vSphere 7.0: NFS Deployment Guide with Pavilion Hyperparallel Flash Array

Version 1.0.0

Last Updated: August 2020
Document Version: Version 1.0.0 Rev 0

Legal Notice:

Technical Support:

Technical Support maintains support centre's globally. If you have questions regarding an existing support agreement, please email/phone the support agreement administration team as follows:

Phone:

USA & Canada: 1-888-342-0461

United Kingdom: 0800–69-8055

Netherlands: 0800-022-2832

International: 1-408-684-4958

Email:

support@pavilion.io

Documentation:
Make sure that you have the current version of the documentation. Each document displays the date of the last update on page 2.

Documentation Feedback:
Your feedback is important for us.
For documentation feedback send your comments to your Pavilion field support contact.

Contents

1.Summary

The purpose of this document is to guide through the installation and configuration of vSphere 7.0 using **Pavilion** Hyperparallel Flash Array and to make it easy for users to use NFS with **Pavilion** HFA.

This document also describes the general set of configurations that has been validated. The following assumptions are made: The audience is familiar with VMware, because this paper is not intended to serve as a comprehensive VMware and NFS Guide.

2. Pavilion Hyperparallel Flash Array (HFA)

2.1 Key Recommendations

The key recommendations are as follows:

- Configure **Pavilion** HFA(s) controllers to use NFS
- Create an NFS HA controller pair in the GUI using one primary and one secondary.
- Create volumes and assign to the NFS HA controller pairs per application.
- Ensure physically HA network topology, separate NIC ports, switches per path.
- Create ESXi Cluster through vCenter and mount datastore using NFSv3 or NFS 4.1

2.2 Introduction To NFS Protocol

The Network File System (**NFS**) protocol allows users to mount remote file systems transparently and gives them access to shared files across networks. It uses a client-server model based on Remote Procedure Call (RPC) protocol, so NFS is portable across different machines, operating systems, networks, and transports. NFS eliminates the need to keep copies of files on several machines by letting the clients all share a single copy of a file on the server.

The **Pavilion** HFA, using version 2.3 of **Pavilion** OS, supports NFS protocol versions 3.0 and 4.1. All clients connecting to the array must support NFS v3 or NFS version 4.1.

The **Pavilion** HFA supports up to 10-line cards providing 20 individual controllers. These controllers can individually be dedicated to serving NVMe over RoCE, NVMe over InfiniBand, NVMe over TCP, iSCSI, or NFS. We will use a pair of individual controllers to build a high availability (HA) NFS pair in the following steps.

The NFS HA server in the **Pavilion** HFA is configured as a single virtual IP, active/passive service with automatic failover managed by the **Pavilion** HFA's NFS server software. Clients can also optionally be configured using standard HA methods, described below, to remove any single points of failure (**SPOF**) from the entire system.

3. Solution Overview

The solution for this guide consists of following components:

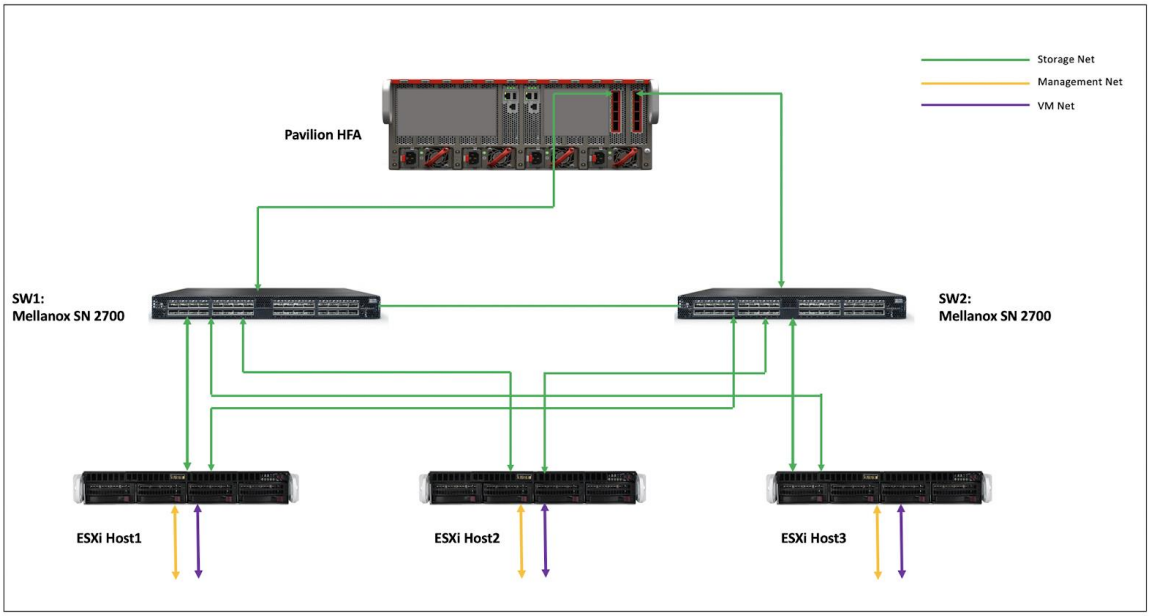
• 3x Supermicro E5-2690 V4 Servers with 1x Mellanox CX-4 Card (dual port)

• **Pavilion** HFA

• 2x Dell Mellanox 2700

• VMware ESXi 7.0 and vCenter 7.0 for hypervisor and management

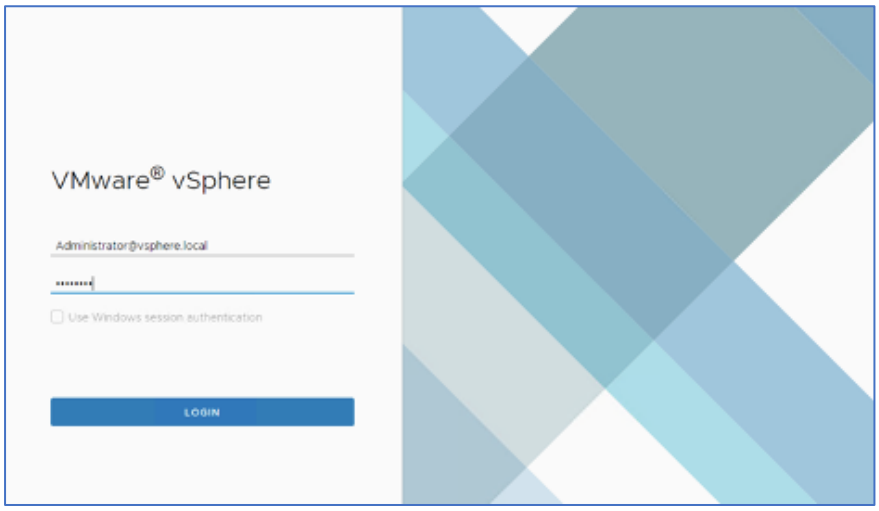
Image below depicts the above solutions overview:



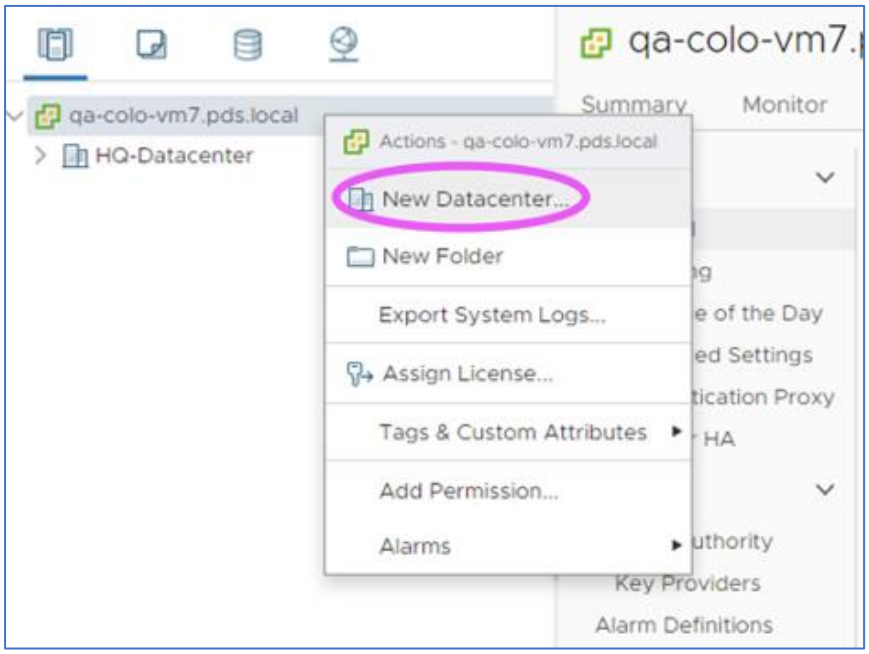
4. Configuring 3 Node ESX Cluster for NFS using VCenter

This section covers setting up 3 Node ESXi Cluster for accessing **Pavilion** volumes using NFS protocol. This section walks the user to create a datacenter, ESXi cluster, and configure networking for NFS traffic.

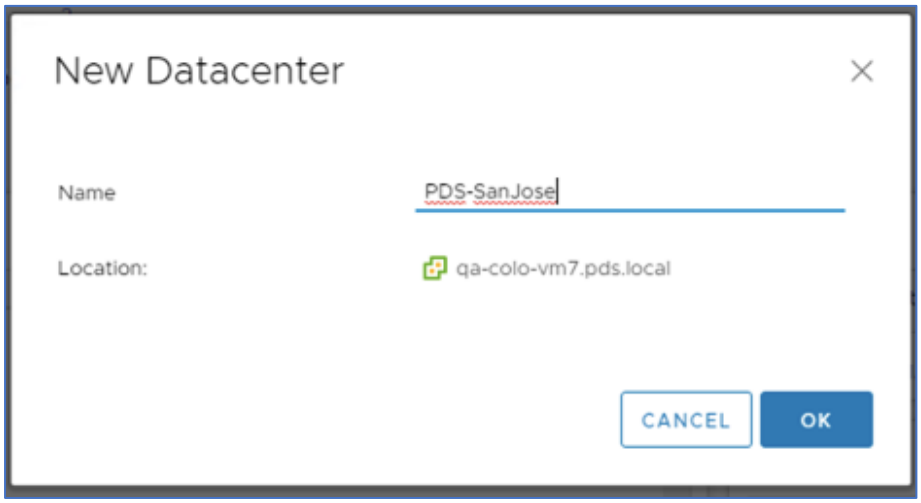
Step 1: Log in to the **VMware® vSphere™** client as seen in the below image:



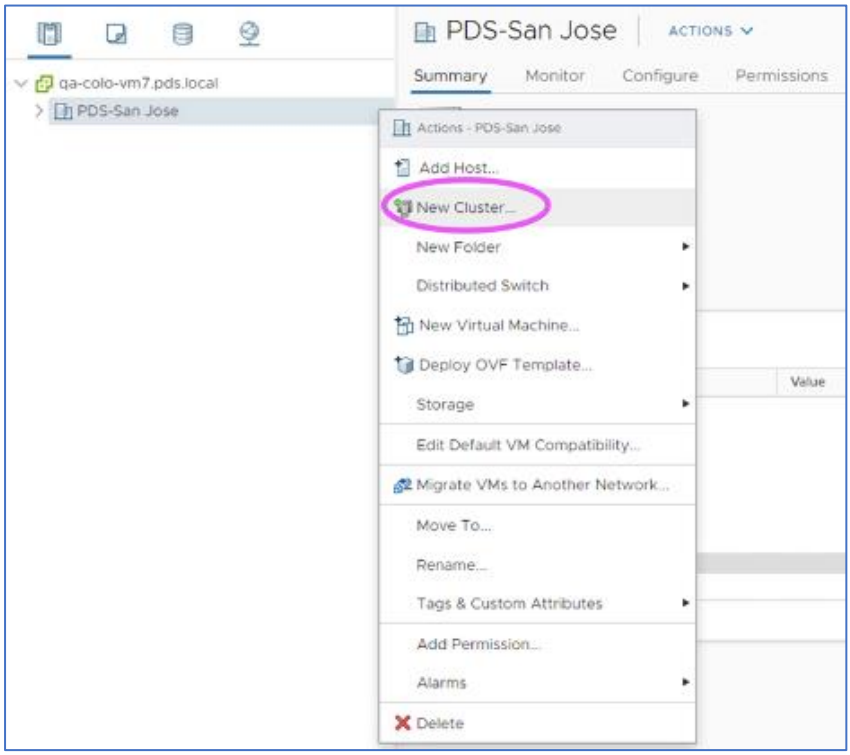
Step 2: Right click on VCenter Instance and Create New Datacenter:



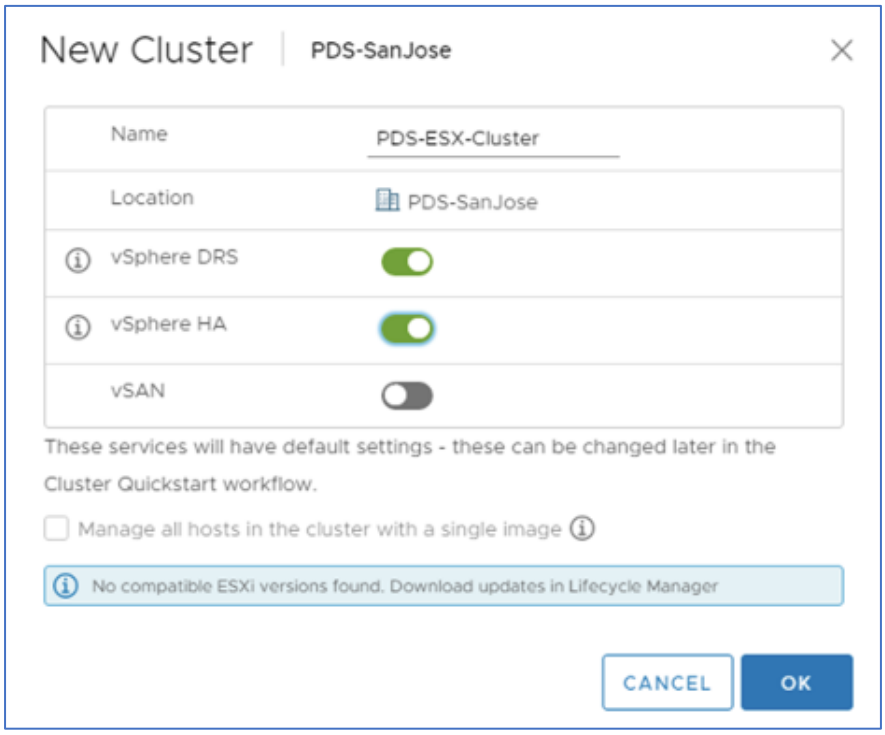
Step 3: Provide Datacenter “Name”:



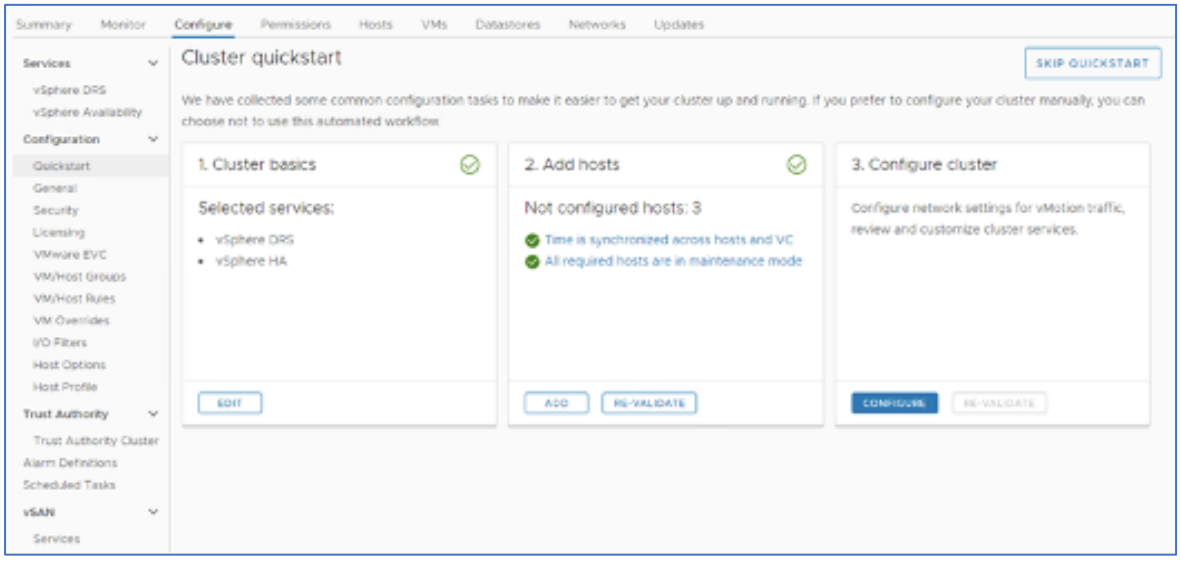
Step 4: After creating Datacenter, Right click at Datacenter and create new ESXi Cluster:



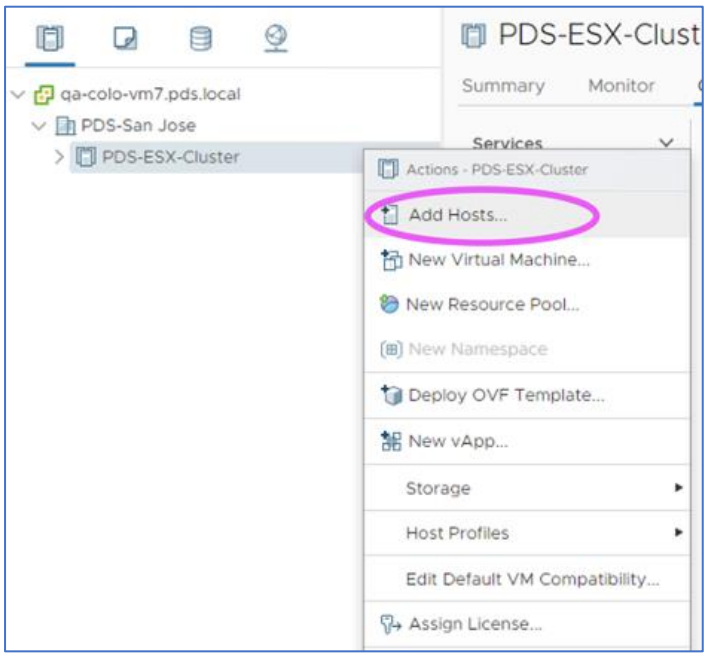
Step 5: Provide Cluster Name and enable features for HA and DRS:



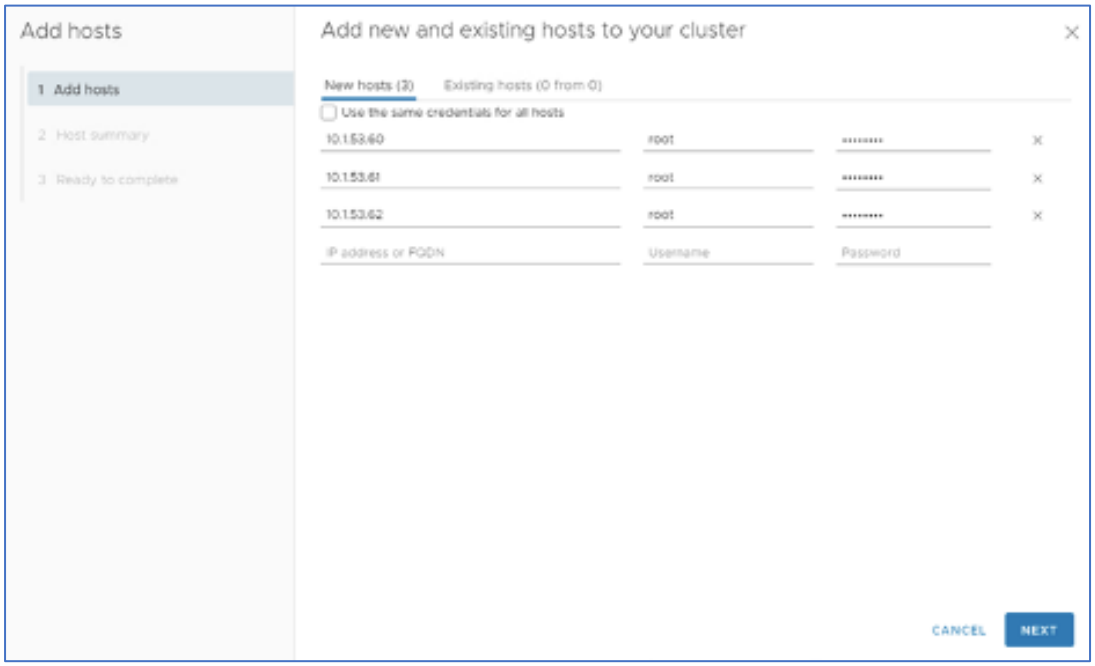
Step 6: The new ESXi cluster gets created:



Step 7: Right Click at ESX Cluster and Add Hosts:

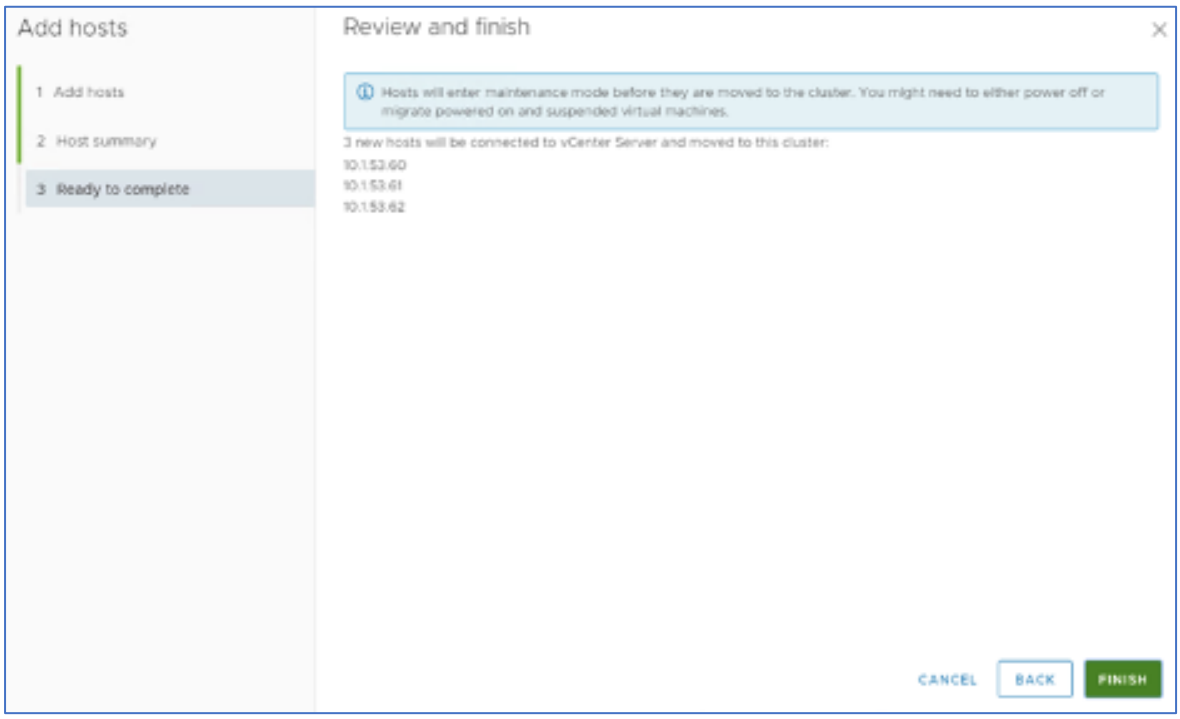


Step 8: Enter Hosts information:

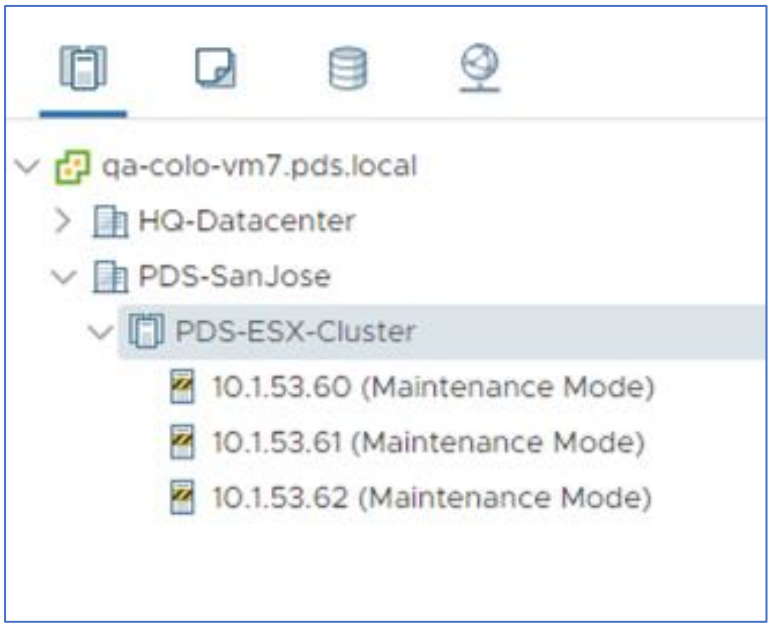


Step 9: Hosts are discovered and ready to be added to the cluster:

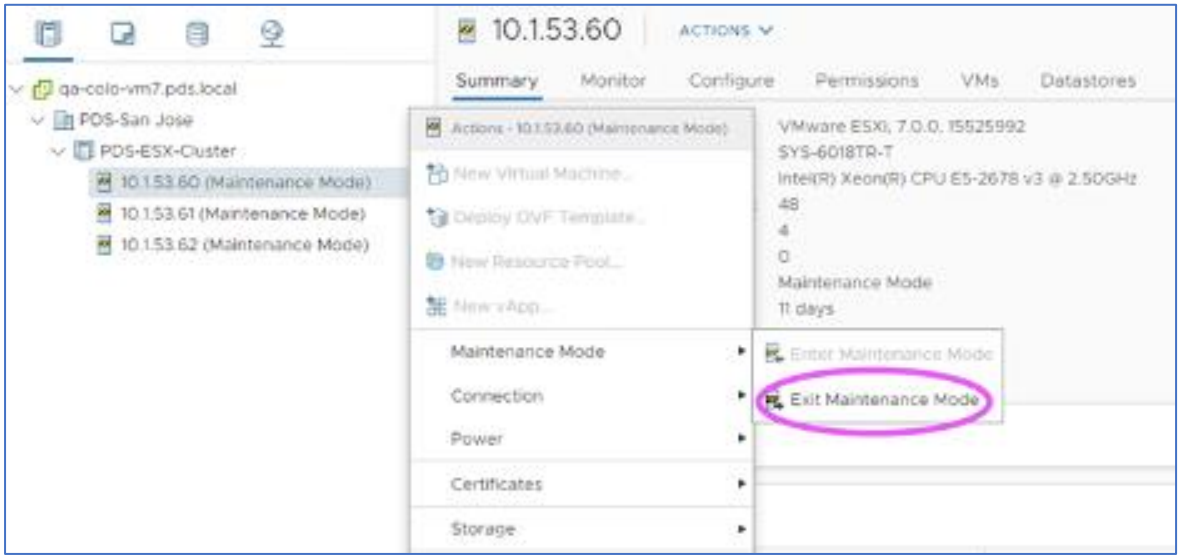
Step 10: Review Hosts Information and click “Finish”:



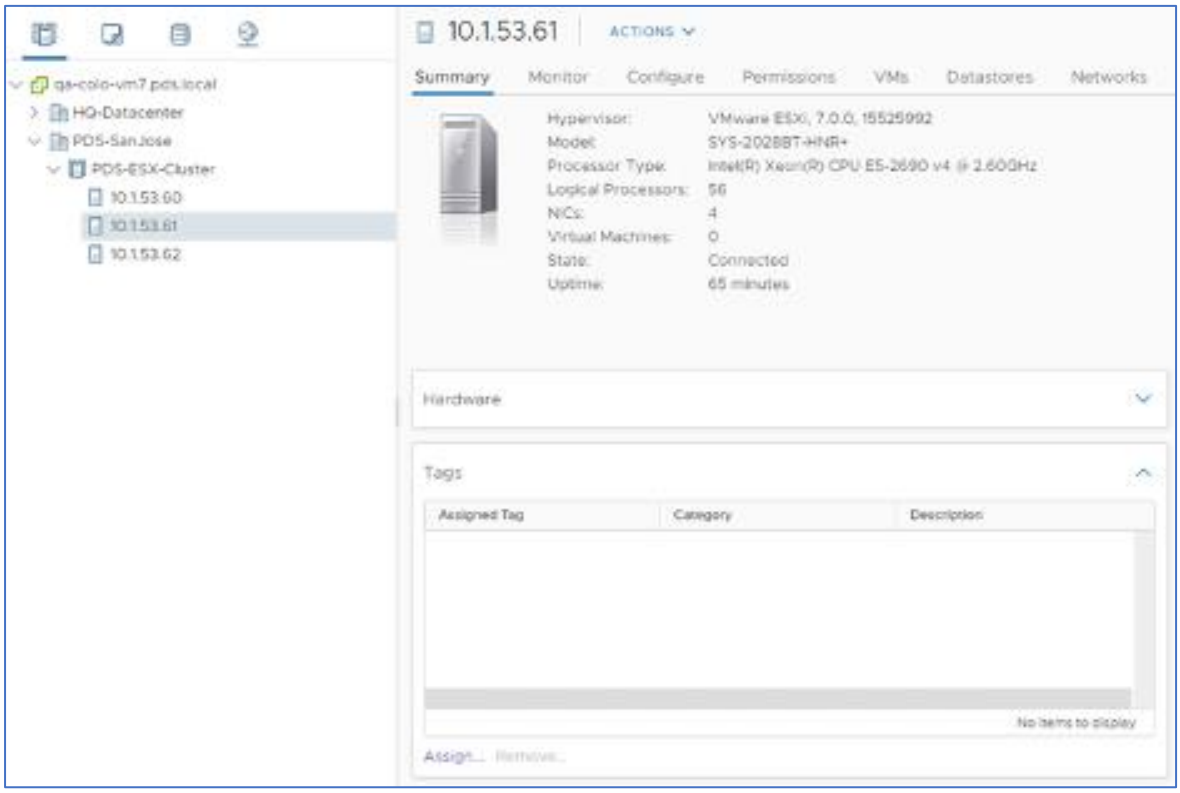
Step 11: New added hosts will be in Maintenance Mode:



Step 12: Exit Maintenance mode for each host in the cluster:



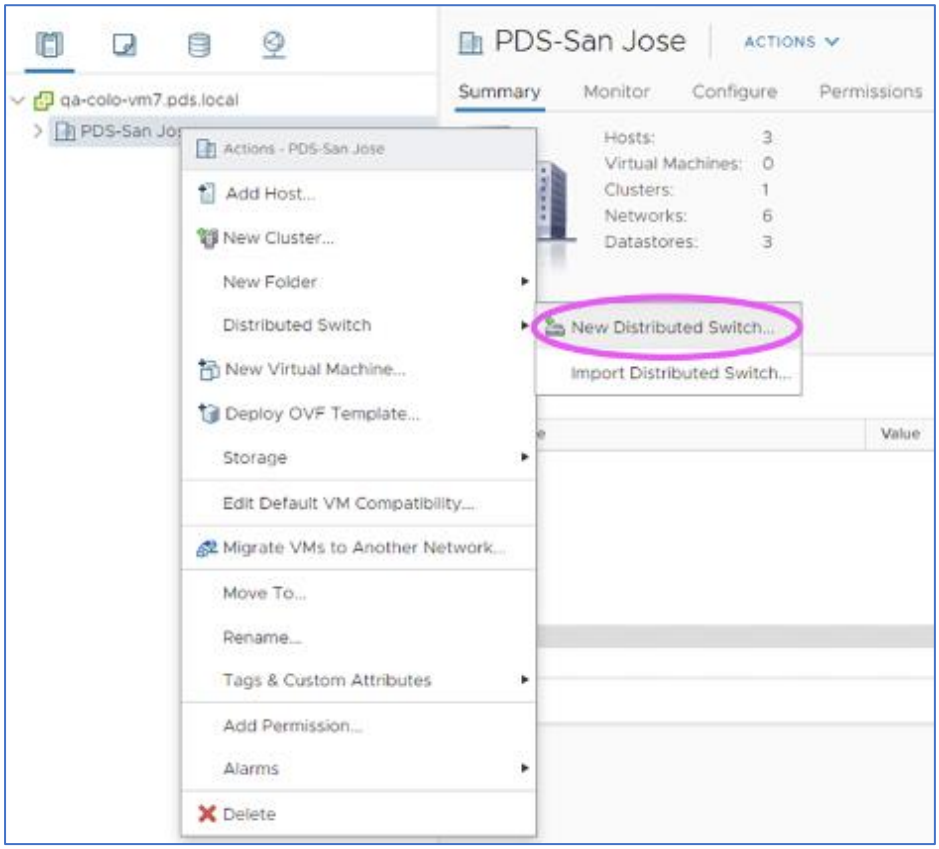
Step 13: The ESXi Cluster with 3 Hosts has been created:



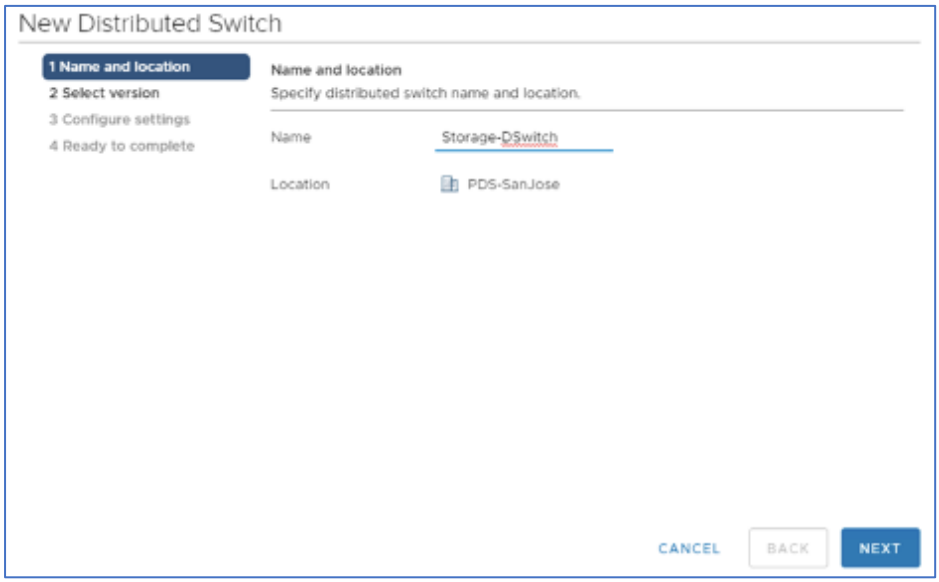
5. Create Distributed Switch for Storage Traffic

This section lists the steps required to create distributed switch for storage traffic.

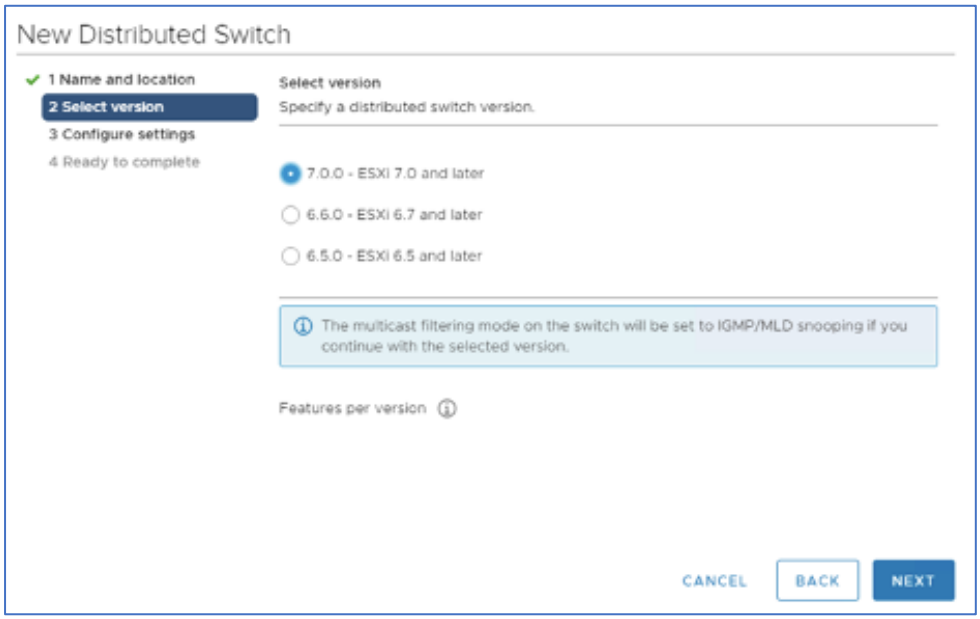
Step 1: Next step is to Create Distributed Switch for Storage Traffic



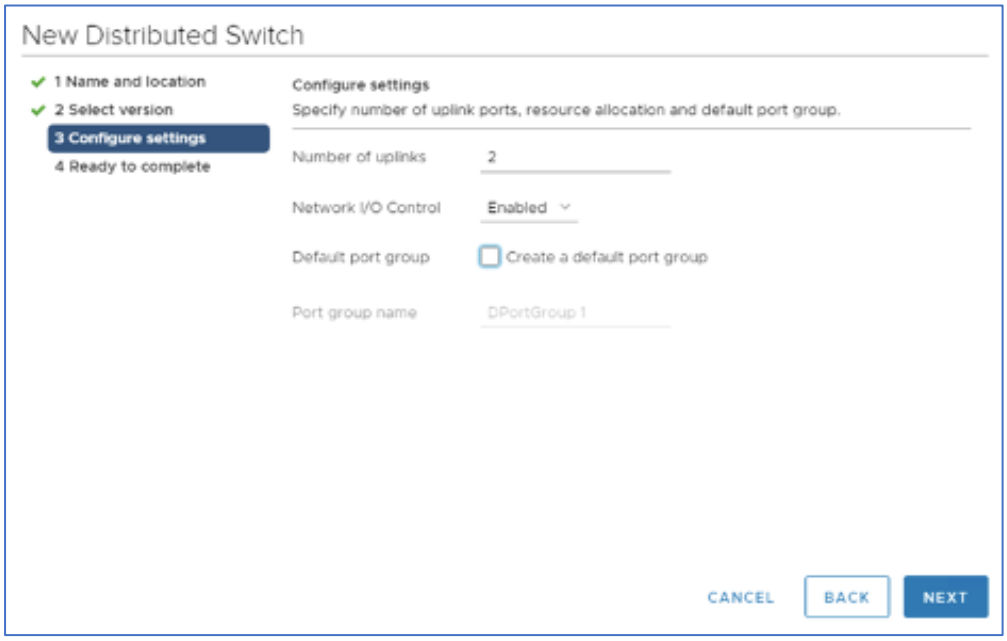
Step 2: Enter New distributed switch name:

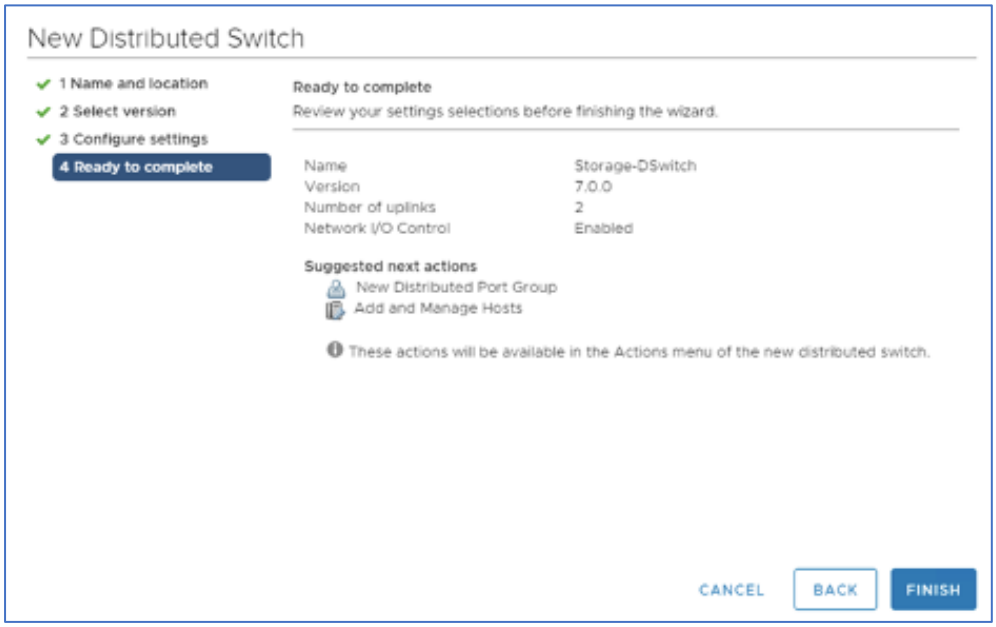


Step 3: Select ESXi version:

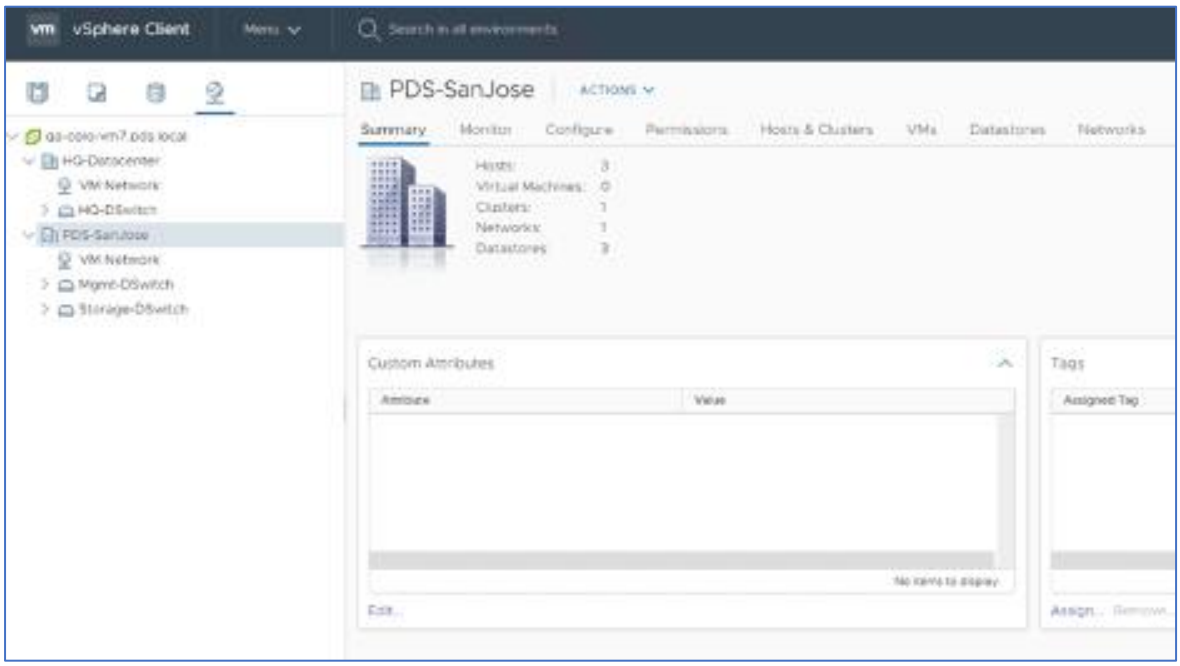


Step 4: Select number of uplinks. For representational purpose 2 uplinks are used. Uncheck “Create default port group”. In the upcoming steps user would learn how to create port groups:

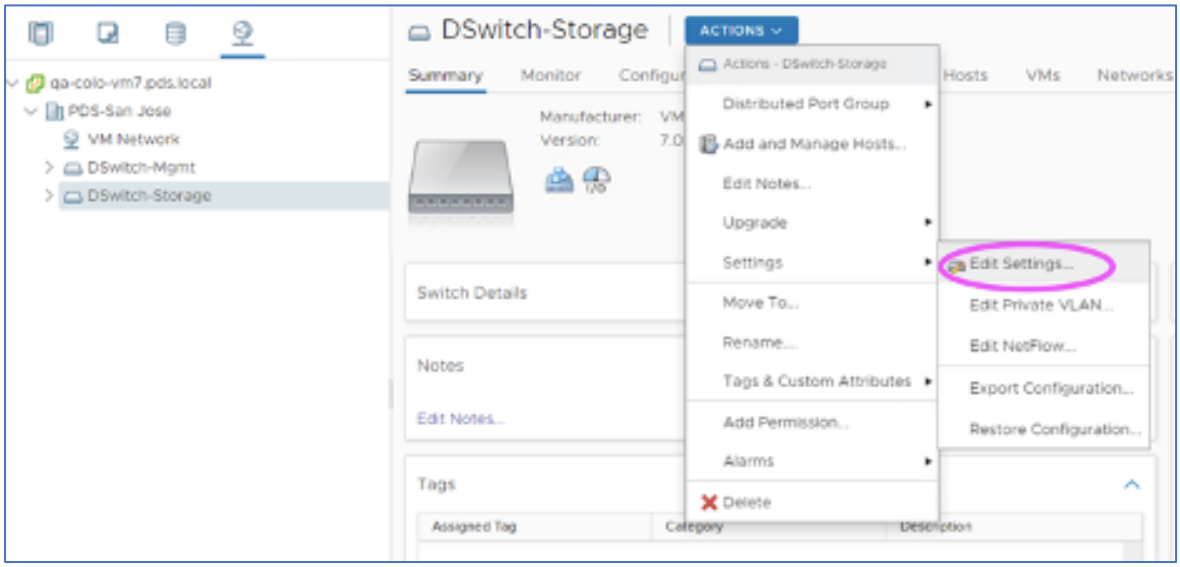


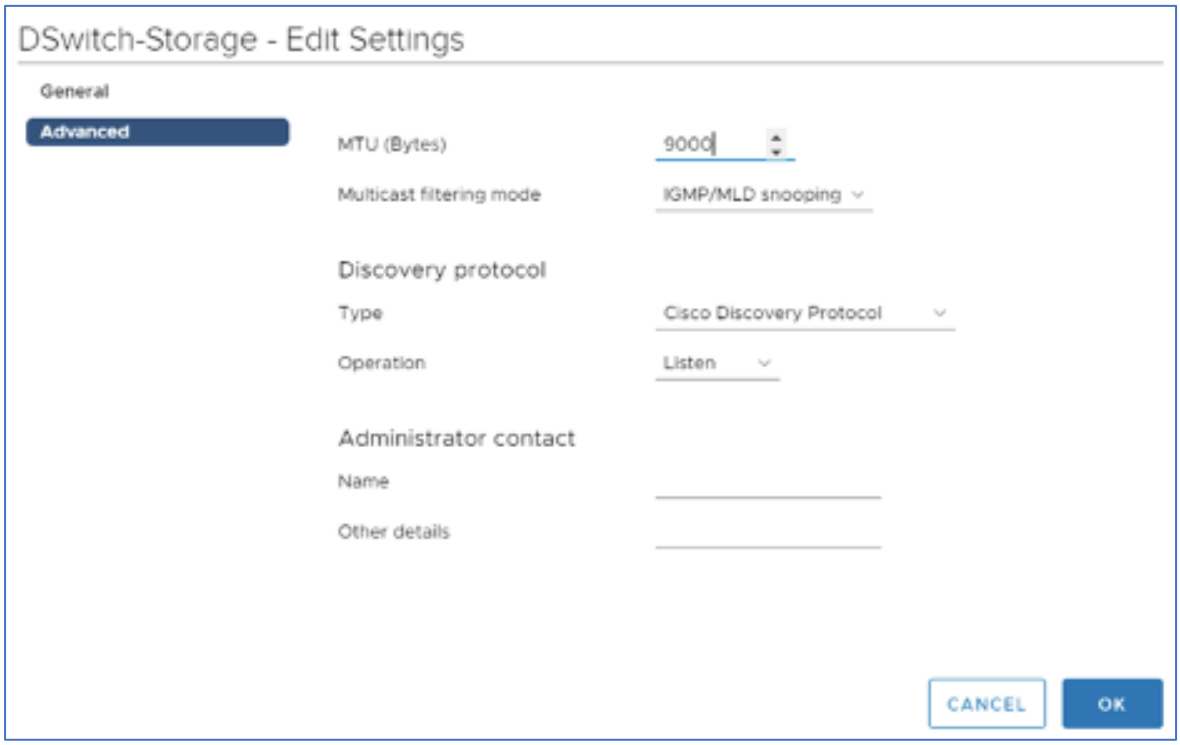


Step 5: Distributed Switch gets created:

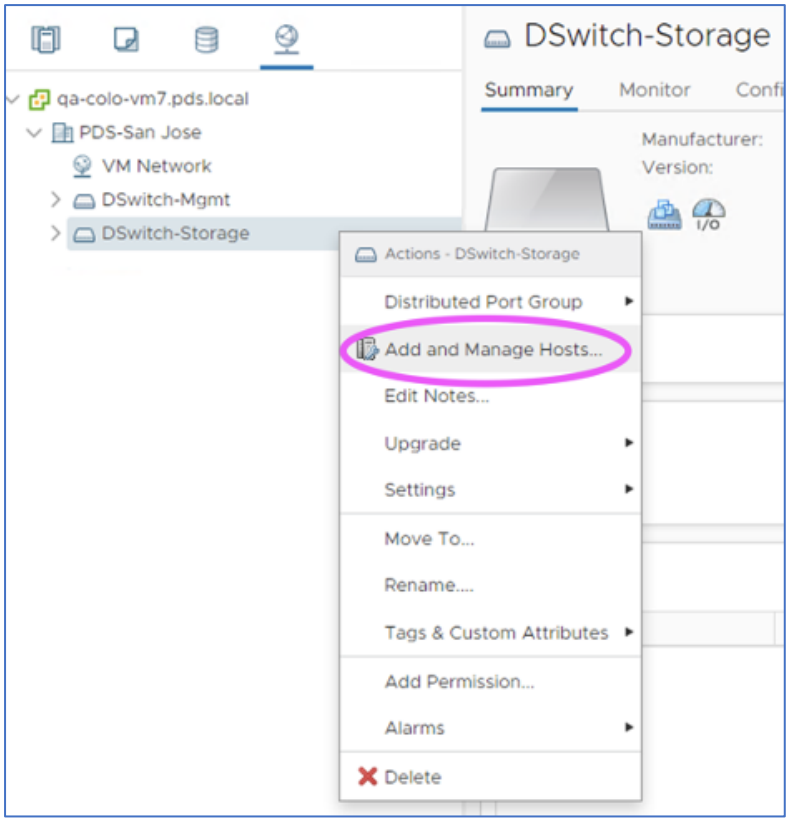


Step 6: Set MTU on the newly created distributed switch. Navigate to Actions and click “Edit Setting”:

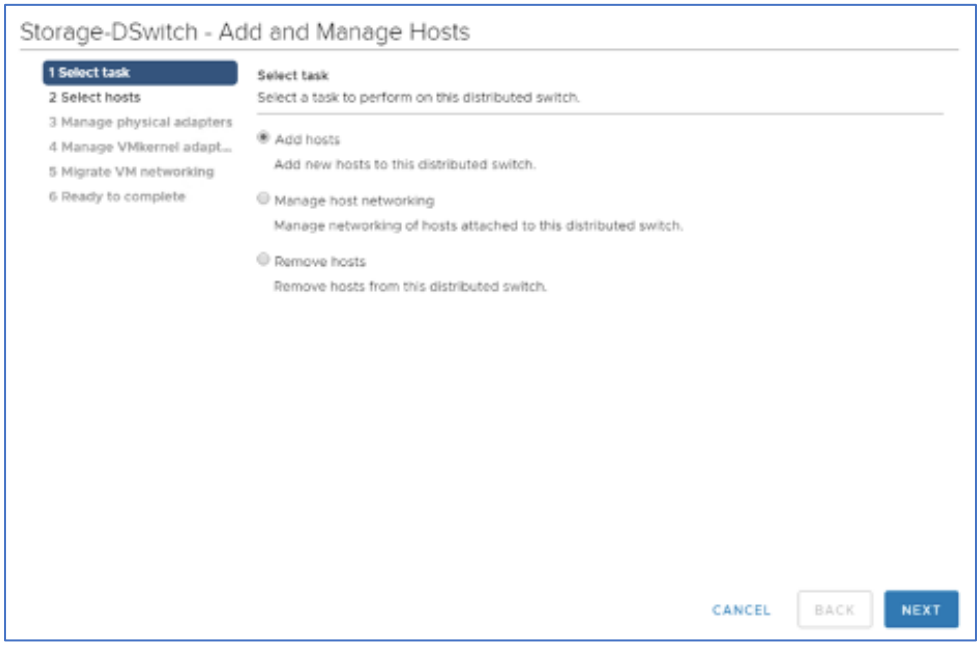




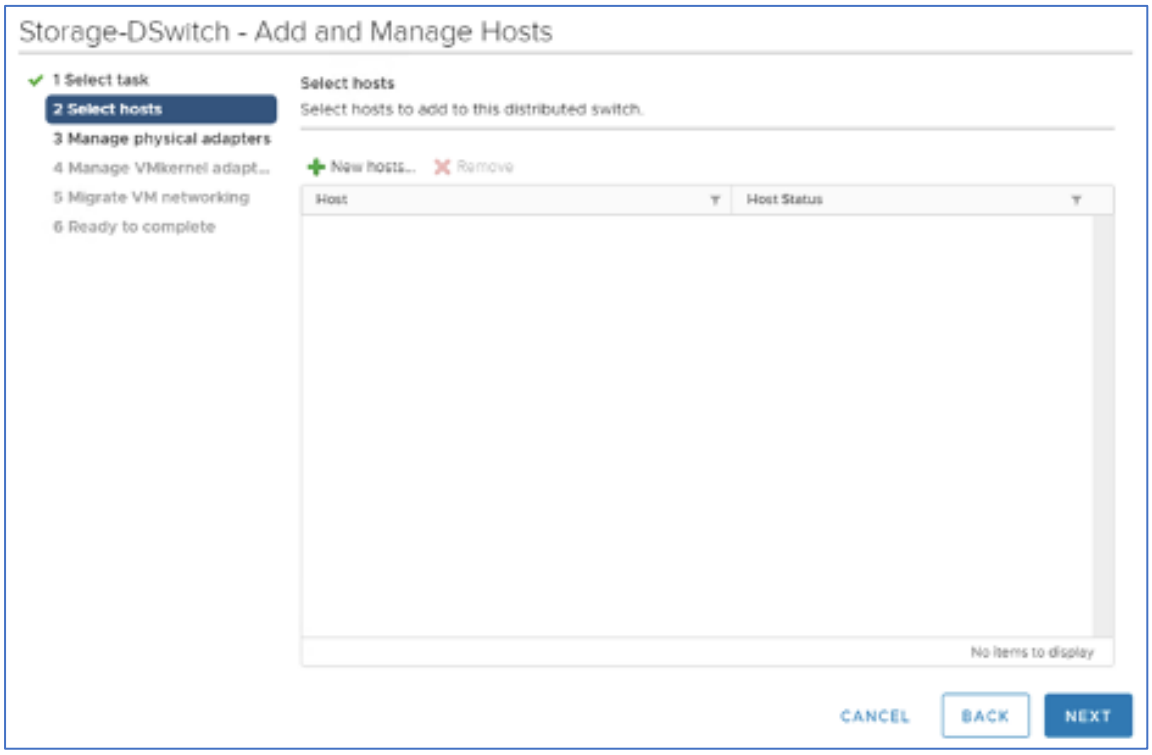
Step 7: Specify which ESXI hosts are to use this Distributed switch and which uplinks are used on those hosts. Next step is to add ESXi hosts which will use the newly created Distributed switch and which uplinks are used on those hosts. Right click on Distributed switch and click “Add and Manage Hosts”:



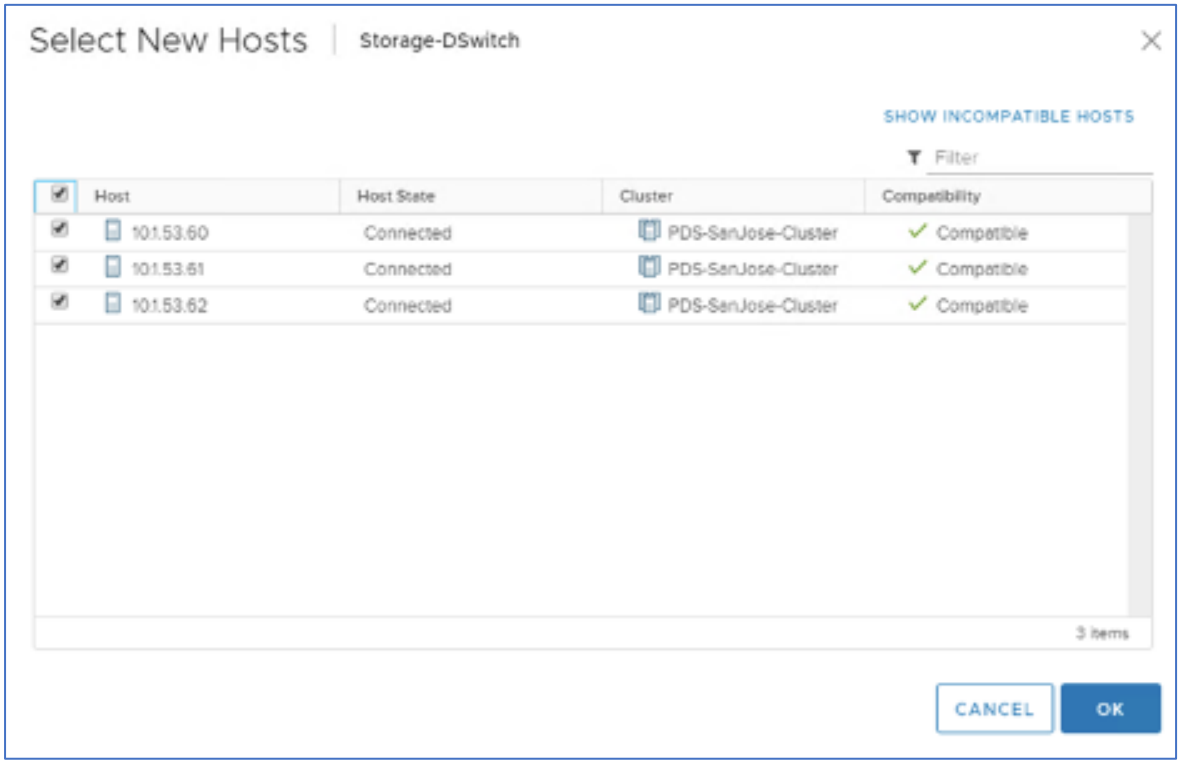
Step 8: Add Hosts:



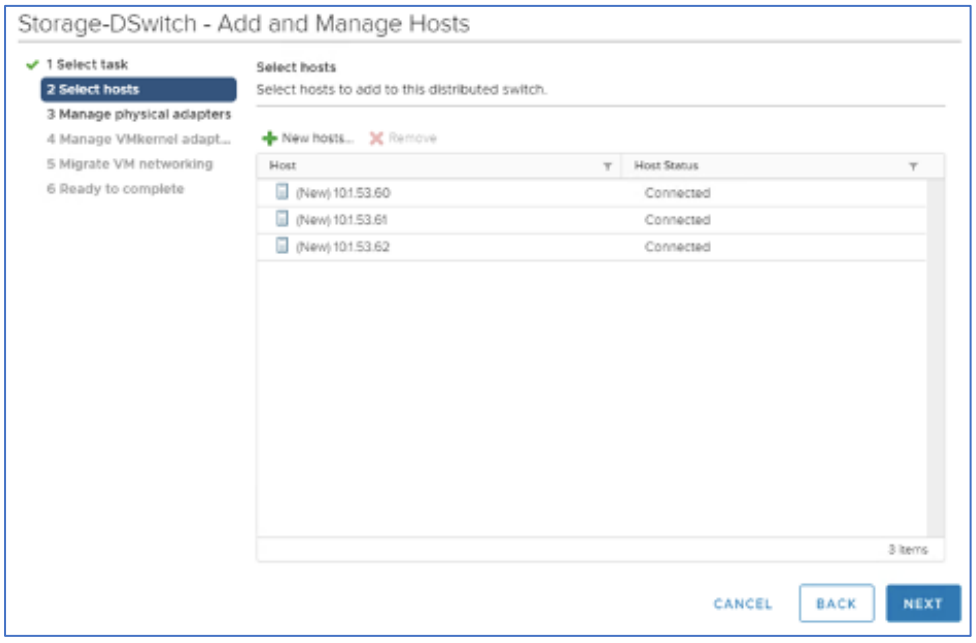
Step 9: Click “New Hosts”:



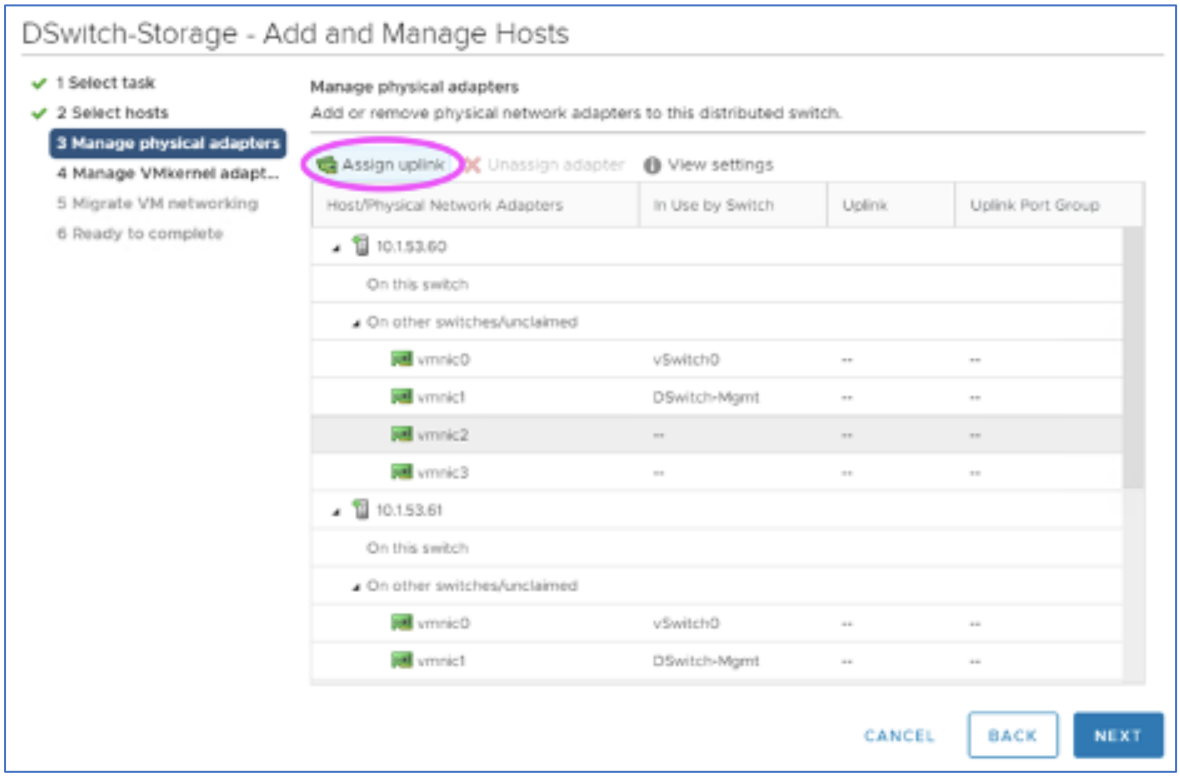
Step 10: Select the Hosts:



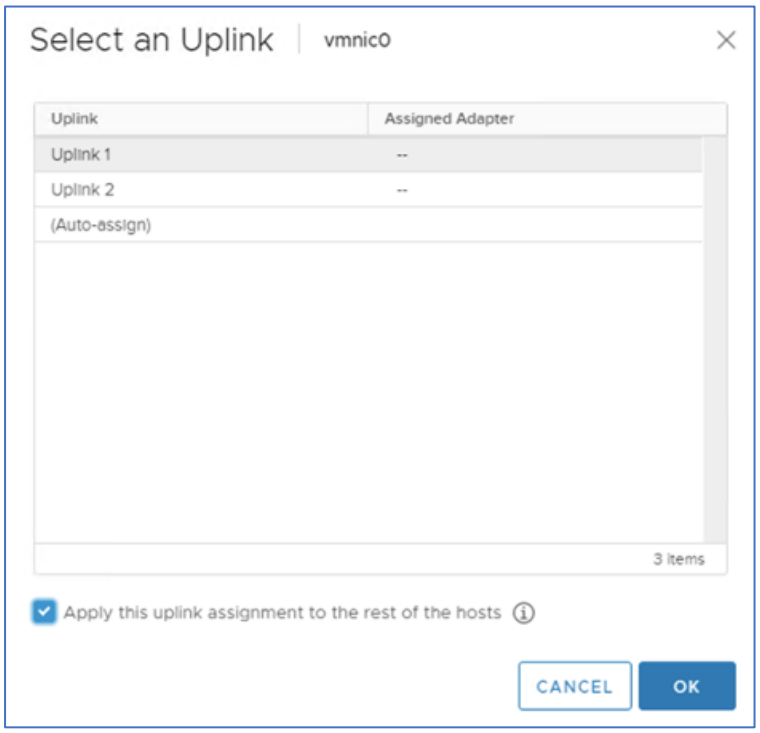
Step 11: Click Next:



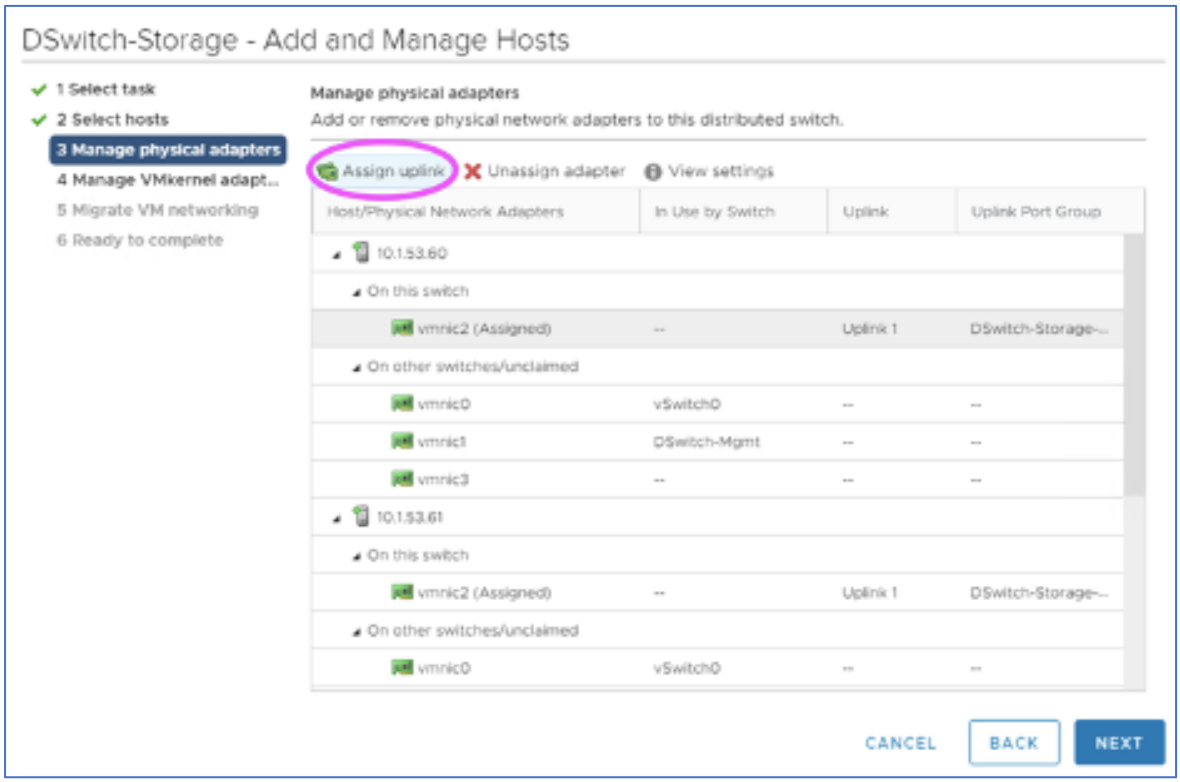
Step 12: Assign Uplinks:



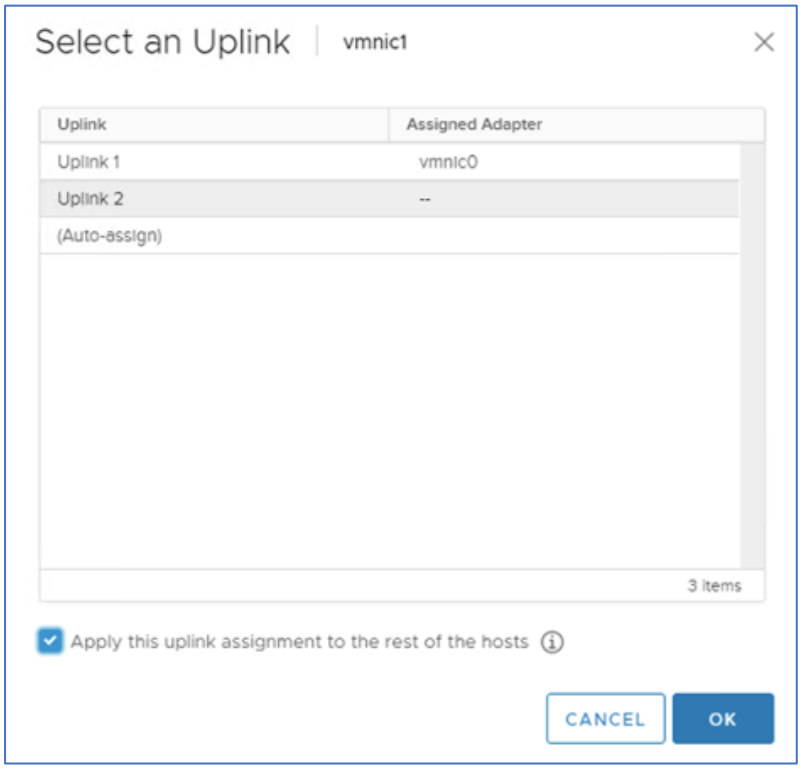
Step 13: Select the Uplink. Make sure to check “Apply this uplink assignment to the rest of the hosts”:



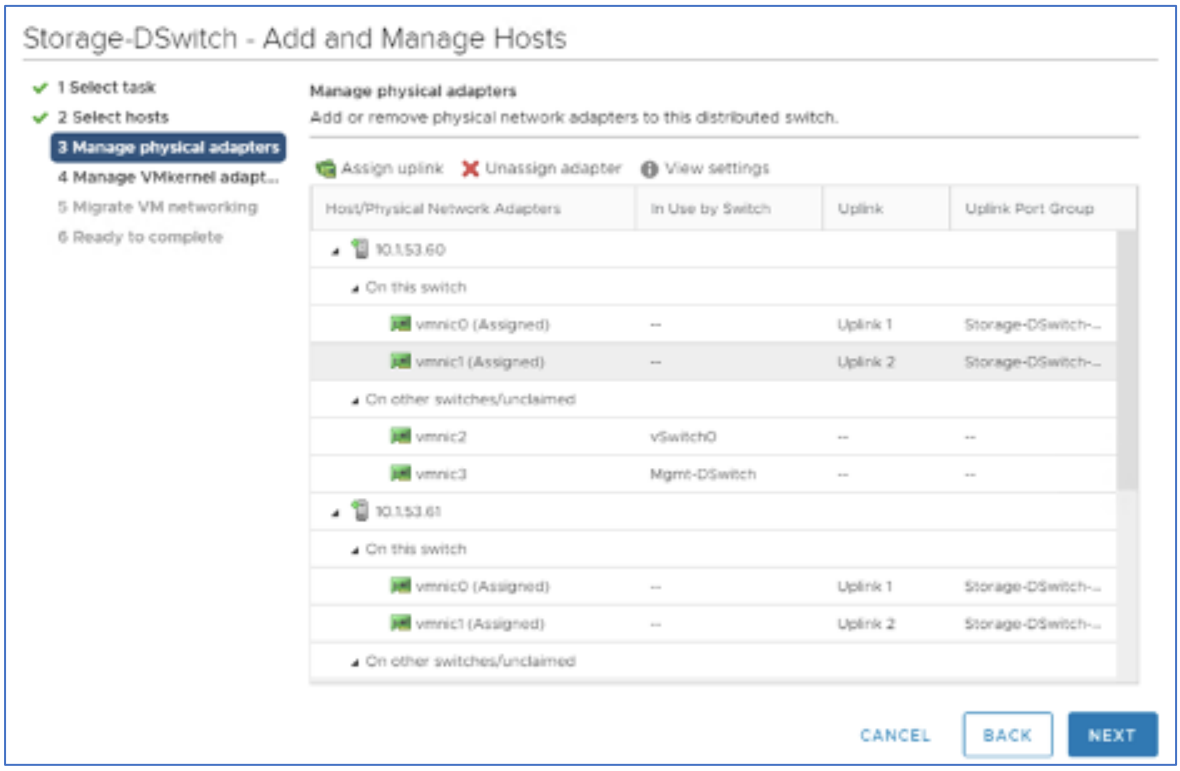
Step 14: Select Assign Uplink and click “NEXT”:



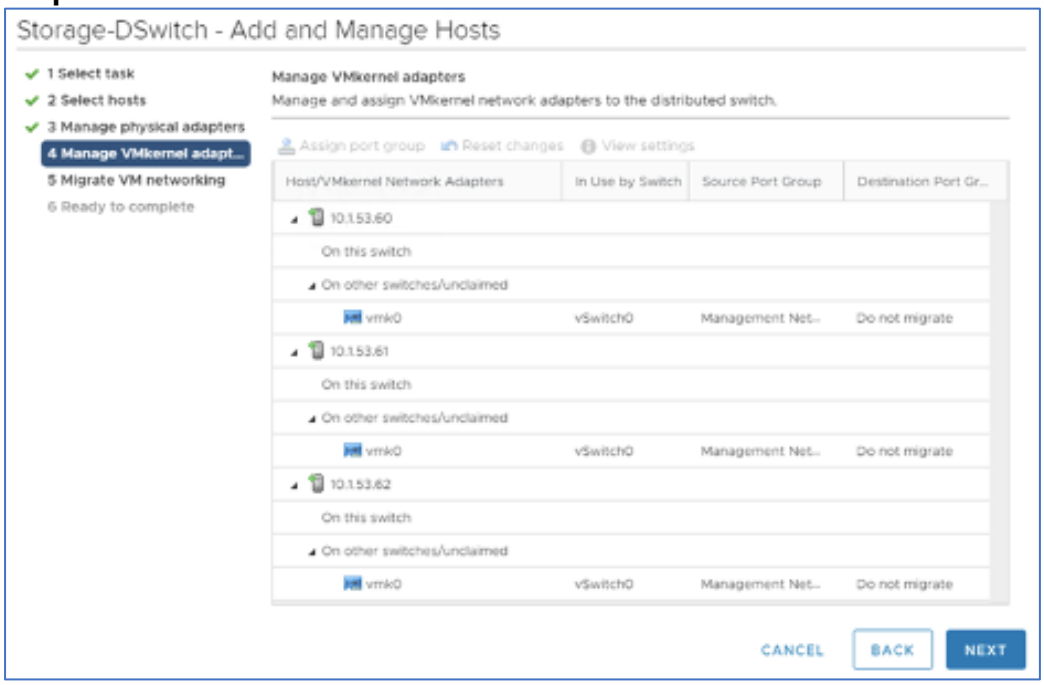
Step 15: Configure Uplink 2



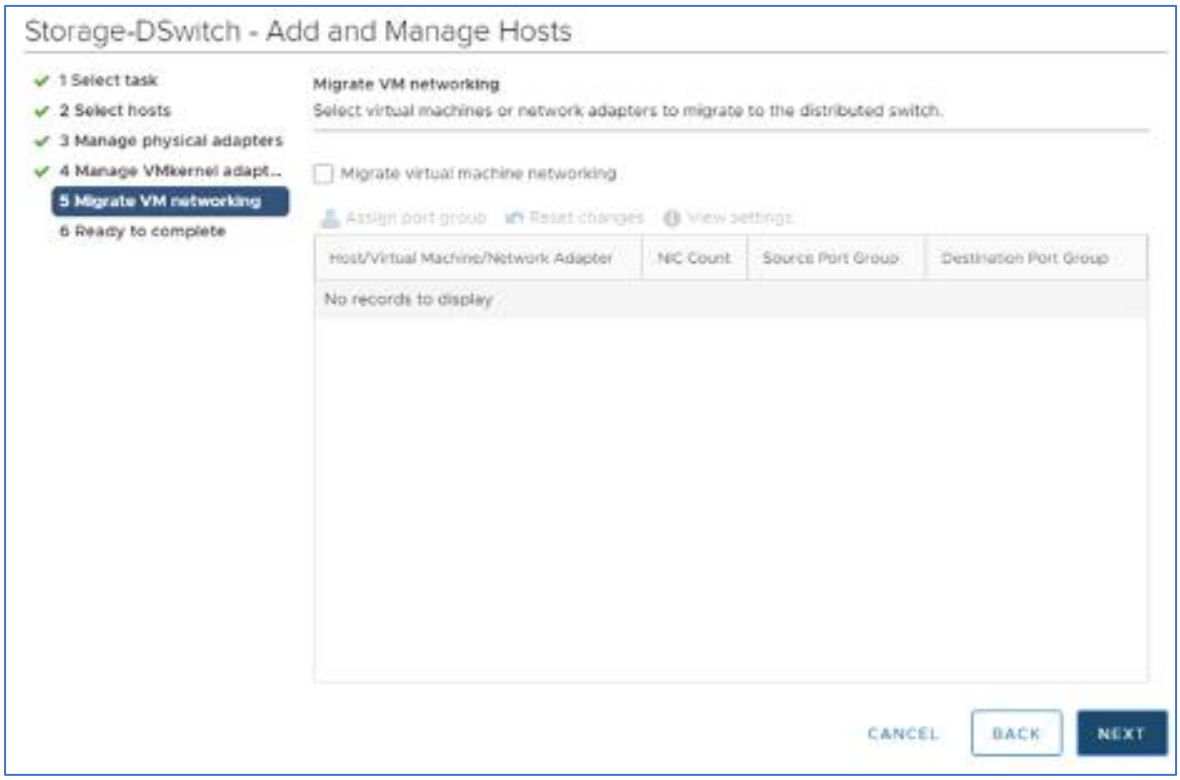
Step 16: Verify NICs are assigned to Uplinks and click “NEXT”:



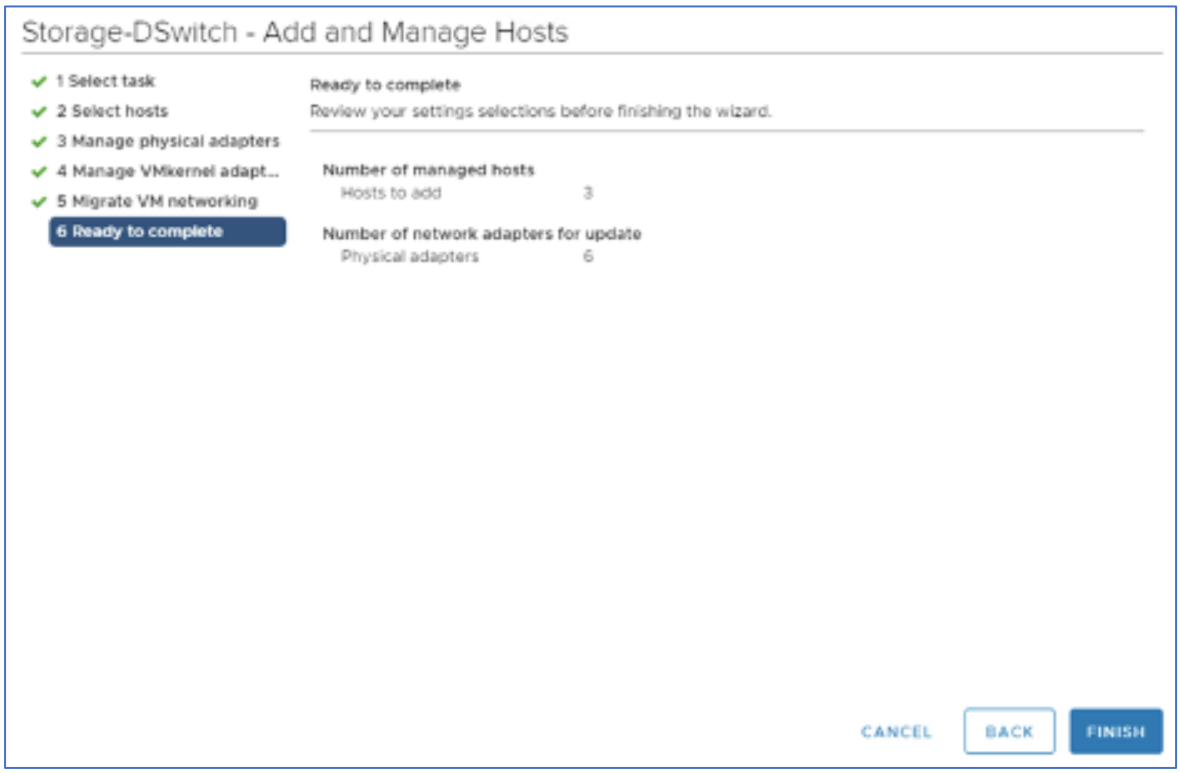
Step 17: Click “NEXT”:



Step 18: Click “NEXT”:



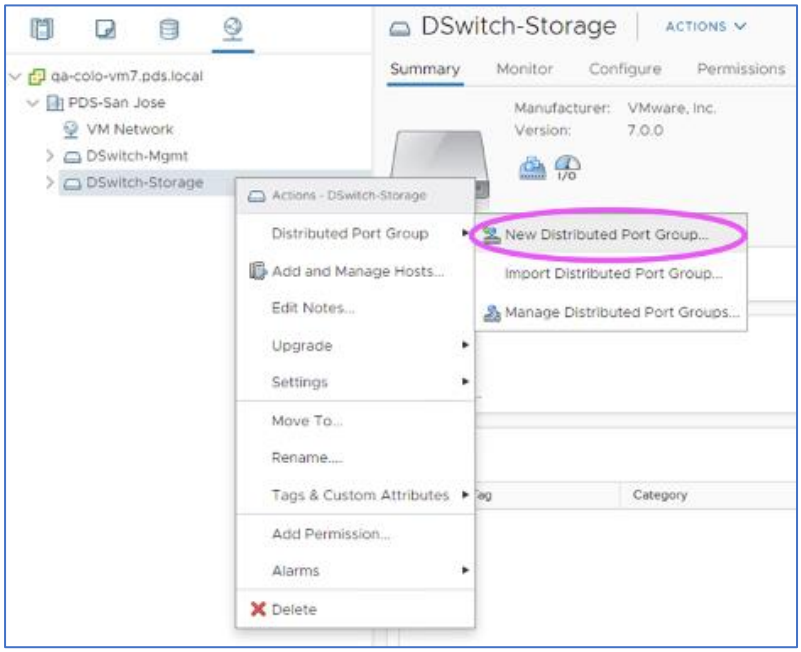
Step 19: Click “FINISH”:



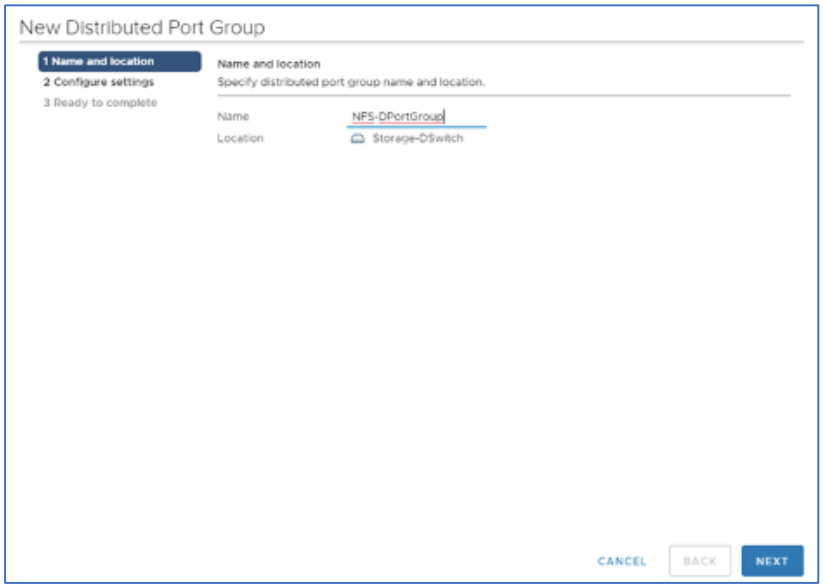
6. Configure Distributed Port Group for NFS Traffic

For representational purpose user can create a single distributed port group “NFS-DPortGroup”.

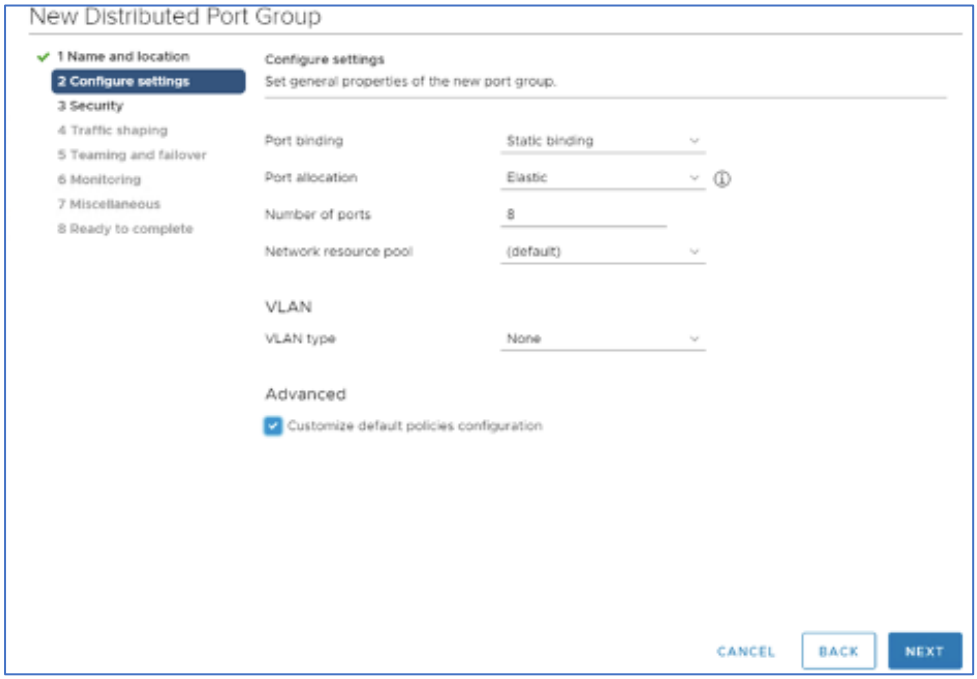
Step 1: Right click on Distributed switch and select “New Distributed Port Group”:



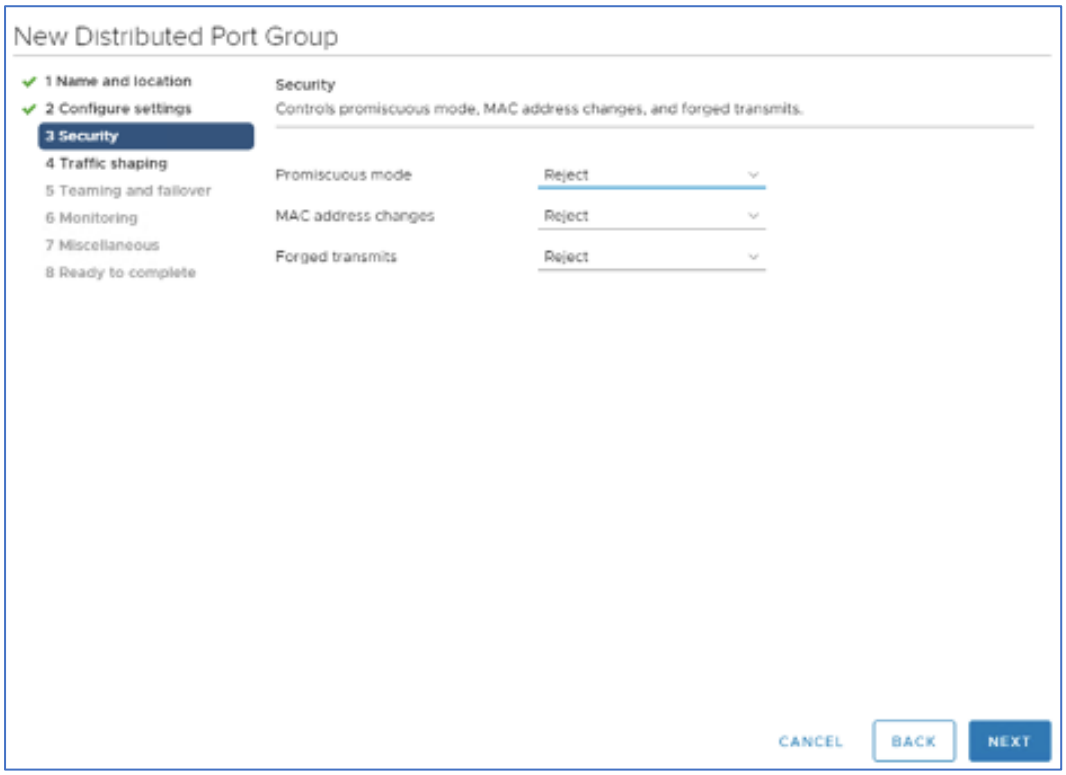
Step 2: Enter Port Group Name and click “Next”:



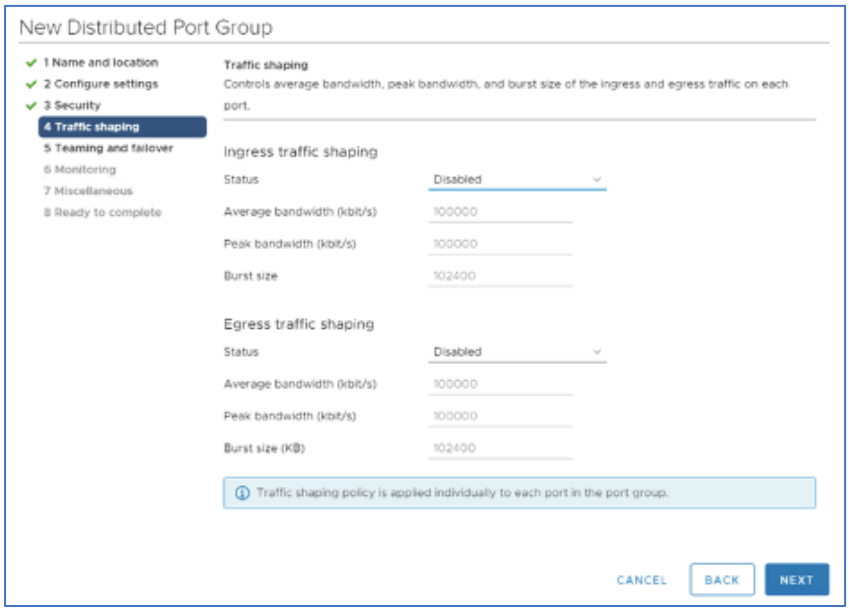
Step 3: Check customize default Policies configuration to set Teaming and Failover settings:



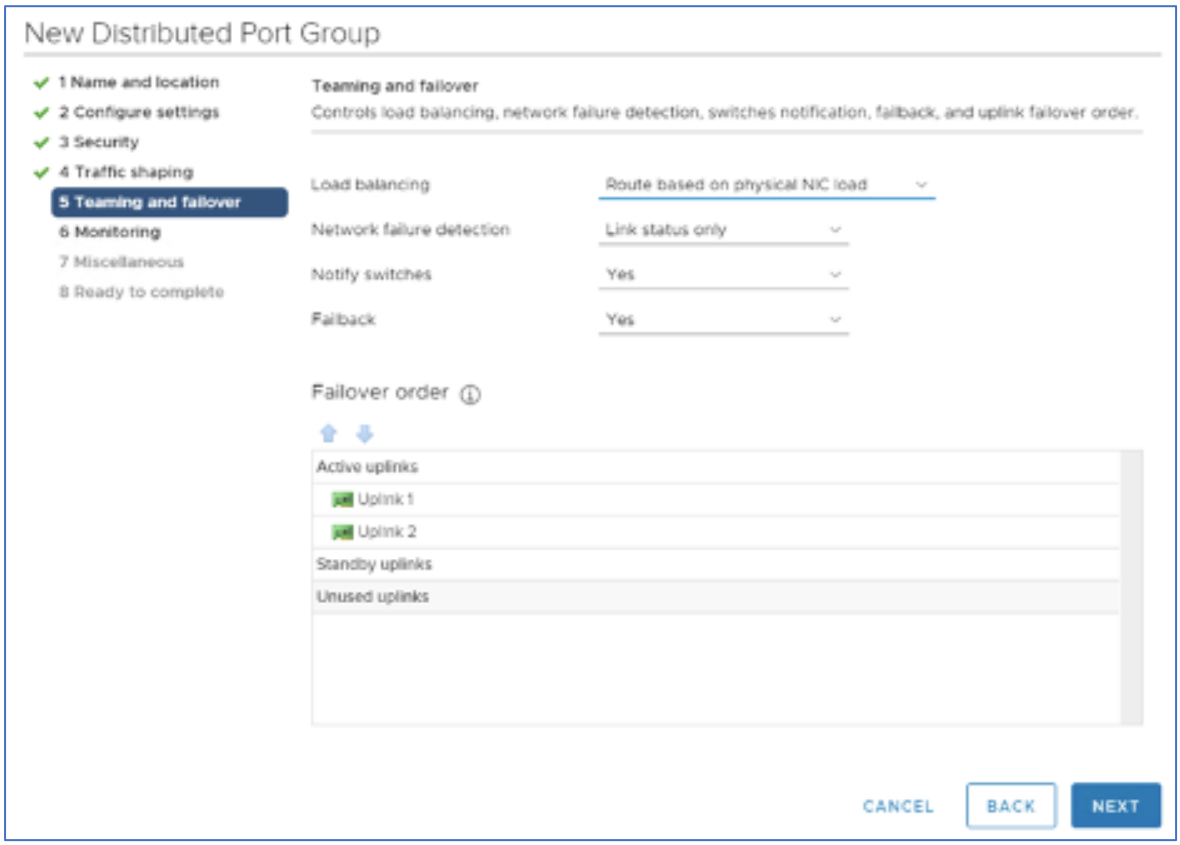
Step 4: Click “NEXT”:



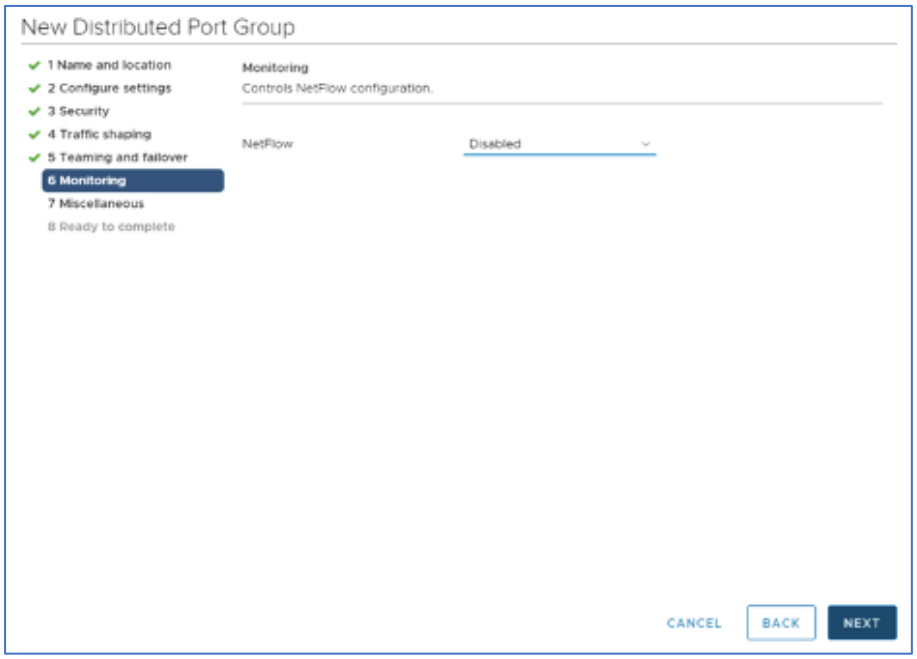
Step 5: Click “NEXT”:



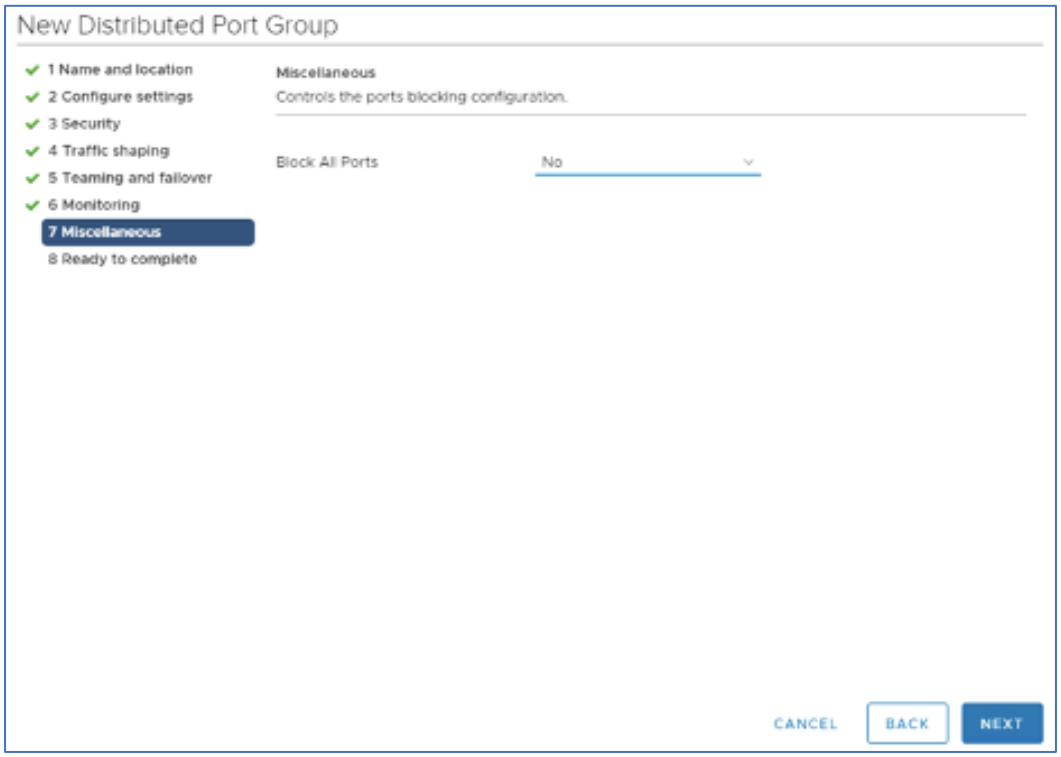
Step 6: Set Load Balancing to “Route based on physical NIC load” and Uplink1 and Uplink2 as Active Uplinks:



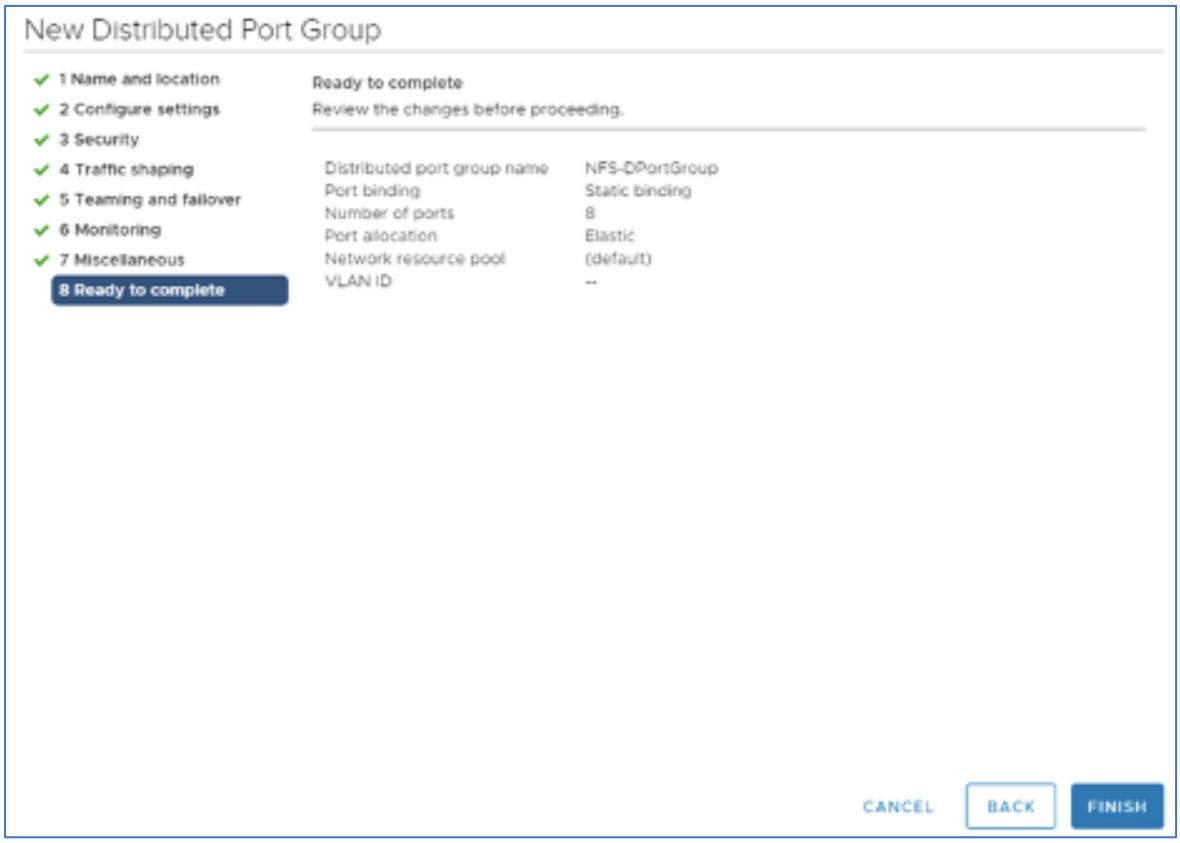
Step 7: Click “NEXT”:



Step 8: Click “NEXT”:



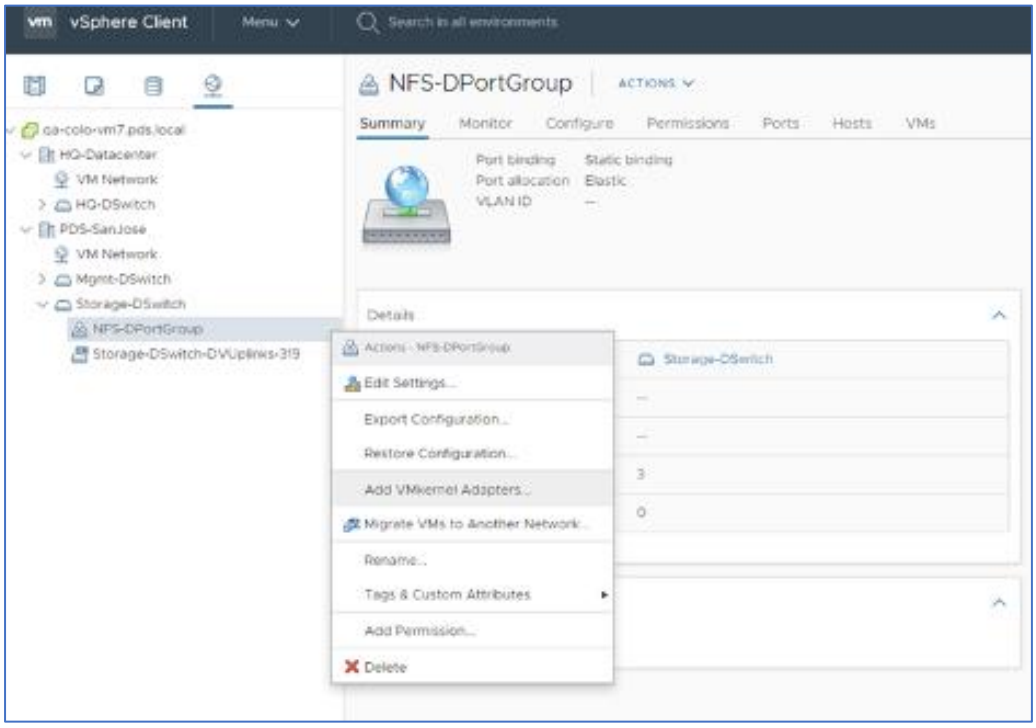
Step 9: Click “NEXT”:



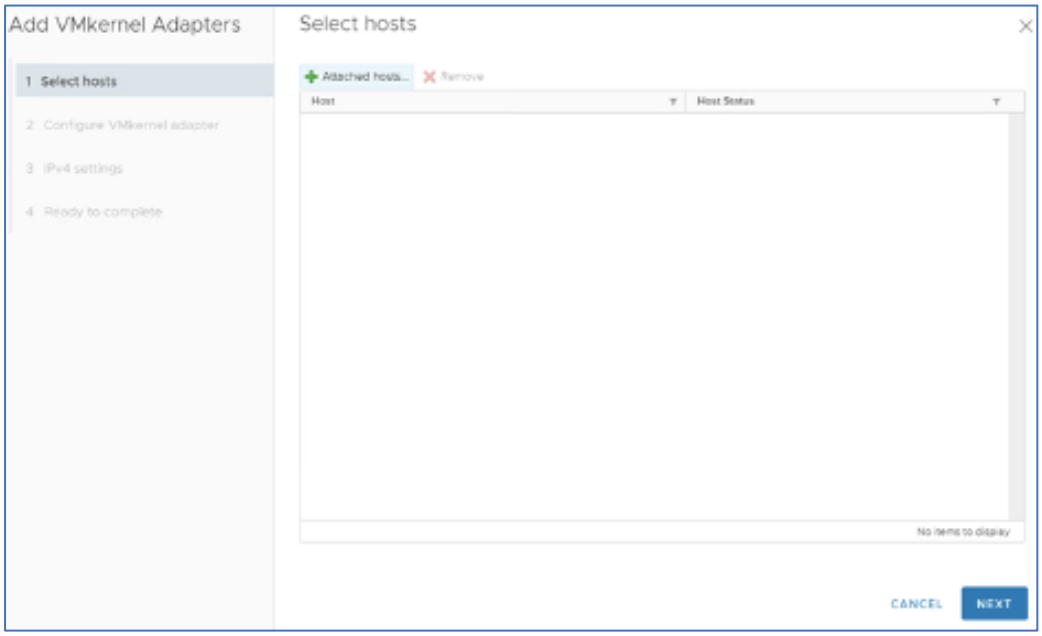
6. Configure VMKernel Port for NFS traffic

This section lists how to configure VMKernel port for NFS traffic:

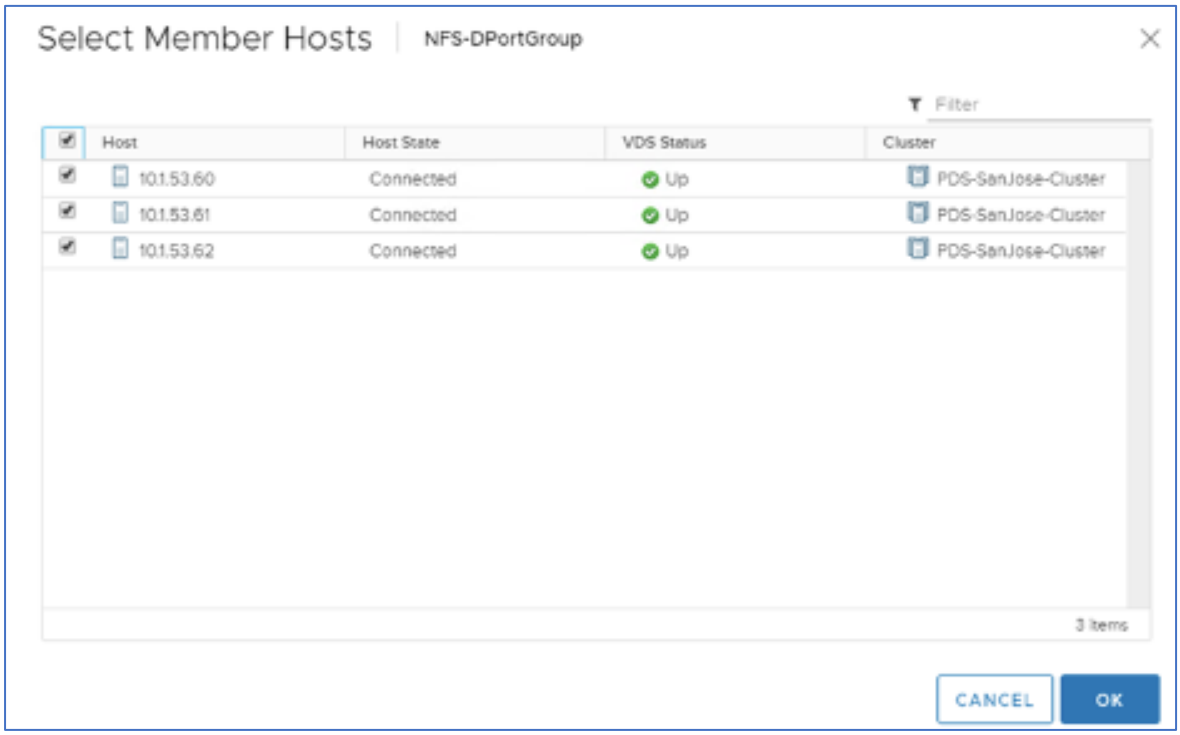
Step 1: Right click the distributed port group and select “Add VMkernel Adapters”:



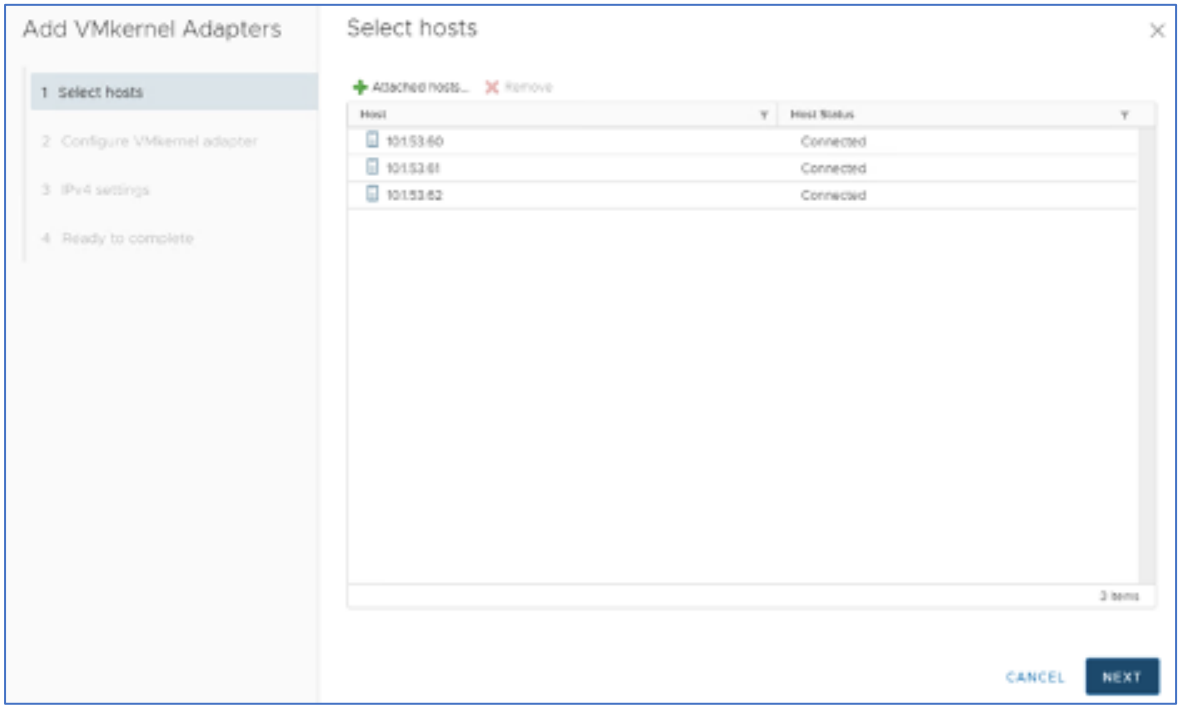
Step 2: Click “Add Hosts”:



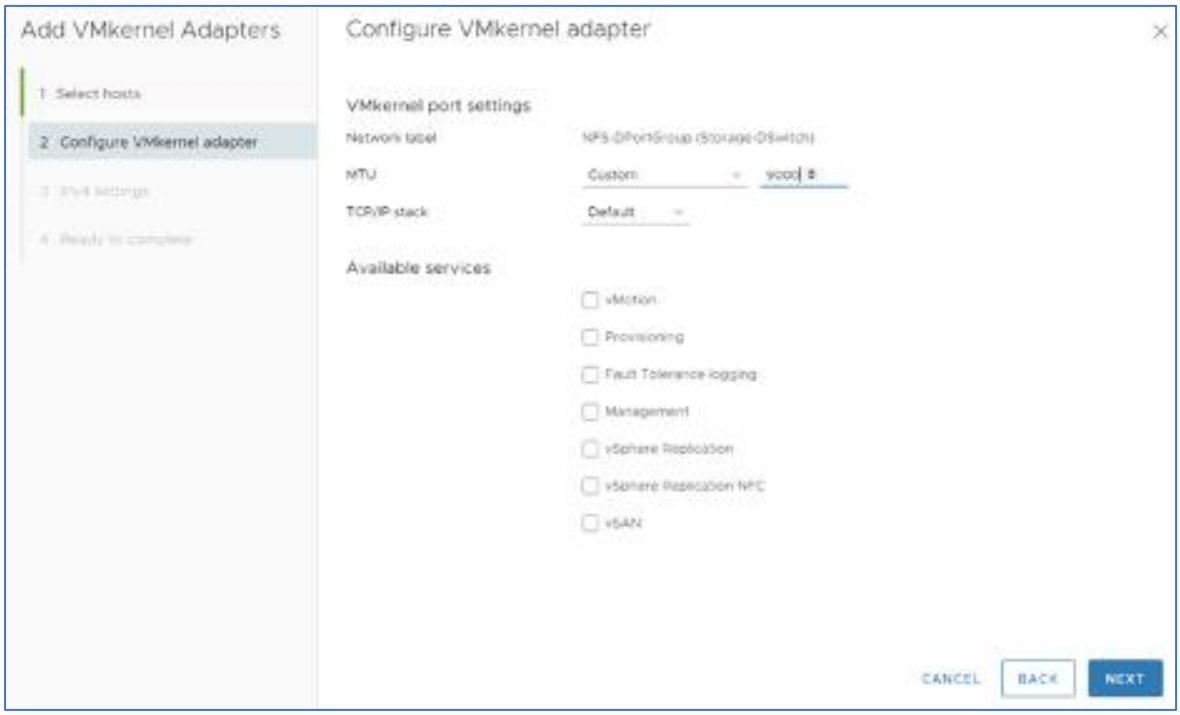
Step 3: Select hosts and Click “OK”:



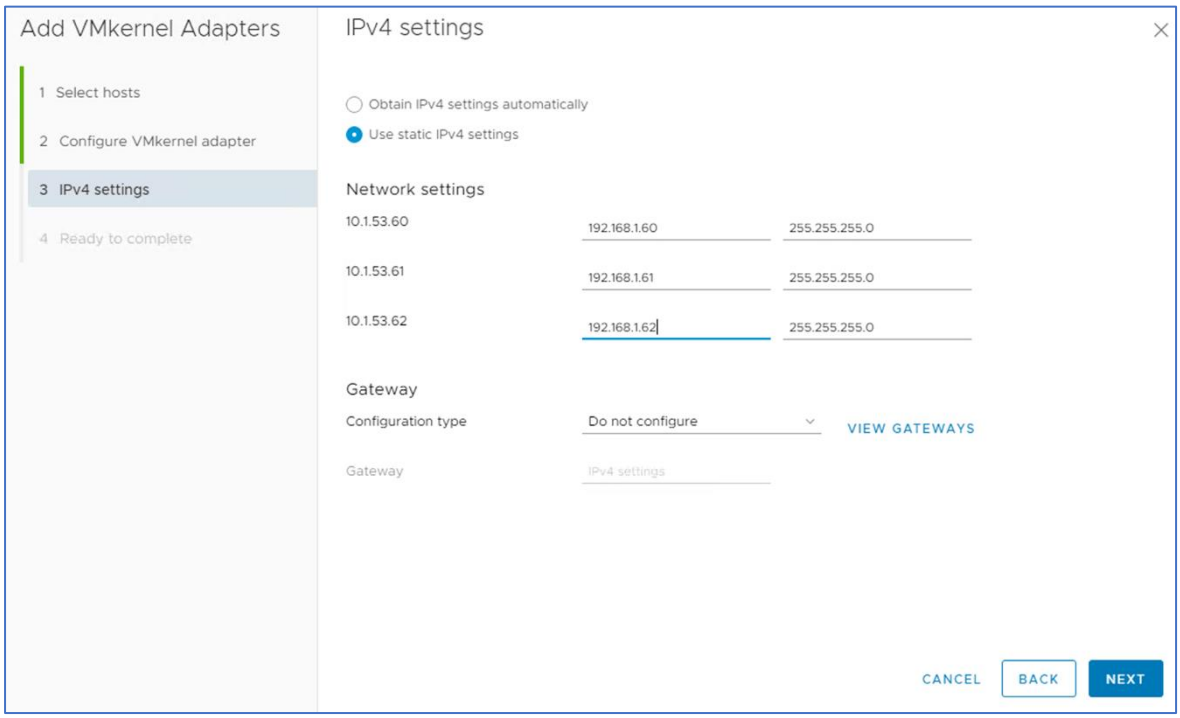
Step 4: Click “NEXT”:



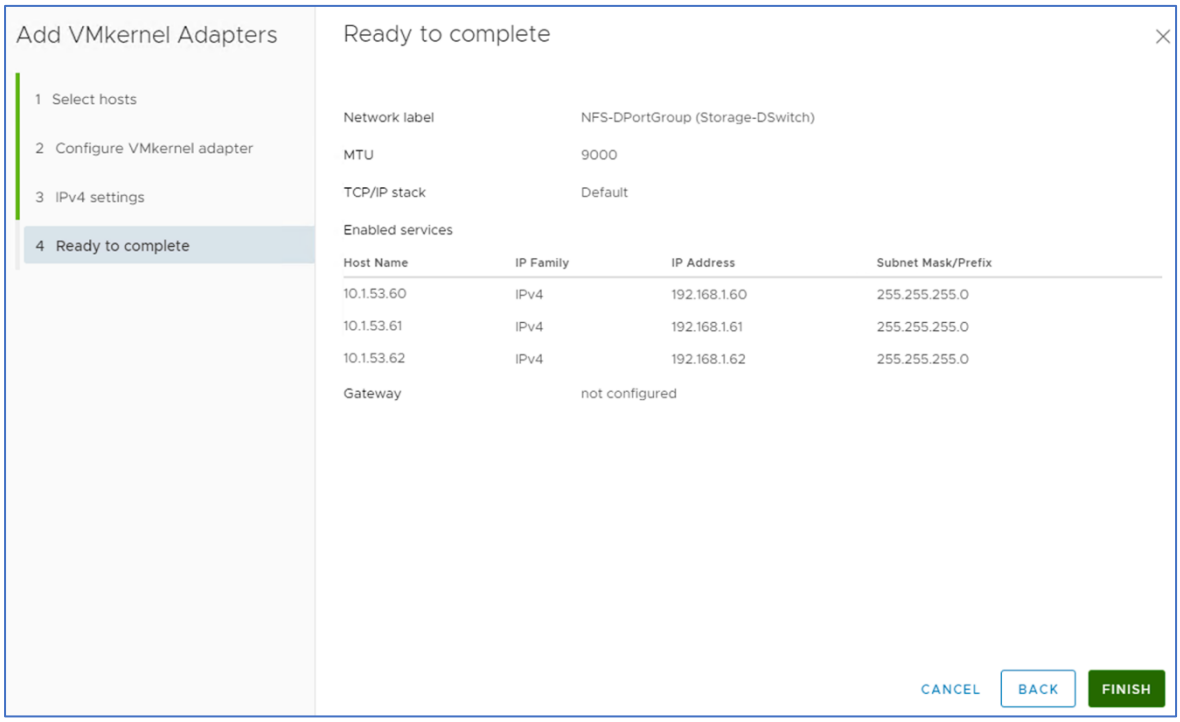
Step 5: Set MTU to 9000 and click “NEXT”:



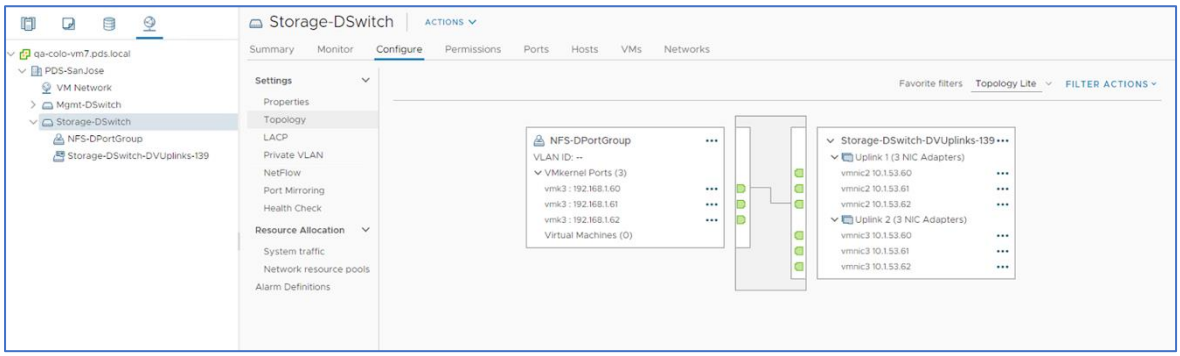
Step 6: Assign IP addresses Click “NEXT”:



Step 7: Verify and click “Finish”:



Step 8: After all the ESXi Cluster Networking has been Completed all configuration can be verified in Distributed Switch Topology :



7. Configuring Pavilion Controllers as NFS Servers

This section will provide the steps required to configure two controllers to serve NFS connections. Once they are configured for NFS service, we will pair them up as are required for a HA configuration in later steps.

Login to the Pavilion HFA

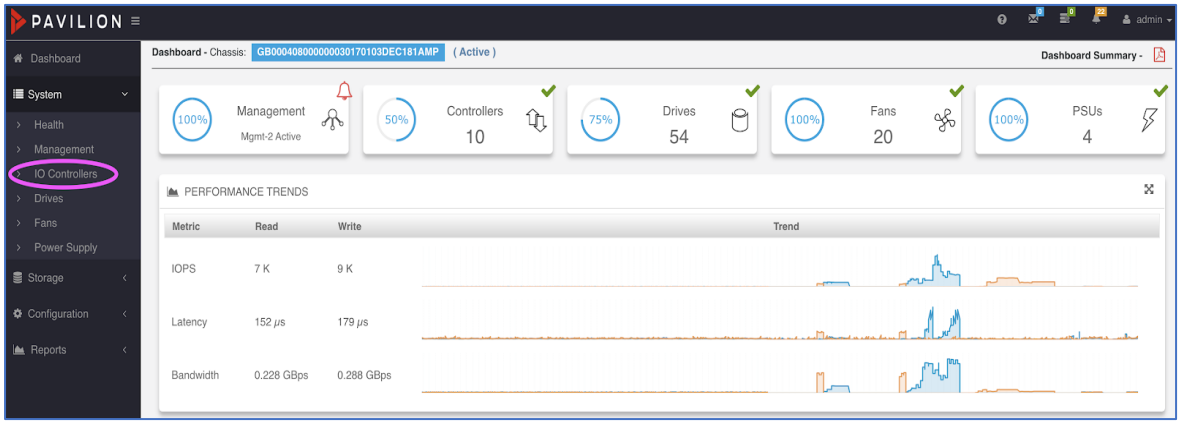
Step 1: Using the GUI interface, log in with the administrator login and password.

7.1 Configure Individual Controllers to serve NFS volumes

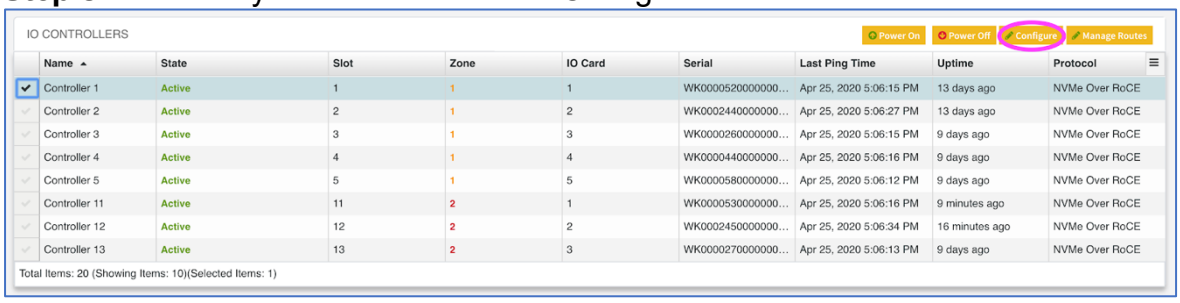
This section lists the steps required to configure individual controlers to serve NFS volumes.

Step 1: Click on the “System->IO Controllers” tab on the side menu to bring up the list of installed controllers. We will select two of them to comprise the NFS HA pair. Note that NFS HA pair controllers need to be in the same “Zone” of the array (4th column in the table). You cannot create a HA pair using controllers from different zones.

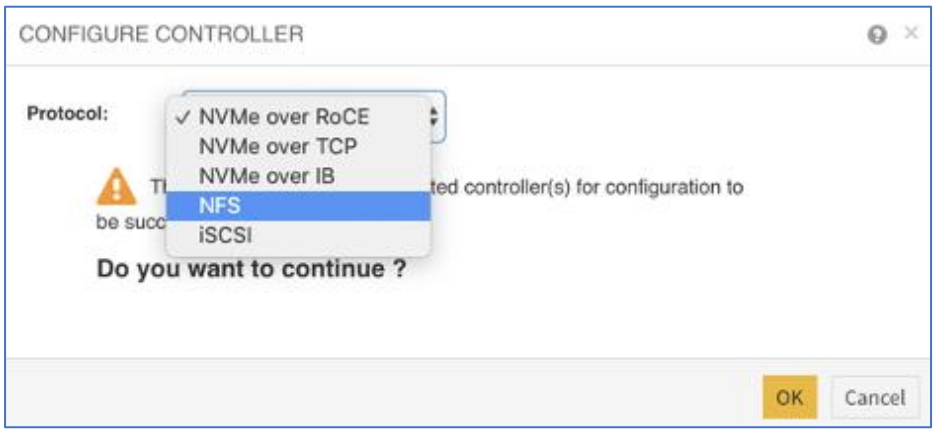
Step 2: Go to IO Controllers:



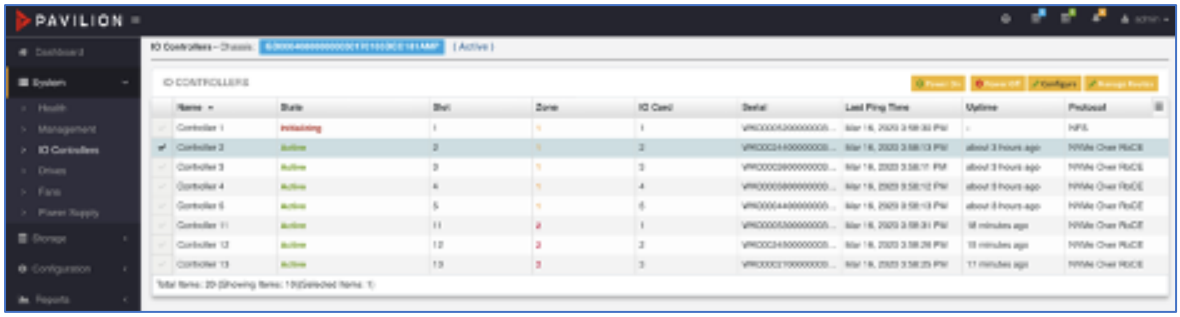
Step 3: Select any controller and click “Configure”:



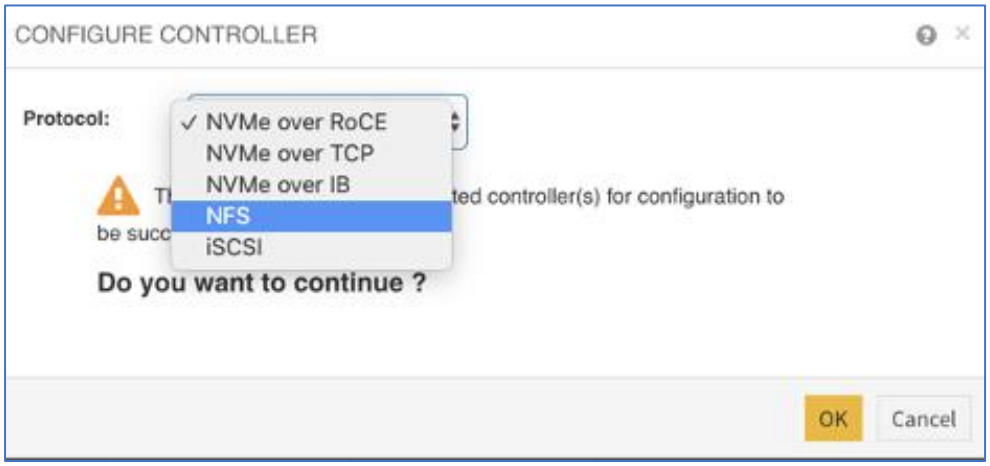
Step 4: Set Protocol to “NFS” and click “OK”:



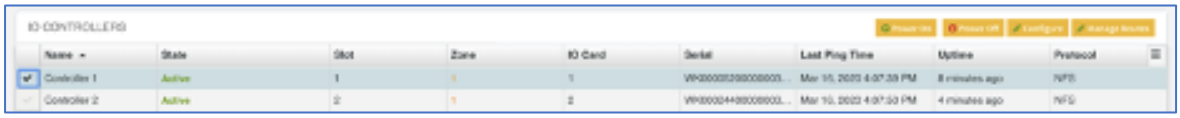
Step 5: Select any other controller in same zone and click configure:



Step 6: Set Protocol to NFS:



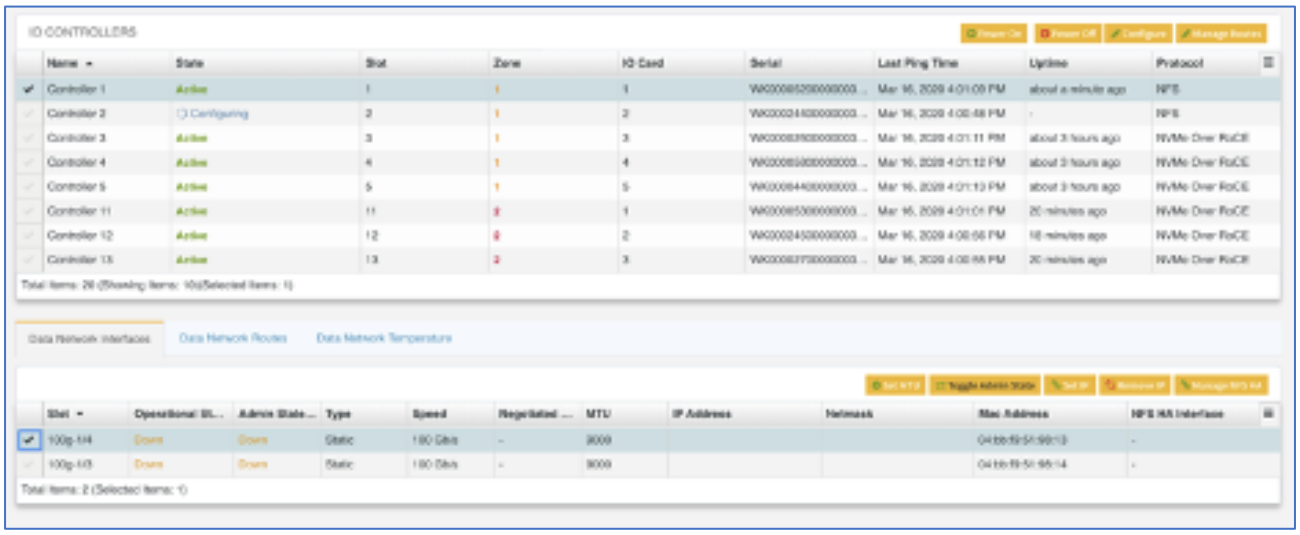
Step 7: Controllers 1 and 2 are configured for NFS:



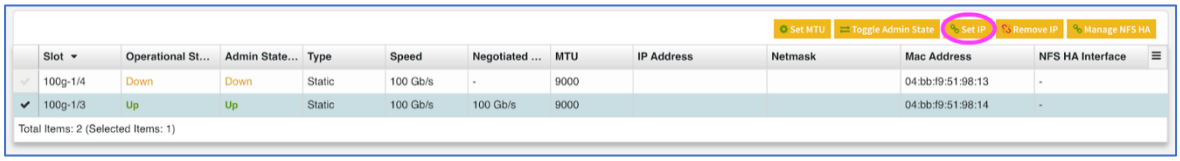
7.2 Configure Data Network (IP) interfaces for the controller

This section lists the steps required to configure Data Netwok (IP) interfaces for the controller.

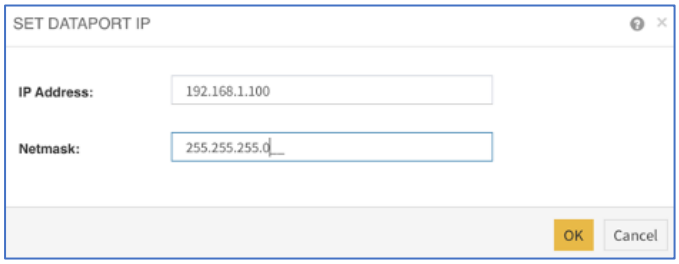
Step 1: Re-select the controller you changed to NFS in the prior step to begin configuring its IP configuration:



Step 2: Once the controller is selected, the Data Network Interfaces tab will appear at the bottom of the screen. Select the interface (each controller has two) and use the “Set IP” button to bring up the “Set Dataport IP” window and enter the IP and netmask desired:



Step 3: Set IP address and Netmask:



Step 4: IP address is configured on the Controller Port:

Step 5: Repeat above steps to configure IP address on the second controller dataport.

8. Enabling High Availability with NFS

This section describes how to configure a highly available Active/Passive NFS server on Pavilion chassis. Pavilion customers access the Network File System (NFS) through a floating IP address.
The NFS server runs on one of the two nodes. If the node on which the NFS server is run on becomes inoperative, the NFS server starts serving on the second node with minimal service interruption.

NFS HA Operation

- Two Data Network Interfaces from separate controllers (configured previously for NFS) are configured as an Active/Standby pair

- Once configured, only the active Data Network Interface will have an IP address (that is, the IP address of the NFS service)

- All the volumes assigned to these two ports will be active on the first port and standby on the second port

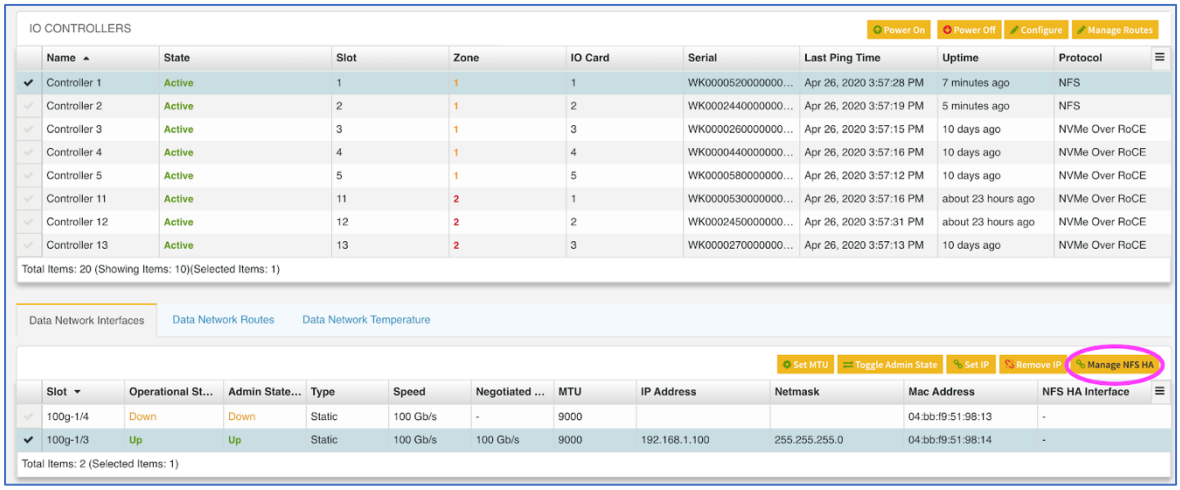
- If the active controller or network fails, then all the volumes which are active on this port will automatically migrate to the standby data network port, and the NFS virtual IP will migrate to the surviving controller

- Since NFS clients will be connected to the server using IP address, all the clients will automatically be able to access the volume after a slight failover delay and without client reconfiguration

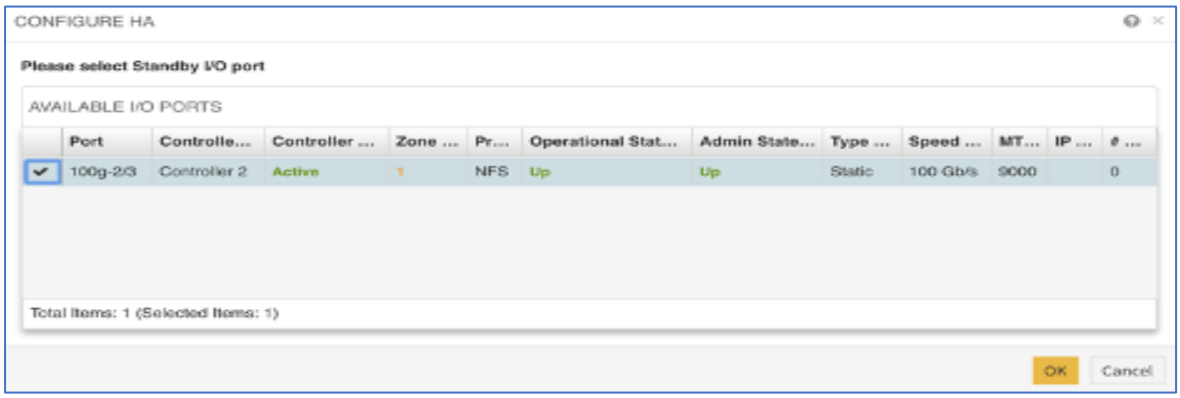
8.1 Creating the NFS HA pair

This section lists how to create the NFS HA pair:

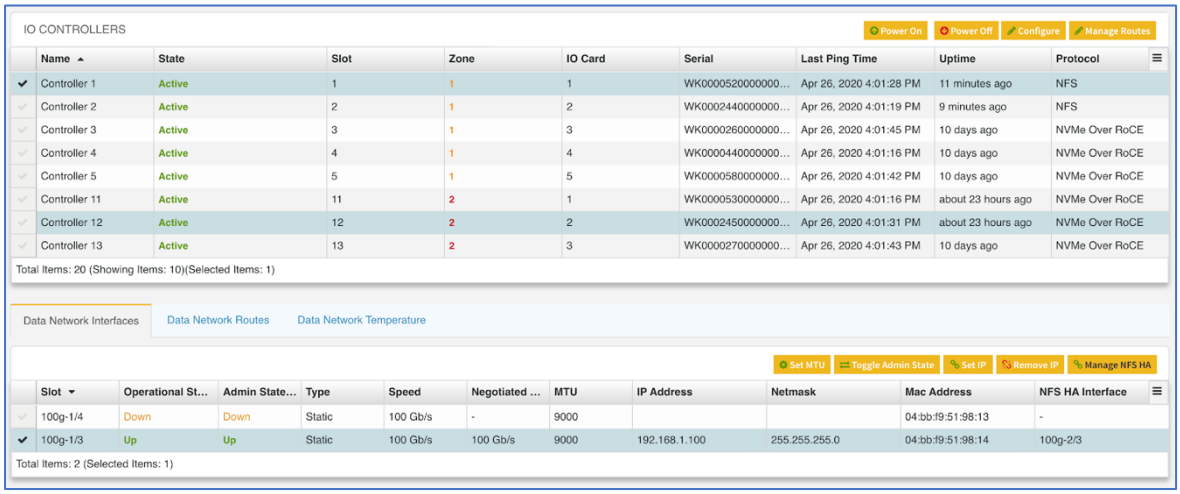
Step 1: Go to the System>IO Controllers menu item on the main web GUI. Select the desired primary NFS controller (which was set up previously), and on the bottom of the page the Data Network Interfaces tab will appear. Select the previously configured interface and press the “Manage NFS HA” button.



Step 2: Select the Standby IO Port



Step 3: At this point, the NFS HA pair will be created and usable by clients:



IO CONTROLLERS

Power On | Power Off | Configure | Manage Routes

	Name	State	Slot	Zone	IO Card	Serial	Last Ping Time	Uptime	Protocol
✔	Controller 1	Active	1	1	1	WK0000520000000…	Apr 26, 2020 4:01:28 PM	11 minutes ago	NFS
	Controller 2	Active	2	1	2	WK0002440000000…	Apr 26, 2020 4:01:19 PM	9 minutes ago	NFS
	Controller 3	Active	3	1	3	WK0000260000000…	Apr 26, 2020 4:01:45 PM	10 days ago	NVMe Over RoCE
	Controller 4	Active	4	1	4	WK0000440000000…	Apr 26, 2020 4:01:16 PM	10 days ago	NVMe Over RoCE
	Controller 5	Active	5	1	5	WK0000580000000…	Apr 26, 2020 4:01:42 PM	10 days ago	NVMe Over RoCE
	Controller 11	Active	11	2	1	WK0000530000000…	Apr 26, 2020 4:01:16 PM	about 23 hours ago	NVMe Over RoCE
	Controller 12	Active	12	2	2	WK0002450000000…	Apr 26, 2020 4:01:31 PM	about 23 hours ago	NVMe Over RoCE
	Controller 13	Active	13	2	3	WK0000270000000…	Apr 26, 2020 4:01:43 PM	10 days ago	NVMe Over RoCE

Total Items: 20 (Showing Items: 10)(Selected Items: 1)

Data Network Interfaces | Data Network Routes | Data Network Temperature

Set MTU | Toggle Admin State | Set IP | Remove IP | Manage NFS HA

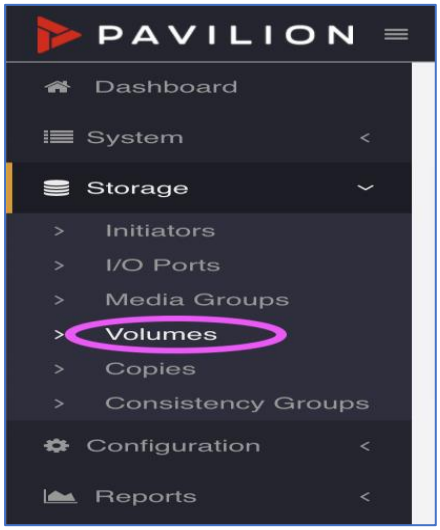
	Slot	Operational St…	Admin State…	Type	Speed	Negotiated …	MTU	IP Address	Netmask	Mac Address	NFS HA Interface
	100g-1/4	Down	Down	Static	100 Gb/s	-	9000			04:bb:f9:51:98:13	-
✔	100g-1/3	Up	Up	Static	100 Gb/s	100 Gb/s	9000	192.168.1.100	255.255.255.0	04:bb:f9:51:98:14	100g-2/3

Total Items: 2 (Selected Items: 1)

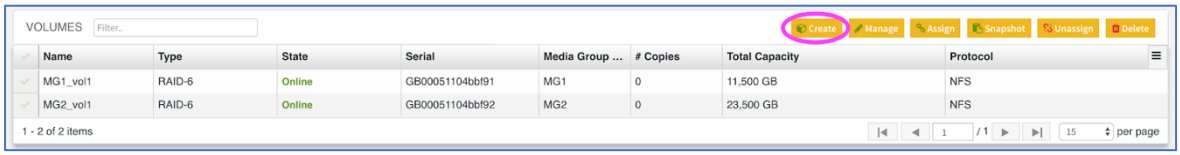
8.2 Creating an NFS volume

This section lists the steps required to create NFS volumes.

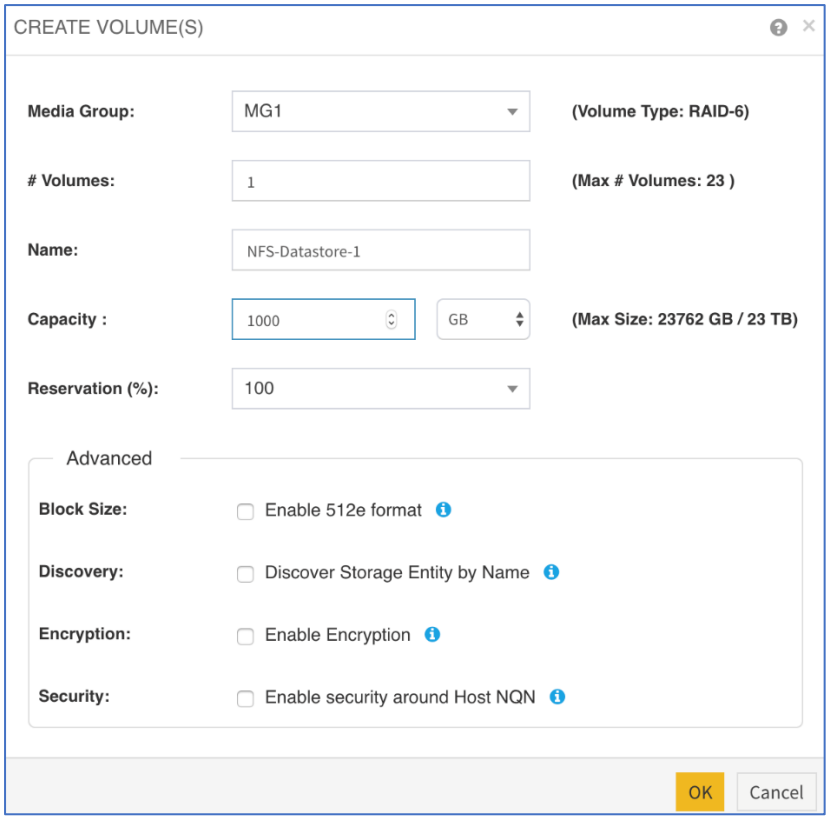
Step 1: Log in to the administration GUI, as usual. Go to “Storage Pane” menu and select “Volumes” You will be presented with a list of pre-existing volumes, and a set of buttons to manage them.



Step 2: Select “Create” to begin NFS export creation:



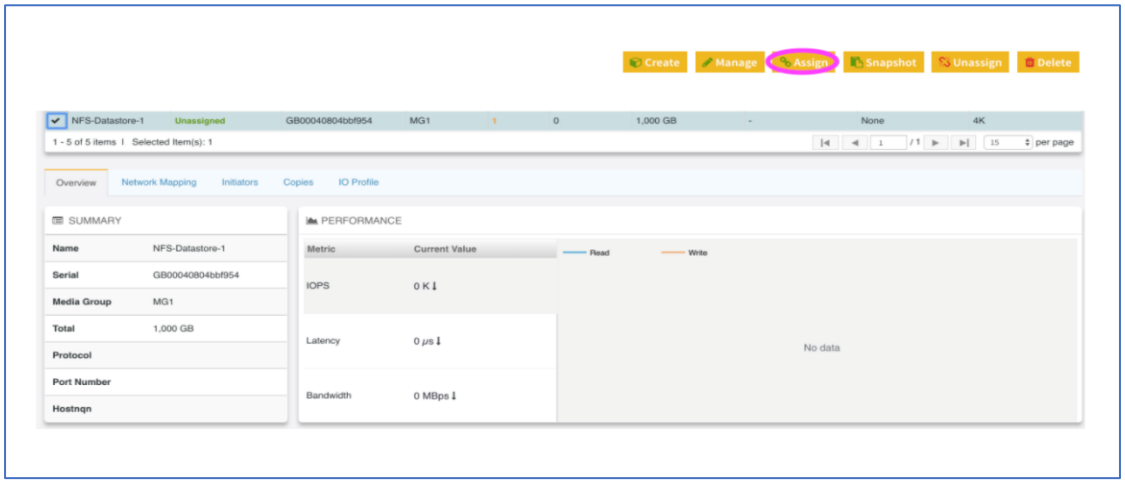
Step 3: Use the options (media group, name, total capacity, etc.) and configure the volume as desired. There is no special option needed to build an NFS volume, it uses the same procedure as an NVMe or iSCSI volume.



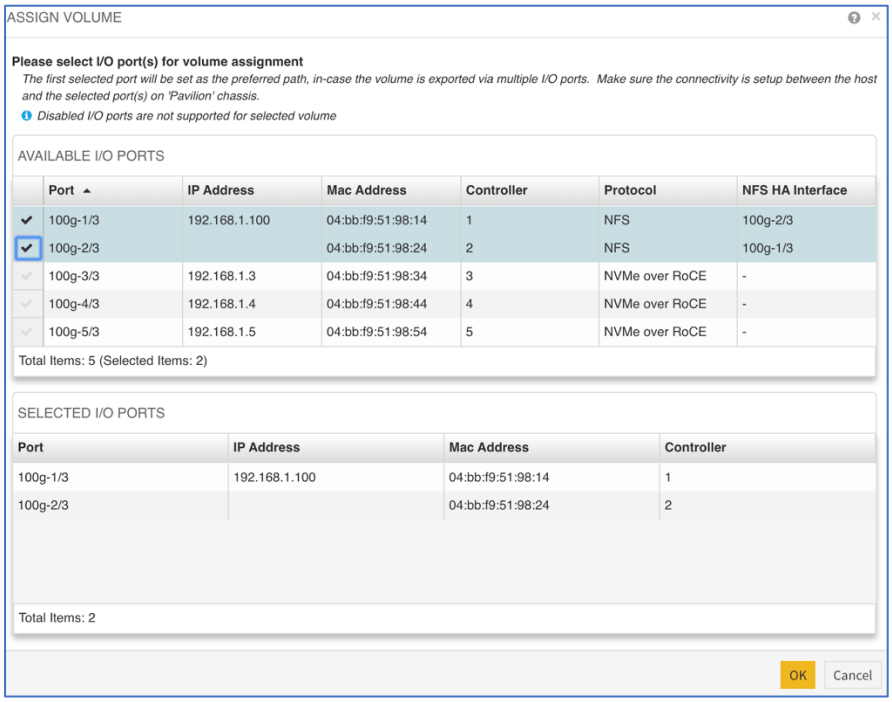
8.3 Assigning the volume to an NFS export

This section lists the seps to assign the volume to an NFS export.

Step 1: Select the newly created volume in the list and click on the “Assign” button:



Step 2: At this point, select the active and standby data ports used to build the NFS HA volume previously and hit “OK”:

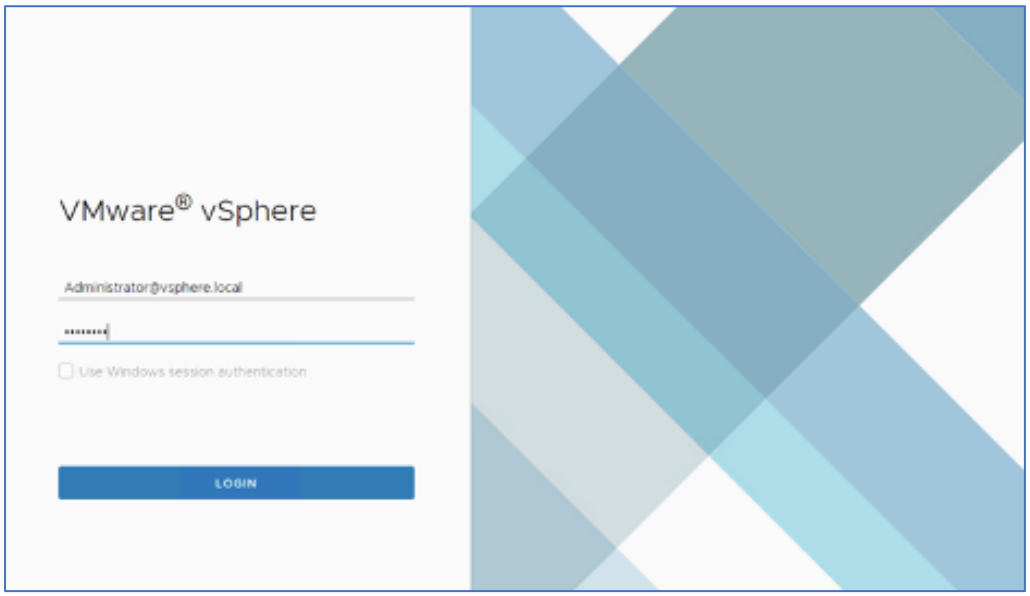


Step 3: The export will now be available for use by clients of the HA pair as /nfs/<volumeserial>, where <volumeserial> is the string shown in the “Volume tab” (normally “GB” followed by a string of numbers).

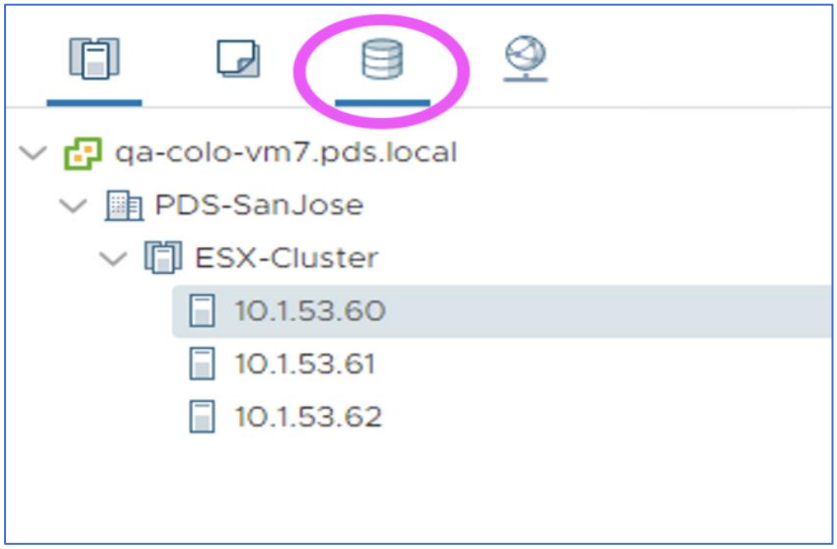
9. VMWare NFS Client Mounting and Options

This section lists the steps required for VMware NFS client mounting and options.

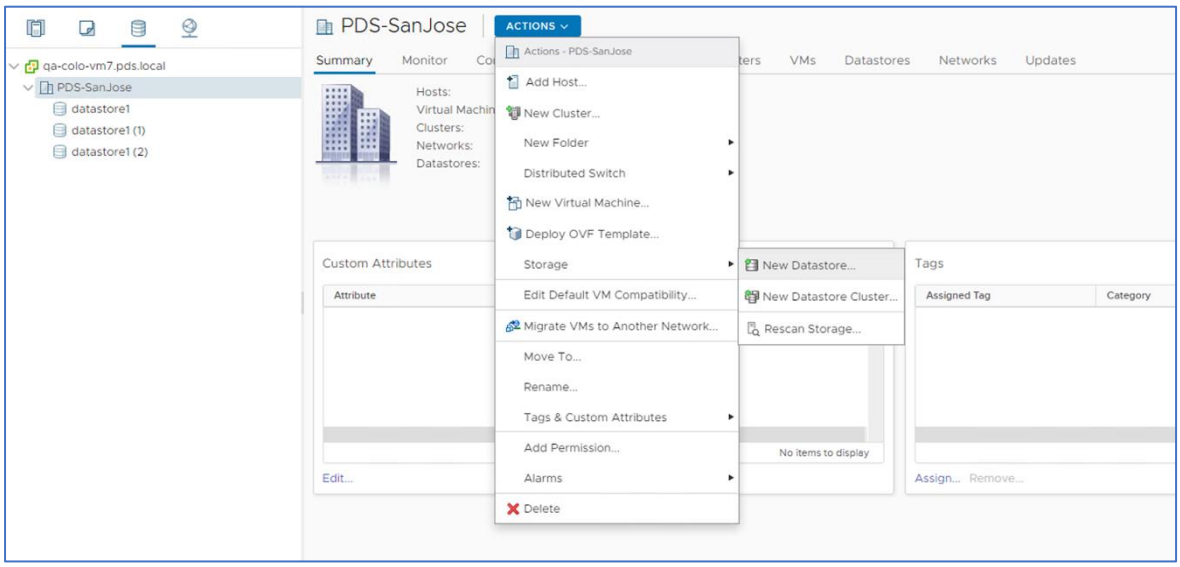
Step 1: Login Back to VCenter Server:



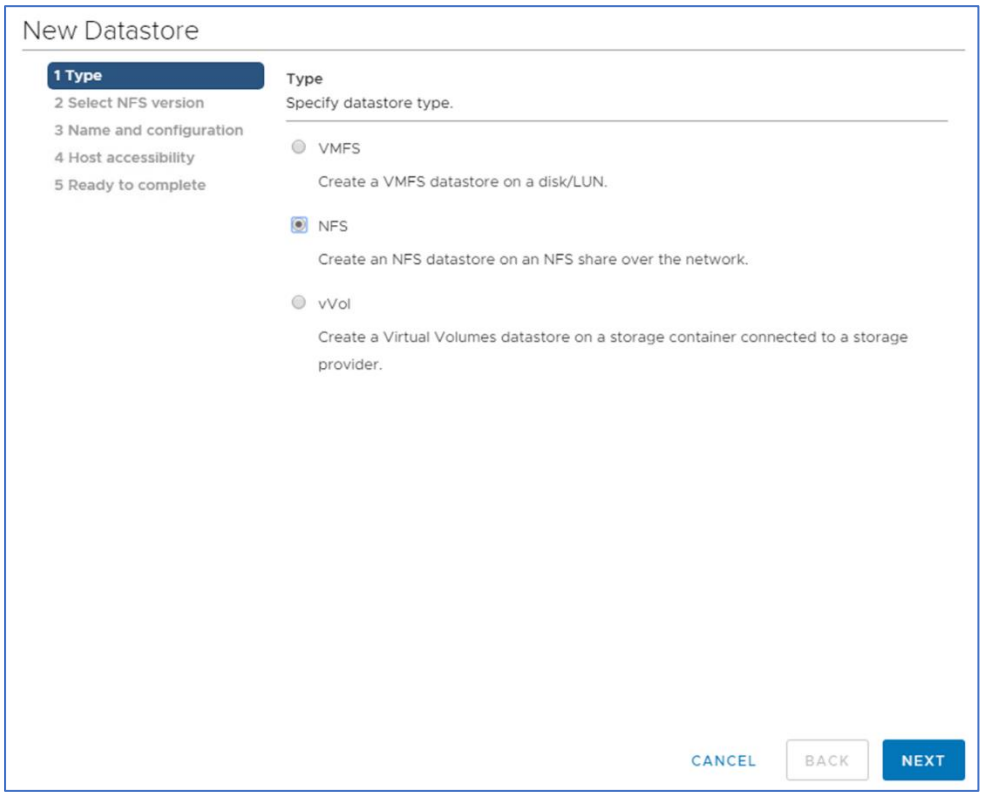
Step 2: At VCenter, click Storage Icon:



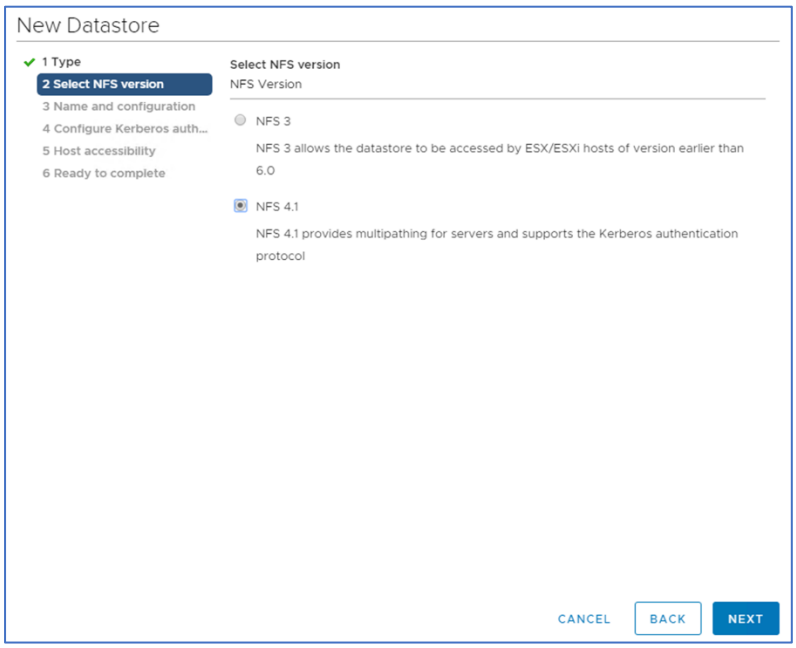
Step 3: Go to Actions and click “New Datastore”:



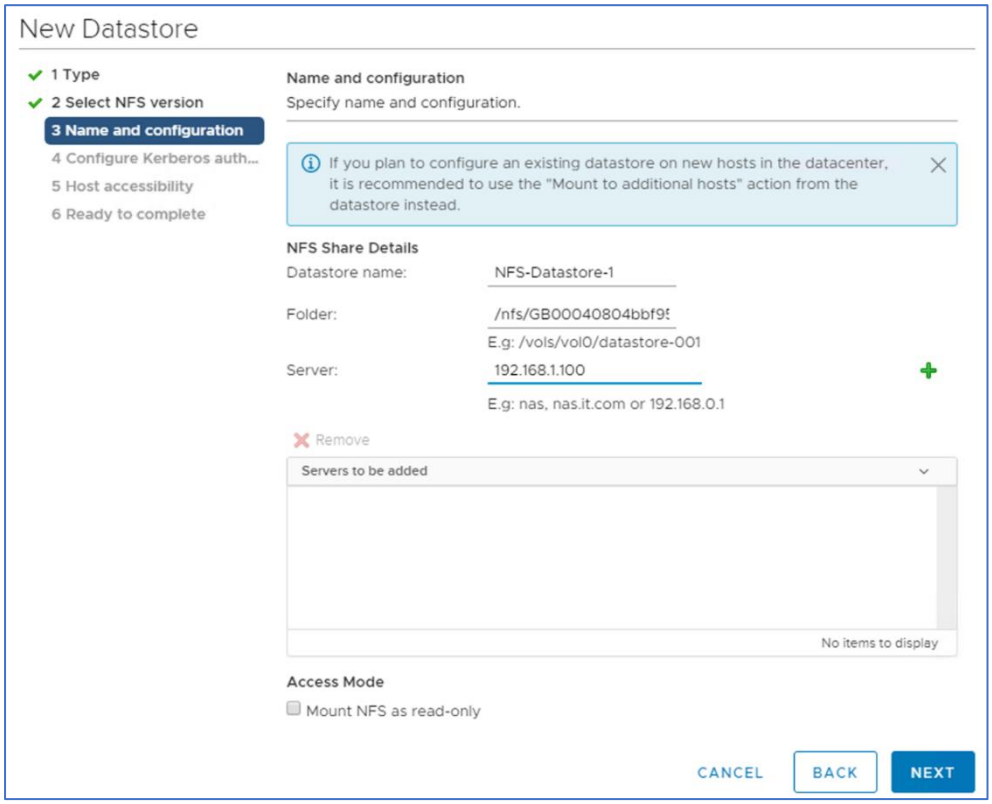
Step 4: Select Datastore type as “NFS”:



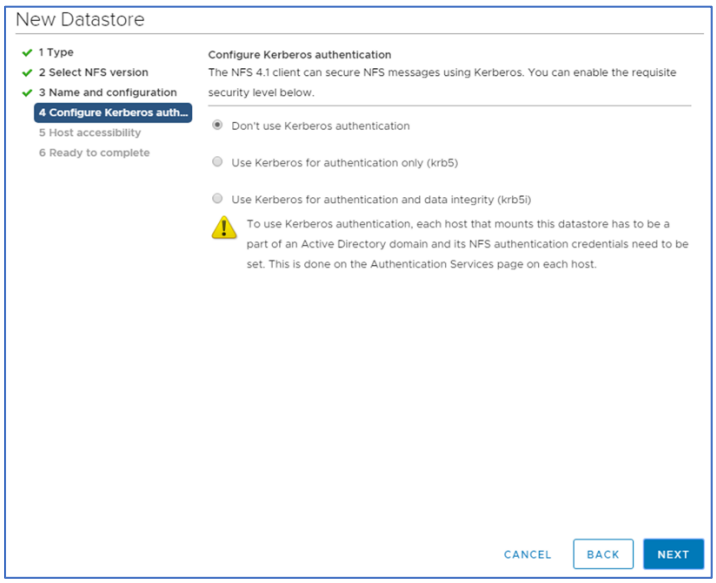
Step 5: Select the NFS version. For this document we will use NFS version 4.1:



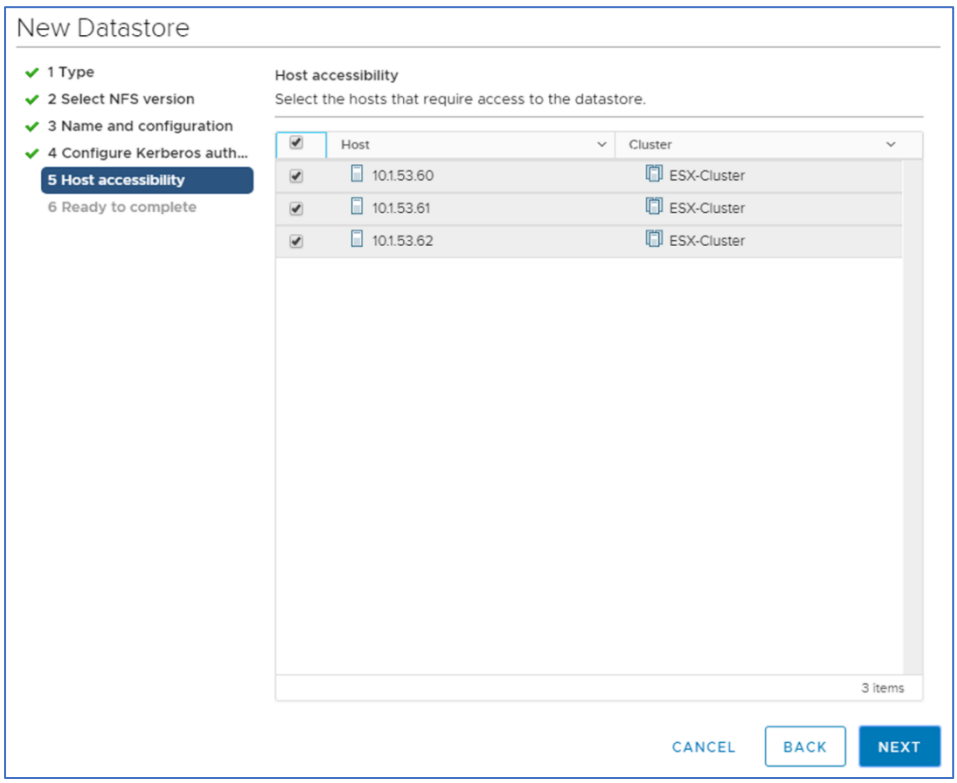
Step 6: In the next step provide the new datastore name, path of the pavilion volume and NFS Server IP address (Pavilion Controller IP address):



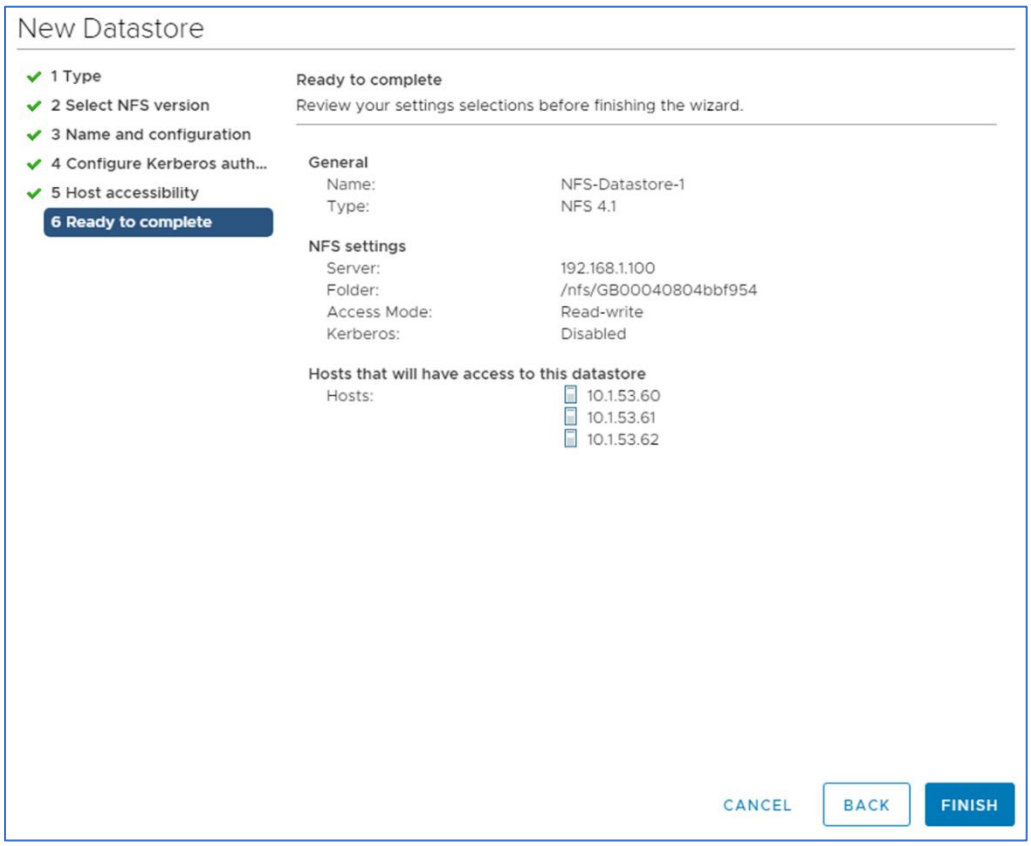
Step 7: Click “NEXT”:



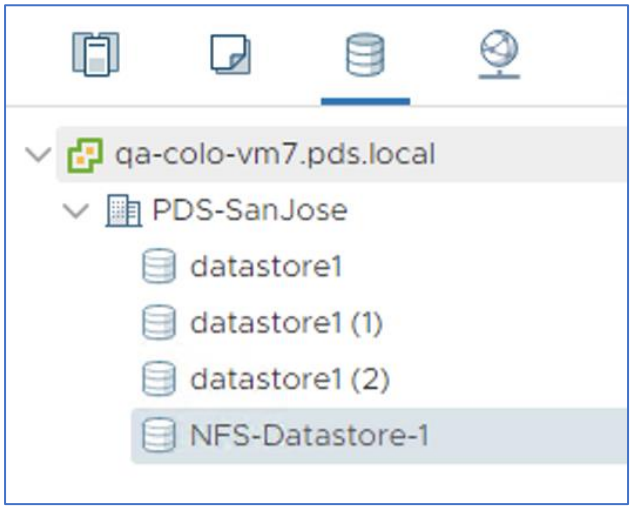
Step 8: Select the Hosts that will have access to the new NFS datastore:e



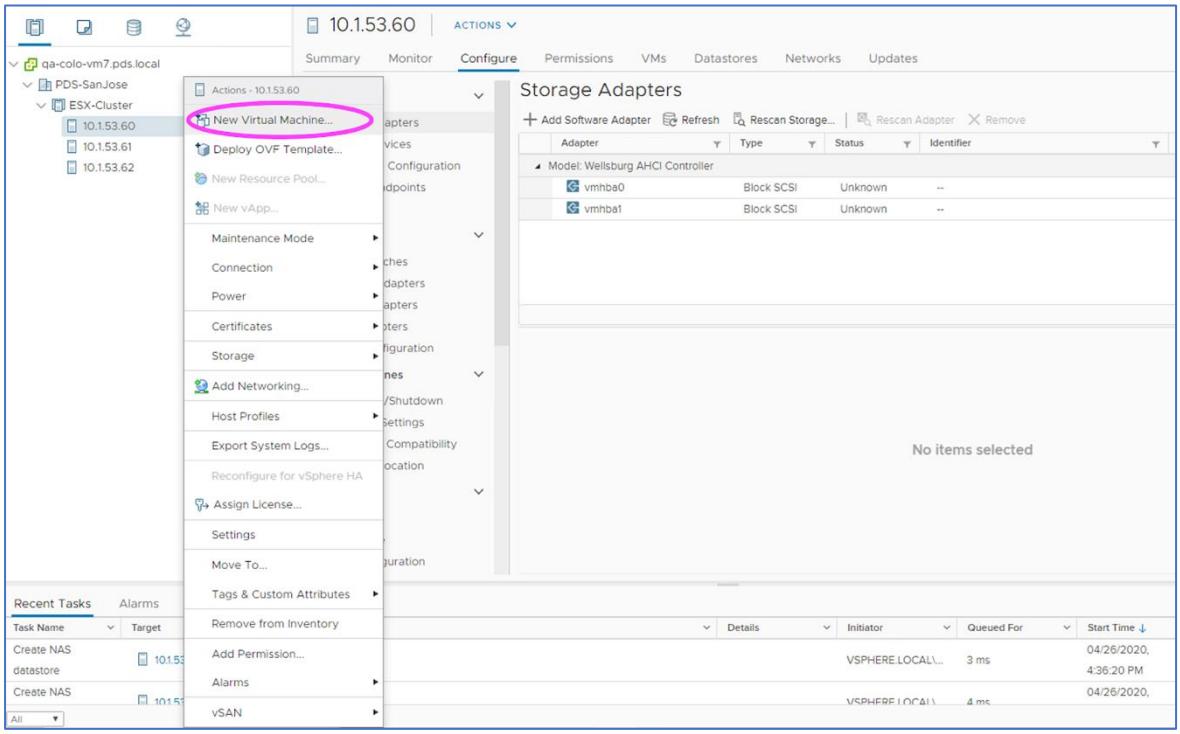
Step 9: Verify Information and click Finish:



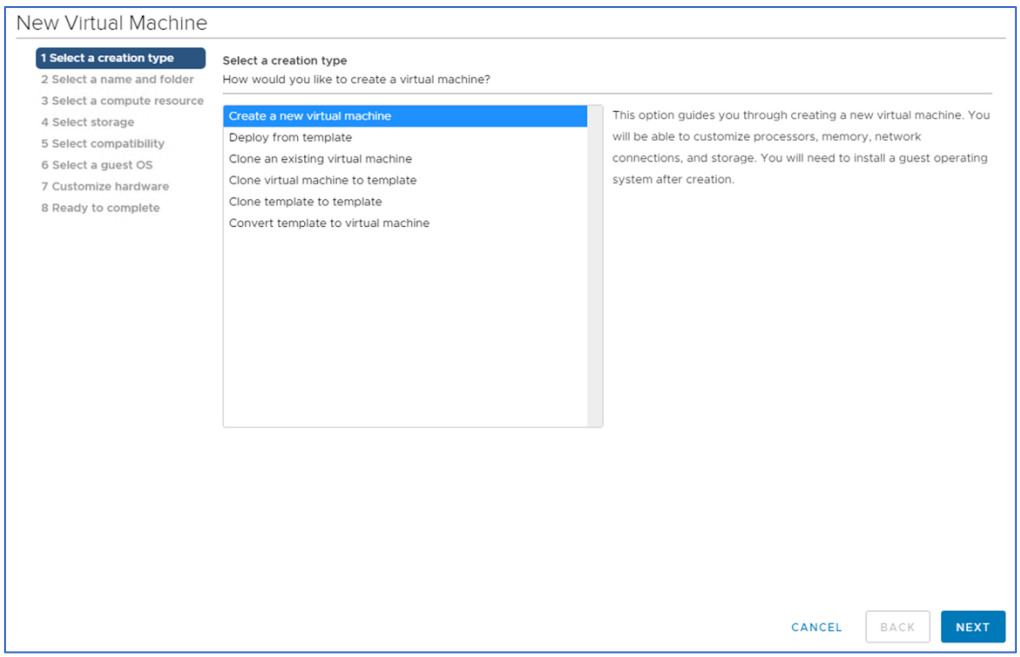
Step 10: New datastore “NFS-Datastore-1” has been configured and ready to use:



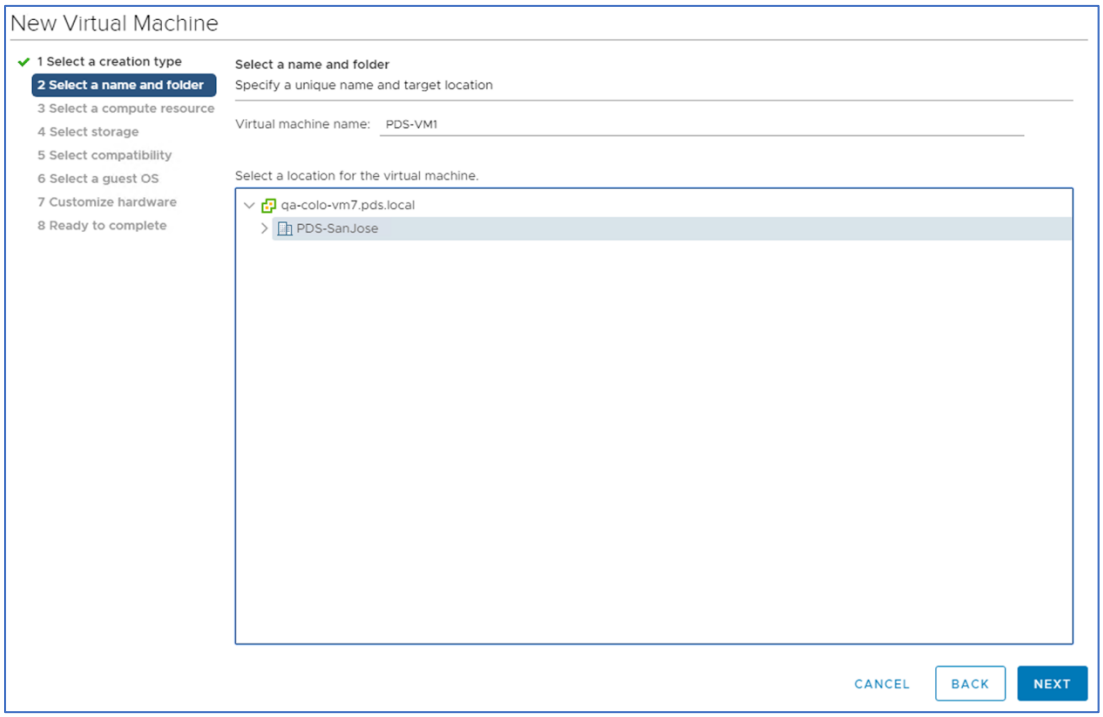
Step 11: Go back to Host and Clusters in Vcenter. Right click on any hosts in your ESX cluster and select New Virtual Machine:



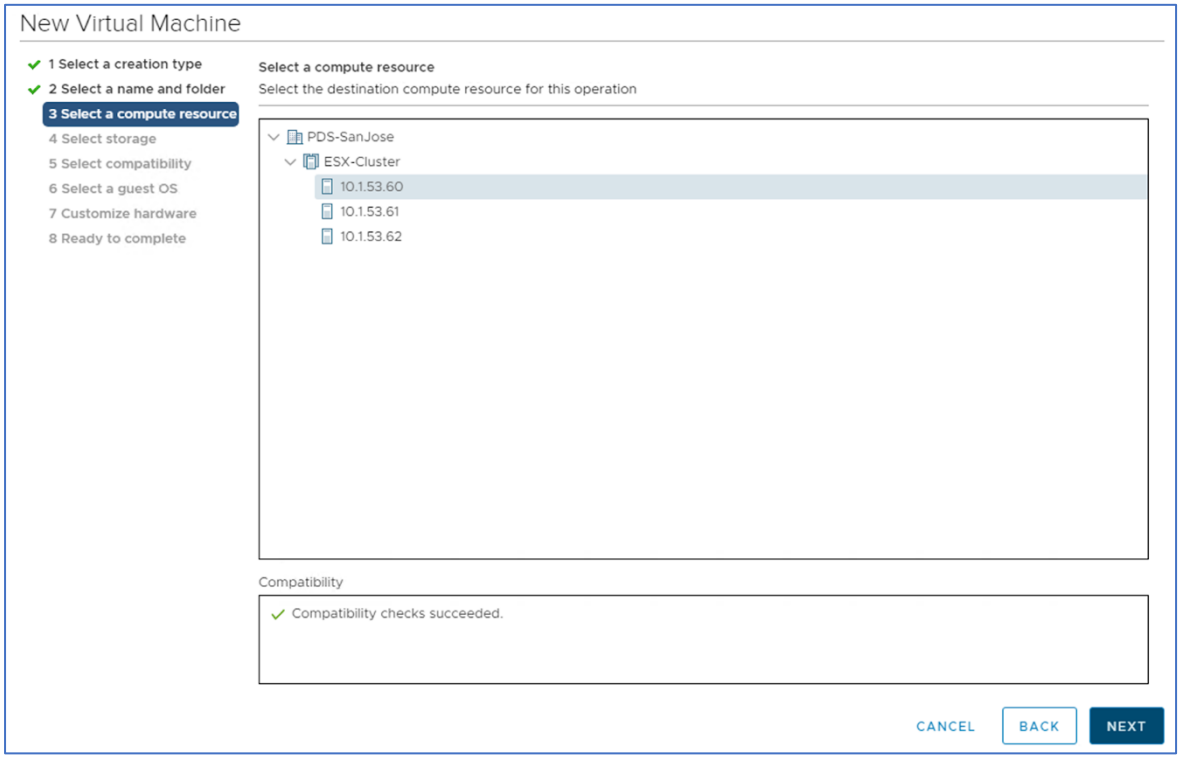
Step 12: Select Creation type and click “NEXT”:



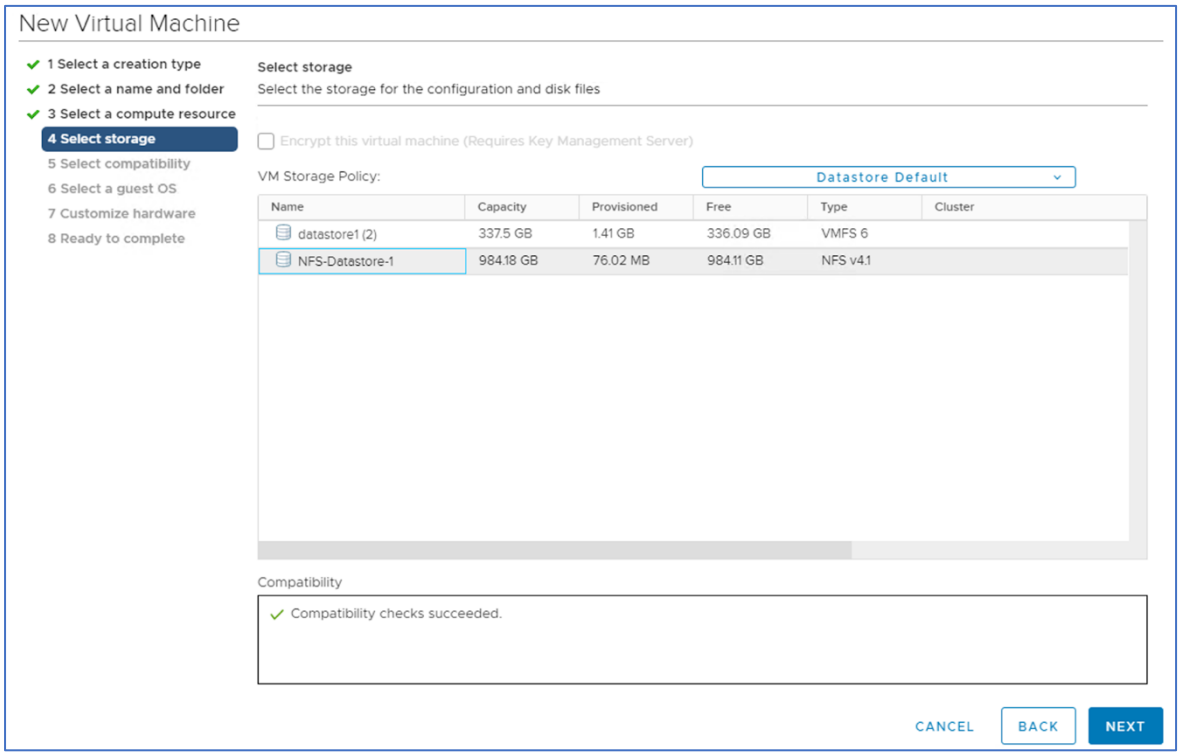
Step 13: Specify Virtual Machine Name and click “NEXT”:



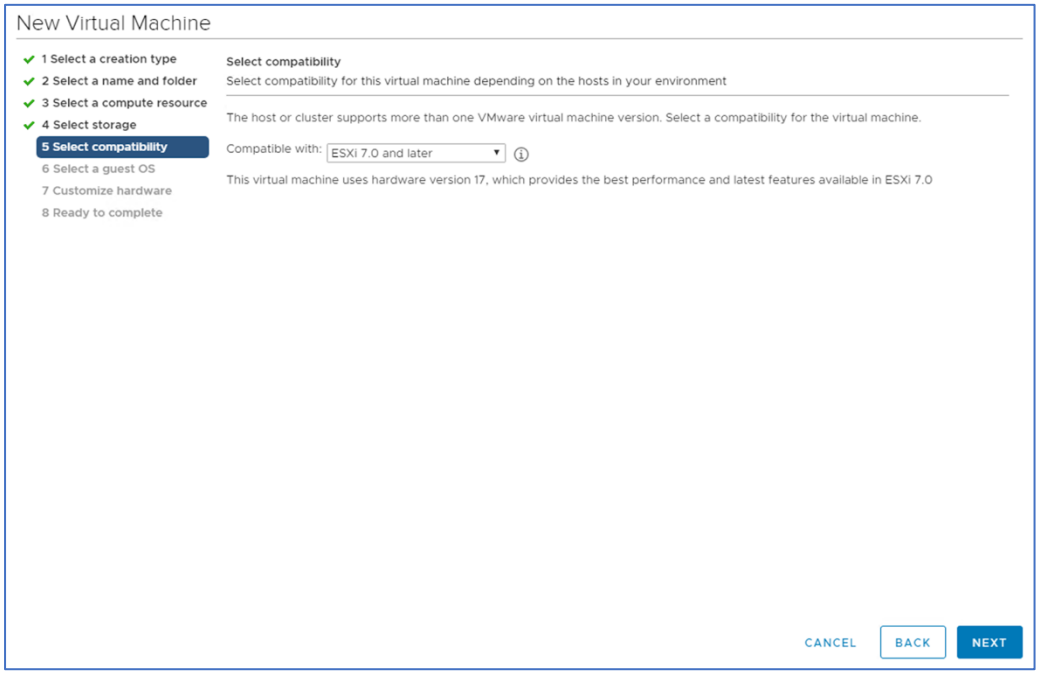
Step 14: Select primary host for the virtual machine and click “NEXT”:



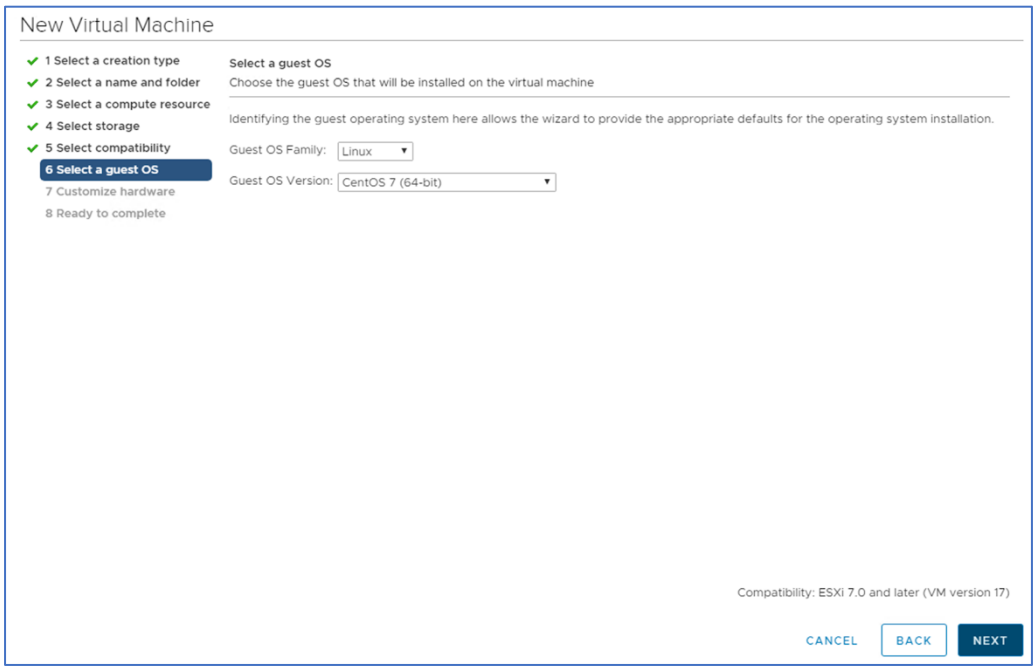
Step 15: Select datastore for the virtual machine and click “NEXT”:



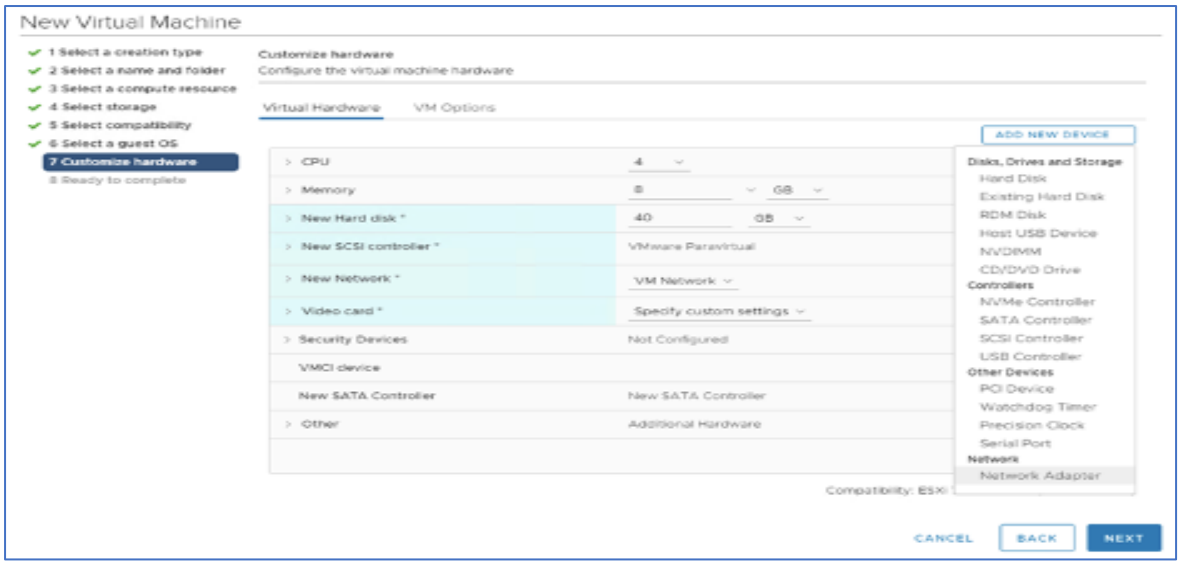
Step 16: Select Compatibility and click “NEXT”:

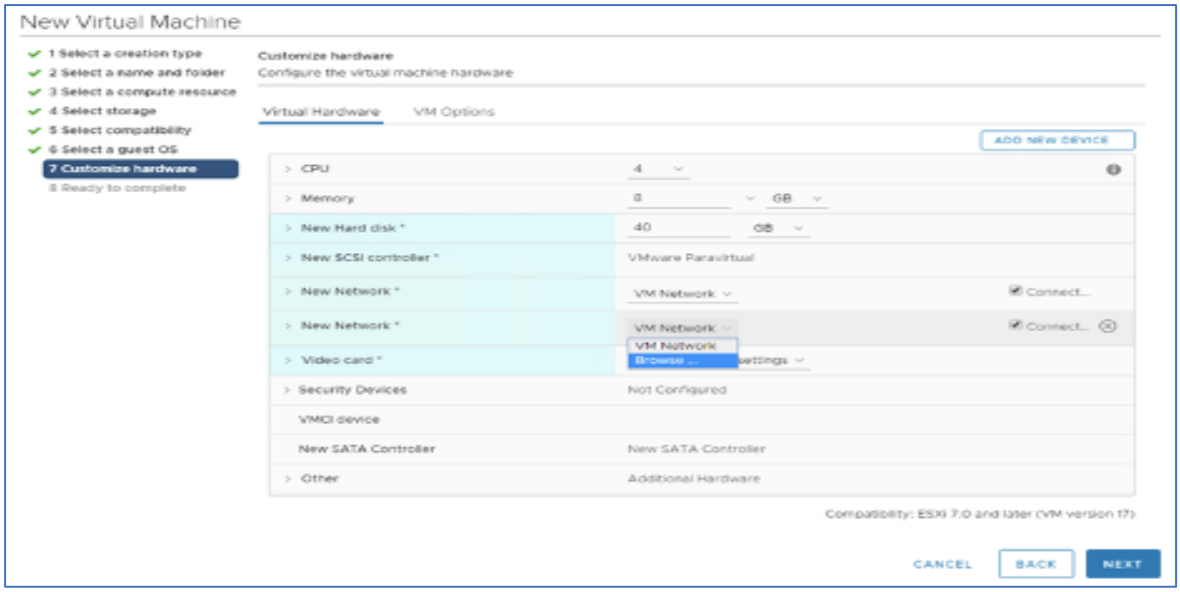


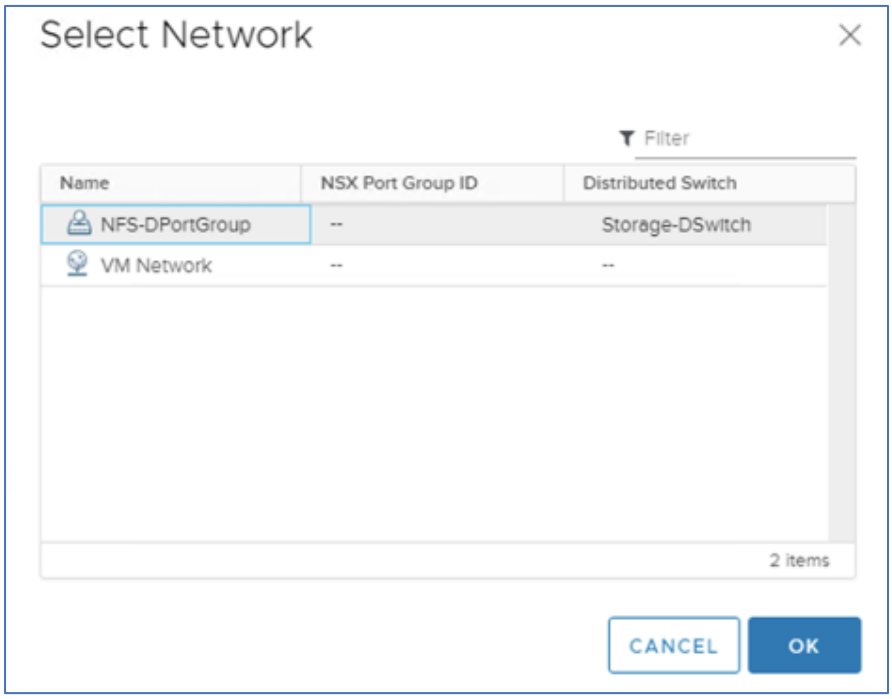
Step 17: Select OS and click “NEXT”:

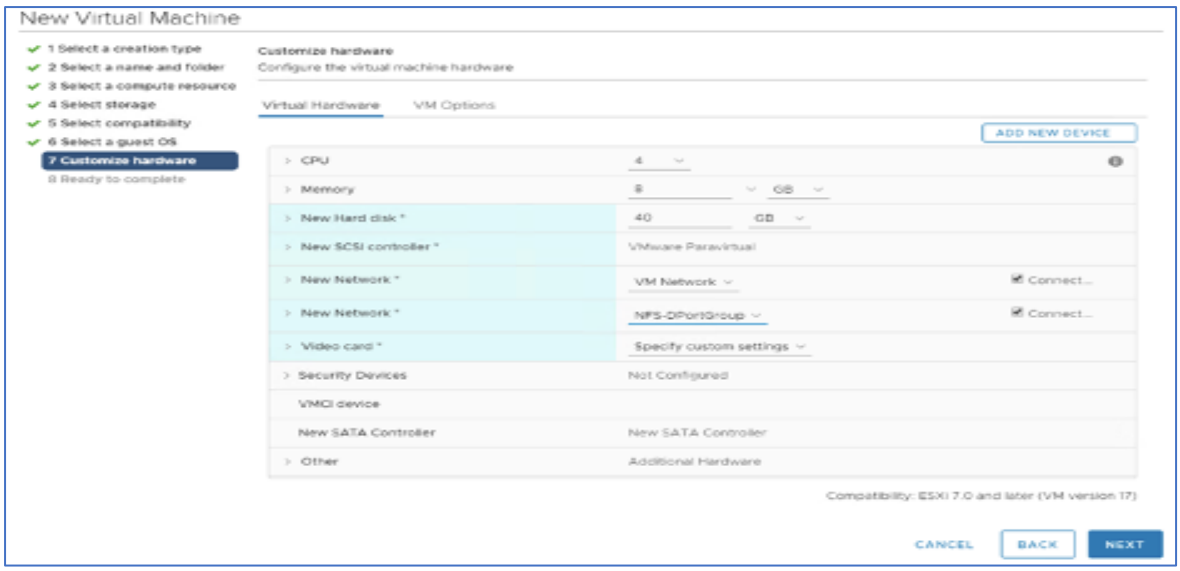


Step 18: Specify Virtual Machine Hardware (CPU, Memory, Network, Hard Disk etc):









Step 19: Verify VM Information and click “FINISH”:

Step 20: Power On the new created VM and install OS: