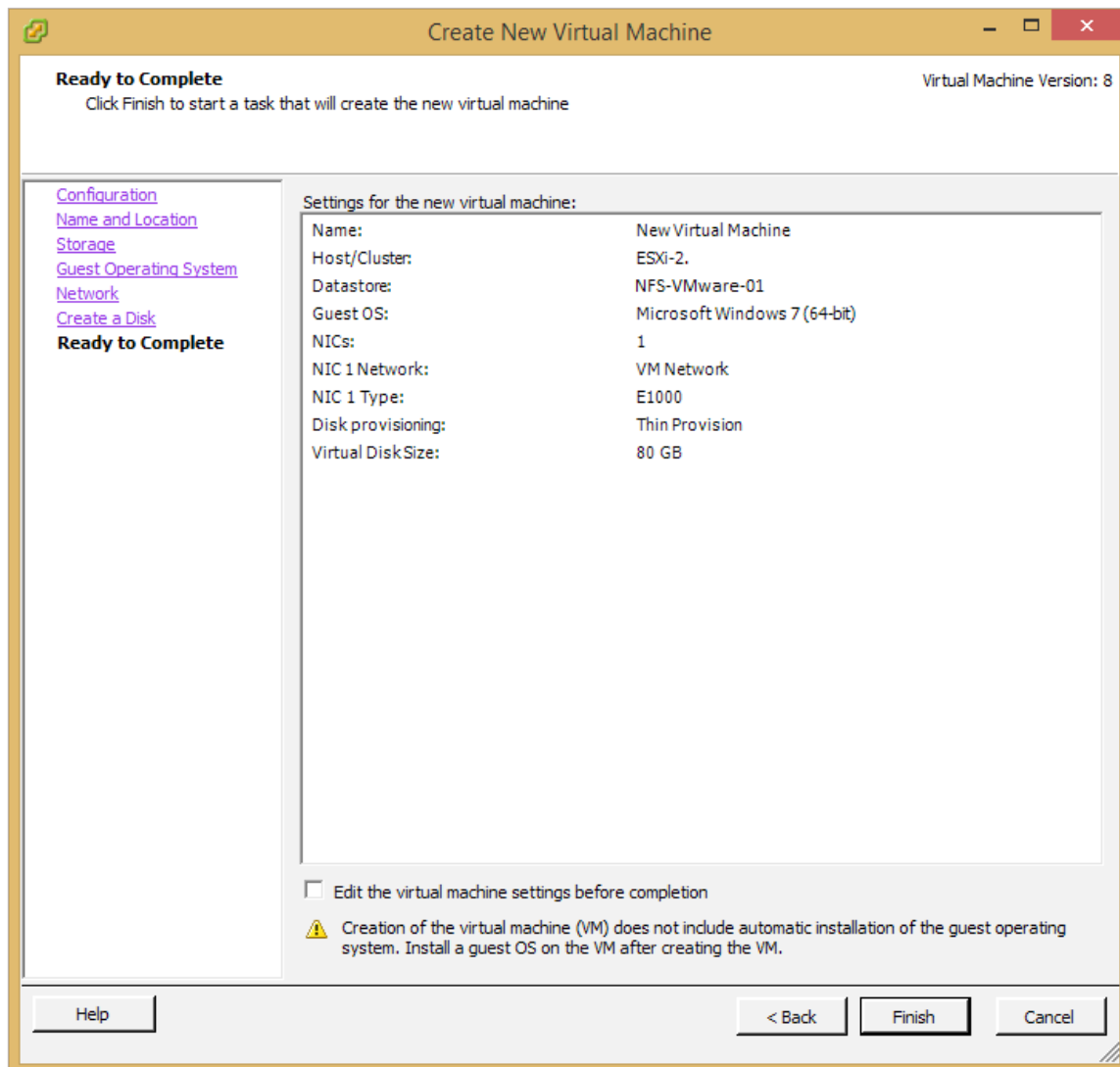
The screenshot shows the 'Create New Virtual Machine' wizard window. The title bar reads 'Create New Virtual Machine'. The main window has a header area with 'Create a Disk' on the left and 'Virtual Machine Version: 8' on the right. Below the header, the instruction 'Specify the virtual disk size and provisioning policy' is displayed. On the left side of the main area, there is a sidebar with links: 'Configuration', 'Name and Location', 'Storage', 'Guest Operating System', 'Network', and 'Create a Disk' (which is highlighted). Below the 'Create a Disk' link, it says 'Ready to Complete'. The main area contains the following fields and options:

- Datastore:** A text box containing 'NFS-VMware-01'.
- Available space (GB):** A text box containing '10692.90'.
- Virtual disk size:** A numeric input box containing '80' and a unit dropdown menu set to 'GB'.
- Provisioning Policy:** Three radio button options:
  - ☐ Thick Provision Lazy Zeroed
  - ☐ Thick Provision Eager Zeroed
  - ☒ Thin Provision

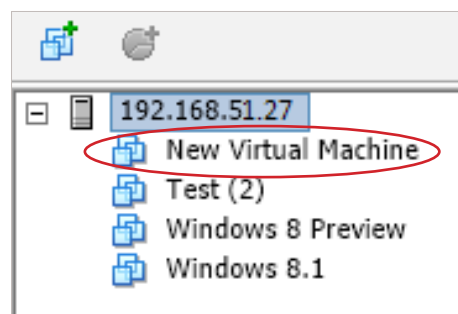
At the bottom of the window, there are three buttons: 'Help', '< Back', and 'Next >', followed by a 'Cancel' button.



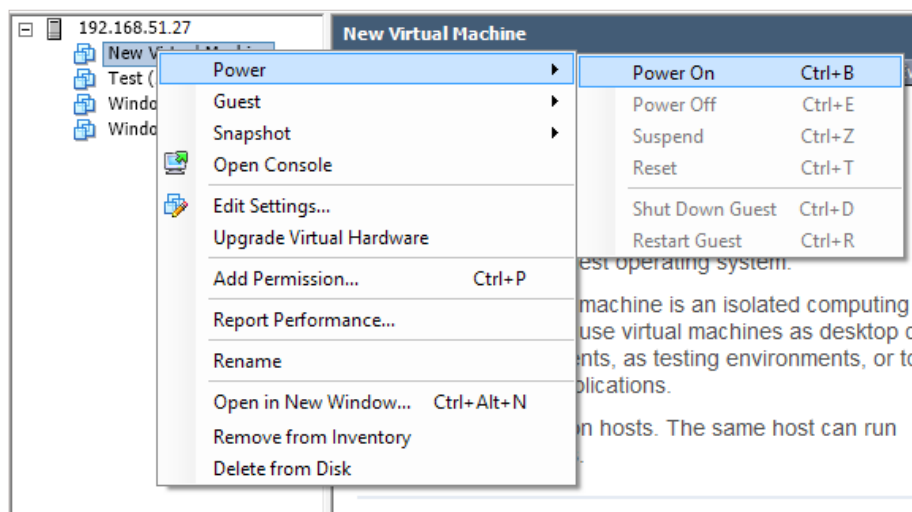
Review your VM settings and click on **Finish**.



After a few seconds you will see your new virtual machine listed in an unpowered state.



To power on the virtual machine, right click on the virtual machine icon and select **Power -> Power On** from the drop down menu.



Once the machine has been powered on, open a console to install the guest OS onto the VM. Click on the **Launch Virtual Machine Console** icon.



And that's it! Please note that to install the OS, you will have to mount an image file of the guest OS install disc to the virtual CD/DVD drive of your virtual machine before you power it on.

