StarWind Virtual SAN®

Hyperconverged 2-Node Scenario with VMware vSphere 6.0

APRIL 2018

TECHNICAL PAPER

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About StarWind

StarWind is a pioneer in virtualization and a company that participated in the development of this technology from its earliest days. Now the company is among the leading vendors of software and hardware hyper-converged solutions. The company's core product is the years-proven StarWind Virtual SAN, which allows SMB and ROBO to benefit from cost-efficient hyperconverged IT infrastructure. Having earned a reputation of reliability, StarWind created a hardware product line and is actively tapping into hyperconverged and storage appliances market. In 2016, Gartner named StarWind "Cool Vendor for Compute Platforms" following the success and popularity of StarWind HyperConverged Appliance. StarWind partners with world-known companies: Microsoft, VMware, Veeam, Intel, Dell, Mellanox, Citrix, Western Digital, etc.

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Introduction

Traditionally, VMware vSphere requires a shared storage to ensure data safety, allow virtual machine migration, enable continuous application availability, and eliminate any single point of failure within an IT environment. VMware vSphere users need to choose between two options when selecting the shared storage:

- Hyperconverged solutions, which allow sharing the same hardware resources for the application (i.e., hypervisor, database) and the shared storage, thus decreasing the TCO and achieving the outstanding performance results.

- Compute and Storage separated solutions, which keep the compute and storage layers separate from each other, thus making the maintenance easier, increasing the hardware utilization efficiency, and allowing building the system for the specific purpose

This guide is intended for experienced VMware and Windows system administrators and IT professionals who need to configure **StarWind Virtual SAN®** hyperconverged solution for vSphere deployments. It provides step-by-step guidance on configuring a 2-node vSphere cluster using **StarWind Virtual SAN®** to convert the local storage of the ESXi hosts into a fault-tolerant shared storage resource for ESXi.

A full set of the up-to-date technical documentation can always be found here, or by pressing the **Help** button in the StarWind Management Console.

For any technical inquiries, please, visit our online community, Frequently Asked Questions page, or use the support form to contact our technical support department.

Pre-Configuring Servers

The diagram below illustrates the network and storage configuration of the solution described in this guide.
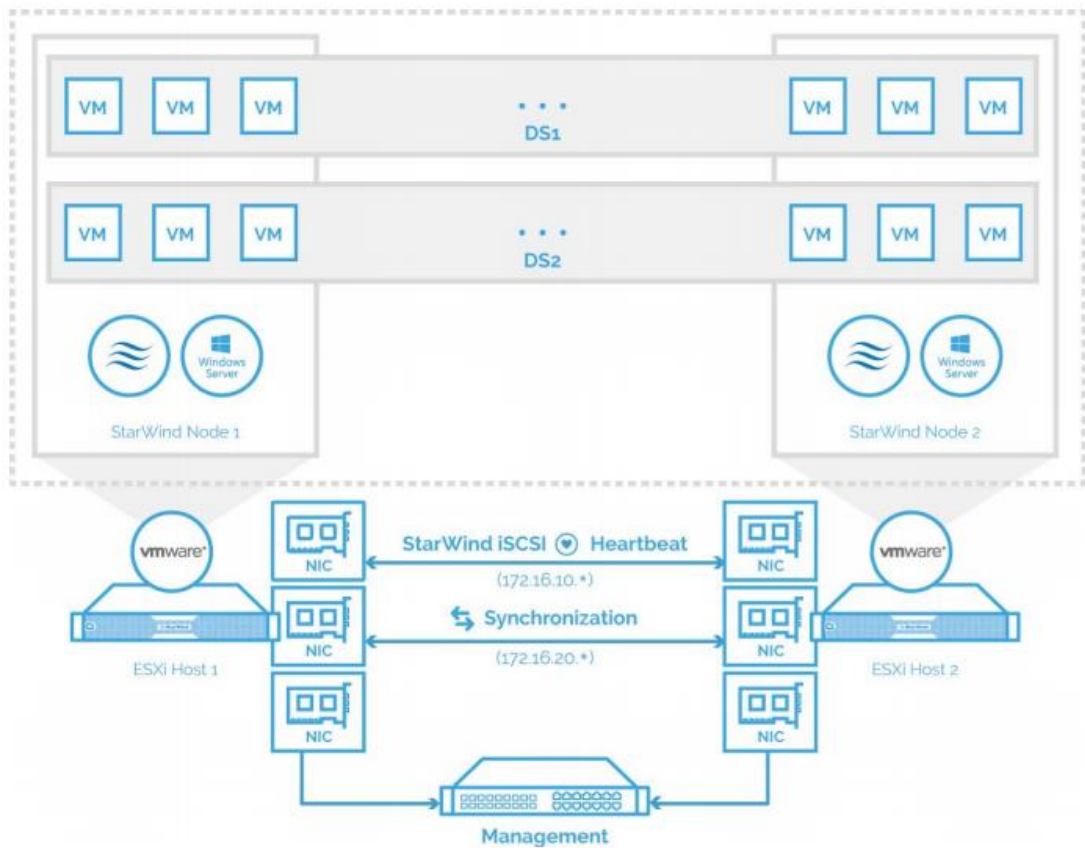
Preparing Hypervisor for StarWind Deployment

Configuring Networks

Configure network interfaces on each node to make sure that Synchronization and iSCSI/StarWind heartbeat interfaces are in different subnets and connected physically according to the network diagram above. In this document, 172.16.10.x subnet is used for iSCSI/StarWind heartbeat traffic, while 172.16.20.x one is used for the Synchronization traffic. All actions below should be applied to each ESXi server.

1.   Create a vSwitch to use for Management traffic if it is not presented.
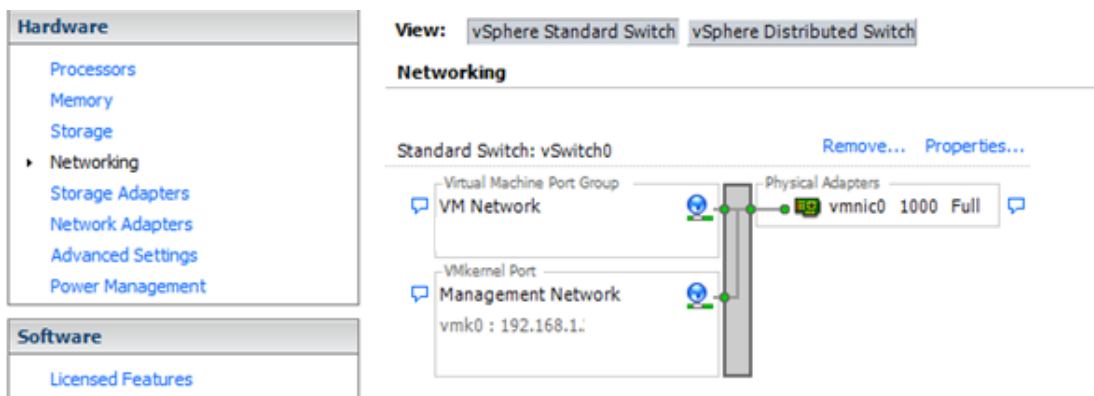
2.   Create a vSwitch for the iSCSI/ StarWind Heartbeat channel.
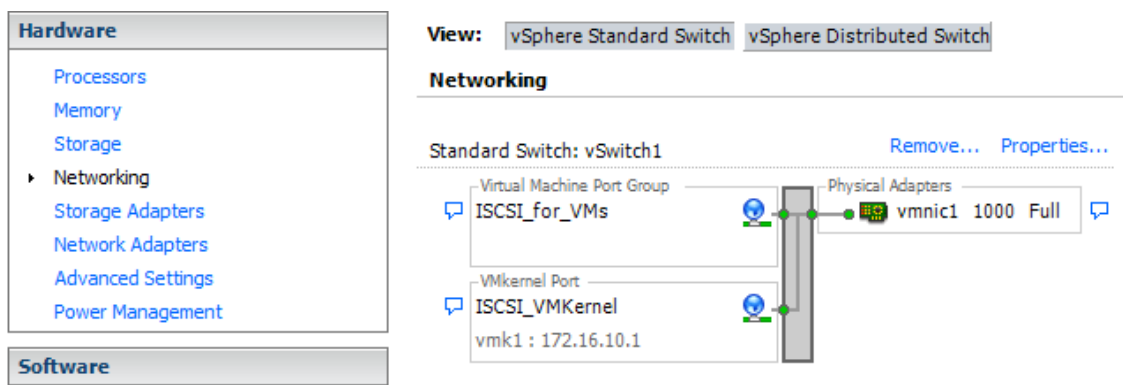
NOTE: A Virtual Machine Port Group should be created for iSCSI/ StarWind Heartbeat and Synchronization vSwitches, while a VMKernel port should be created only for iSCSI traffic. Static IP address should be assigned to VMKernel ports.

3. Create a vSwitch for the Synchronization channel.
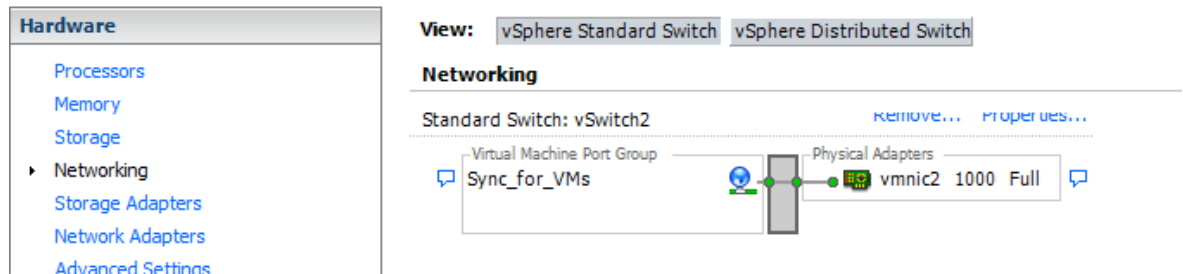
NOTE: It is recommended to set jumbo frames to 9000 on vSwitches and VMKernel ports for iSCSI and Synchronization traffic. Additionally, vMotion can be enabled on VMKernel ports.

4. Repeat the steps above for any other links intended for Synchronization and iSCSI/Heartbeat traffic on both ESXi nodes.

Preparing StarWind VMs

5.   Create Virtual Machines (VMs) on each Windows Server 2016/2012R2 ESXi host () and install StarWind VSAN.

StarWind VMs on ESXi hosts should be configured with the following settings:

RAM: at least 4 GB (plus the size of the RAM cache if it is going to be used);
CPUs: at least 4 virtual processors with 2 GHz reserved;
Hard disk 1: 100 GB for OS (recommended);
Hard disk 2: Depends on the storage volume intended for the shared storage.
NOTE: Each hard disk should be Thick Provisioned Eager Zeroed.

Network adapter 1: Management
Network adapter 2: iSCSI
Network adapter 3: Sync
NOTE: All network adapters should be VMXNET3.

NOTE: Active Directory Domain Services role can be added on StarWind Virtual Machine (VM) if necessary so that it could serve as a domain controller.

NOTE: When using Star Wind with synchronous replication feature inside of a Virtual Machine, it is recommended not to make backups and snapshots of the Virtual Machine with Star Wind Service which could pause the Star Wind Virtual Machine.
Pausing the Virtual Machines while Star Wind service under load may lead to split-brain issues in devices with synchronous replication and data corruption.

Configuring StarWind VMs startup/shutdown

6. Set up the VMs startup policy on both ESXi hosts in **Configuration -> Virtual Machine Startup and Shutdown -> Properties** menu. In the window that pops up, check **Allow virtual machines to start and stop automatically with the system** to enable the option, choose the stop-action as **Guest Shutdown**, and move up the StarWind VMs. Click **Ok** to proceed.

7. Start both StarWind virtual machines, install OS and StarWind Virtual SAN.

Downloading, Installing and Registering the Software

8.   Download the StarWind setup executable file from the official website by following the link:
https://www.starwind.com/registration-starwind-virtual-san

9.   Launch the downloaded setup file on the server where **StarWind Virtual SAN** or one of its components is to be installed. The setup wizard appears.

10.   Read and accept the License Agreement.
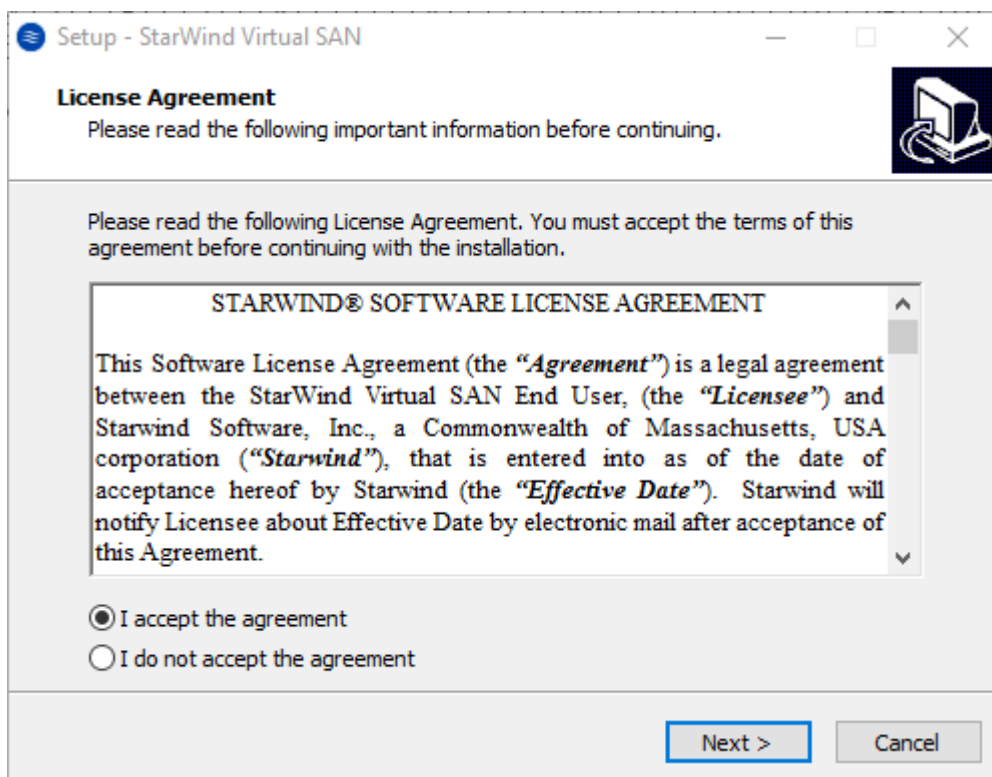
Click **Next** to continue.

11. Read the information about the new features and improvements carefully. Red text indicates warnings for users who are updating their existing software installations.
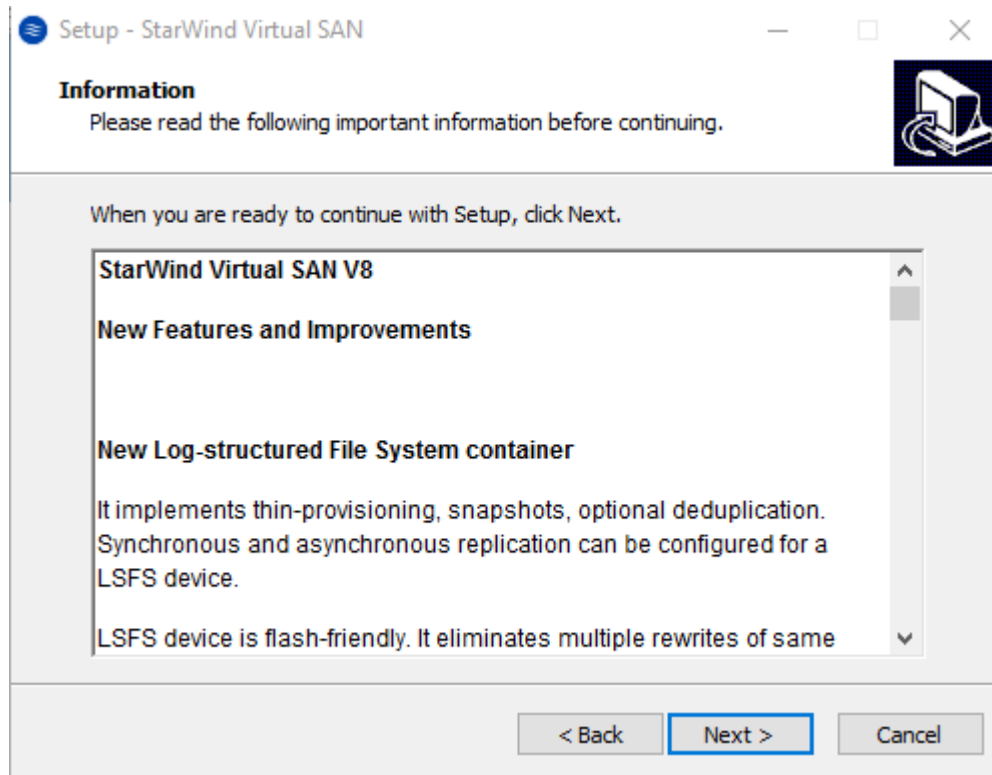
Click **Next** to continue.

12. Select the following components for the minimum setup:

- **StarWind Virtual SAN Service**
  StarWind VSAN service is the "core" of the software. It allows creating iSCSI targets and sharing virtual and physical devices. The service can be managed via StarWind Management Console on any Windows computer or VSA connected to the network. Alternatively, the service can be managed from StarWind Web Console which is deployed separately.

- **StarWind Management Console**
  StarWind Management Console is the Graphic User Interface (GUI) part of the software that controls and monitors all storage-related operations (e.g., allows users to create targets and devices on StarWind Virtual SAN servers connected to the network).
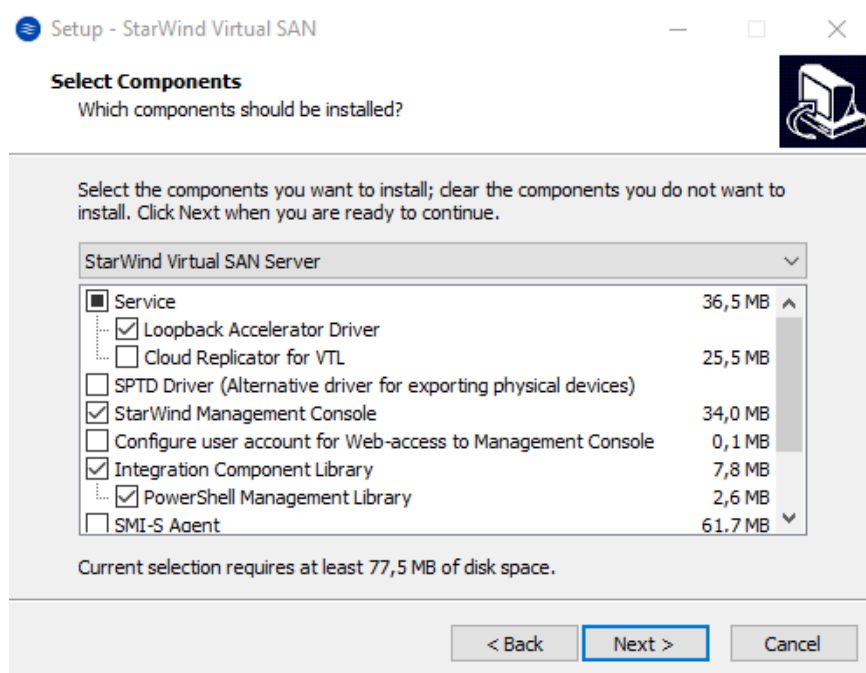
13. Specify **Start Menu Folder**.
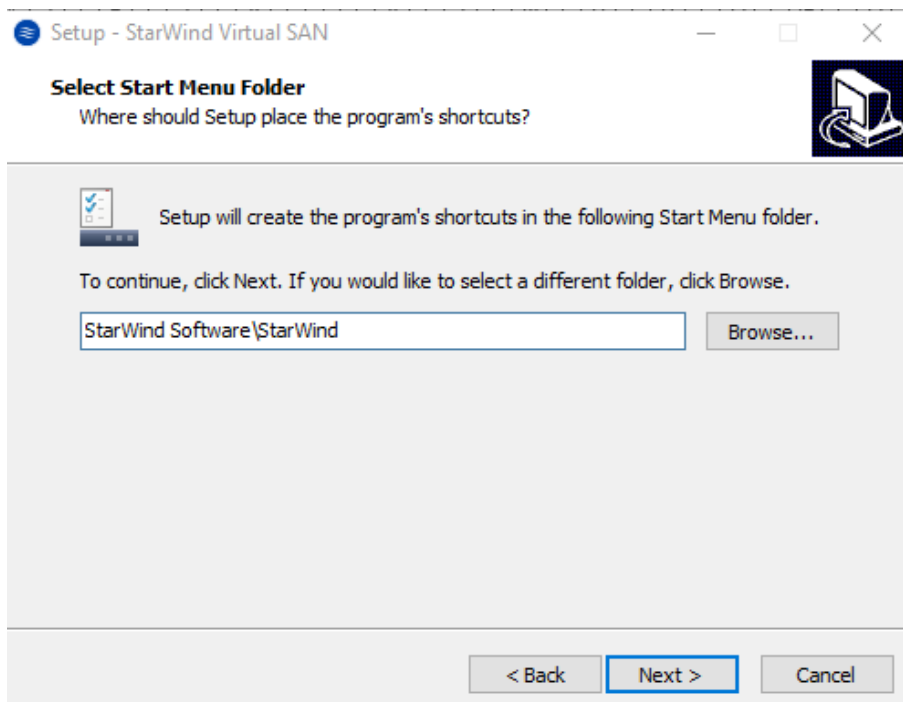
Click **Next** to continue.

14. Tick the checkbox if a desktop icon is needed.
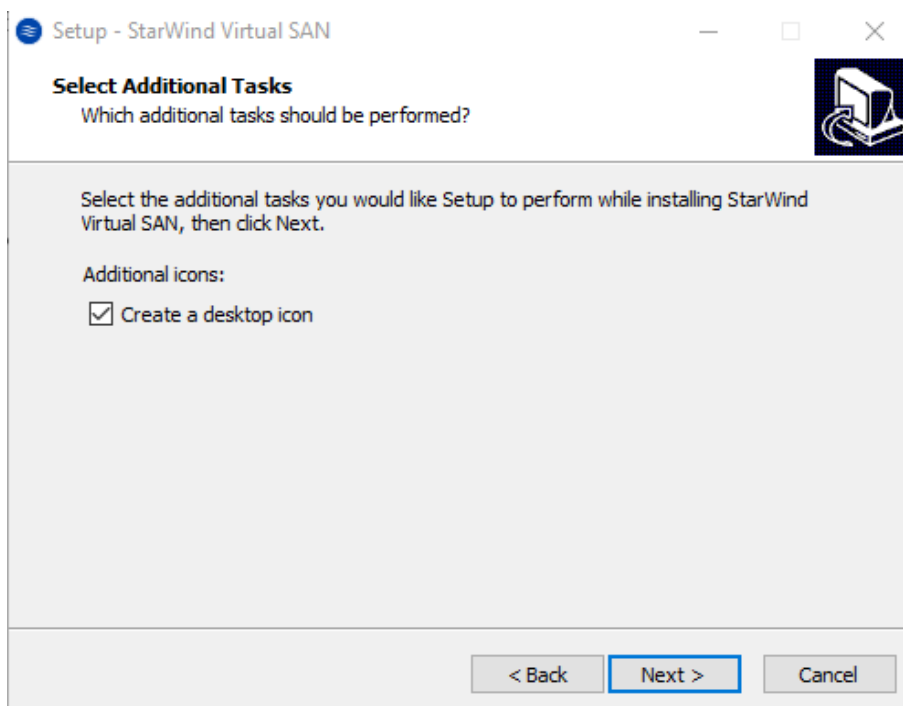
15.   The prompt that appears allows requesting a time-limited fully functional evaluation key or a FREE version key. Alternatively, use the already purchased **StarWind Virtual SAN** commercial license key. Select the corresponding option.
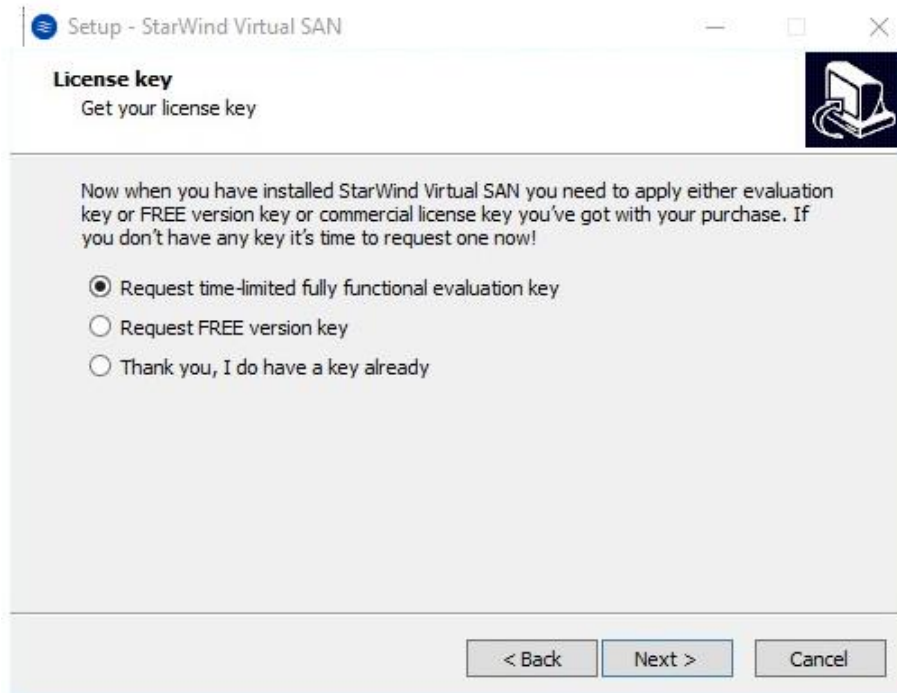
16.   Click **Browse** to choose the license file.
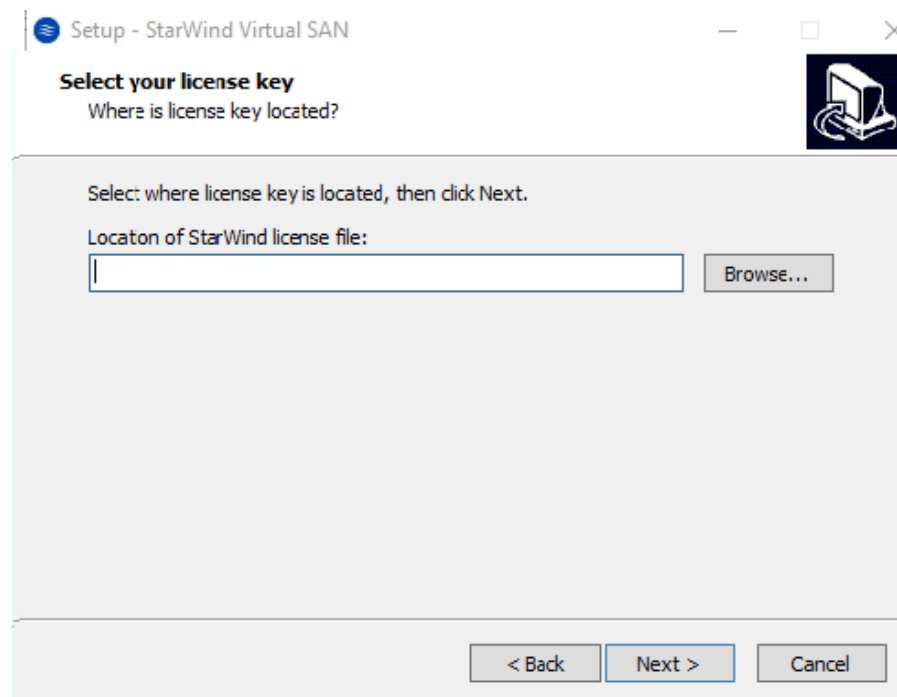
17. Verify the licensing information.
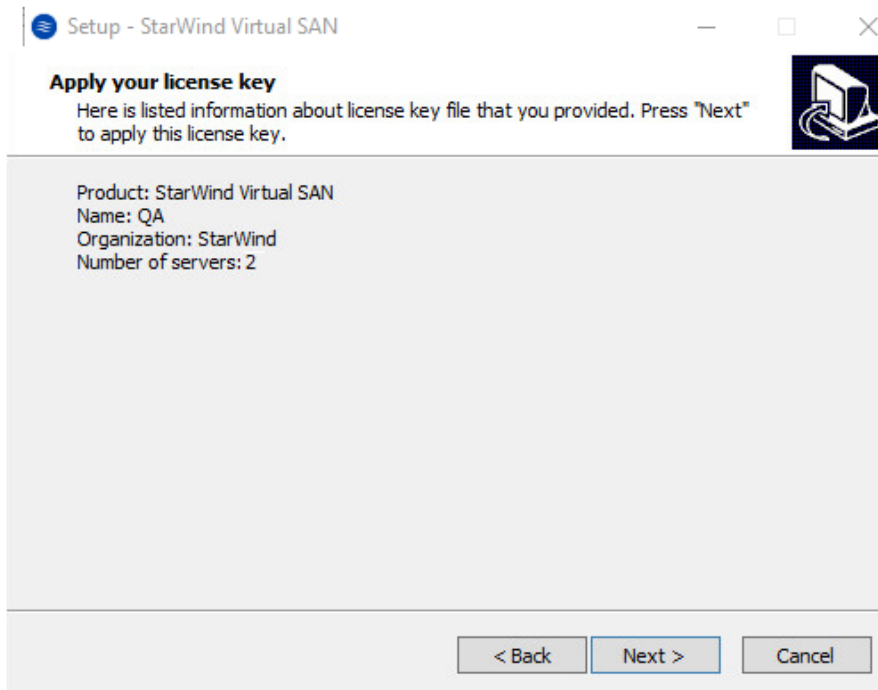
Click **Next** to apply the license key.

18. Verify the installation settings. Click **Back** to make any changes or **Install** to continue.
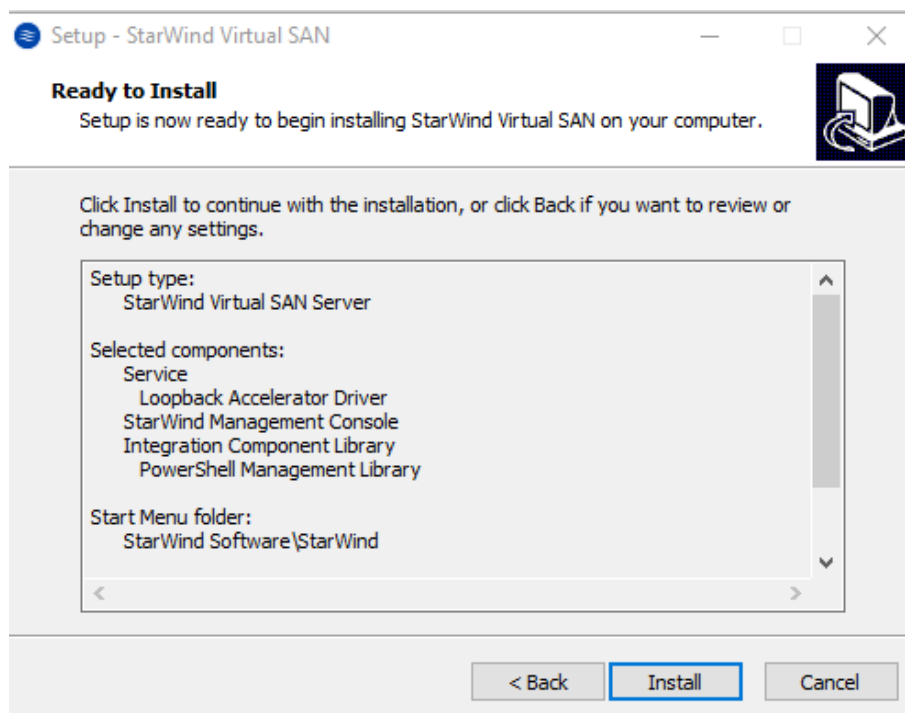
19.   Click **Finish** to complete the installation process. Optionally, StarWind Management
       Console can be launched by ticking the corresponding checkbox.
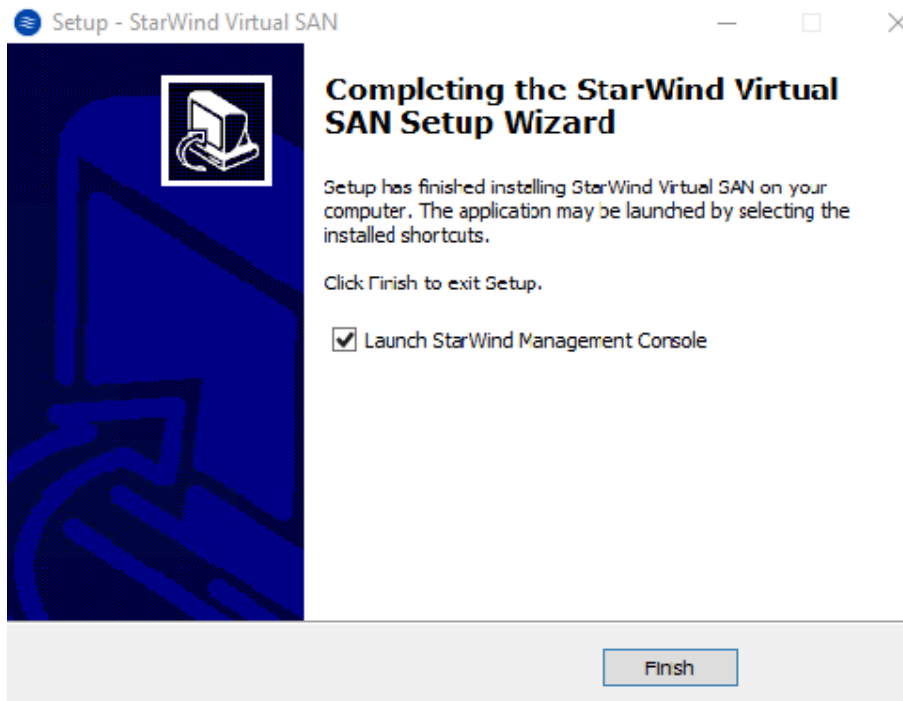
20.   Repeat the steps above on the second virtual machine.

Configuring Automatic storage rescan

For each ESXi host, configure the automatic storage rescan.

Log in to StarWind VM and install vSphere PowerCLI on each StarWind virtual machine by adding the PowerShell module (Internet connectivity is required). To do so, run the following PowerShell command:
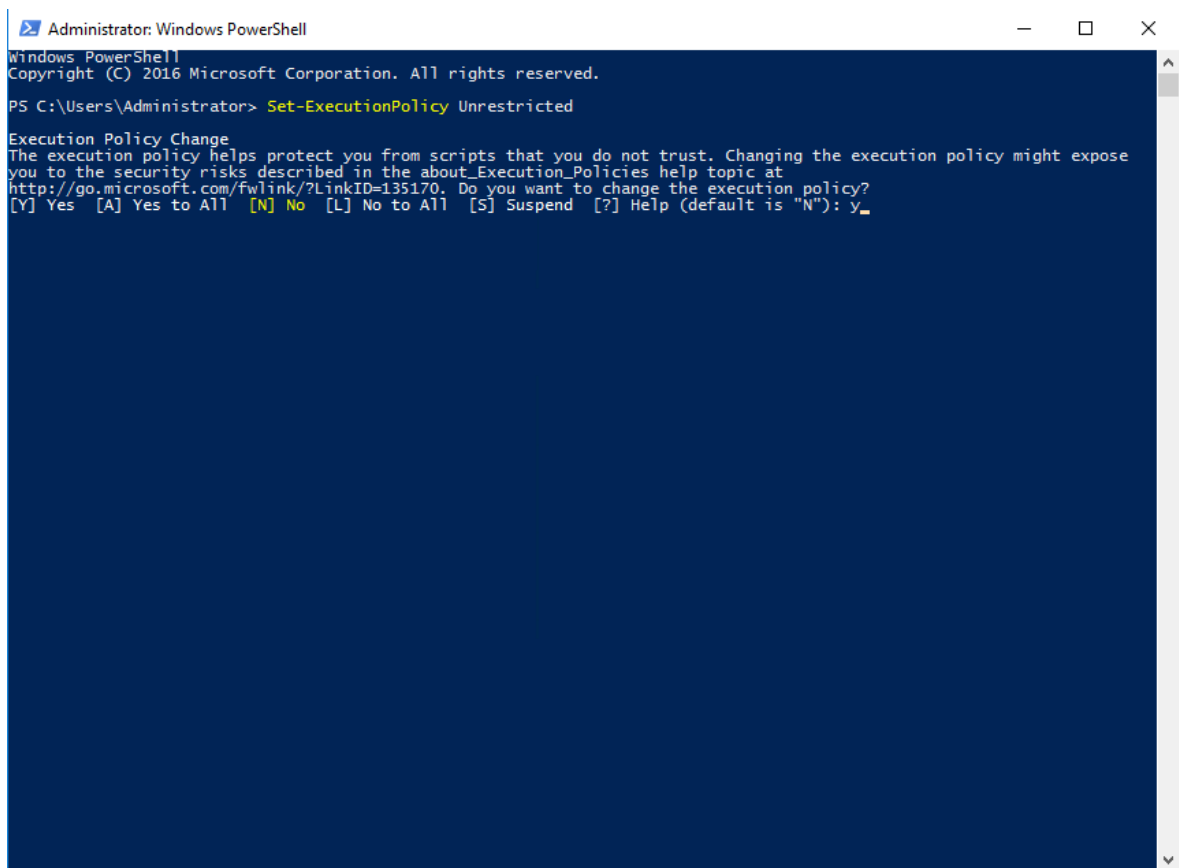
Install-Module -Name VMware.PowerCLI -AllowClobber

NOTE: In case of using Windows Server 2012 R2, online PowerCLI installation requires Windows Management Framework 5.1 or later installed on VMs. Windows Management Framework 5.1 can be downloaded by following the link:
https://go.microsoft.com/fwlink/?linkid=839516

21. Open PowerShell and change the Execution Policy to **Unrestricted** by running the following command:

Set-ExecutionPolicy Unrestricted

22.   Create PowerShell script which will perform an HBA rescan on the hypervisor host.
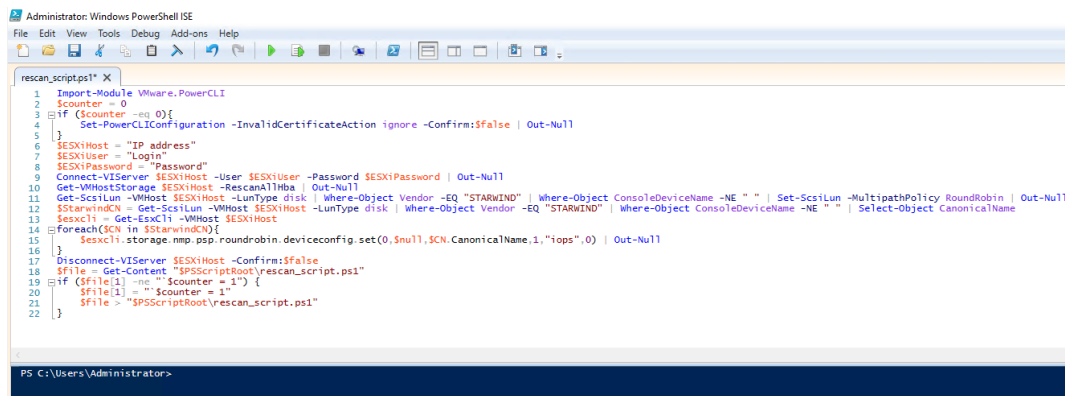
Import-Module VMware.PowerCLI
$counter = 0
if ($counter -eq 0){
Set-PowerCLIConfiguration -InvalidCertificateAction ignore -Confirm:$false | Out-Null
}
$ESXiHost = "IP address"
$ESXiUser = "Login"
$ESXiPassword = "Password"
Connect-VIServer $ESXiHost -User $ESXiUser -Password $ESXiPassword | Out-Null
Get-VMHostStorage $ESXiHost -RescanAllHba | Out-Null
Get-ScsiLun -VMHost $ESXiHost -LunType disk | Where-Object Vendor -EQ "STARWIND" |
Where-Object ConsoleDeviceName -NE " " | Set-ScsiLun -MultipathPolicy RoundRobin | Out-Null
$StarwindCN = Get-ScsiLun -VMHost $ESXiHost -LunType disk |
Where-Object Vendor -EQ "STARWIND" | Where-Object ConsoleDeviceName -NE " " |
Select-Object CanonicalName
$esxcli = Get-EsxCli -VMHost $ESXiHost
foreach($CN in $StarwindCN){
$esxcli.storage.nmp.psp.roundrobin.deviceconfig.set(0,$null,$CN.CanonicalName,1,"iops",0) |
Out-Null
}
Disconnect-VIServer $ESXiHost -Confirm:$false
$file = Get-Content "$PSScriptRoot\rescan_script.ps1"
if ($file[1] -ne "`$counter = 1") {
$file[1] = "`$counter = 1"
$file > "$PSScriptRoot\rescan_script.ps1"
}

In the corresponding lines, specify the IP address and login credentials of the ESXi host on which the current StarWind VM is stored and running:

$ESXiHost1 = "IP address"

$ESXiUser = "Login"

$ESXiPassword = "Password"

Save the script as rescan_script.ps1 to the root of the C:\ drive of the VM.

23.   Perform the configuration steps above on the partner node.

24.   Go to **Control Panel -> Administrative Tools -> Task Scheduler -> Create Basic Task** and follow the wizard steps:
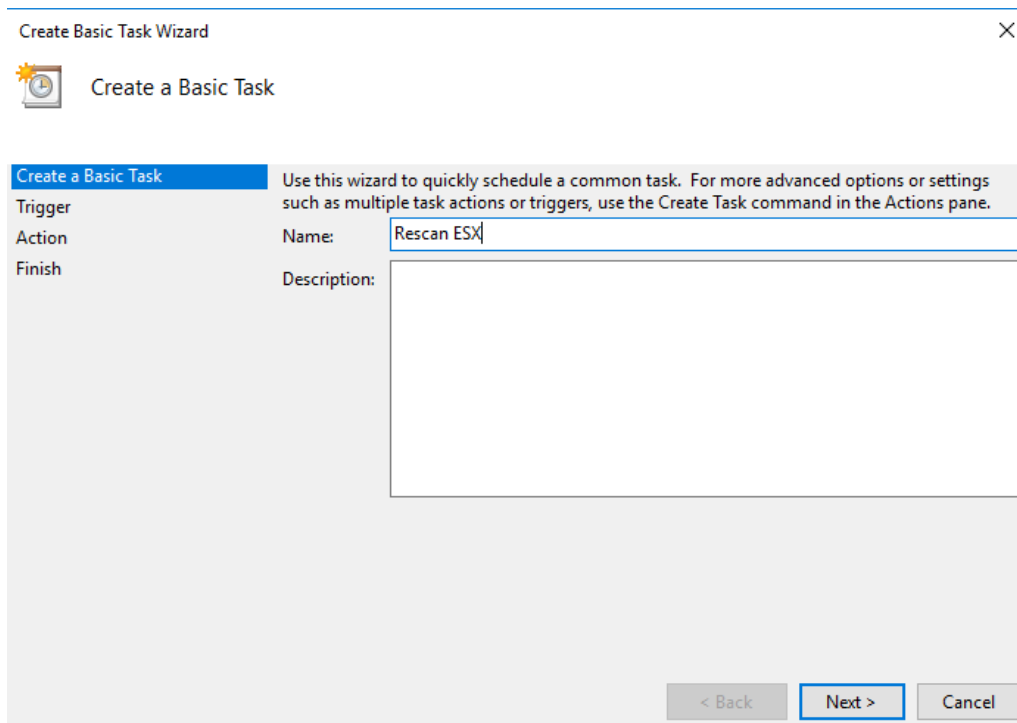
25.   Specify the task name, select **When a specific event is logged**, and click **Next**.
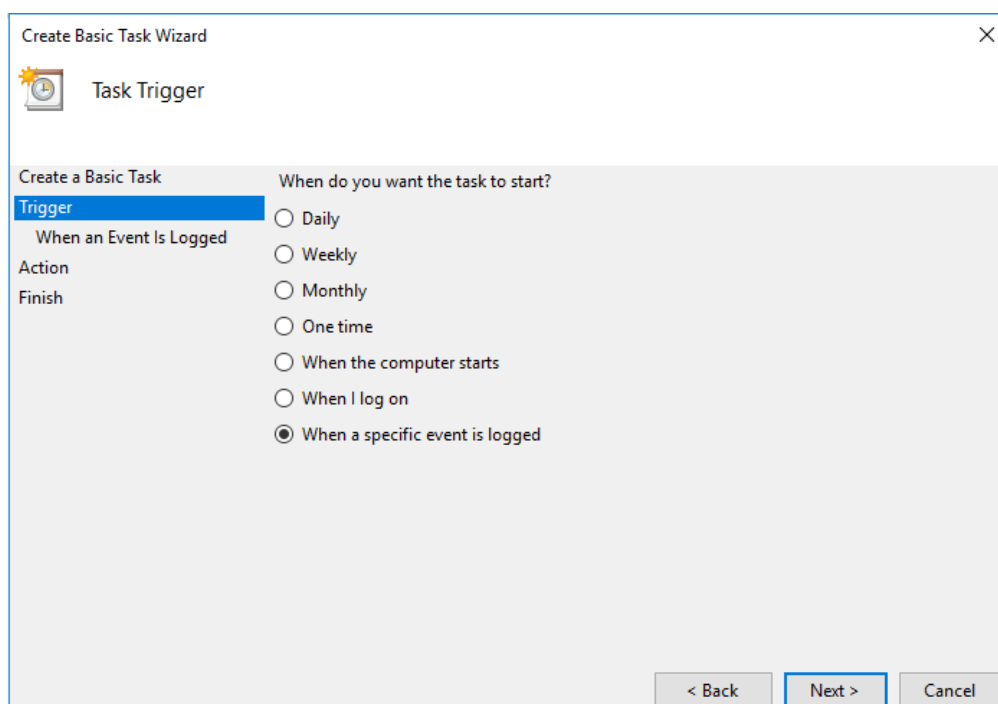
26.   Select **Application** in the Log dropdown menu, type **StarWindService** as the event source and **788** as the event ID. Click the **Next** button.
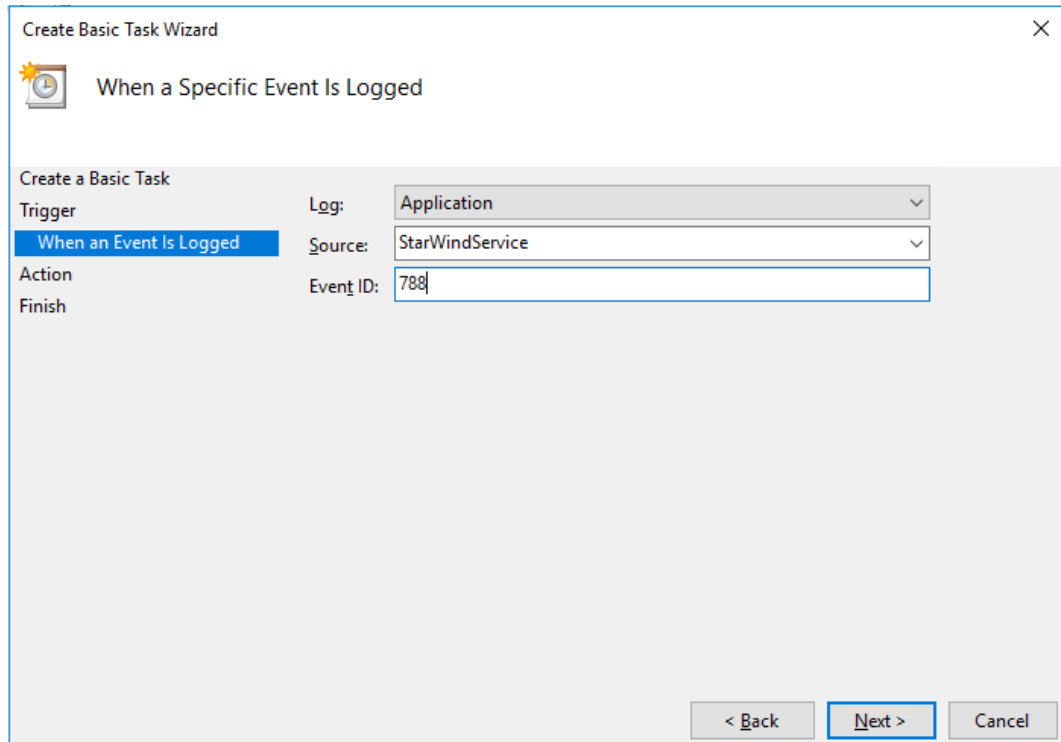
27.   Choose **Start a Program** as an action the task should perform and click Next.
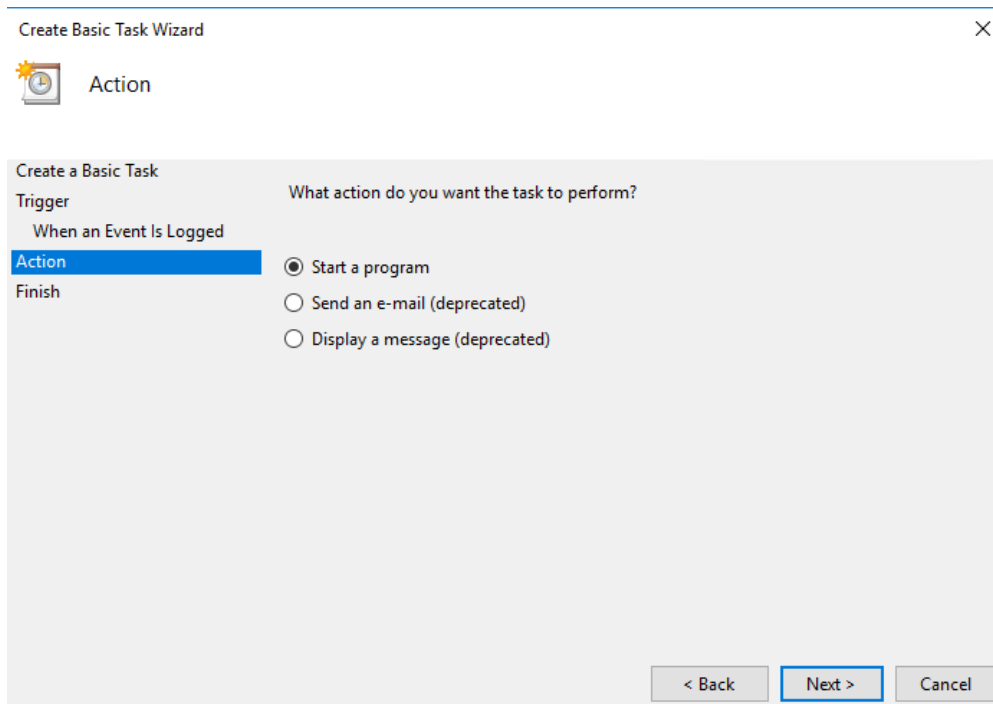
28.   Type **powershell.exe** in the **Program/script** field. In the **Add arguments** field, type:
       " -ExecutionPolicy Bypass -NoLogo -NonInteractive -NoProfile -WindowStyle Hidden -File
       C:\rescan_script.ps1 "
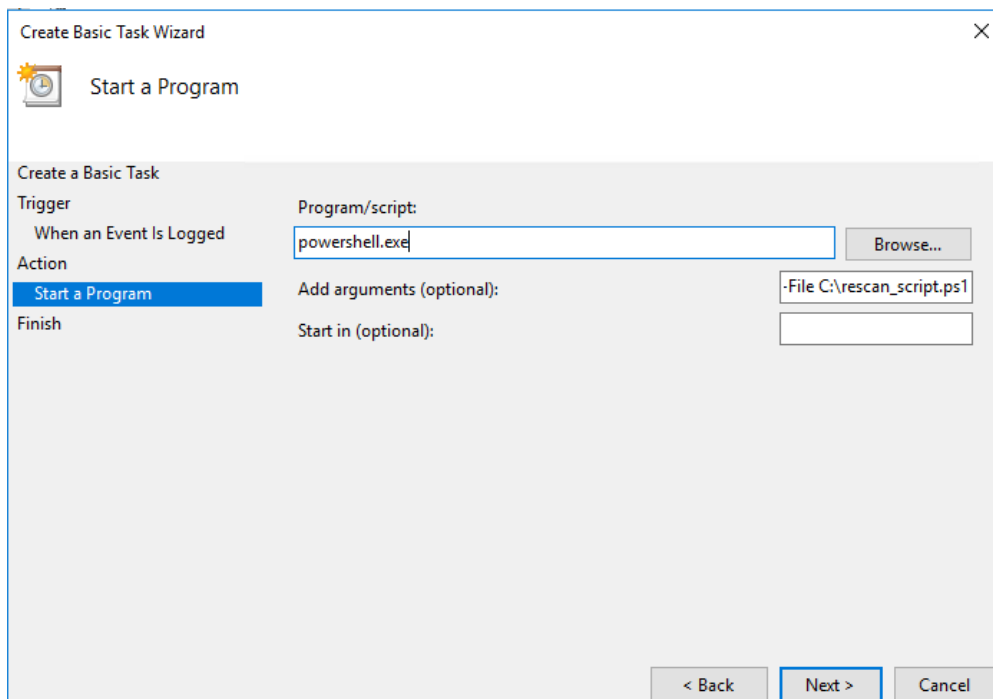
Click the **Next** button to continue.

29.   Click **Finish** to exit the wizard.
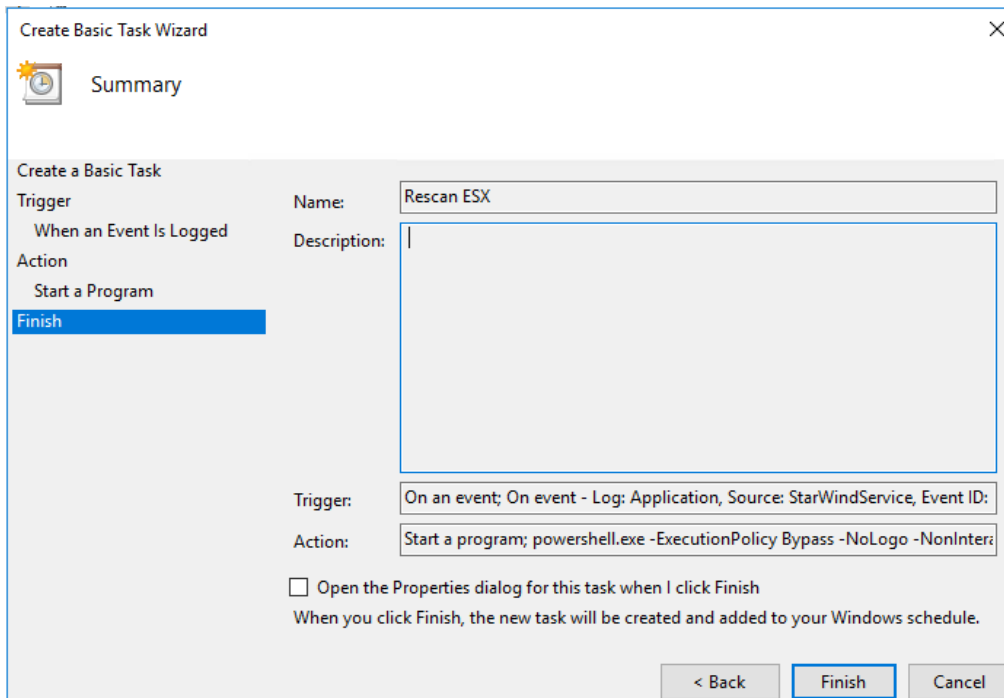
30.   Configure the task to run with the highest privileges by ticking the corresponding checkbox in the window. Make sure that the **"Run whether user is logged on or not"** option is selected.
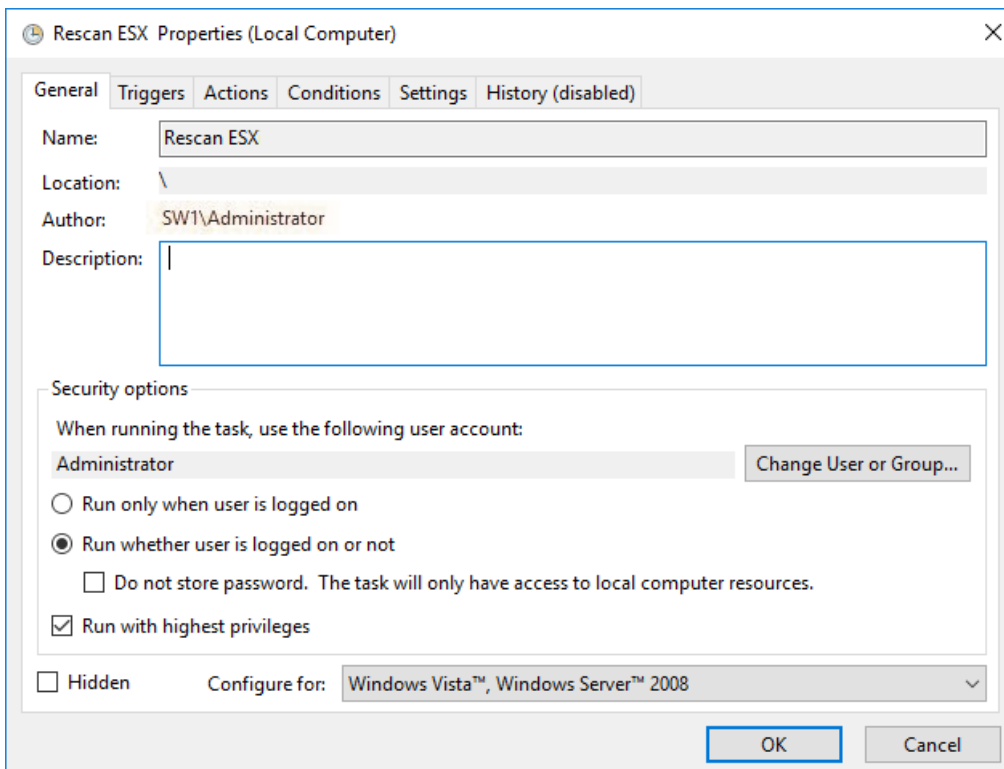
31. Switch to the **Triggers** tab. Verify that the trigger on event 788 is set up correctly.
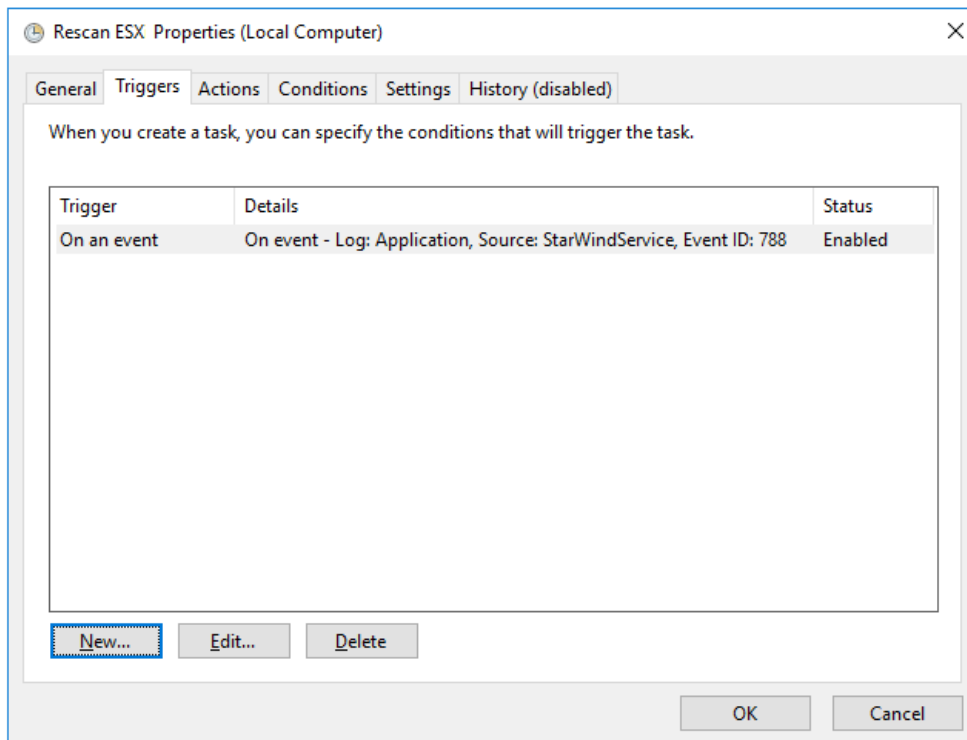
32. Click **New** and add other triggers by Event ID **782, 257, 773,** and **817**.
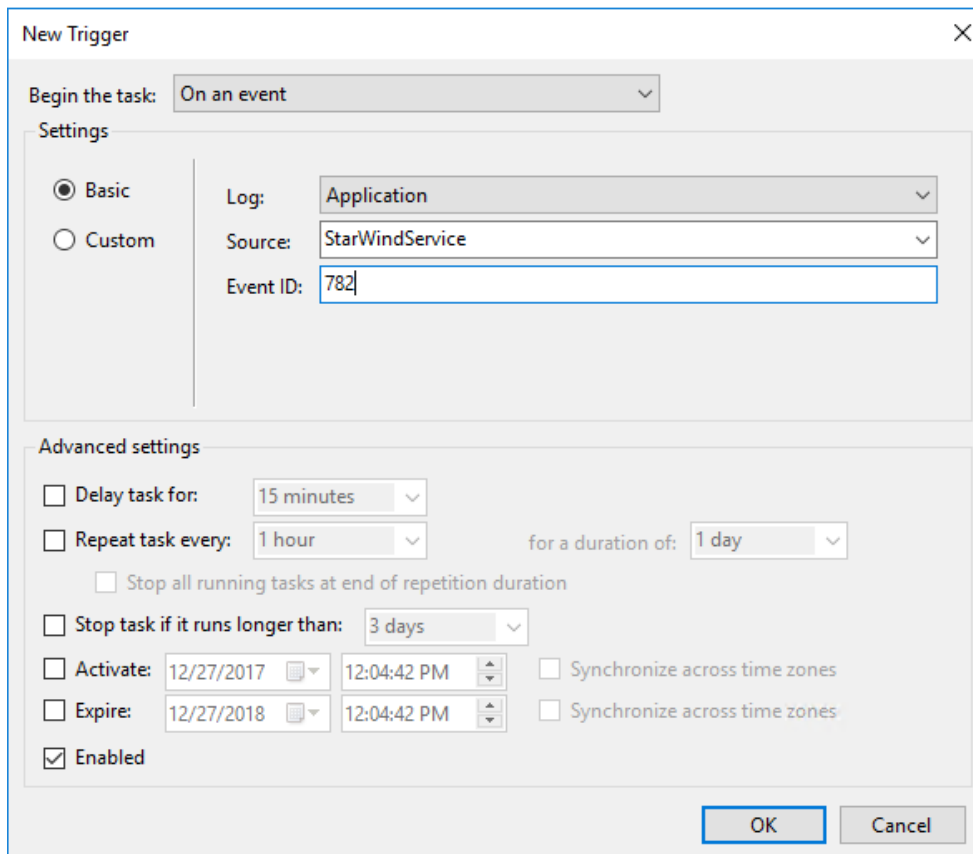
33.   All added triggers should look like in the screenshot below.
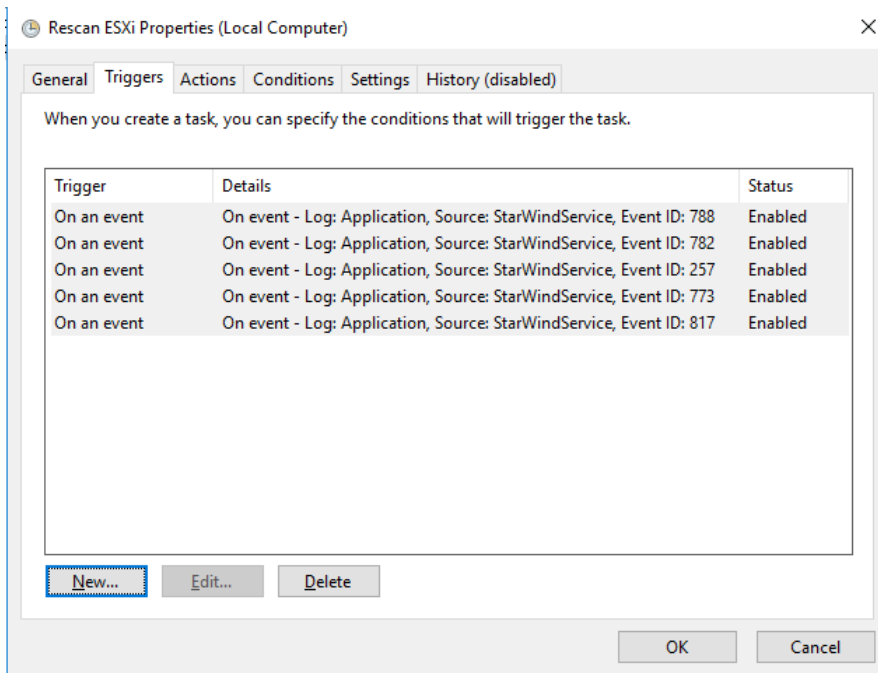
34.   Switch to the **Actions** tab and verify the parameters for the task.
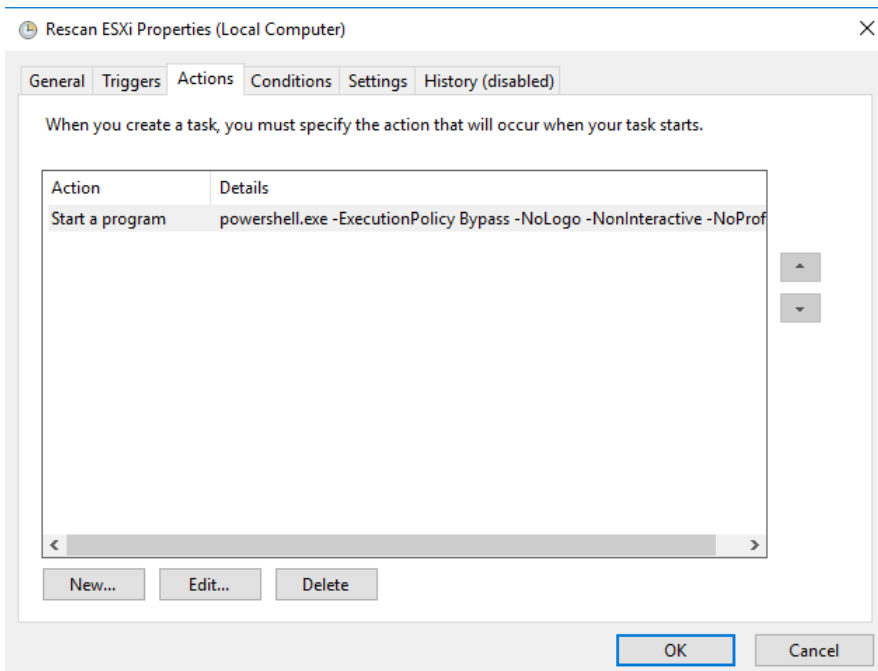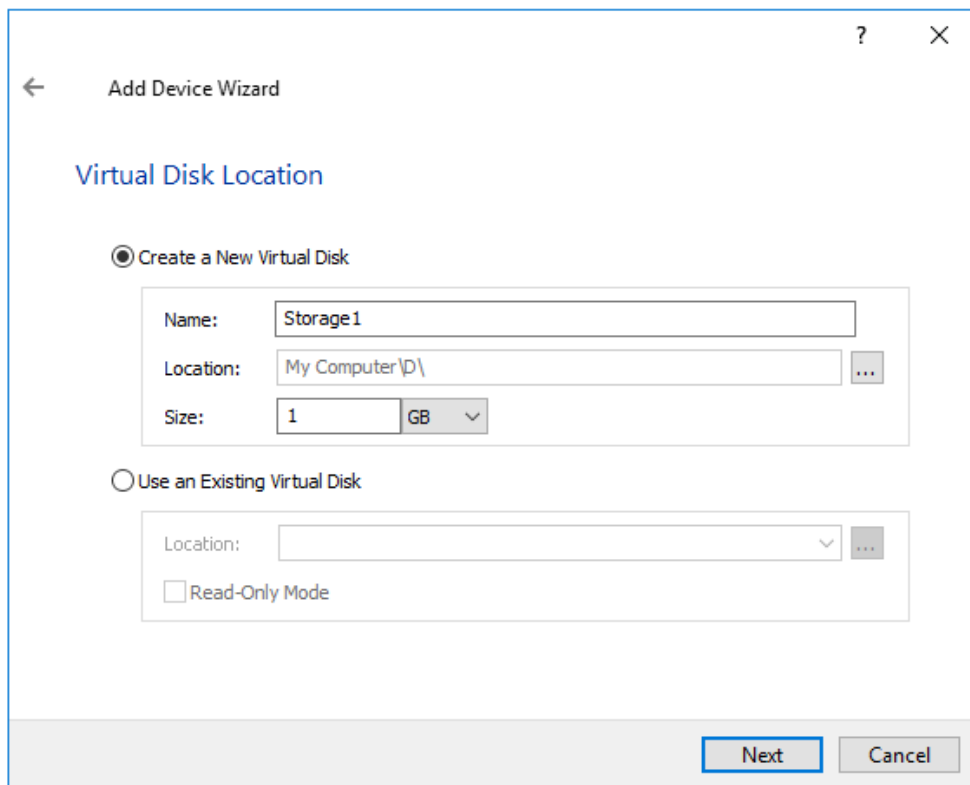
Press **OK** and type the credentials for the user whose rights are used to execute the command in the prompt.

35.   Perform the same steps on the second StarWind VM, specifying the corresponding settings.

Provisioning Storage with StarWind VSAN

Creating StarWind HA devices (DS1, DS2)

36.   Open StarWind Management Console and click the **Add Device (advanced)** button.

37.   Select **Hard disk device** as the type of the created device. Click **Next** to continue.

38.   Select **Virtual disk**. Click **Next** to continue.

39.   Specify **Virtual Disk Location** and **Size**.

Click **Next**.

40. Specify **Virtual Disk Options** and click **Next** to continue.
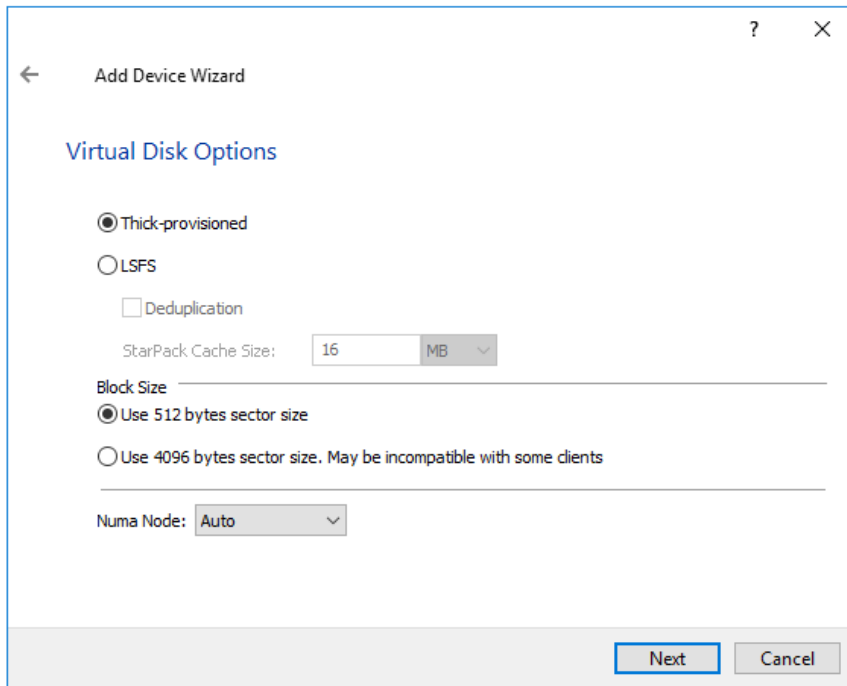
NOTE: For ESXi, use 512 bytes **Block Size**

41. Define the RAM caching policy and specify the cache size (in corresponding units) and click **Next** to continue.
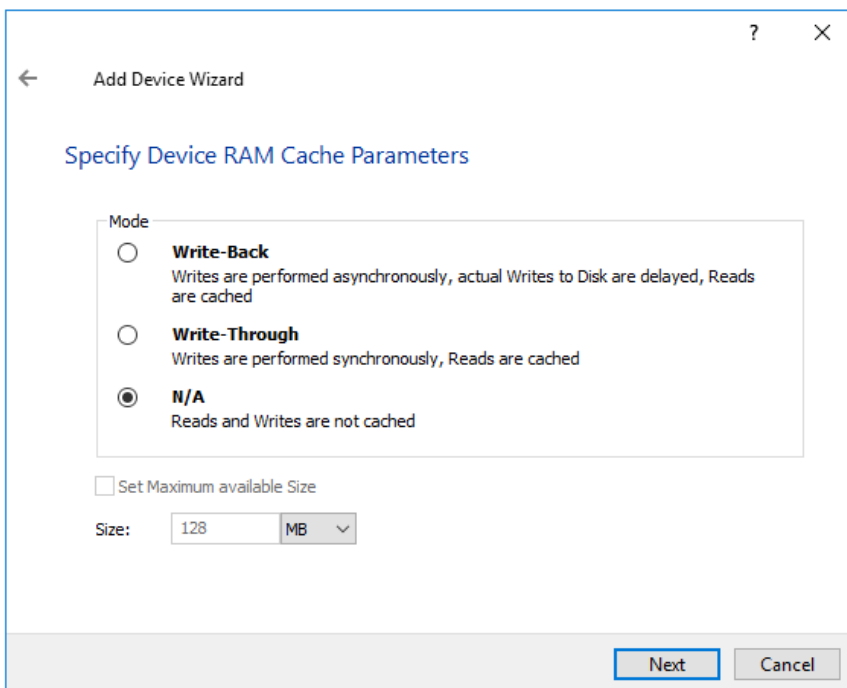
NOTE: The recommended RAM cache size is 1 GB per 1 TB of storage.

42.   Define the flash caching policy and the cache size. Click **Next** to continue.

NOTE: The recommended flash cache size is 10% of the created device size.

43.   Specify the target parameters. Select the **Target Name** checkbox to enter a custom target name if required. Otherwise, the name will be generated automatically in accordance with the specified target alias.

Click **Next** to continue.

44.   Click **Create** to add a new device and attach it to the target.

45.   Click **Finish** to close the wizard.

46.   Right-click the recently created device and select **Replication Manager** from the shortcut menu.

47.   Click **Add replica**.
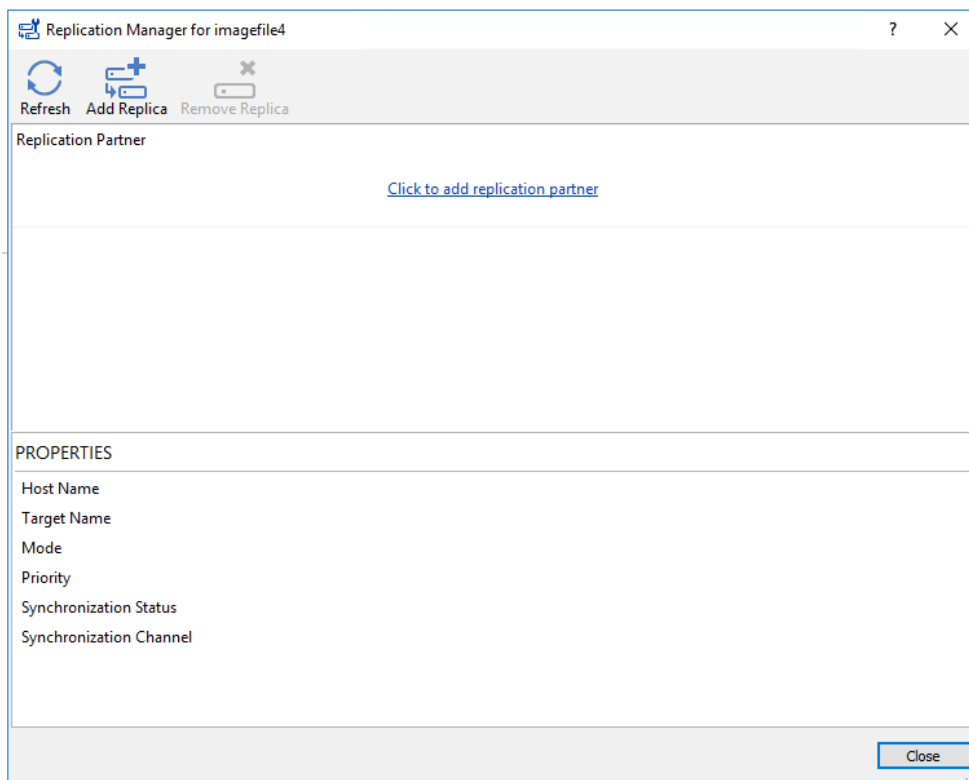
48. Select **Synchronous two-way replication** as a replication mode and click **Next** to proceed.
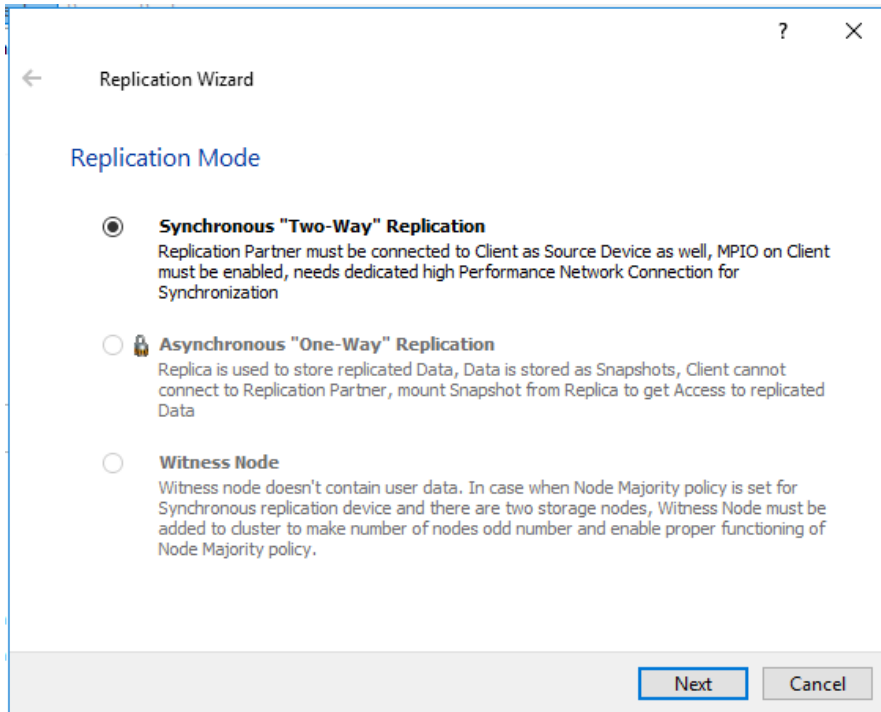
49. Specify Partner Host Name, IP Address, and Port Number.
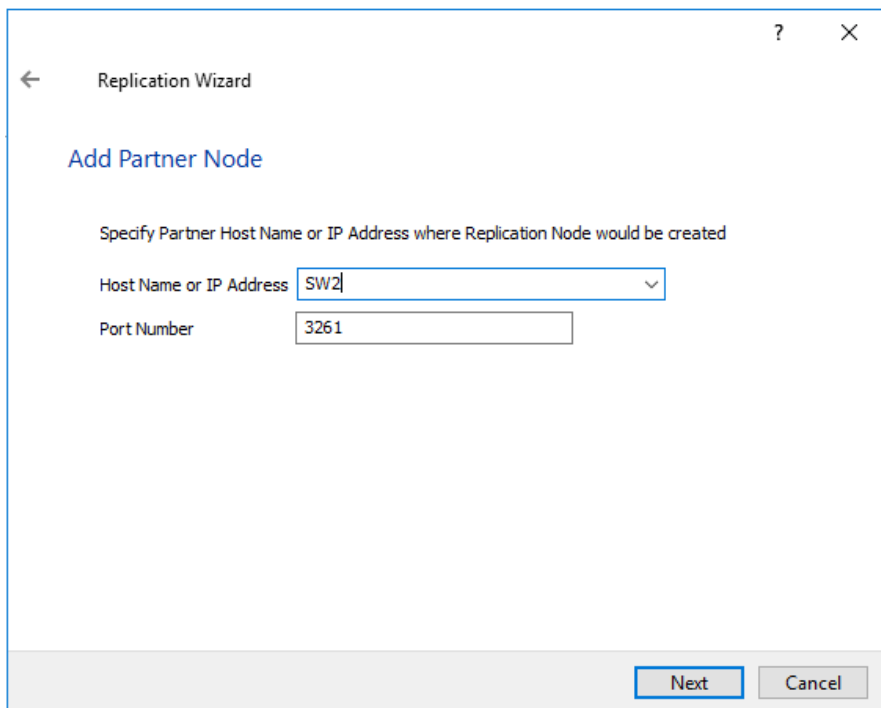
Click **Next**.

50. Choose **Create new Partner Device** and click **Next**.
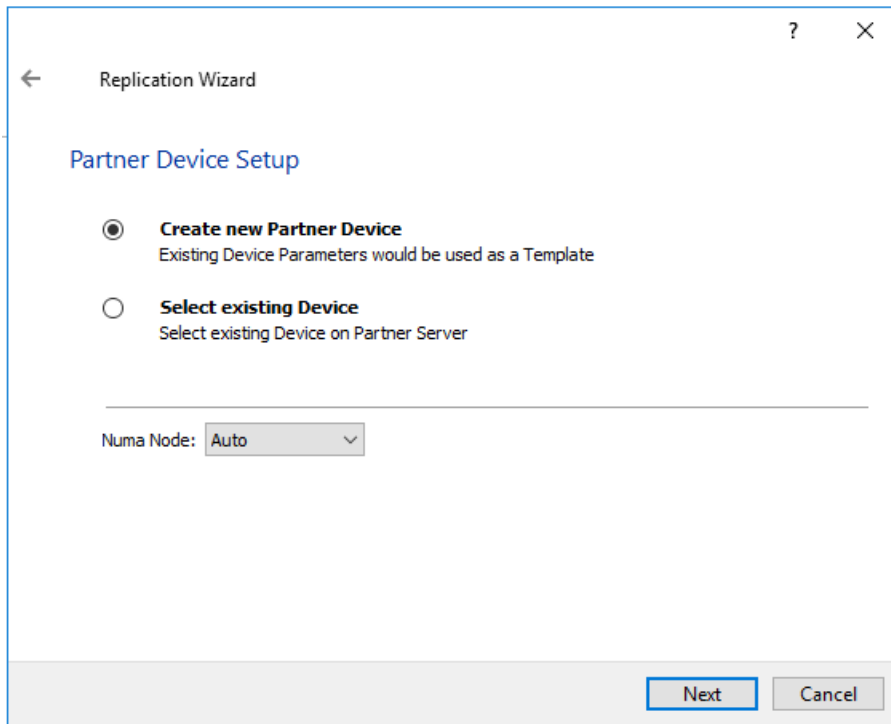
51. Choose the device **Location** and specify **Target Name** if required. Otherwise, the name will be generated automatically according to the specified target alias.
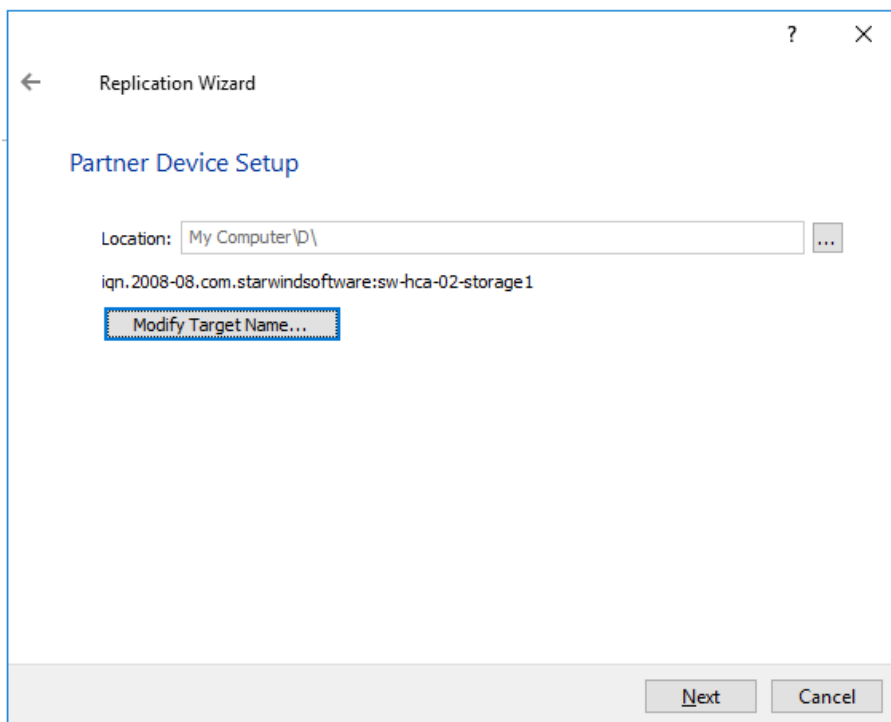
52.   Click **Change Network Settings**.
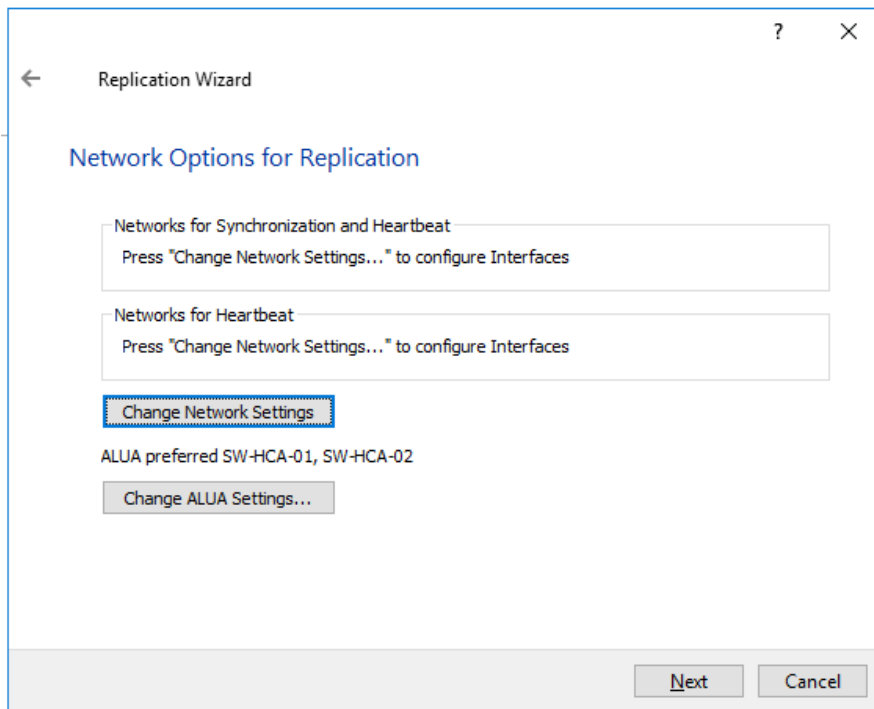
53.   **Specify Interfaces for Synchronization** and **Heartbeat** channels.
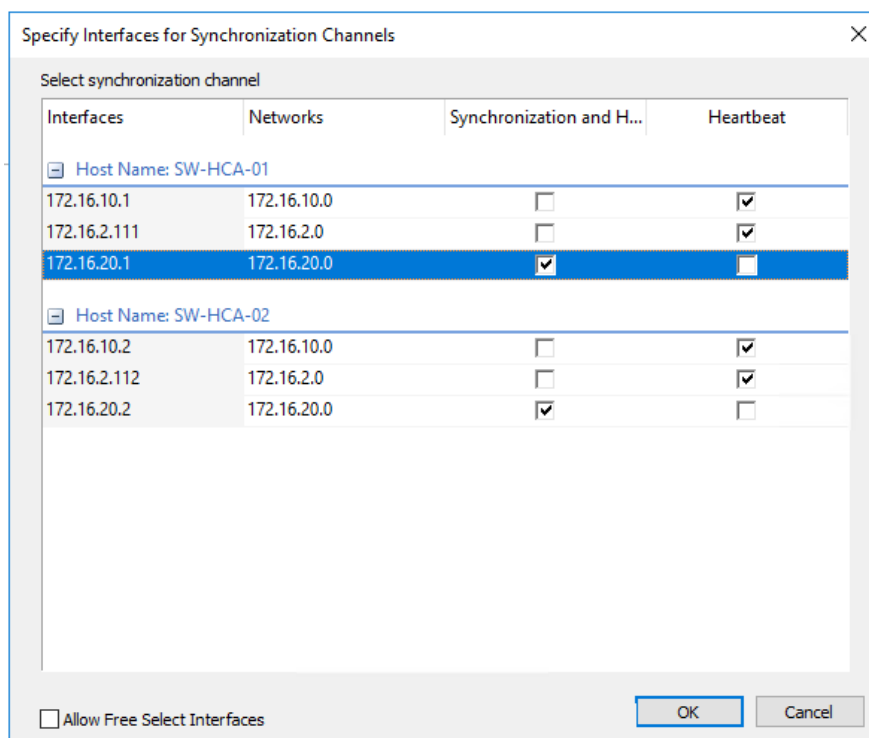
Click **OK**. Then click **Next**.

54.   Choose **Synchronize from existing Device**
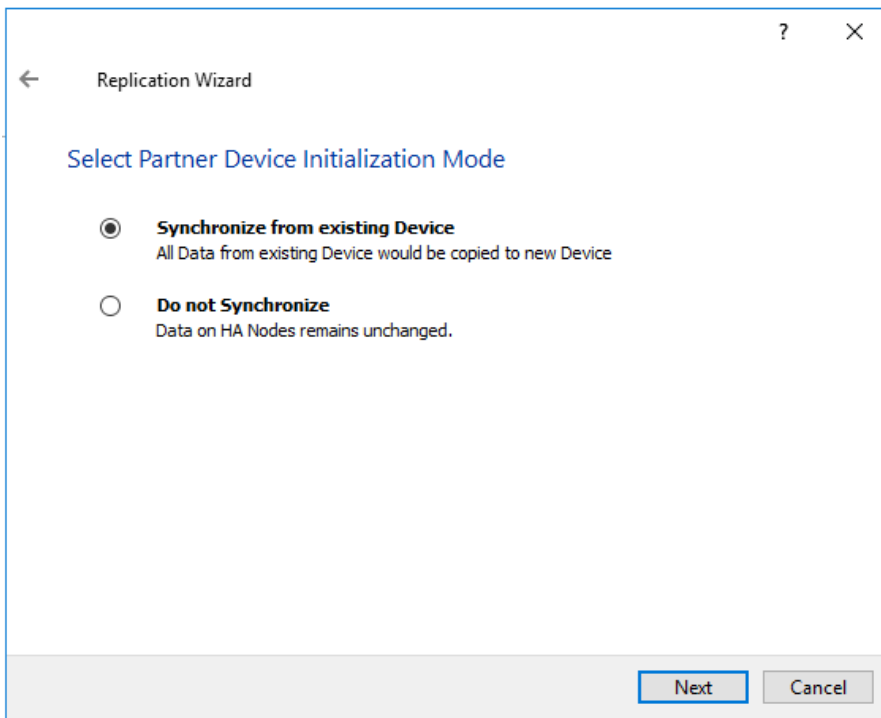
55.   Click **Create Replica**.
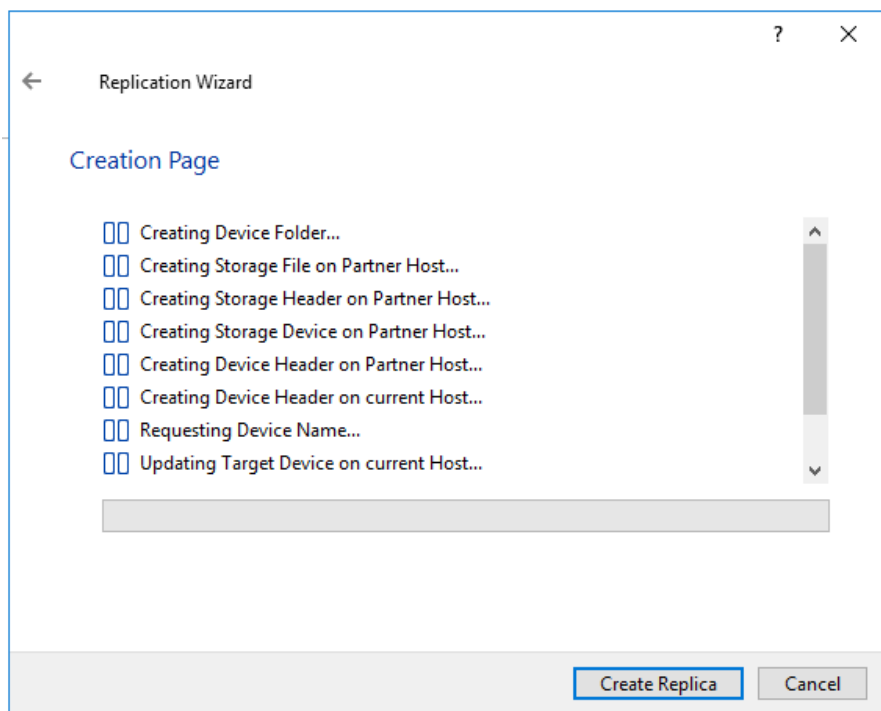
Click **Finish** to close the wizard.

56. The successfully added devices appear in **StarWind Management Console**.
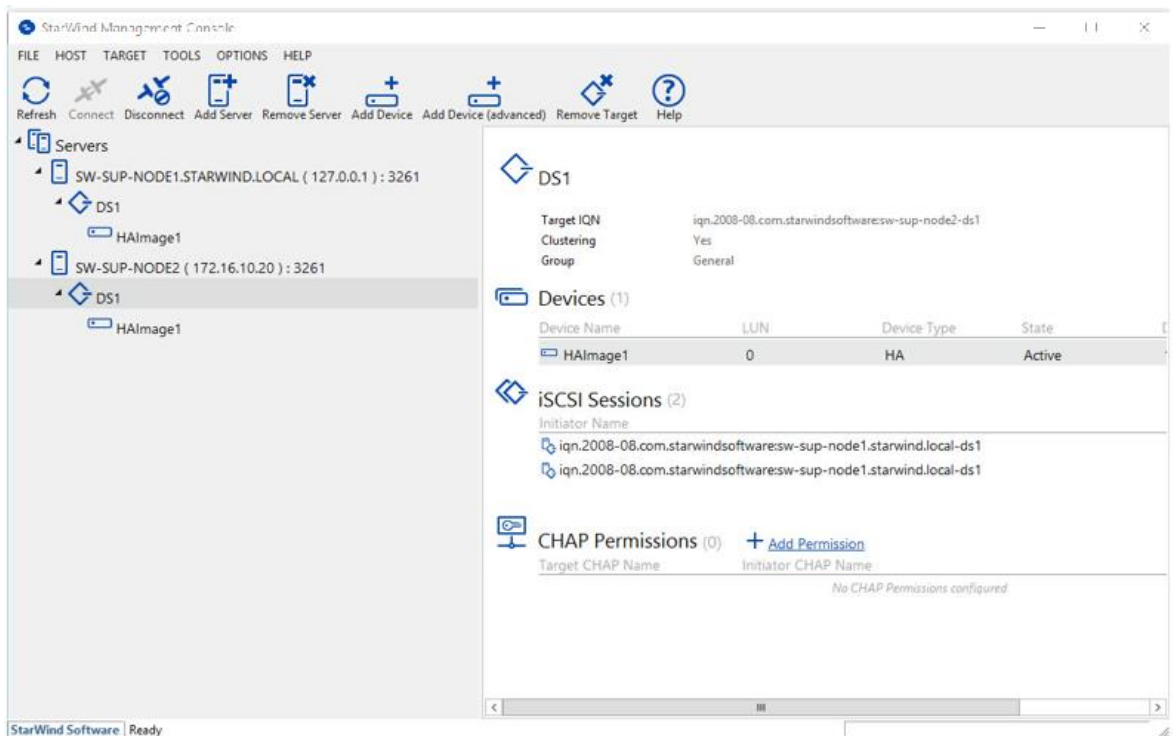
57. Repeat the steps described above to create other virtual disks that will be used as datastores.
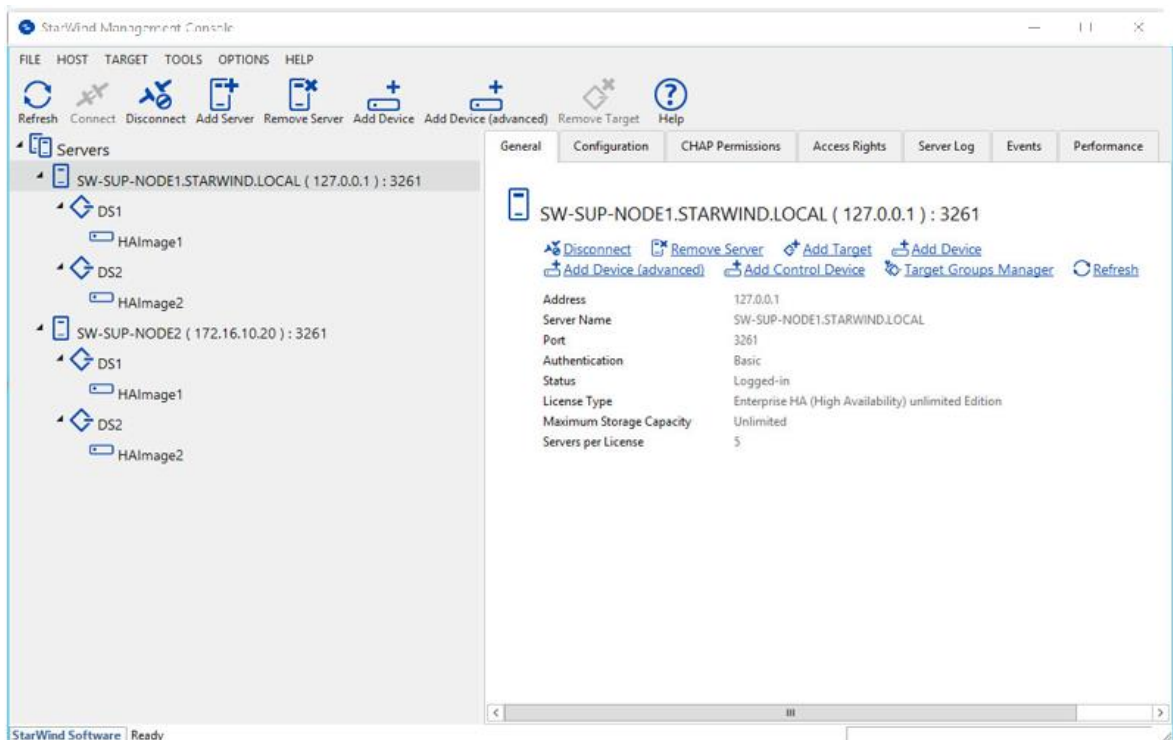
Preparing Datastores

Adding Discovery portals

58. To connect the previously created devices to ESX host, navigate to the **Configuration** tab, then click on **Storage Adapters** and choose (or add) the ISCSI storage adapter. In the **Details** section, click the **Properties** tab.
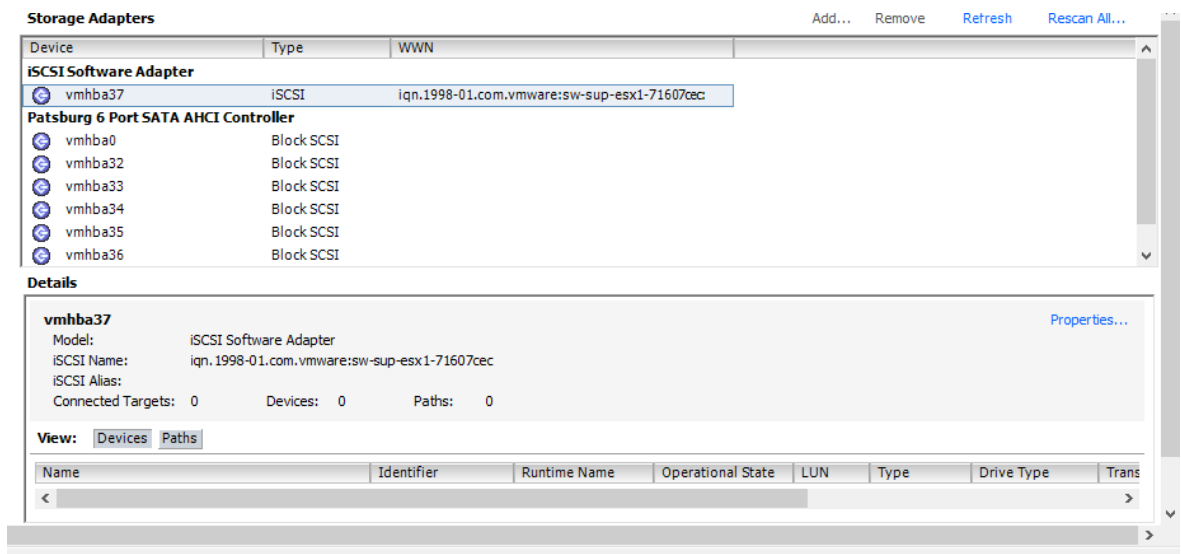
59. In **Dynamic Discovery** click the **Add...** button to specify iSCSI interfaces.
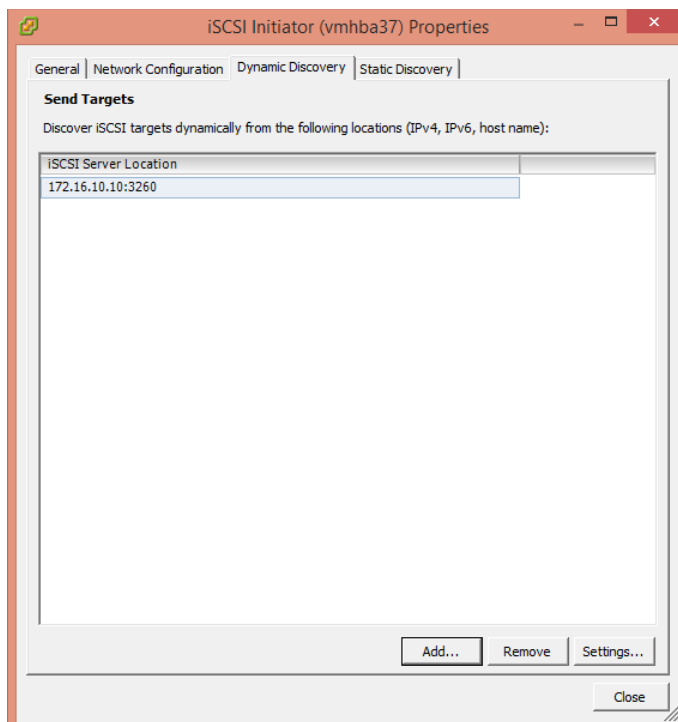
60. Enter the iSCSI IP address of the first StarWind node from the virtual local network 172.16.10.*
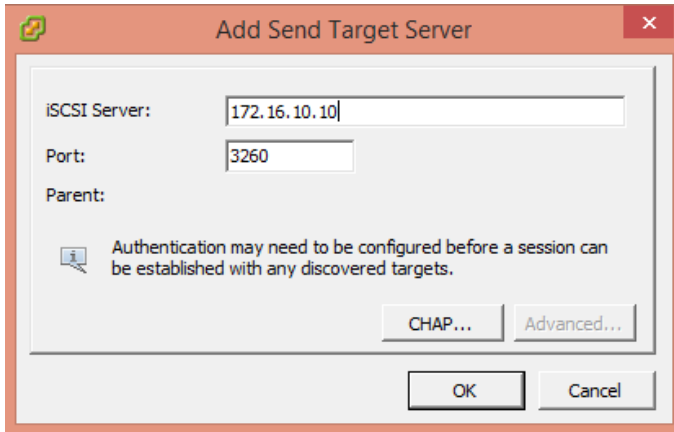
Click **OK.**

61. Add the IP address of the second StarWind node – 172.16.10.*
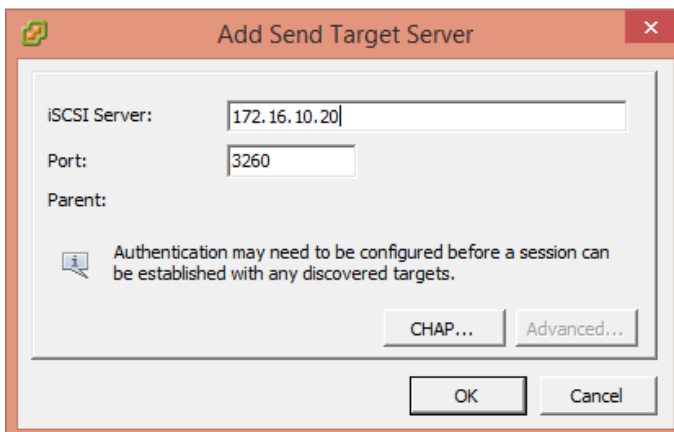
Click **OK.**

62. Everything should look like the image below.
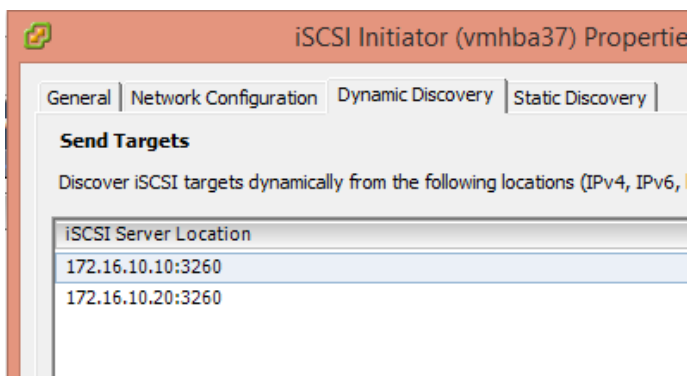
63.   Rescan the storage.
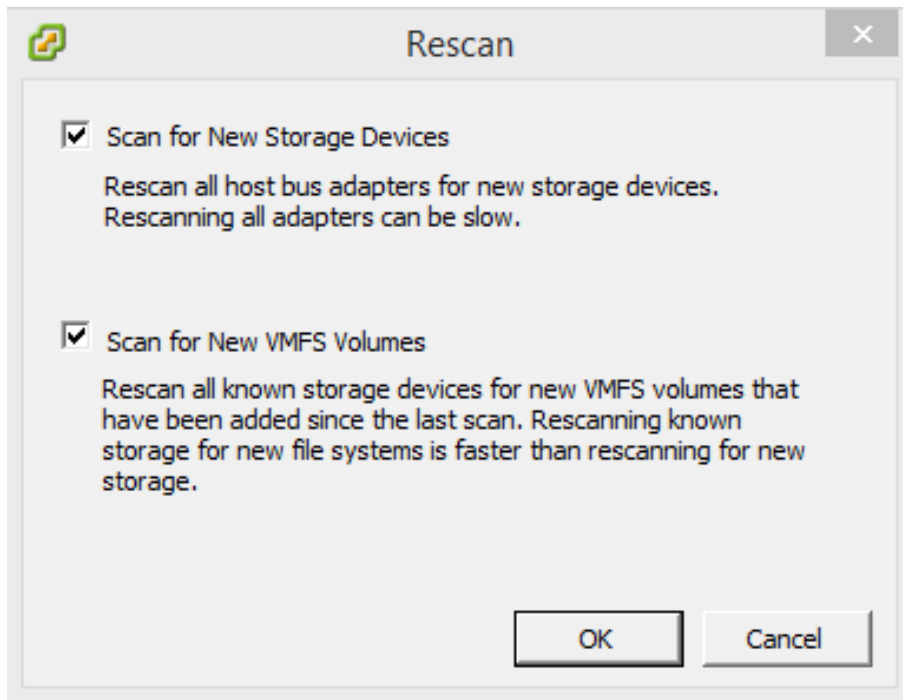
64.   Now, the previously created StarWind devices are visible.
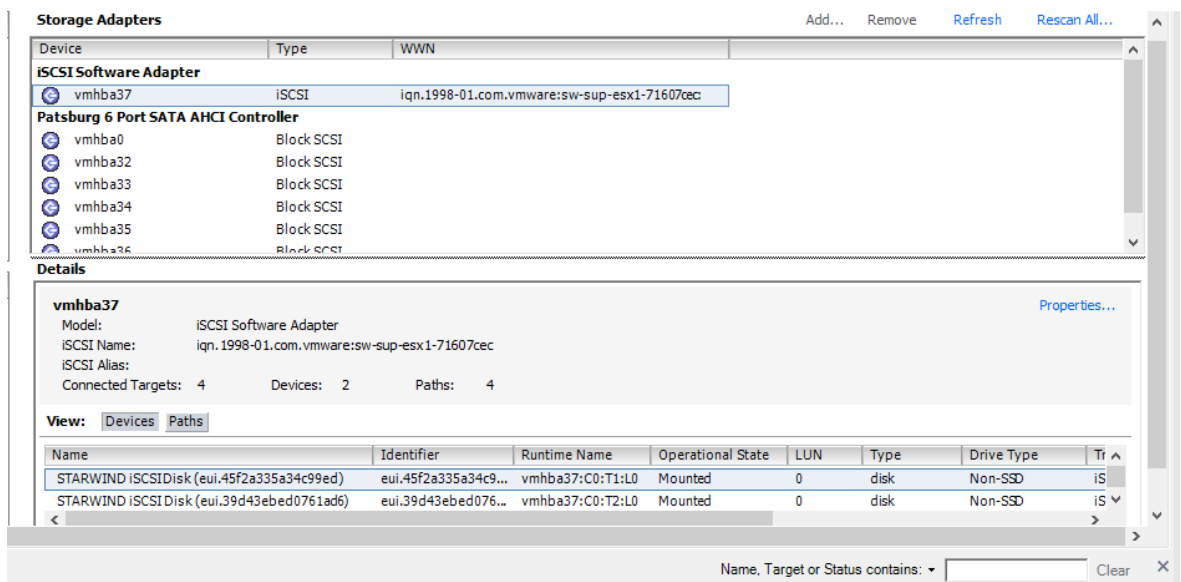
65. Repeat all the steps from this section for the other ESXi node, specifying the corresponding IP addresses for the iSCSI subnet.

Creating Datastores

66.   Open **Configuration** tab of any host and click **Storage**.
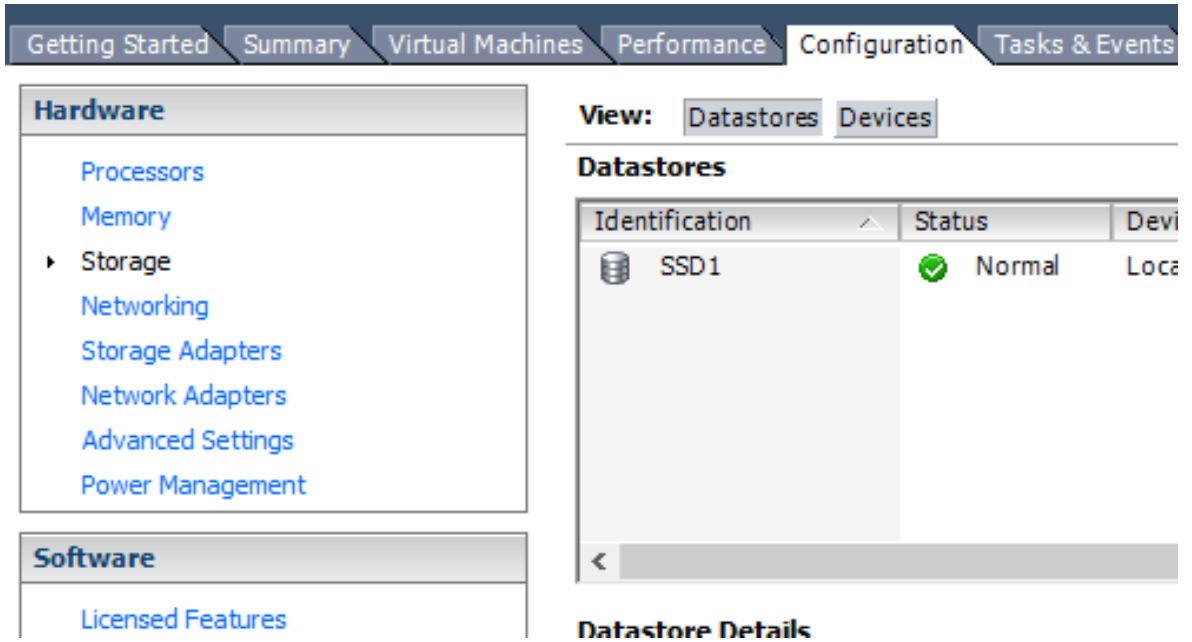
67.   Click **Add Storage**.
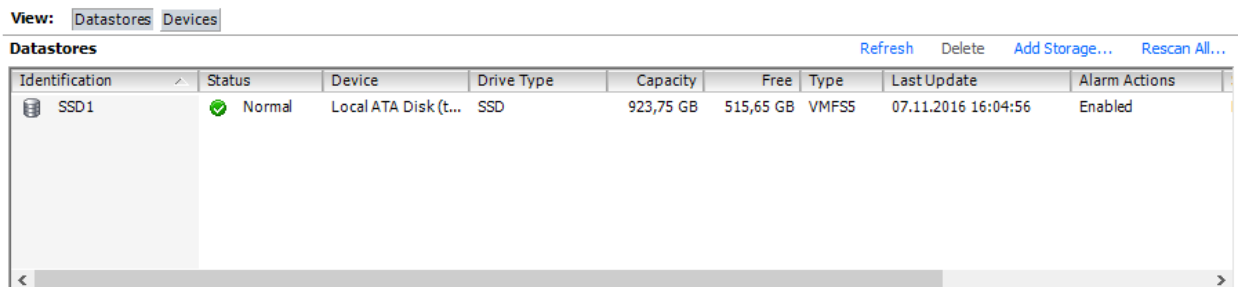
68.	Select **Disk/LUN**.
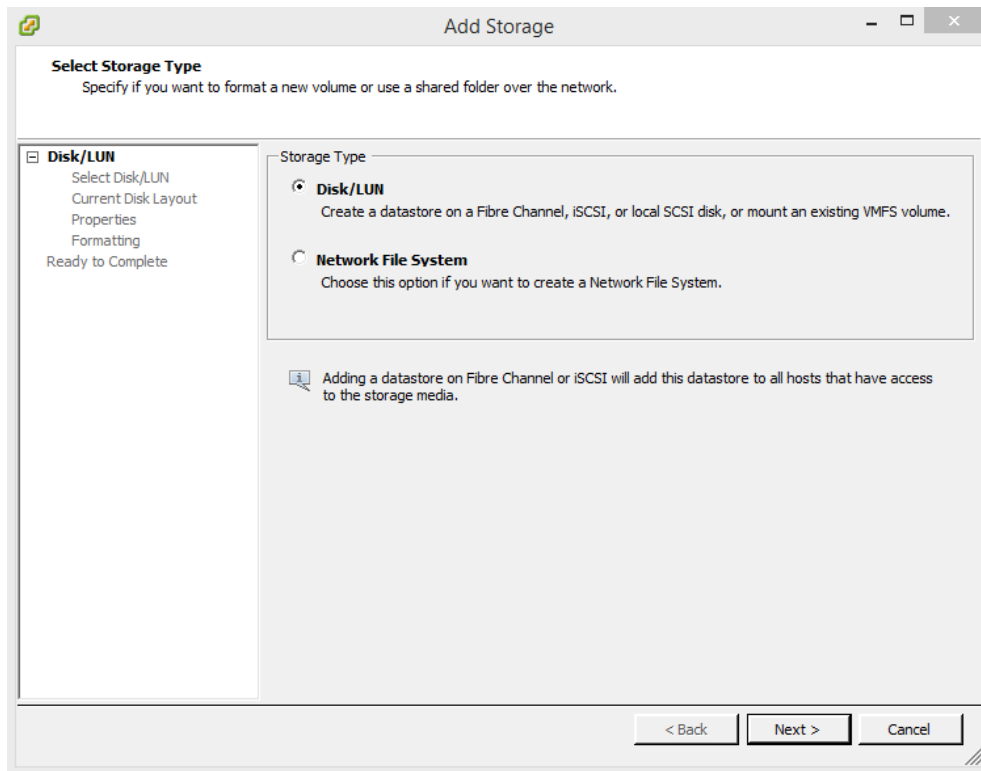
69.	Select the previously discovered StarWind device and click **Next**.
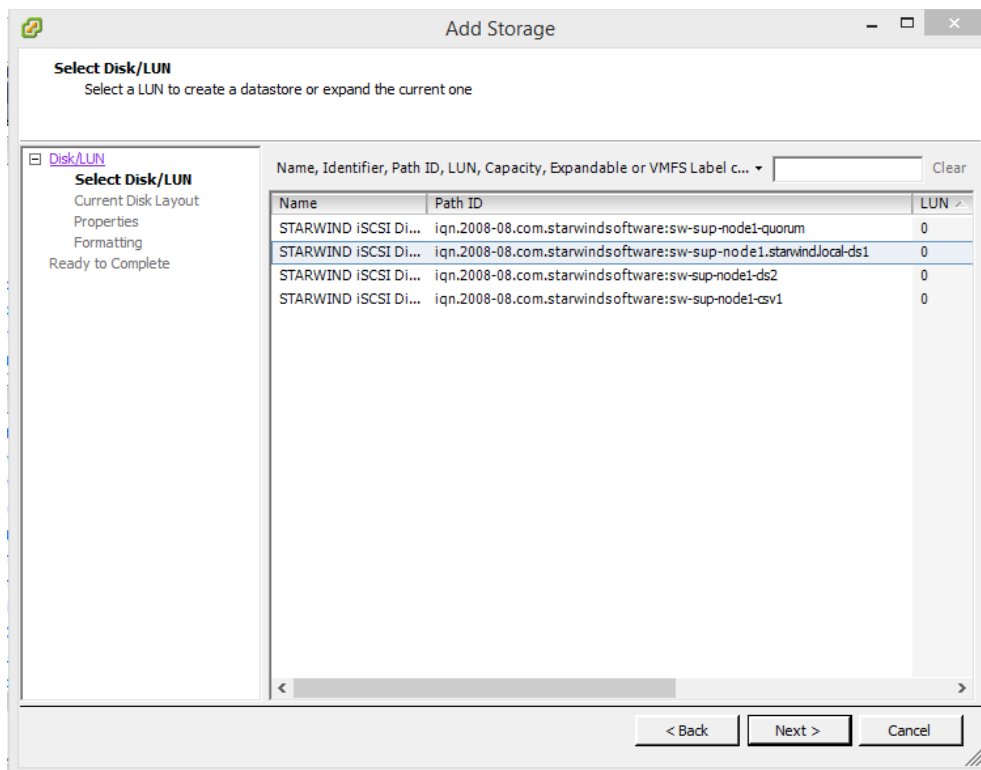
70. Check **Current Disk Layout** and click **Next**.
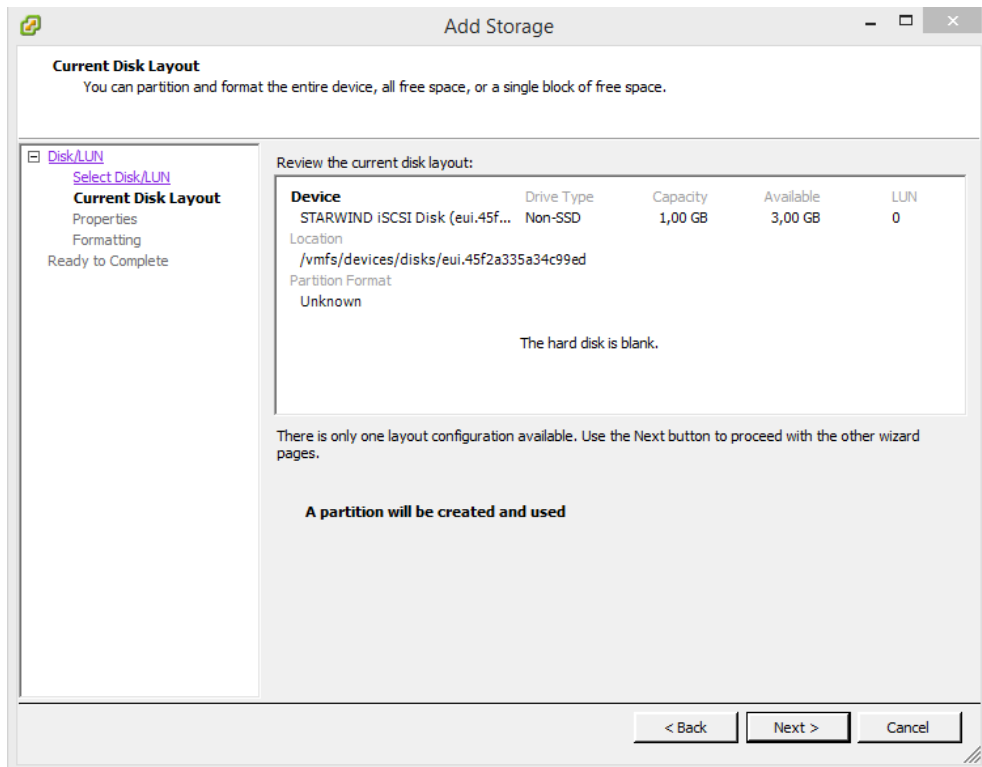
71. Specify the datastore name and click **Next**.
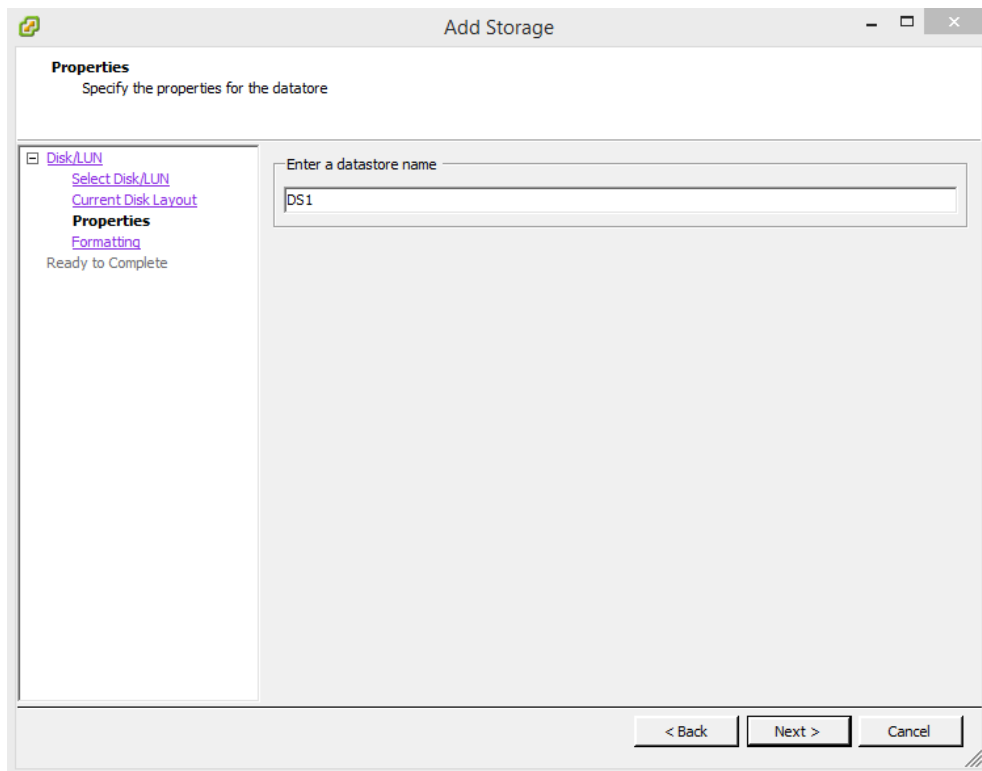
72. Enter the datastore size and click **Next**.
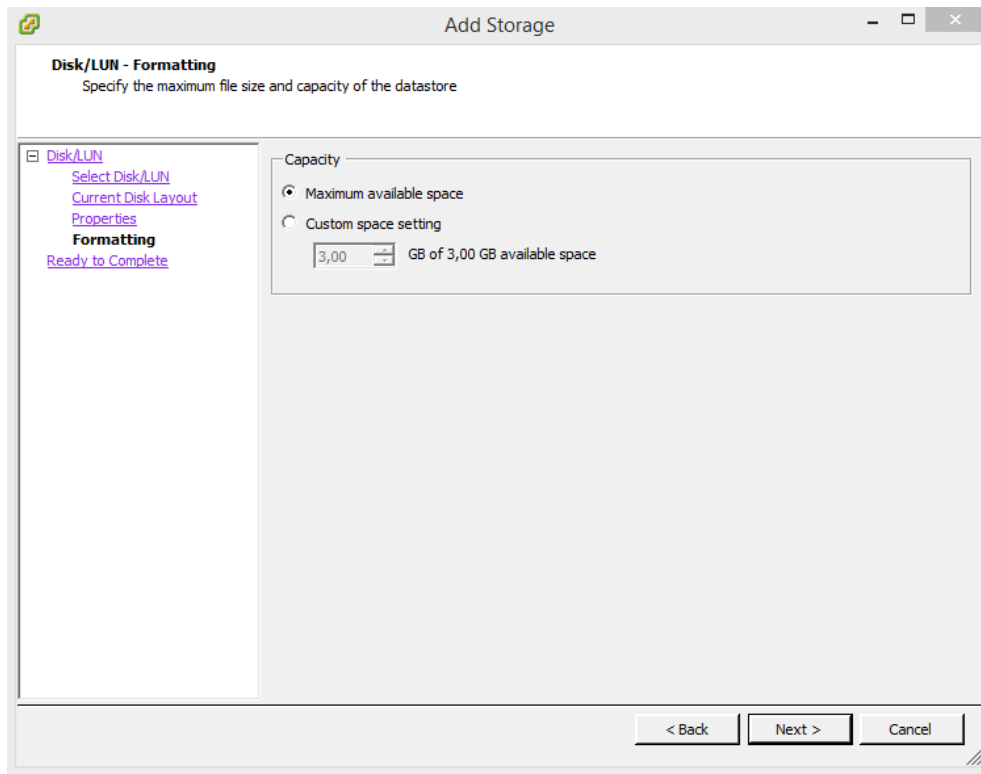
73. Verify the settings and click **Finish**.
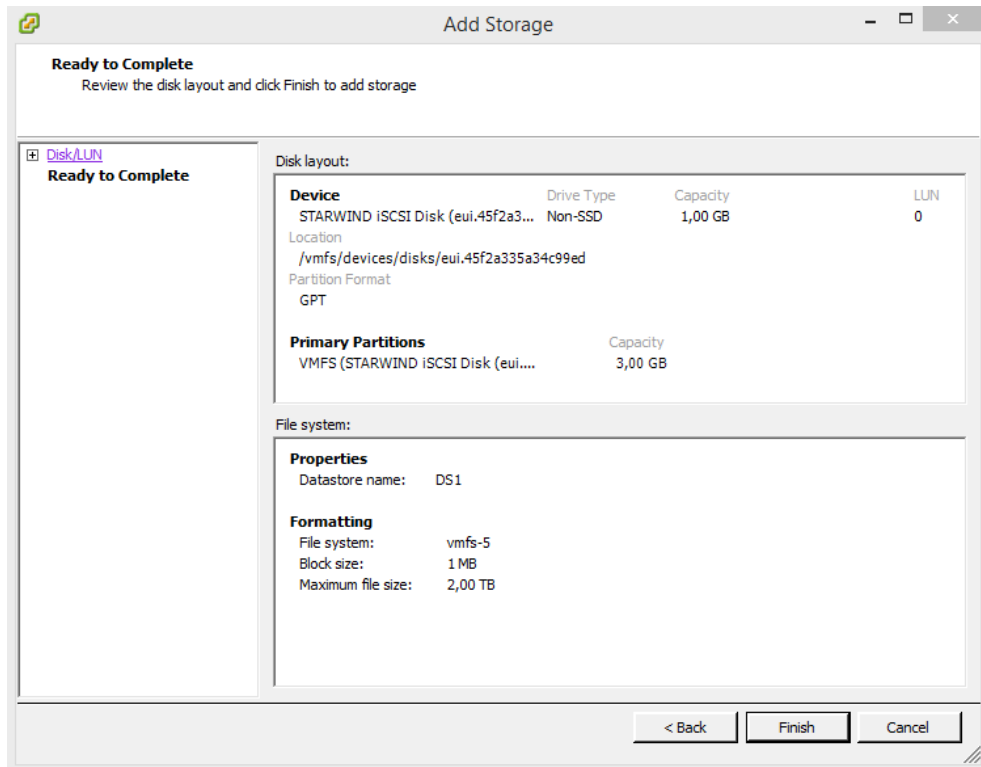
74. Add another Datastore (DS2) as it is described above but select the second device for that purpose.
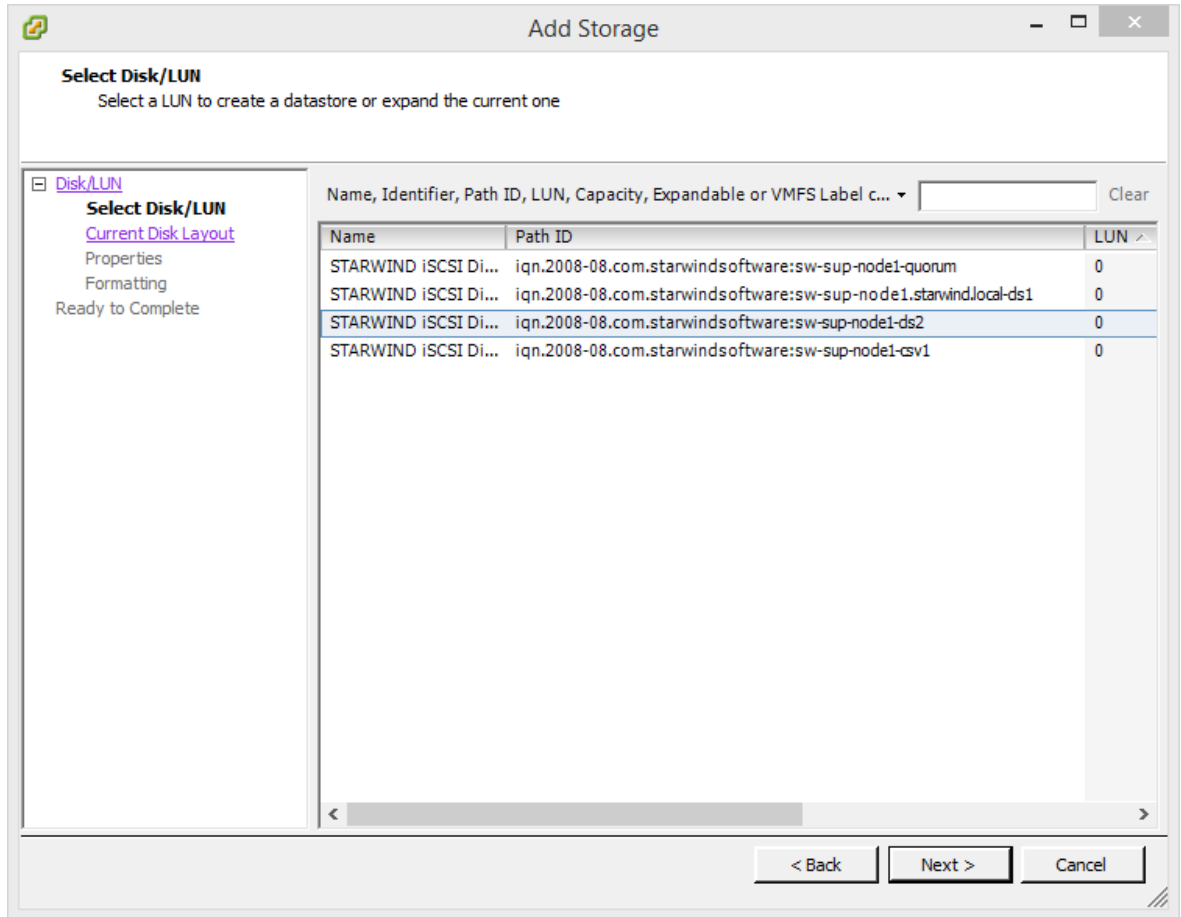
75. Verify that the storages (DS1, DS2) are connected to both hosts. Otherwise, rescan the storage adapter.
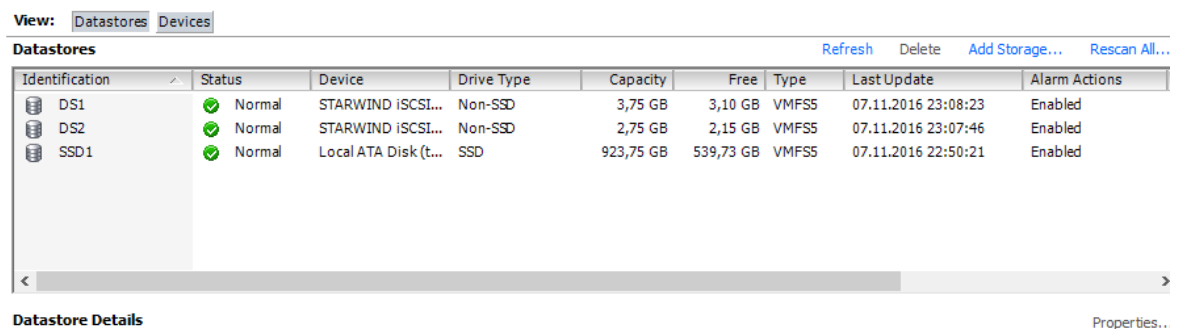
76.   Right-click on a datastore and select **Properties**.
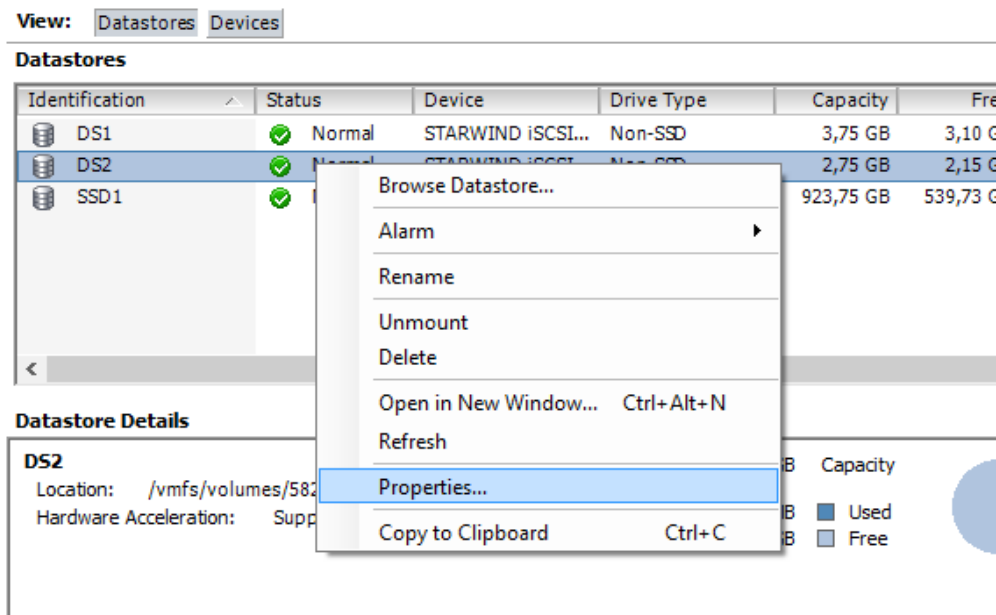
77.   Click **Manage Paths**.
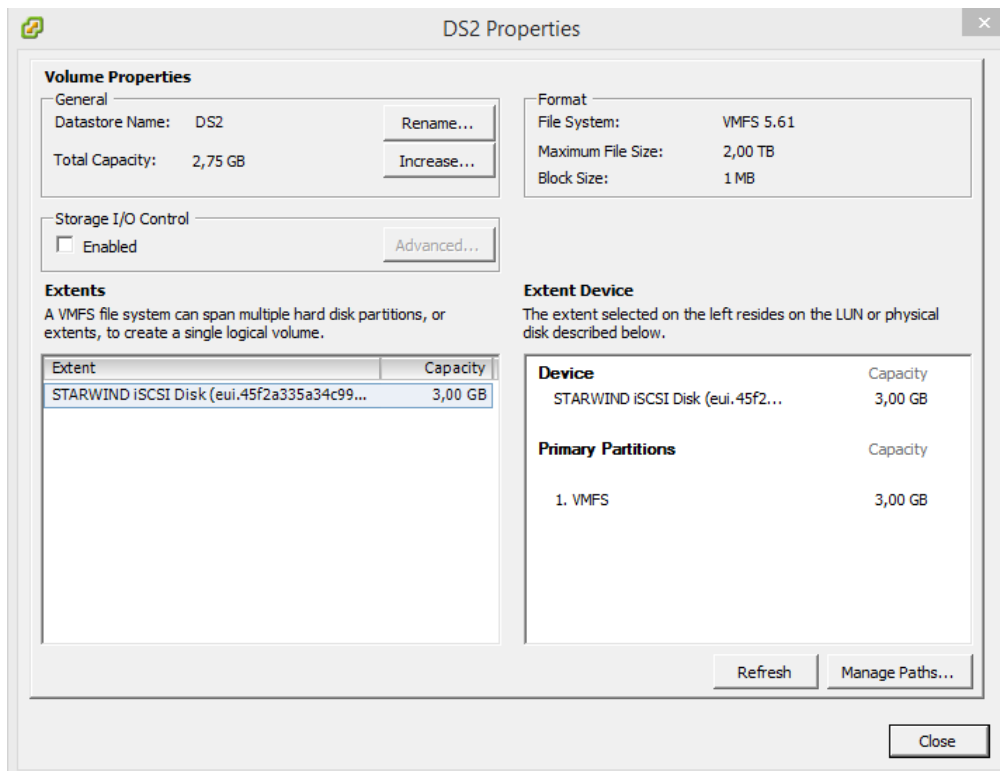
78. Change the **Path Selection** policy to the **Round Robin** one and click **Change**.
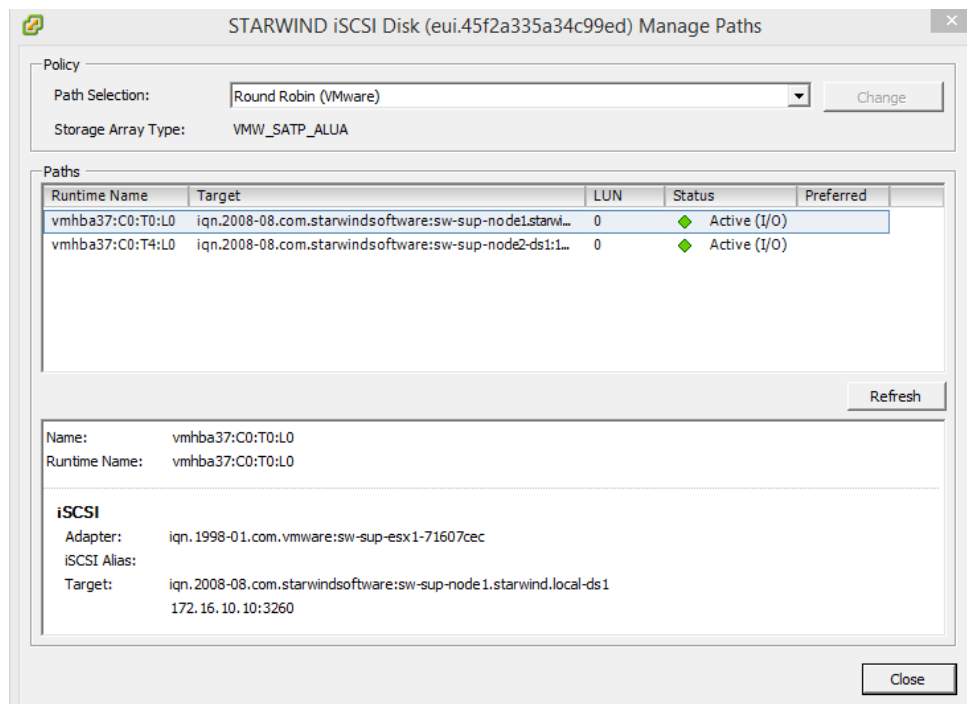
79. Repeat the same steps for each Datastore for each host.

Additional tweaks

80.   Click on the configuration tab of any host and choose **Security Profile**.

81.   Choose **SSH** and click **Options**.
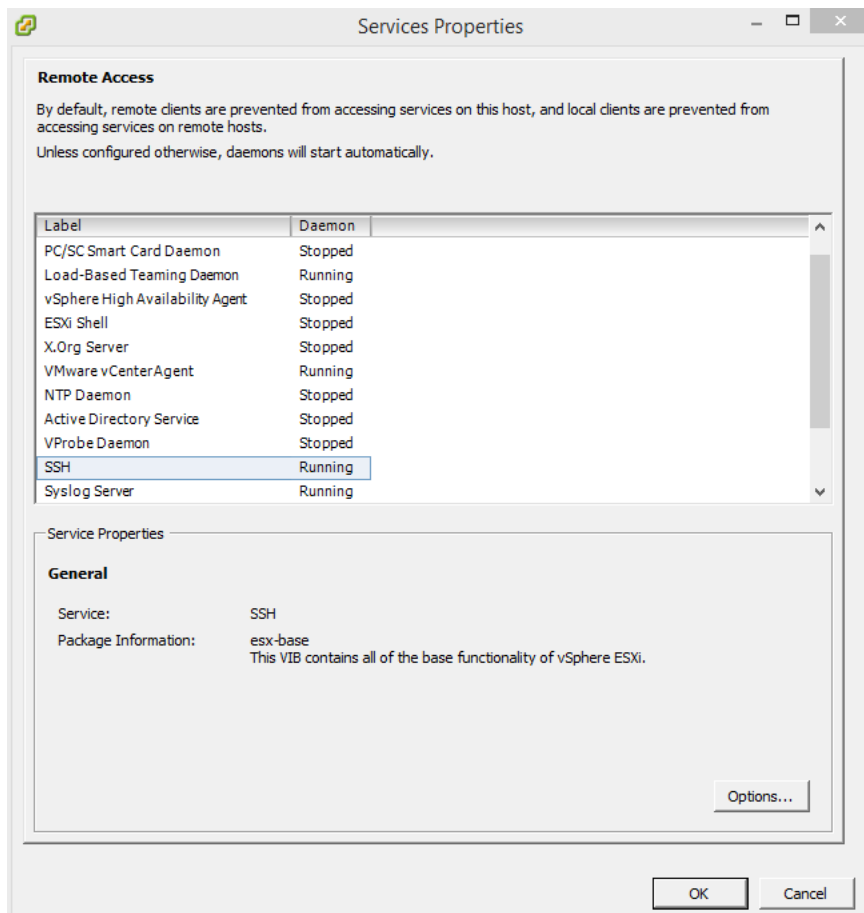
82.   Select **Start and Stop with host** and press **Start**.
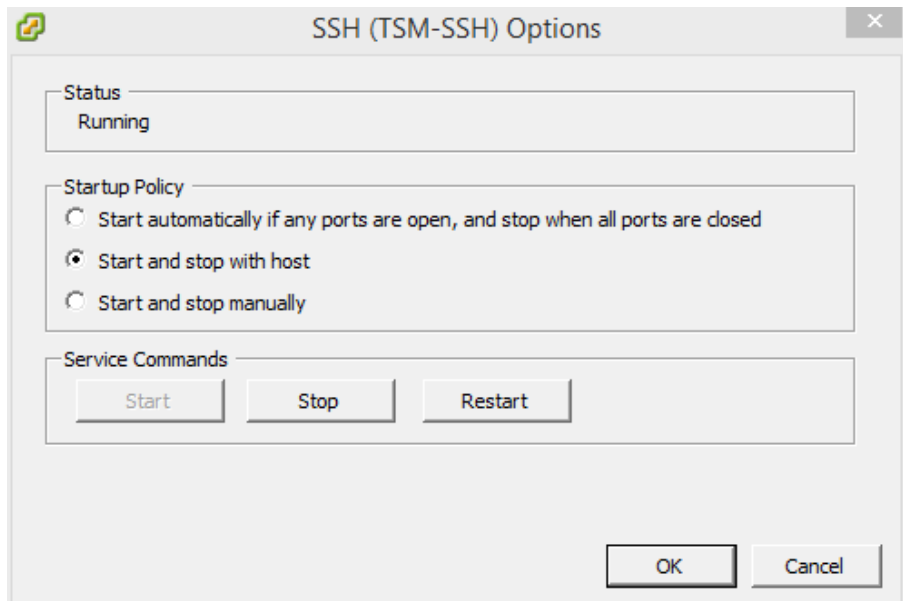
83.   Connect to the host using an SSH client (e.g., Putty).
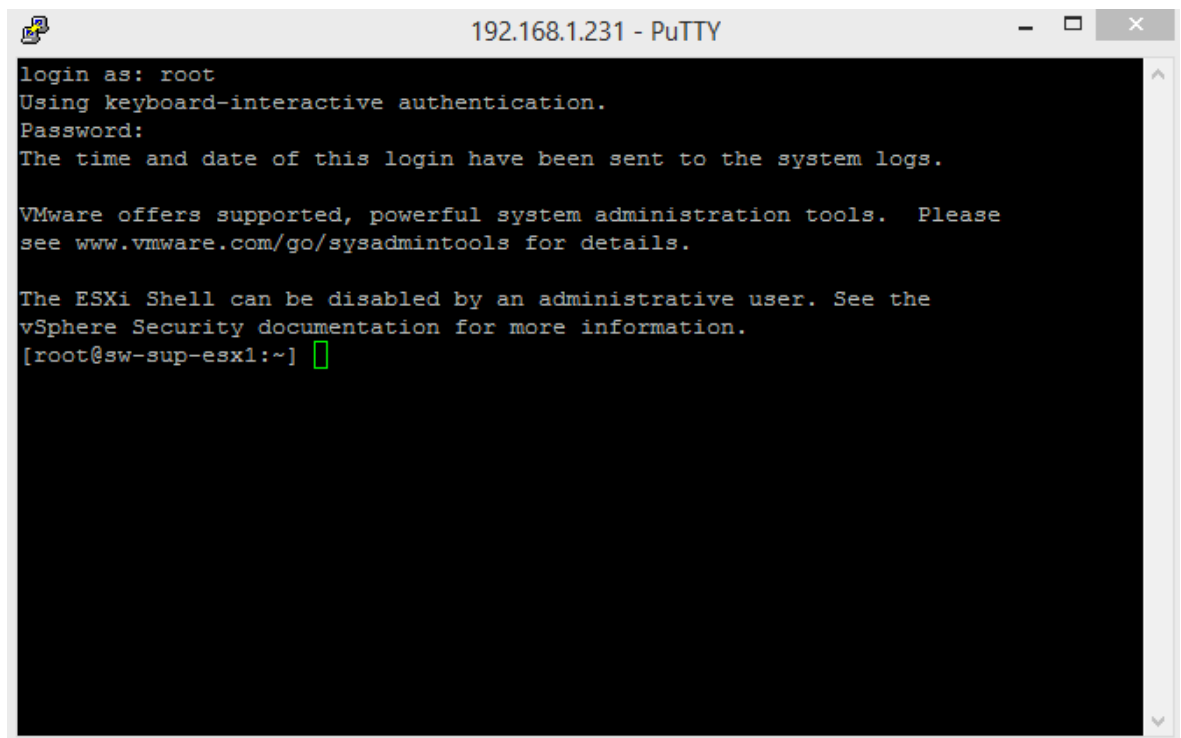
84.   Check the device list using the following command:
        esxcli storage nmp device list

85.   For all devices, reduce Round Robin size from 1000 to 1 using the following command:
       esxcli storage nmp psp roundrobin deviceconfig set --type=iops --iops=1 --device=

NOTE. Paste StarWind device UID at the end of the cmdlet.

86.   Repeat the same steps for each host and datastore.

87.   Click the configuration tab on any host and choose **Advanced Settings**.
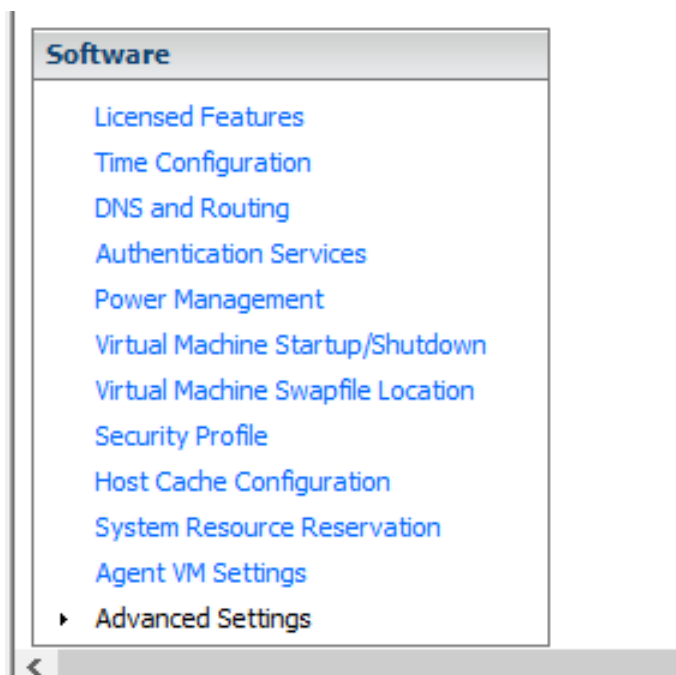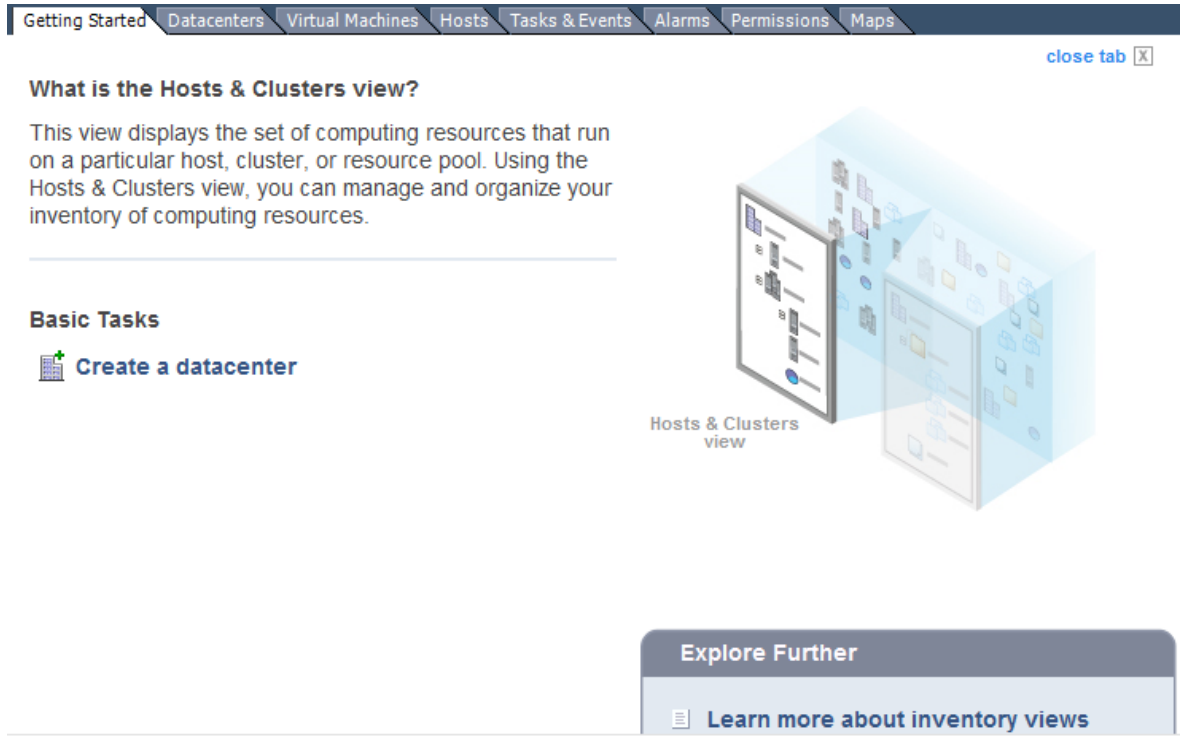
88.   Select **Disk** and change the **Disk.DiskMaxIOSize** parameter to 512.
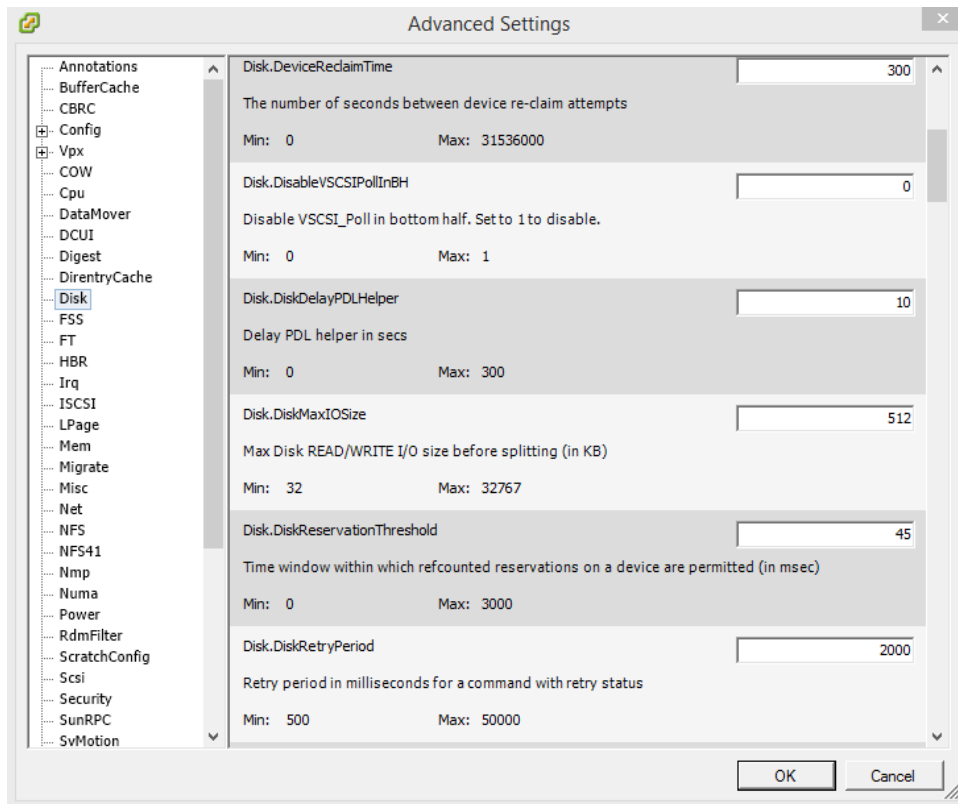
Creating a Datacenter

89.   Connect to vCenter, click **Getting Started**, then **Create Datacenter,** and enter the
       Datacenter name.

Creating a Cluster

90.   Navigate to the Datacenter **Getting Started** tab and press **Create a cluster**.

91.   Enter the cluster name and click **Next**.

Adding Hosts to the Cluster

92.   Open the **Cluster** tab and click **Add a host**.

93.   Enter the name or IP address of the ESXi host and specify the administrative account. Click **Next**.

94. Verify settings and click **Next**.

95. **Assign the License** and click **Next**.

96. **NOTE: Lockdown mode** is not enabled by default. Click **Next**.

97. Verify the settings and click **Finish**.

98.   Add the second host to the cluster.
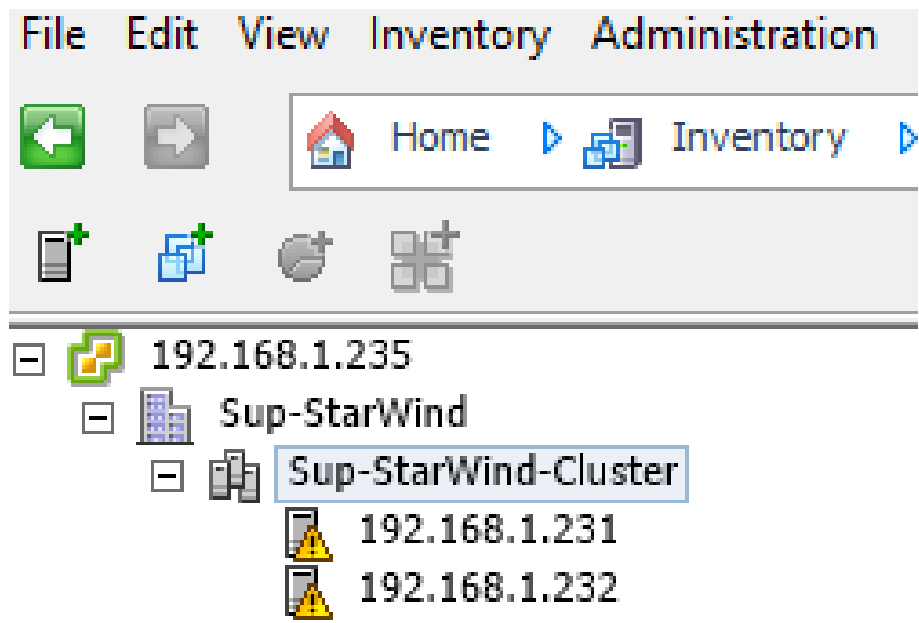
Turn on vSphere HA Feature

99.   Open the cluster **Edit Settings** and click **Turn on vSphere HA**. Press **OK**.

Conclusion
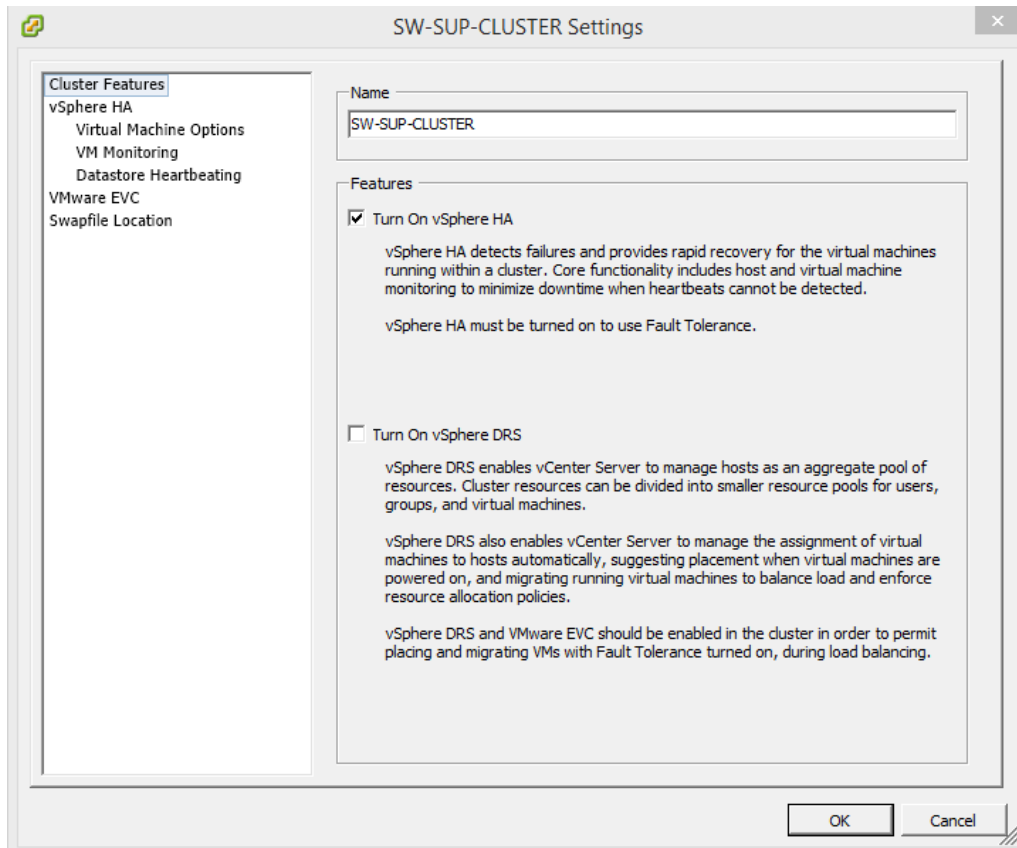
This technical paper covers **StarWind VSAN** configuration with VMware vSphere 6.0 and below for minimalistic hyperconverged 2-node scenario. In this setup, all virtual machines are stored on the shared storage provided by **StarWind**. VMware HA ensures VMs redundancy, while StarWind is responsible for the storage uptime. The combination of StarWind shared storage and VMware HA delivers high availability for applications and data across the entire virtualized environment. Using **StarWind VSAN**, the local storage resources of both ESXi hosts are turned into a fault-tolerant shared storage synchronously "mirrored" between the nodes. Being nested inside a VM and run on both ESXi hosts, StarWind VSAN ensures data safety and maintains the continuous application availability.

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