

StarWind Virtual SAN: Configuration Guide for VMware vSphere [ESXi], VSAN Deployed as a Controller Virtual Machine (CVM) using PowerShell CLI

2024

TECHNICAL PAPERS



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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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Annotation

Relevant Products

This guide is applicable to StarWind Virtual SAN and StarWind Virtual SAN Free (Version V8 (Build 15260, CVM Version 20231016) and later).

For older versions of StarWind Virtual SAN (Version V8 (Build 15260, OVF Version 20230901) and earlier), please refer to this configuration guide: [StarWind Virtual SAN: Configuration Guide for VMware vSphere \[ESXi\], VSAN Deployed as a Controller VM using PowerShell CLI](#)

Purpose

This guide provides a comprehensive outline on how to deploy and configure StarWind Virtual SAN within the VMware vSphere environment and create StarWind devices using the Web UI. It includes links to the system requirements, RAID settings, best practices, and steps to ensure a seamless setup and integration.

Audience

The guide is created for IT specialists, system administrators, and VMware professionals who are keen on deploying and configuring StarWind Virtual SAN on VMware vSphere.

Expected Result

Users will possess a robust understanding of the steps and best practices for deploying and configuring StarWind Virtual SAN in a VMware vSphere environment.

Starwind Virtual San For Vsphere Vm Requirements

Prior to installing StarWind Virtual SAN Virtual Machines, please make sure that the system meets the requirements, which are available via the following link:
<https://www.starwindsoftware.com/system-requirements>

Storage provisioning guidelines: <https://knowledgebase.starwindsoftware.com/guidance/how-to-provision-physical-storage-to-starwind-virtual-san-controller-virtual-machine/>

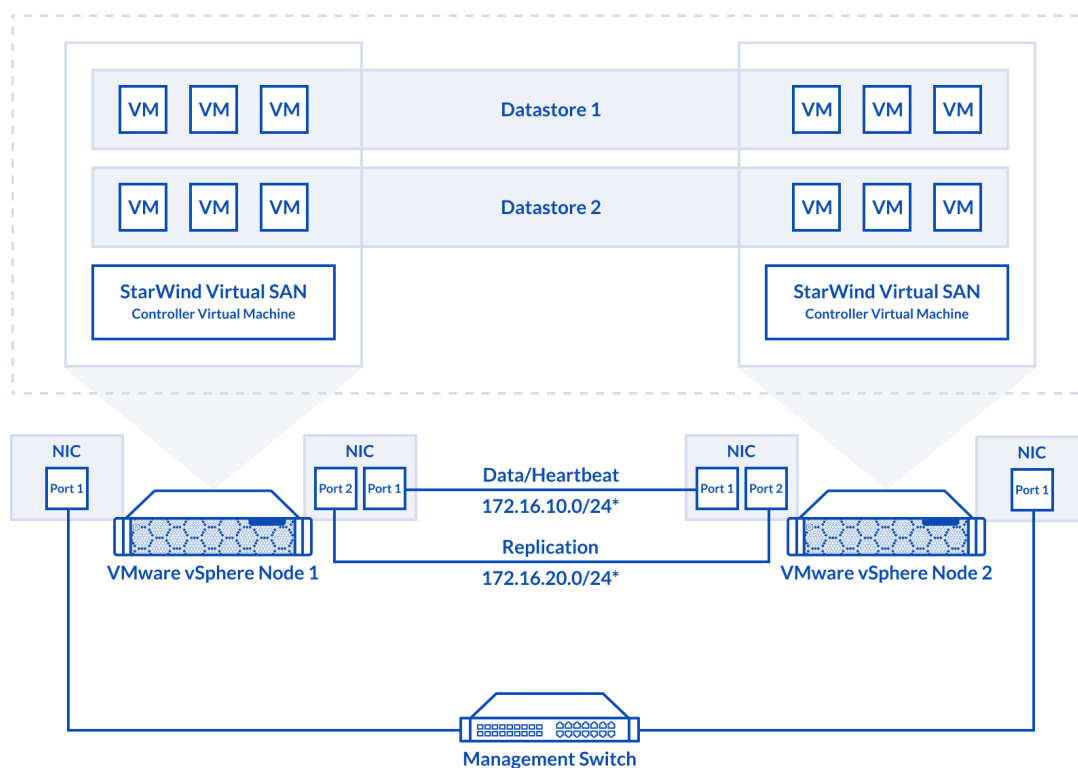
Recommended RAID settings for HDD and SSD disks:
<https://knowledgebase.starwindsoftware.com/guidance/recommended-raid-settings-for-h>

[dd-and-ssd-disks/](#)

Please read StarWind Virtual SAN Best Practices document for additional information:
<https://www.starwindsoftware.com/resource-library/starwind-virtual-san-best-practices>

Pre-Configuring The Servers

The diagram below illustrates the network and storage configuration of the solution:



1. ESXi hypervisor should be installed on each host.
2. StarWind Virtual SAN for vSphere VM should be deployed on each ESXi host from an OVF template, downloaded on this page:
<https://www.starwindsoftware.com/release-notes-build>
3. The network interfaces on each node for Synchronization and iSCSI/StarWind

heartbeat interfaces should be in different subnets and connected directly according to the network diagram above. Here, the 172.16.10.x subnet is used for the iSCSI/StarWind heartbeat traffic, while the 172.16.20.x subnet is used for the Synchronization traffic.

NOTE: Do not use iSCSI/Heartbeat and Synchronization channels over the same physical link. Synchronization and iSCSI/Heartbeat links and can be connected either via redundant switches or directly between the nodes.

vCenter Server can be deployed separately on another host or as VCSA on StarWind VSAN highly-available storage, created in this guide.

Preparing Environment For Starwind Vsan Deployment

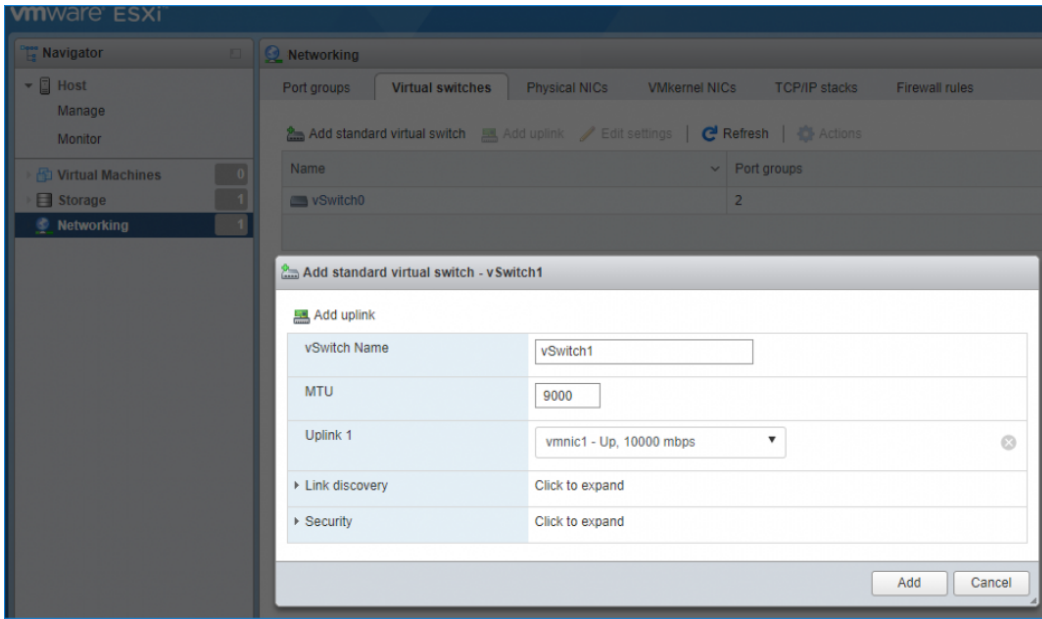
Configuring Networks

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. All actions below should be applied to each ESXi server.

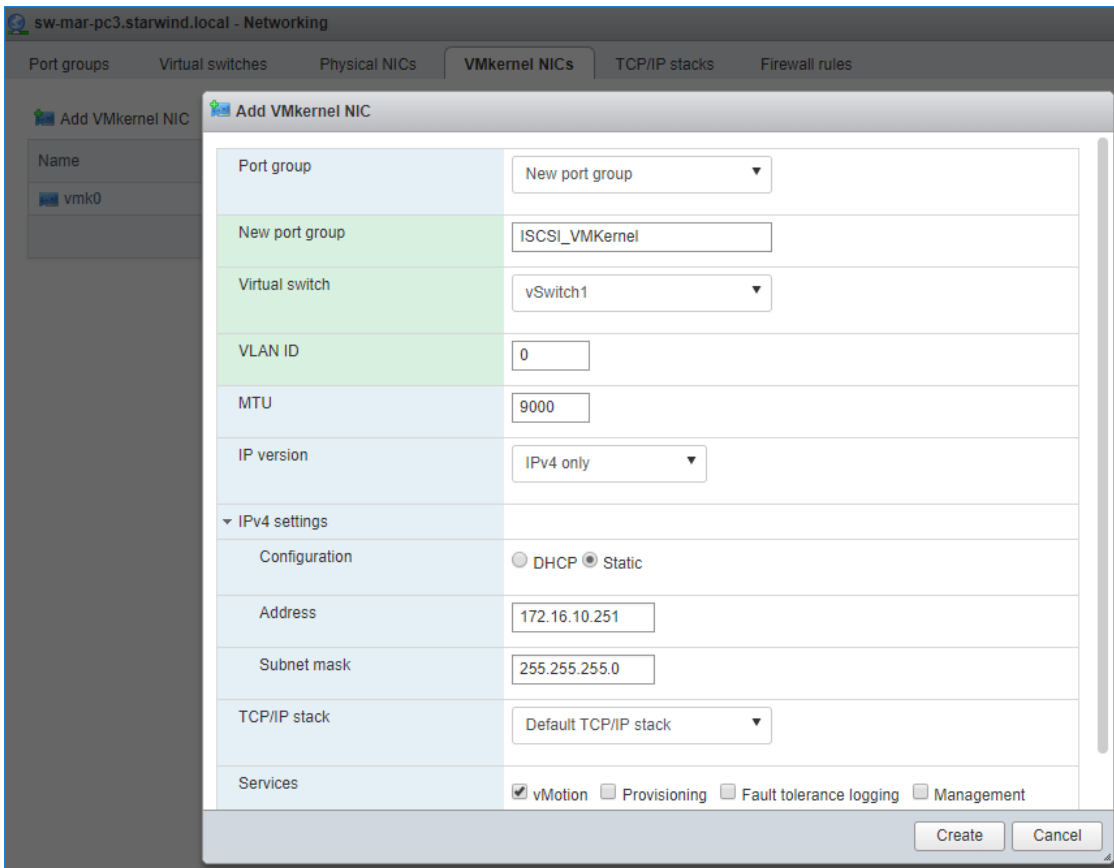
NOTE: Virtual Machine Port Group should be created for both iSCSI/ StarWind Heartbeat and the Synchronization vSwitches. VMKernel port should be created only for iSCSI traffic. Static IP addresses should be assigned to VMKernel ports.

NOTE: It is recommended to set MTU to 9000 on vSwitches and VMKernel ports for iSCSI and Synchronization traffic. Additionally, vMotion can be enabled on VMKernel ports.

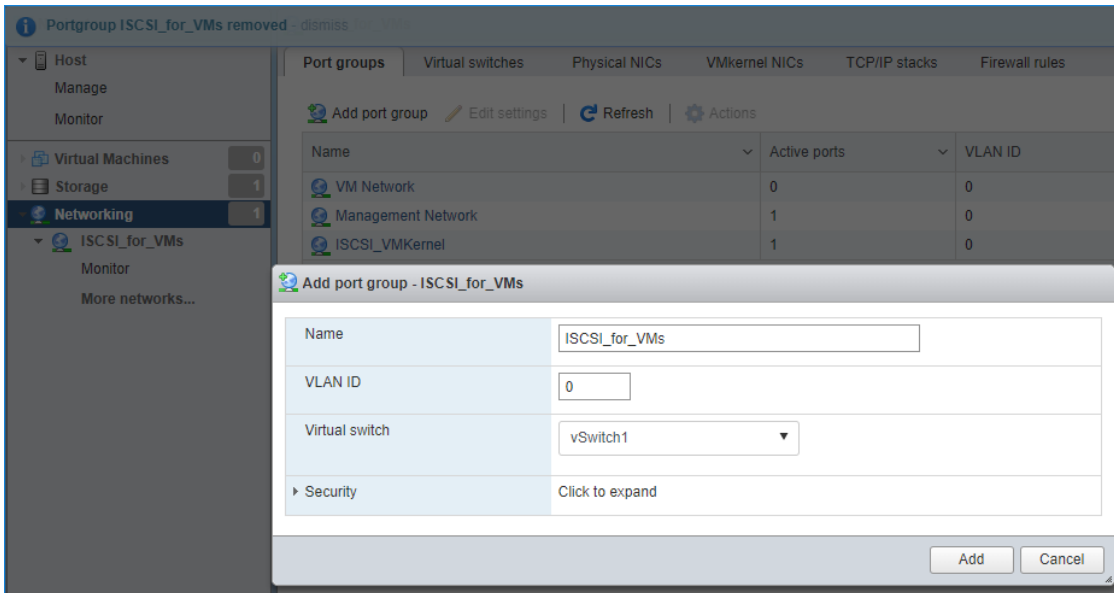
1. Using the VMware ESXi web console, create two standard vSwitches: one for the iSCSI/StarWind Heartbeat channel (vSwitch1) and the other one for the Synchronization channel (vSwitch2).



2. Create a VMKernel port for the iSCSI/ StarWind Heartbeat channel.



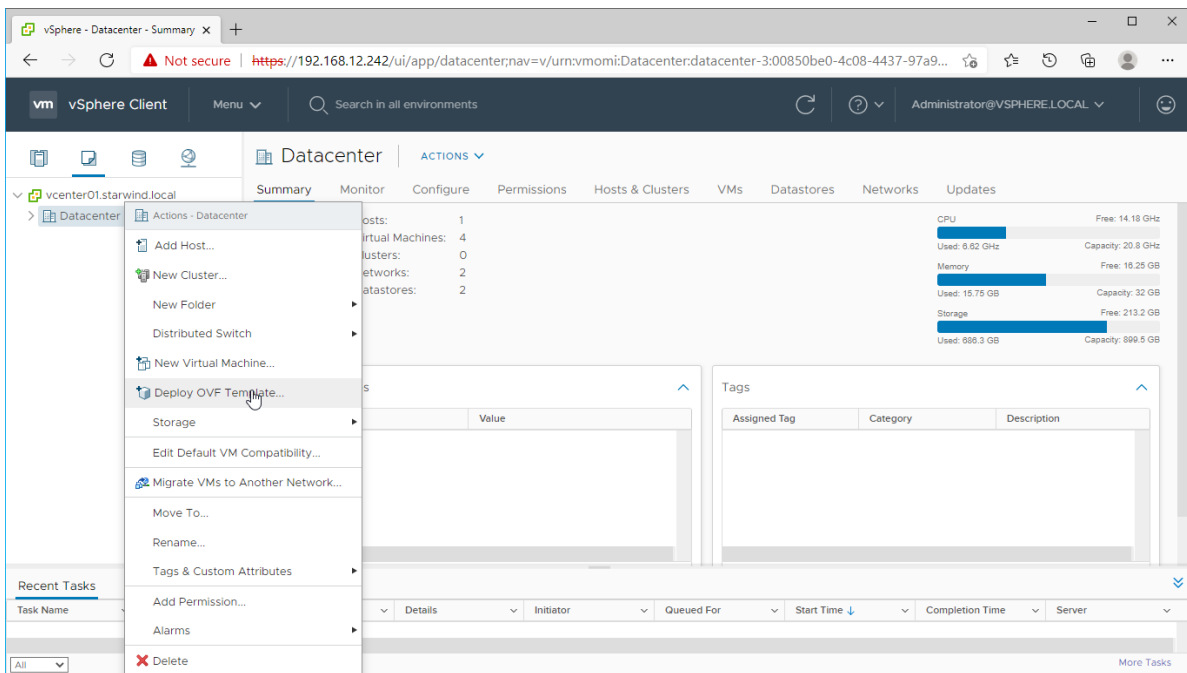
3. Add a Virtual Machine Port Groups on the vSwitch for iSCSI traffic (vSwitch1) and on the vSwitch for Synchronization traffic (vSwitch2).



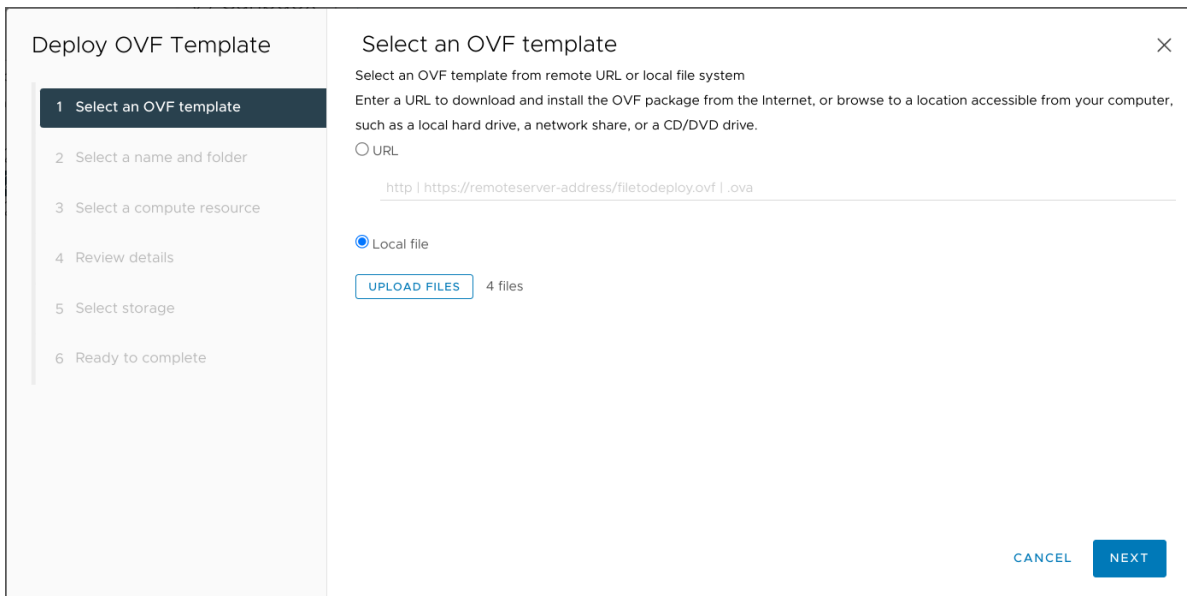
4. Repeat steps 1-3 for any other links intended for Synchronization and iSCSI/Heartbeat traffic on ESXi hosts.

Deploying Starwind Virtual San For Vsphere

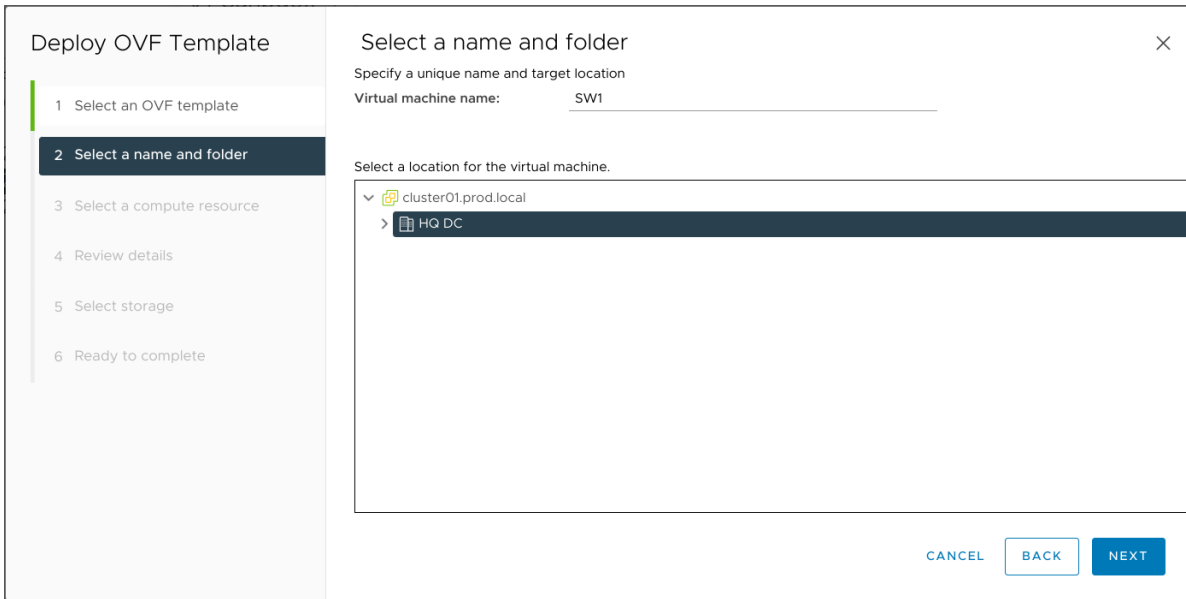
1. Download zip archive that contains StarWind Virtual SAN for vSphere:
<https://www.starwindsoftware.com/starwind-virtual-san#download>
2. Extract the virtual machine files.
3. Deploy the control virtual machine to the VMware vSphere. Right-click on the Datacenter, cluster, or node menu and select the "Deploy OVF Template..." option from a drop-down menu.



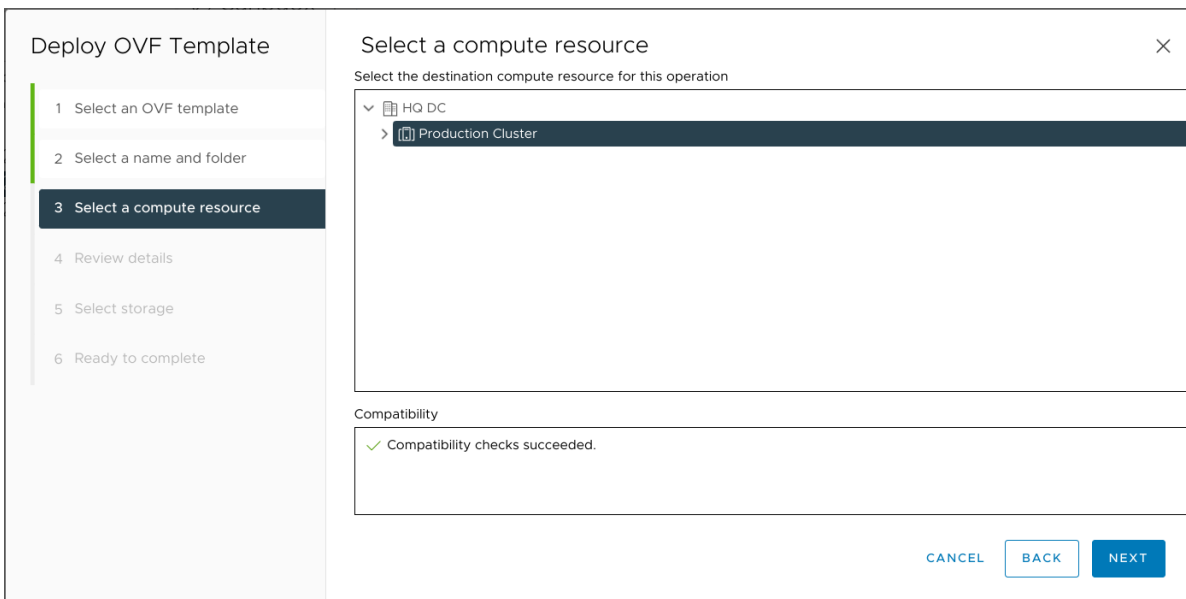
4. In the first step of the wizard, point to the location of the OVF template. Select the VM files and click Next.



5. Specify the VM name and target location.



6. Select a compute resource intended to run the StarWind vSAN CVM



7. Review the template details. Click Next.

Deploy OVF Template

- Select an OVF template
- Select a name and folder
- Select a compute resource
- Review details**
- Select storage
- Select networks
- Customize template
- Ready to complete

Review details ×

Verify the template details.

⚠ The OVF package contains advanced configuration options, which might pose a security risk. Review the advanced configuration options below. Click next to accept the advanced configuration options.

Publisher	No certificate present
Product	StarWind Appliance
Vendor	StarWind Software Inc.
Download size	Unknown
Size on disk	Unknown (thin provisioned) 30.0 GB (thick provisioned)
Extra configuration	disk.EnableUUID = true nvram = ovf:/file/file2

CANCEL BACK NEXT

8. In the second step of the wizard, specify the virtual machine provisioning type, VM Storage Policy, and select the direct-attached storage for the appliance system drive. Click Next.

Deploy OVF Template

- Select an OVF template
- Select a name and folder
- Select a compute resource
- Review details
- Select storage**
- Select networks
- Customize template
- Ready to complete

Select storage ×

Select the storage for the configuration and disk files

Select virtual disk format: Thick Provision Lazy Zeroed

VM Storage Policy: [Dropdown] **⚠**

Disable Storage DRS for this virtual machine

Name	Storage Compatibility	Capacity	Provisioned	Free	Type	Cluster
Datastore	--	10 TB	3.38 TB	6.61 TB		

4 items

Compatibility

✓ Compatibility checks succeeded.

CANCEL BACK NEXT

9. Select the destination network for each network adapter assigned to the VM.

The default naming for virtual switches:

- the Management virtual switch is “Management vSwitch”,
- the iSCSI virtual switch is “Data/iSCSI vSwitch”,
- the Synchronization virtual switch is “Replication/Sync vSwitch “.

Specify corresponding network connections according to your virtual network naming. Click Next.

Deploy OVF Template

- Select an OVF template
- Select a name and folder
- Select a compute resource
- Review details
- Select storage
- Select networks**
- Customize template
- Ready to complete

Select networks ×

Select a destination network for each source network.

Source Network	Destination Network
Management Network	Management ▼
Data Network	Data network ▼
Replication Network	Replica network ▼

3 Items

IP Allocation Settings

IP allocation: Static - Manual

IP protocol: IPv4

CANCEL BACK NEXT

10. Specify the hostname, static IPv4 address, gateway, DNS, and additional network settings for Management and iSCSI/Data network interfaces:

Deploy OVF Template

- Select an OVF template
- Select a name and folder
- Select a compute resource
- Review details
- Select storage
- Select networks
- Customize template**
- Ready to complete

Customize template ×

Customize the deployment properties of this software solution.

✓ All properties have valid values ×

Management interface network settings 5 settings

Hostname	Hostname of StarWind Appliance SW1
IPv4 address for Management interface	IPv4 address for Management interface (example 192.168.1.100) 192.168.12.206
IPv4 netmask for Management interface	IPv4 netmask for Management interface (example 24) 23
IPv4 gateway for Management interface	IPv4 gateway for Management interface (example 192.168.1.1) 192.168.12.1
DNS Server for Management interface	DNS Server for Data interface (example 8.8.8.8) 192.168.12.17

CANCEL BACK NEXT

NOTE: To manage the StarWind appliances via the StarWind vCenter plugin, the static IPv4 address must be assigned.

Deploy OVF Template	
1 Select an OVF template	
2 Select a name and folder	
3 Select a compute resource	
4 Review details	
5 Select storage	
6 Select networks	
7 Customize template	
8 Ready to complete	

Customize template	
DNS Server for Management interface	192.168.12.1
DNS Server for Data interface (example 8.8.8.8)	192.168.12.17
▼ Data interface network settings	3 settings
IPv4 address for Data interface	IPv4 address for Data interface (example 172.16.10.10)
	172.16.10.100
IPv4 netmask for Data interface	IPv4 netmask for Data interface (example 24)
	24
MTU for Data interface	MTU for Data interface (example 9000)
	9000
▼ Enable additional services	1 settings
Enable SSH	SSH is disabled by default. Select the checkbox to enable it
	<input checked="" type="checkbox"/>

CANCEL BACK NEXT

NOTE: if a DHCP server is available on the given network, you can skip setting the additional parameters for that interface.

11. Review the deployment summary information and click to start the VM creation.

Deploy OVF Template	
1 Select an OVF template	
2 Select a name and folder	
3 Select a compute resource	
4 Review details	
5 Select storage	
6 Select networks	
7 Customize template	
8 Ready to complete	

Ready to complete	
▼ Select networks	
Network mapping	3
Management Network	Management
Data Network	Data network
Replication Network	Replica network
IP allocation settings	
IP protocol	IPV4
IP allocation	Static - Manual
▼ Customize template	
Properties	Hostname = SW1 IPv4 address for Management interface = 192.168.12.206 IPv4 netmask for Management interface = 23 IPv4 gateway for Management interface = 192.168.12.1 DNS Server for Management interface = 192.168.12.17 IPv4 address for Data interface = 172.16.10.100 IPv4 netmask for Data interface = 24 MTU for Data interface = 9000 Enable SSH = True

CANCEL BACK FINISH

12. Repeat the VM deployment on each other ESXi hosts.

NOTE: In some cases, it's recommended to reserve memory for StarWind VSAN VM.

NOTE: When using StarWind with the synchronous replication feature inside of a Virtual Machine, it is recommended not to make backups and/or snapshots of the Virtual Machine with the StarWind VSAN service installed, as this could pause the StarWind

Virtual Machine. Pausing the Virtual Machines while the StarWind VSAN service is under load may lead to split-brain issues in synchronous replication devices, thus to data corruption.

Initial Configuration Wizard

1. Start StarWind Virtual SAN CVM.

2. Launch VM console to see the VM boot process and get the IPv4 address of the Management network interface.

NOTE: in case VM has no IPv4 address obtained from a DHCP server, use the Text-based User Interface (TUI) to set up a Management network.

Default credentials for TUI: user/rds123RDS

3. Using the web browser, open a new tab and enter the VM IPv4 address to open StarWind VSAN Web Interface. Click “Advanced” and then “Continue to...”



Your connection is not private

Attackers might be trying to steal your information from **192.168.12.206** (for example, passwords, messages, or credit cards). [Learn more](#)

NET:ERR_CERT_AUTHORITY_INVALID

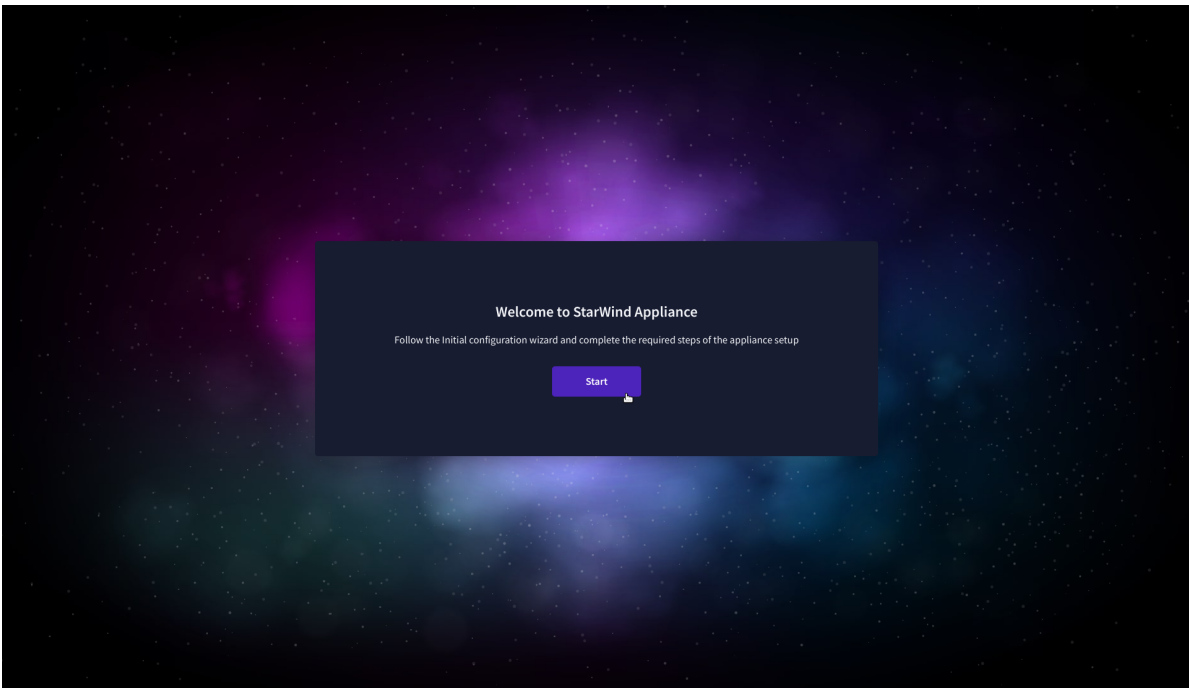
Hide advanced

Back to safety

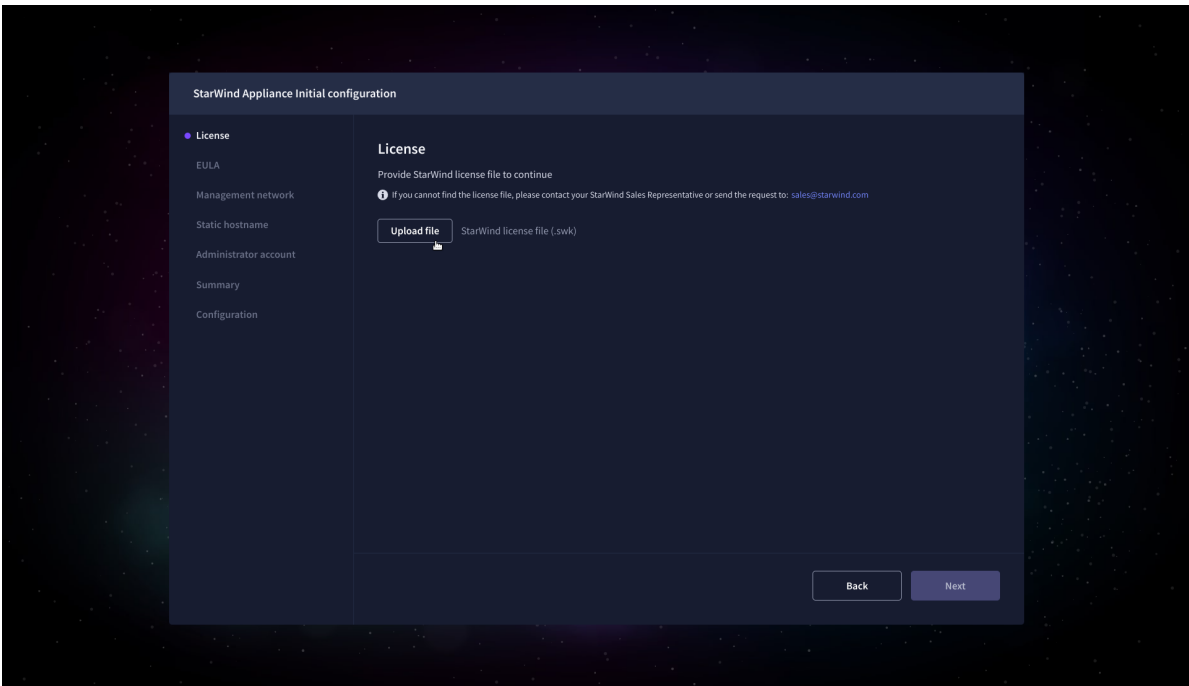
This server could not prove that it is **192.168.12.206**; its security certificate is not trusted by your computer's operating system. This may be caused by a misconfiguration or an attacker intercepting your connection.

Proceed to 192.168.12.206 (unsafe)

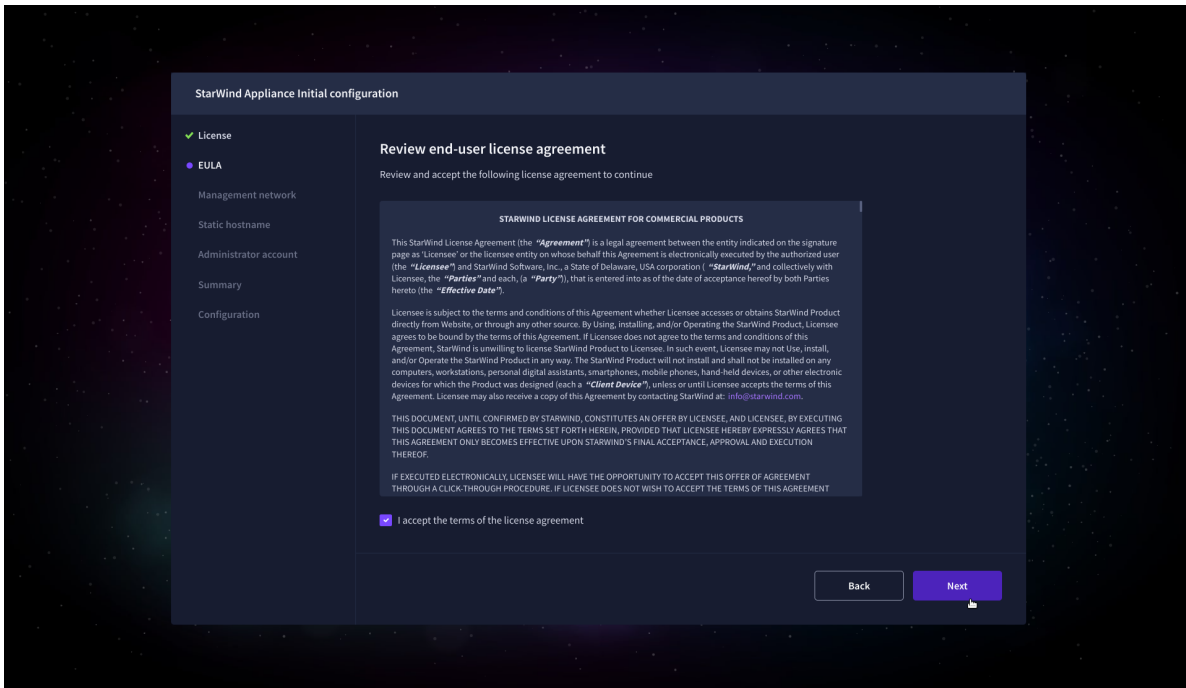
4. StarWind VSAN web UI welcomes you, and the “Initial Configuration” wizard will guide you through the deployment process.



5. In the following step, upload the license file.

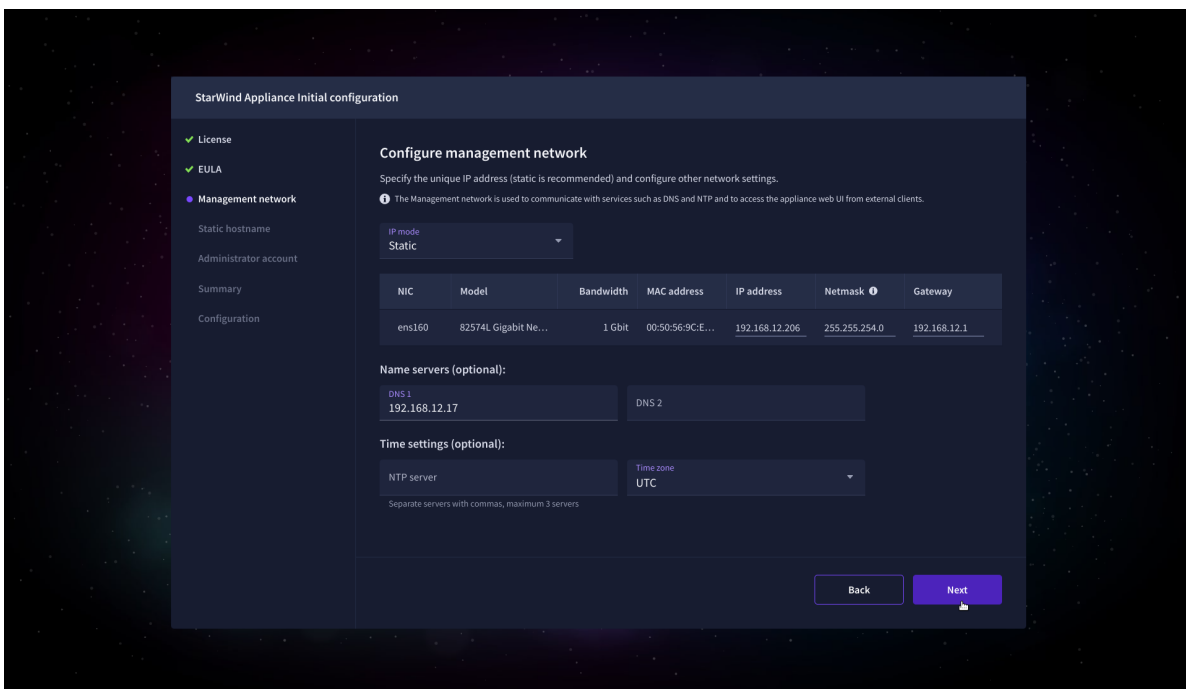


6. Read and accept the End User License Agreement to proceed.

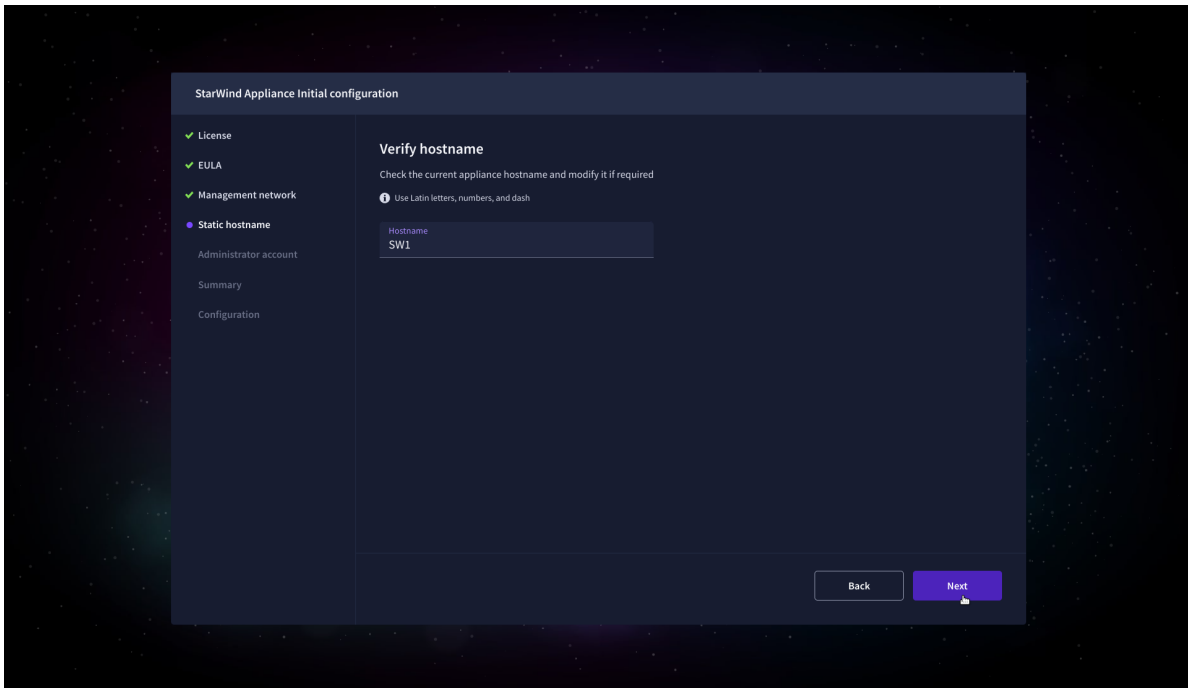


7. Review or edit the Network settings and click Next.

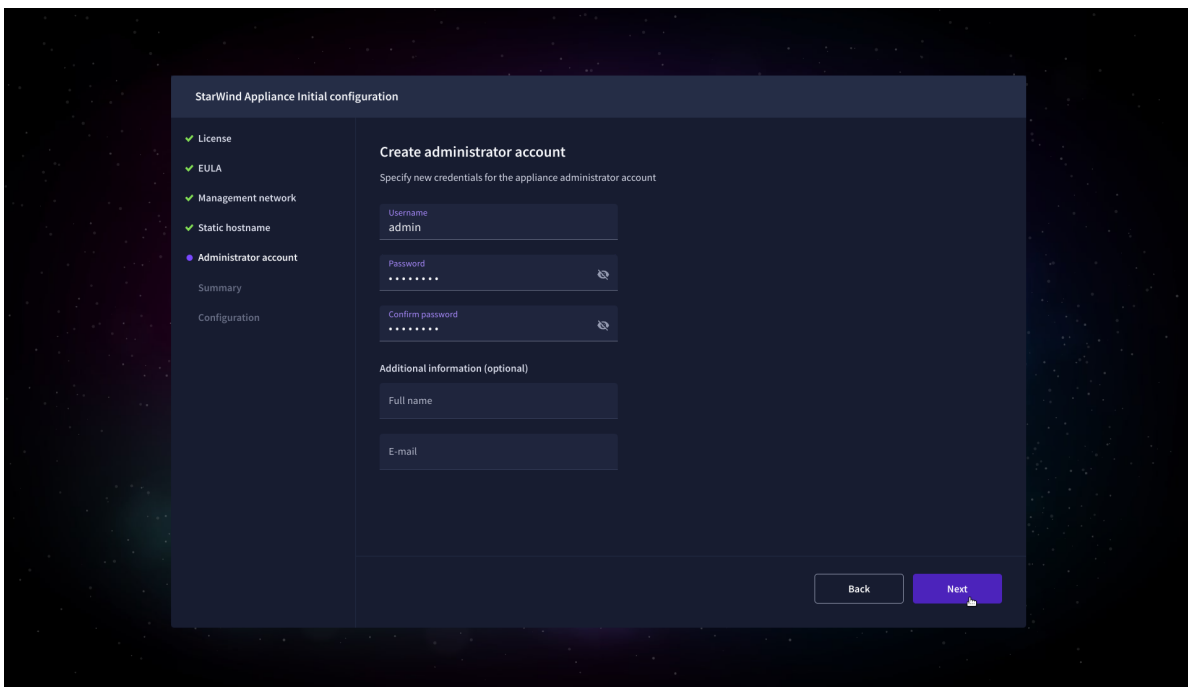
NOTE: Static network settings are recommended for the configuration.



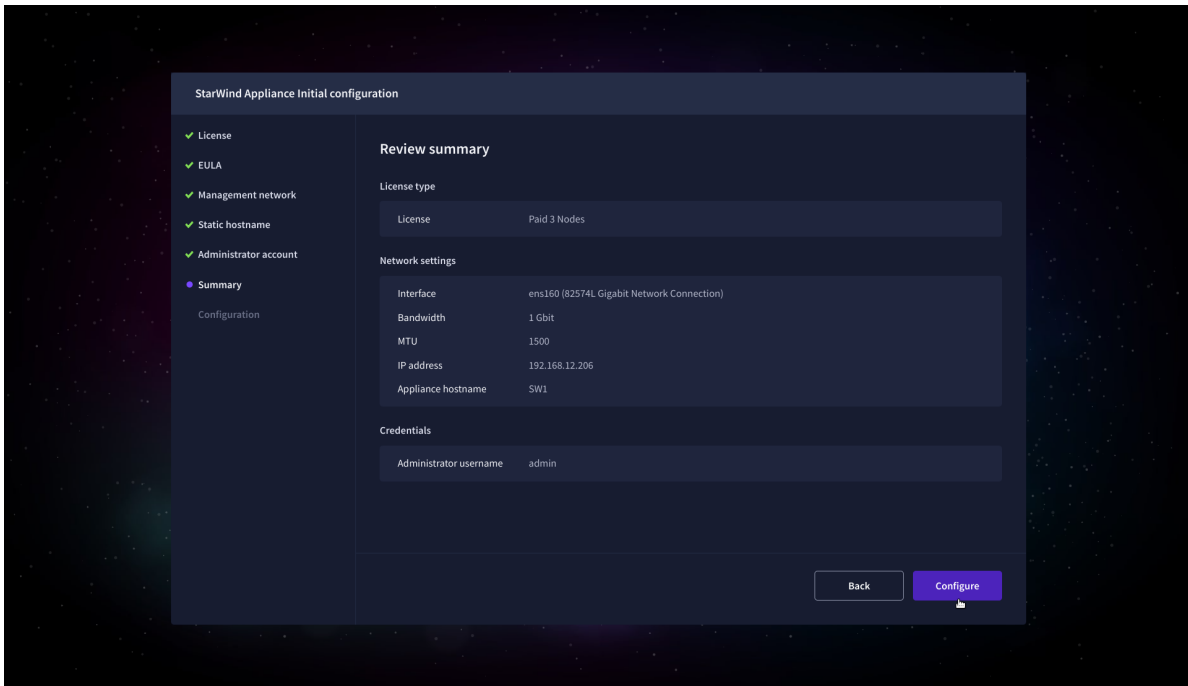
8. Specify the hostname for the virtual machine and click Next.



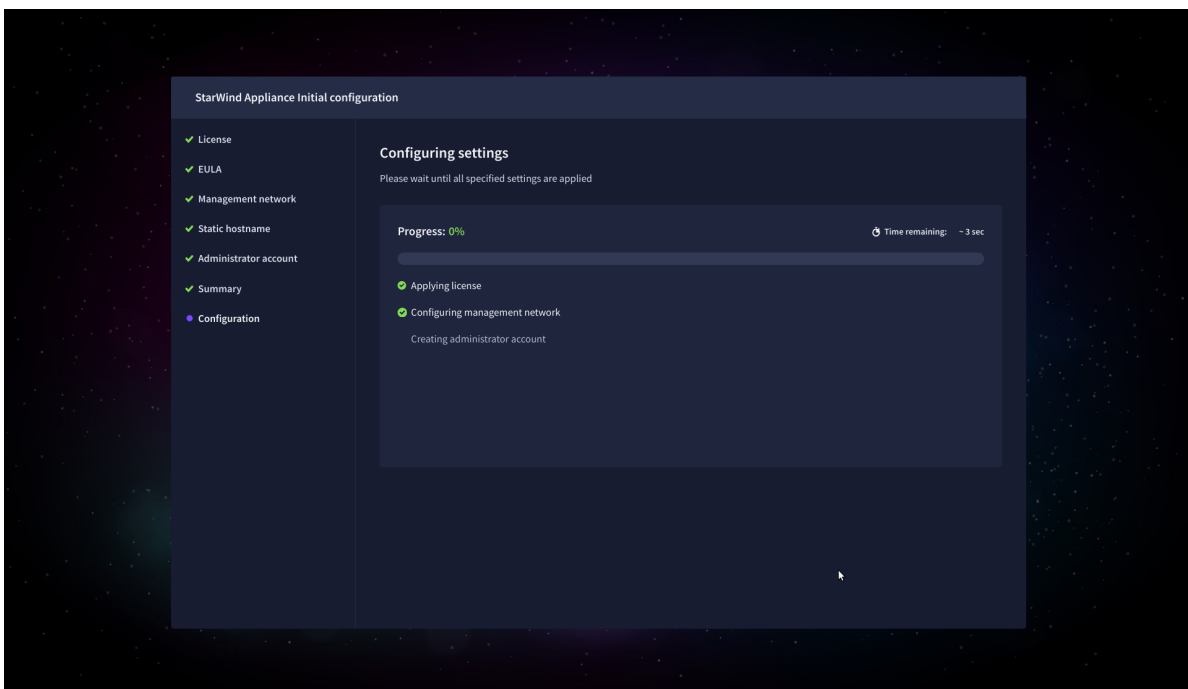
9. Create an administrator account. Click Next.



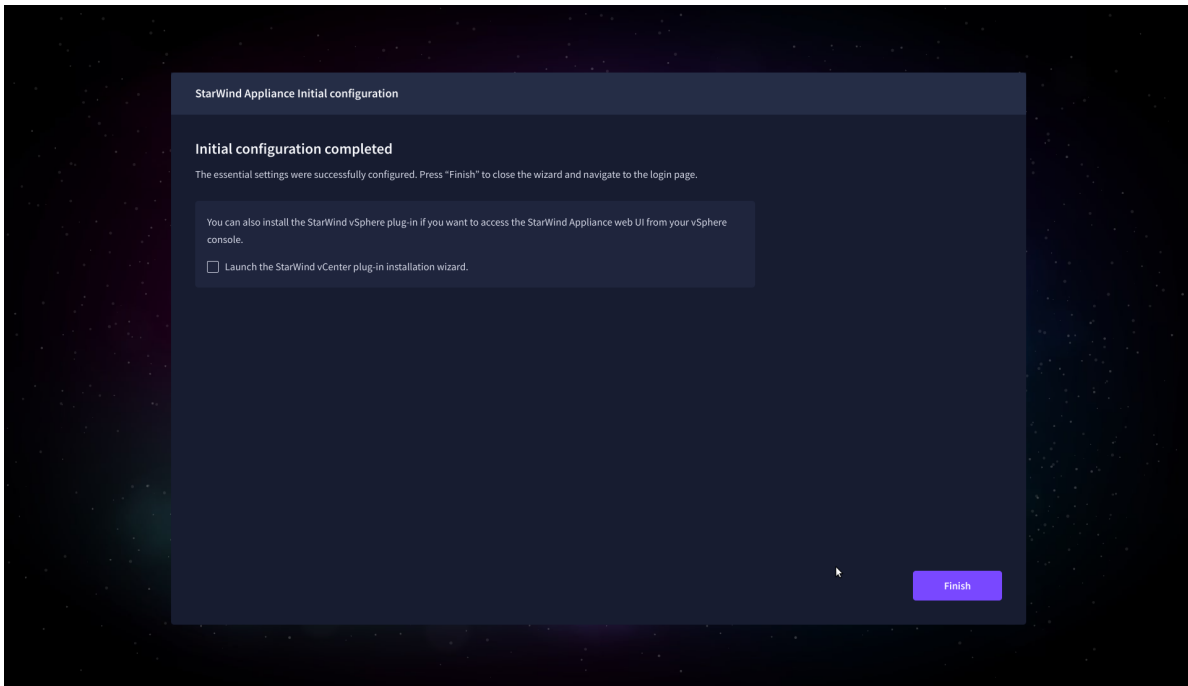
10. Review your settings selection before setting up StarWind VSAN.



11. Please standby until the Initial Configuration Wizard configures StarWind VSAN for you.



12. The appliance is set and ready. Click on the Done button to install the StarWind vCenter Plugin right now or uncheck the checkbox to skip this step and proceed to the [Login page](#).



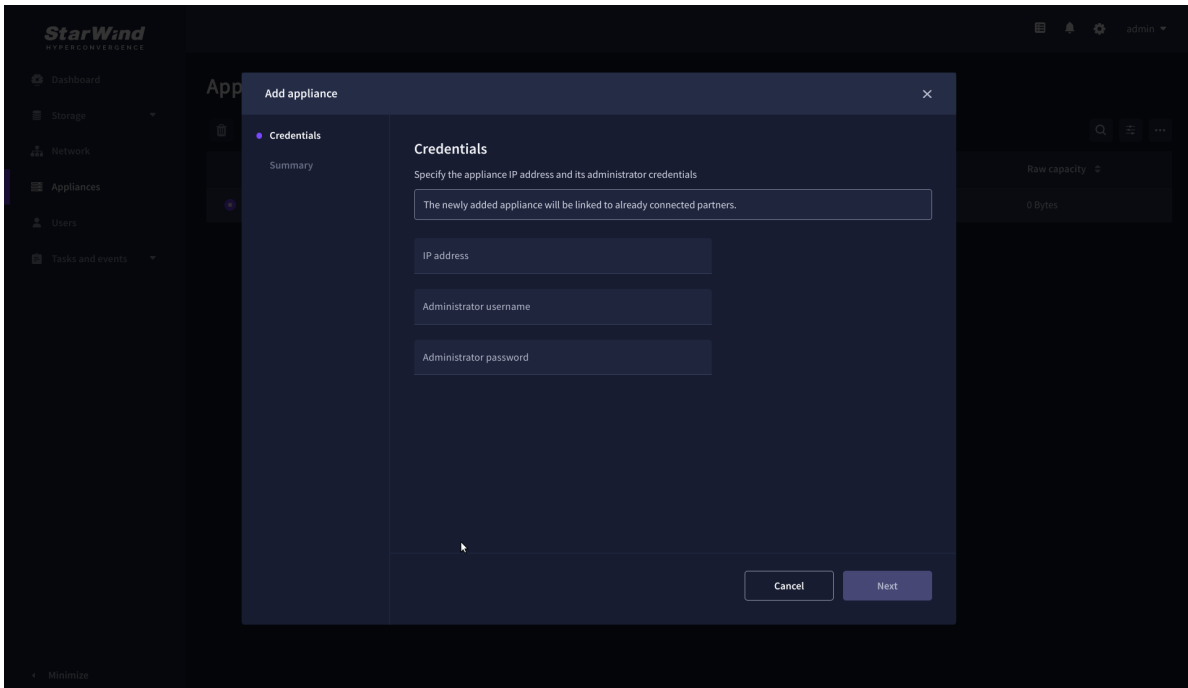
13. Repeat the initial configuration on other StarWind CVMs that will be used to create 2-node or 3-node HA shared storage.

Add Appliance

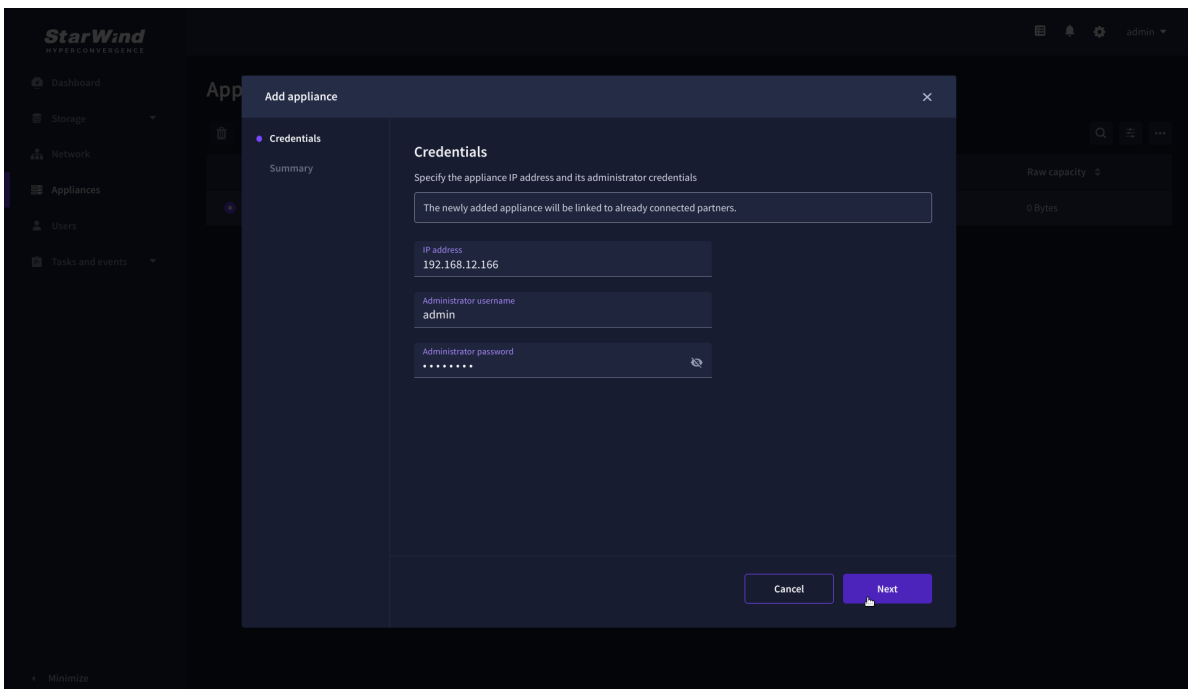
To create 2-way or 3-way synchronously replicated highly available storage, add partner appliances that use the same license key.

1. Add StarWind appliance(s) in the web console, on the Appliances page.

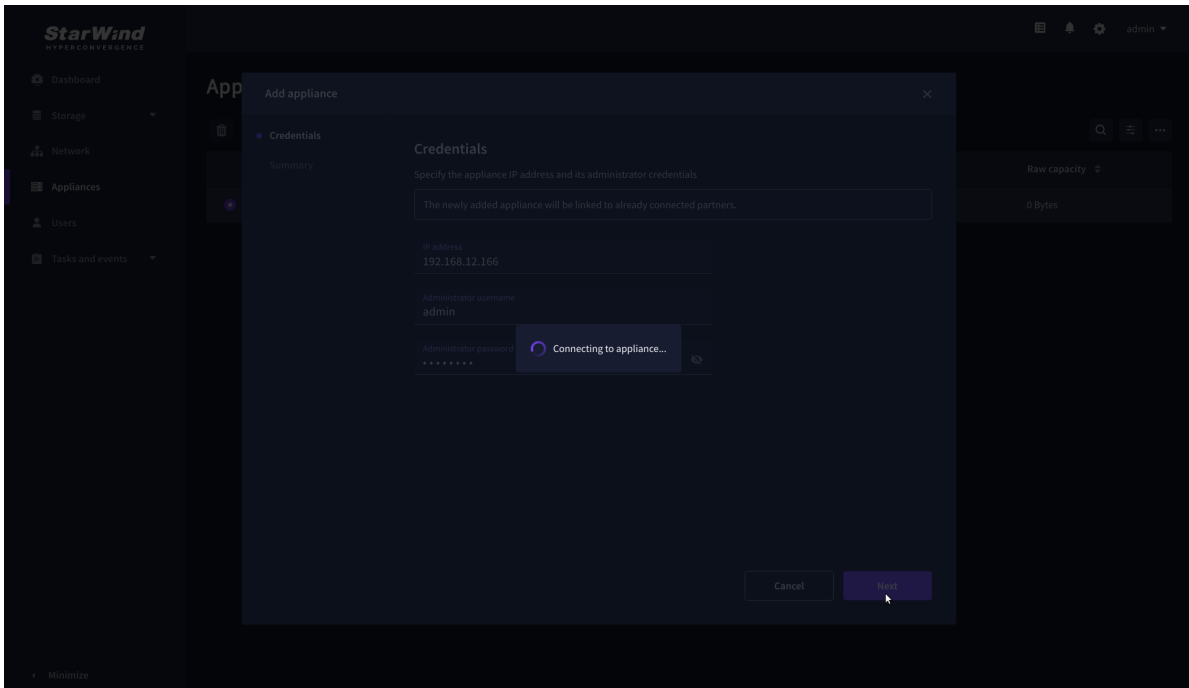
NOTE: The newly added appliance will be linked to already connected partners.



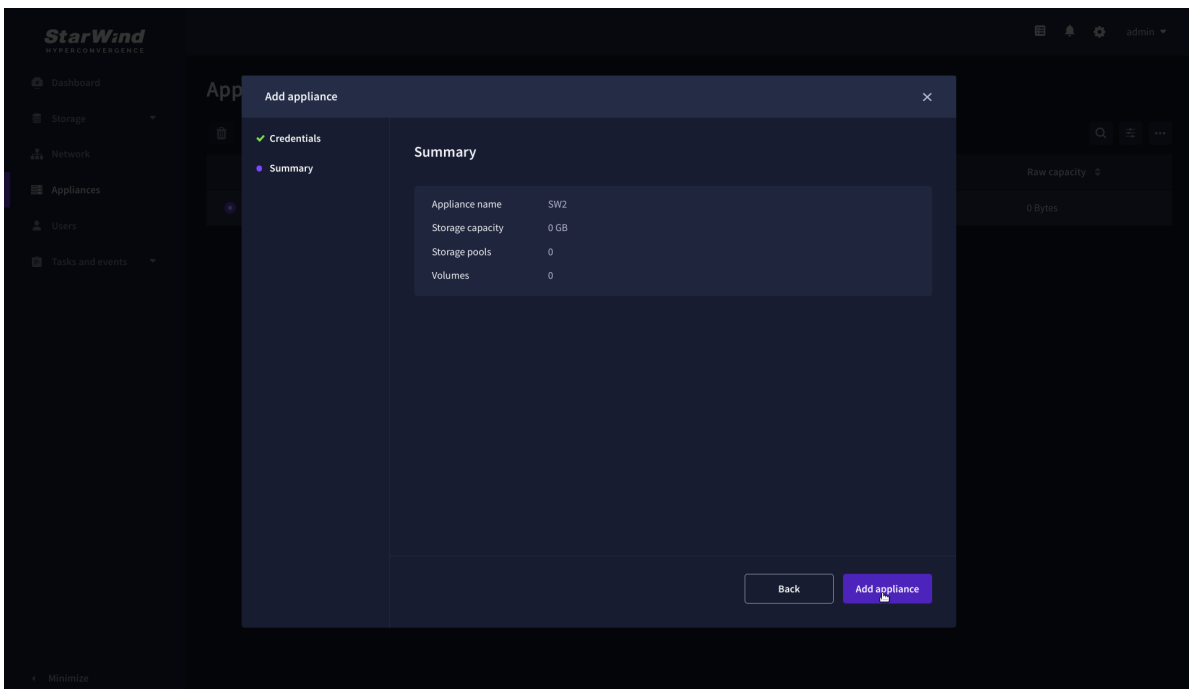
2. Provide credentials of partner appliance.



3. Wait for connection and validation of settings.

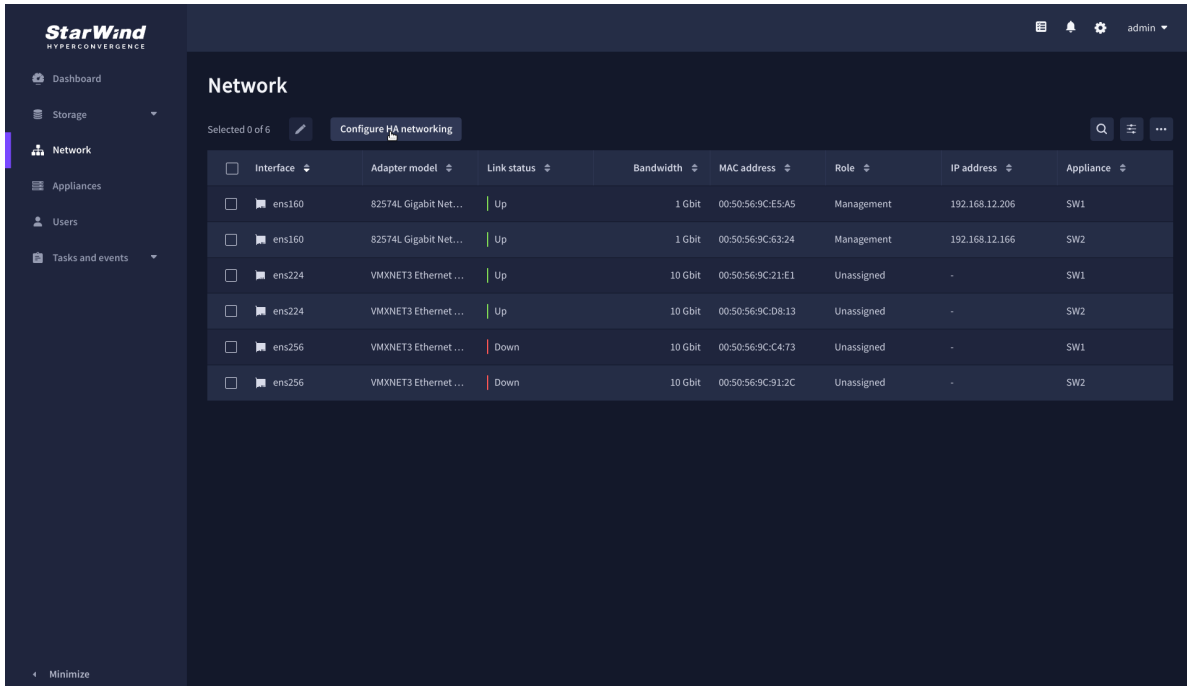


4. Review the summary and click “Add appliance”.



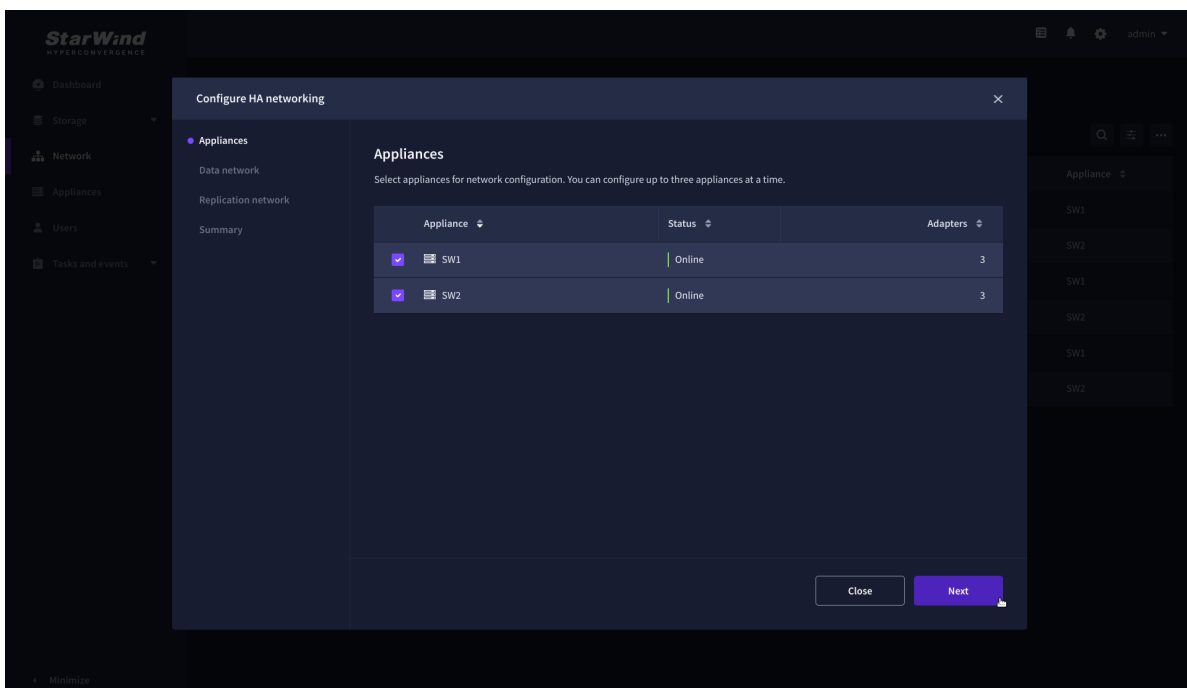
Configure Ha Networking

1. Launch the “Configure HA Networking” wizard.



2. Select appliances for network configuration.

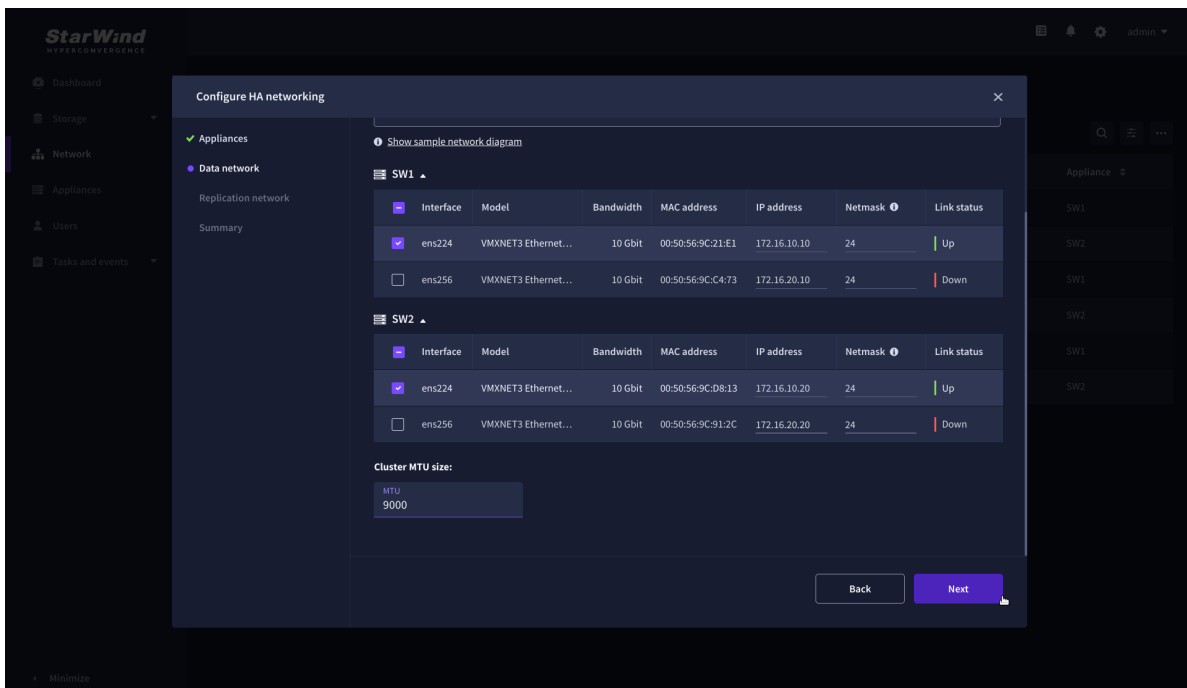
NOTE: the number of appliances to select is limited by your license, so can be either two or three appliances at a time.



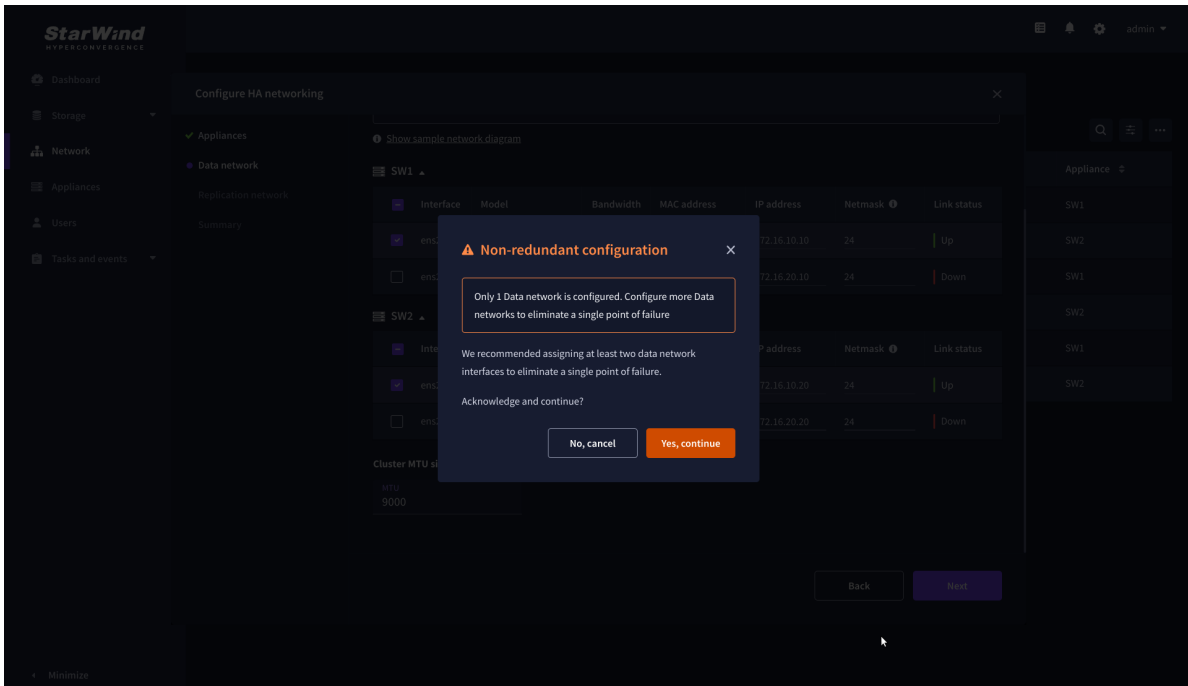
3. Configure the “Data” network. Select interfaces to carry storage traffic, configure them with static IP addresses in unique networks, and specify subnet masks:

- assign and configure at least one interface on each node
- for redundant configuration, select two interfaces on each node
- ensure interfaces are connected to client hosts directly or through redundant switches

4. Assign MTU value to all selected network adapters, e.g. 1500 or 9000. Ensure the switches have the same MTU value set.



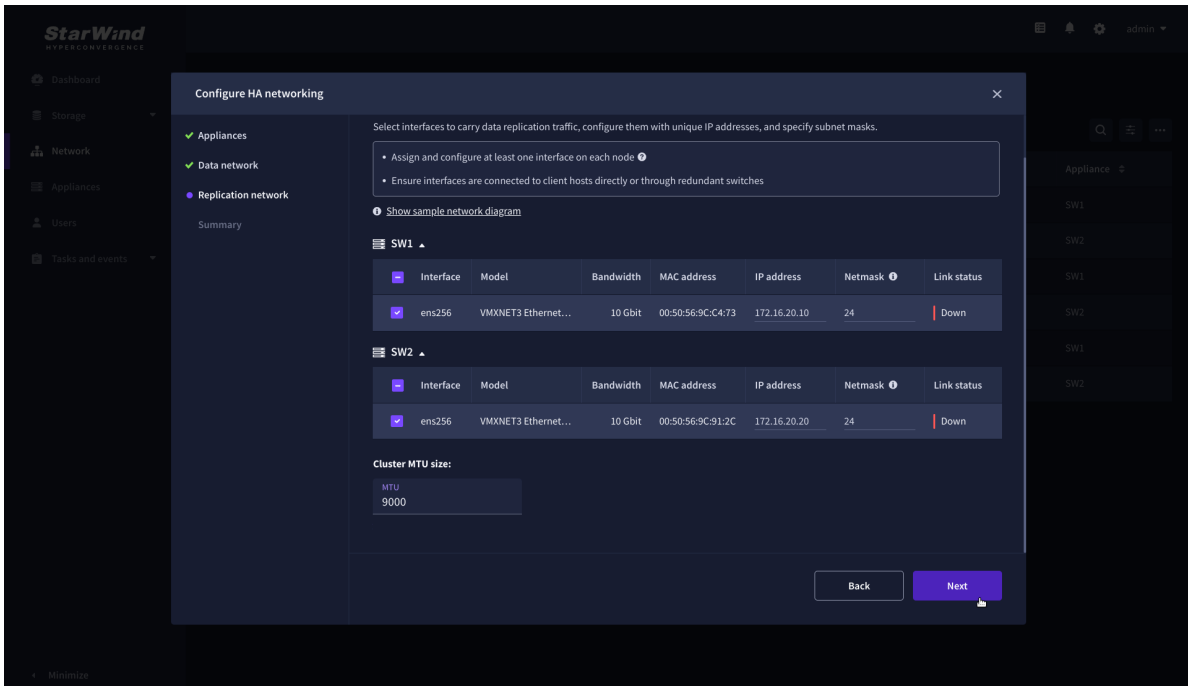
5. Click Next to validate Data network settings.



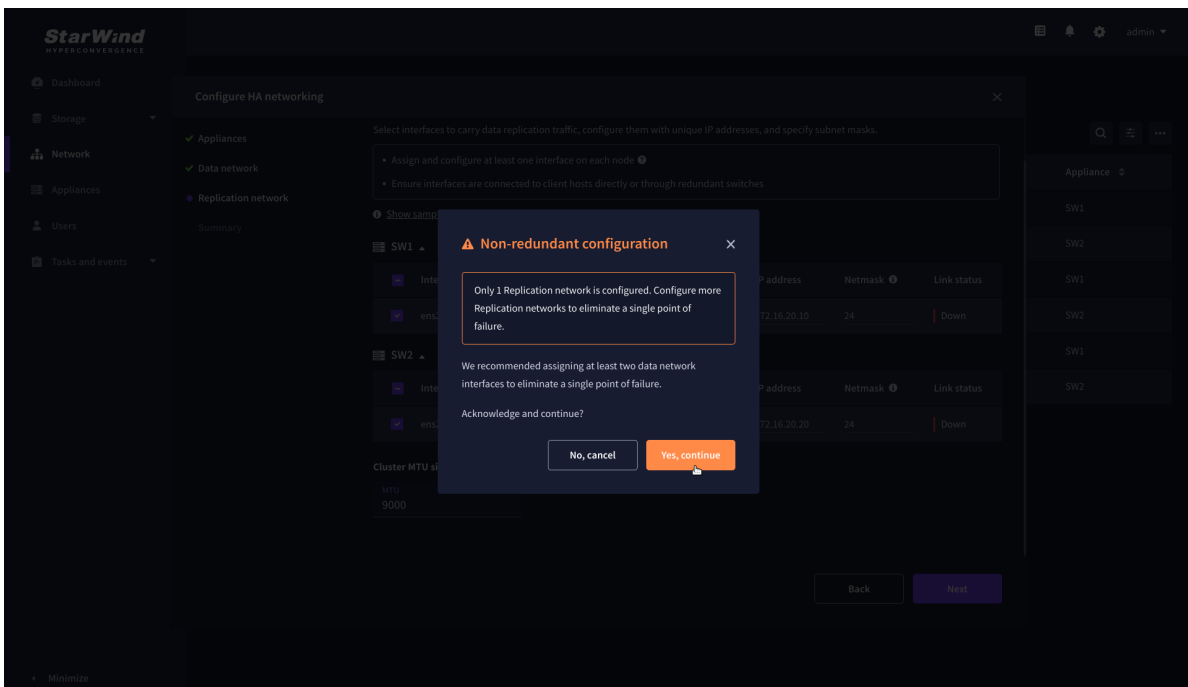
6. Configure the “Replication” network. Select interfaces to carry storage traffic, configure them with static IP addresses in unique networks, and specify subnet masks:

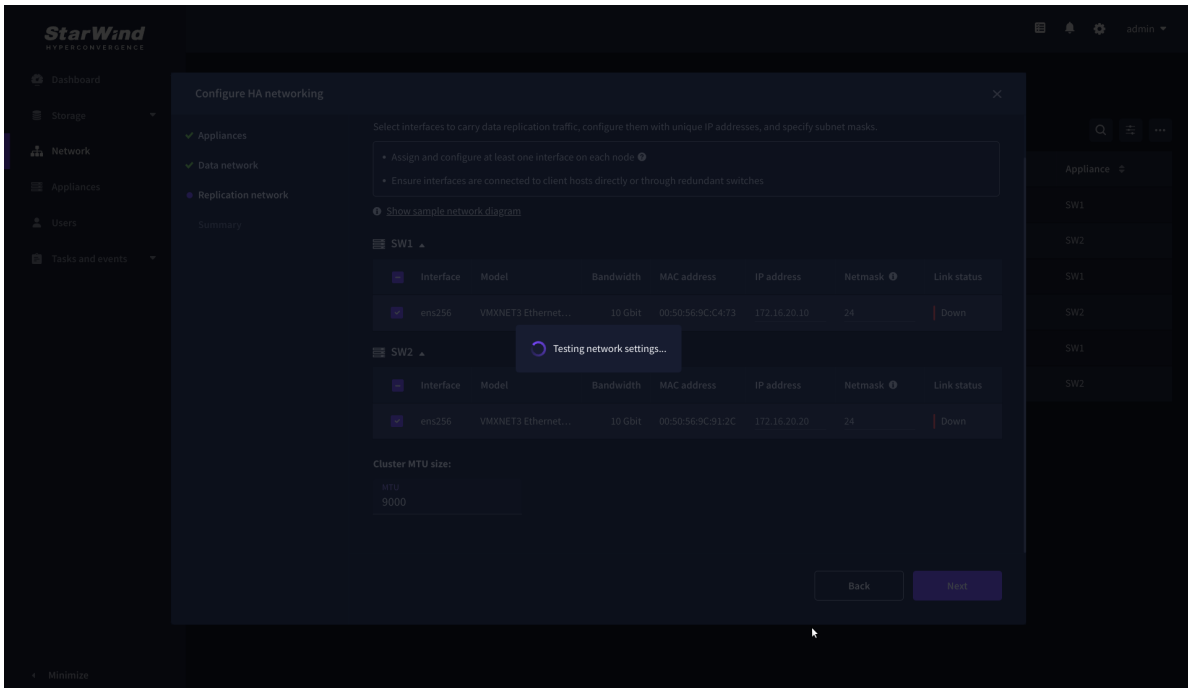
- assign and configure at least one interface on each node
- for redundant configuration, select two interfaces on each node
- ensure interfaces are connected to client hosts directly or through redundant switches

7. Assign MTU value to all selected network adapters, e.g. 1500 or 9000. Ensure the switches have the same MTU value set.

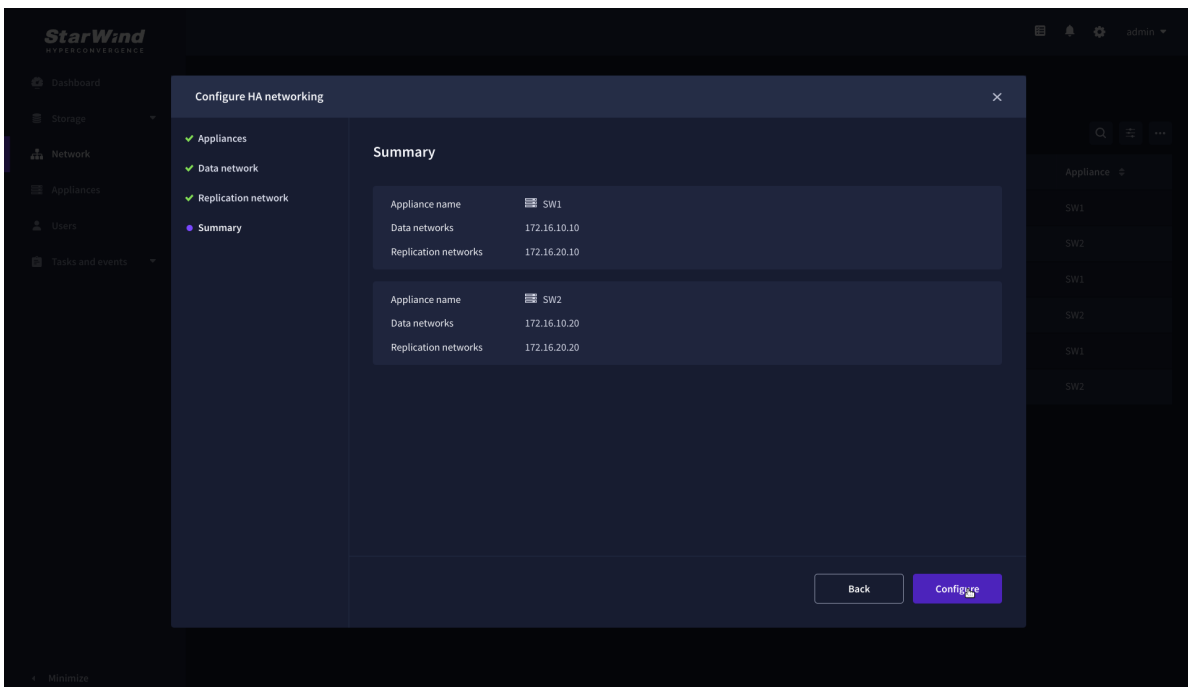


8. Click Next to validate the Replication network settings completion.





9. Review the summary and click Configure.



Add Physical Disks

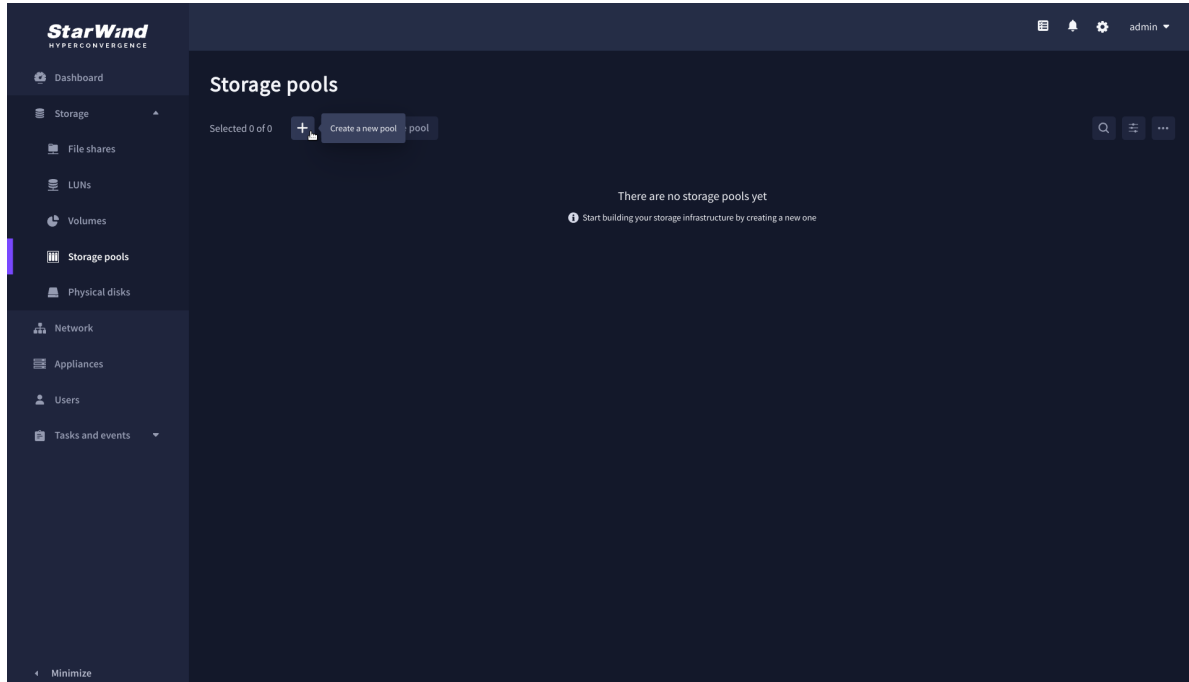
Attach physical storage to StarWind Virtual SAN Controller VM:

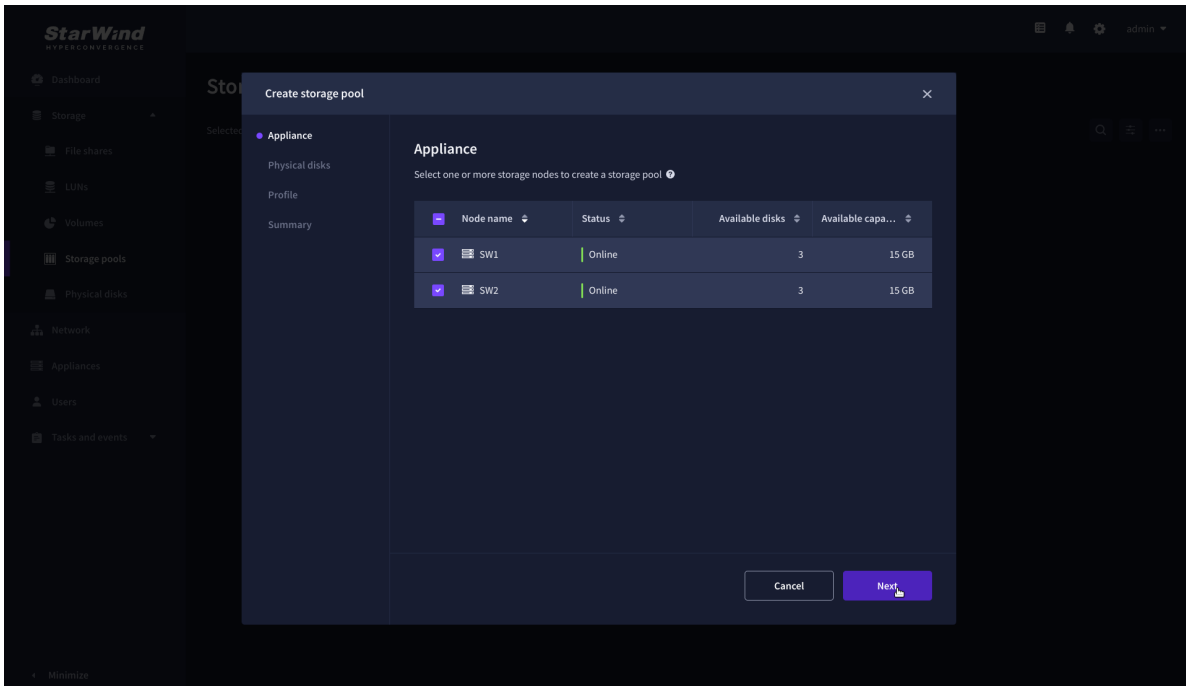
- Ensure that all physical drives are connected through an HBA or RAID controller.
- Deploy StarWind VSAN CVM on each server that will be used to configure fault-tolerant standalone or highly available storage.
- Store StarWind VSAN CVM on a separate storage device accessible to the hypervisor host (e.g., SSD, HDD).
- Add HBA, RAID controllers, or NVMe SSD drives to StarWind CVM via a passthrough device.

Learn more about storage provisioning guidelines in the [KB article](#).

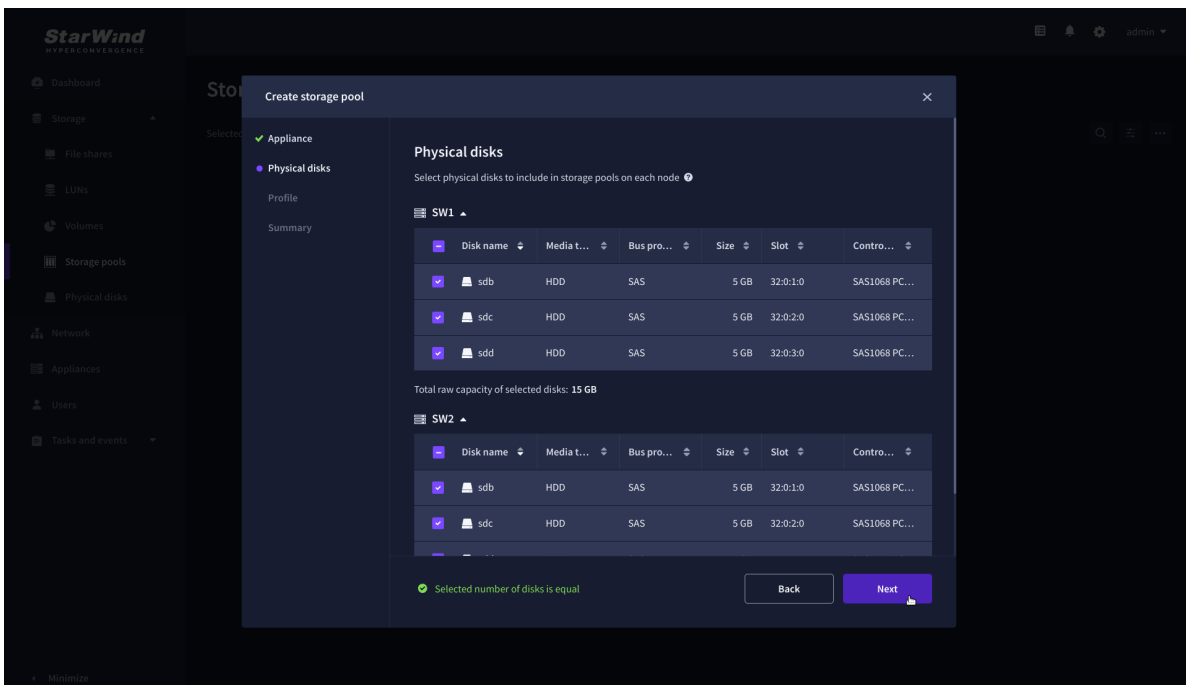
Create Storage Pool

1. Click the “Add” button to create a storage pool.
2. Select two storage nodes to create a storage pool on them simultaneously.

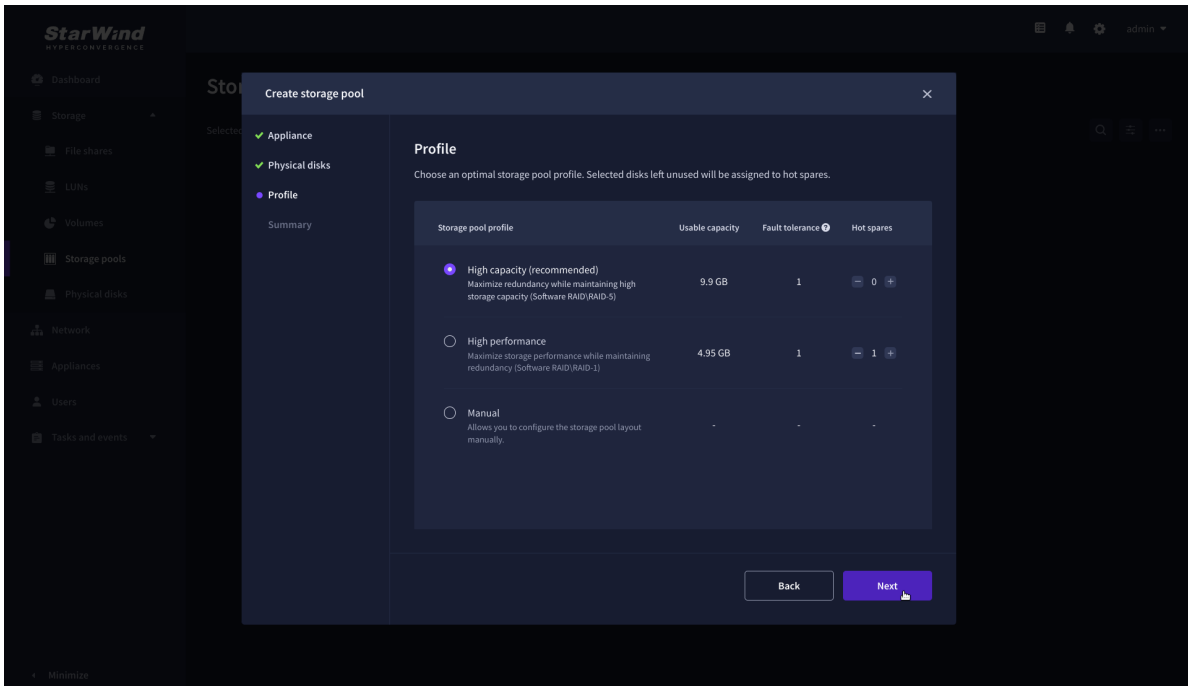




3. Select physical disks to include in the storage pool name and click the “Next” button.
NOTE: Select identical type and number of disks on each storage node to create identical storage pools.



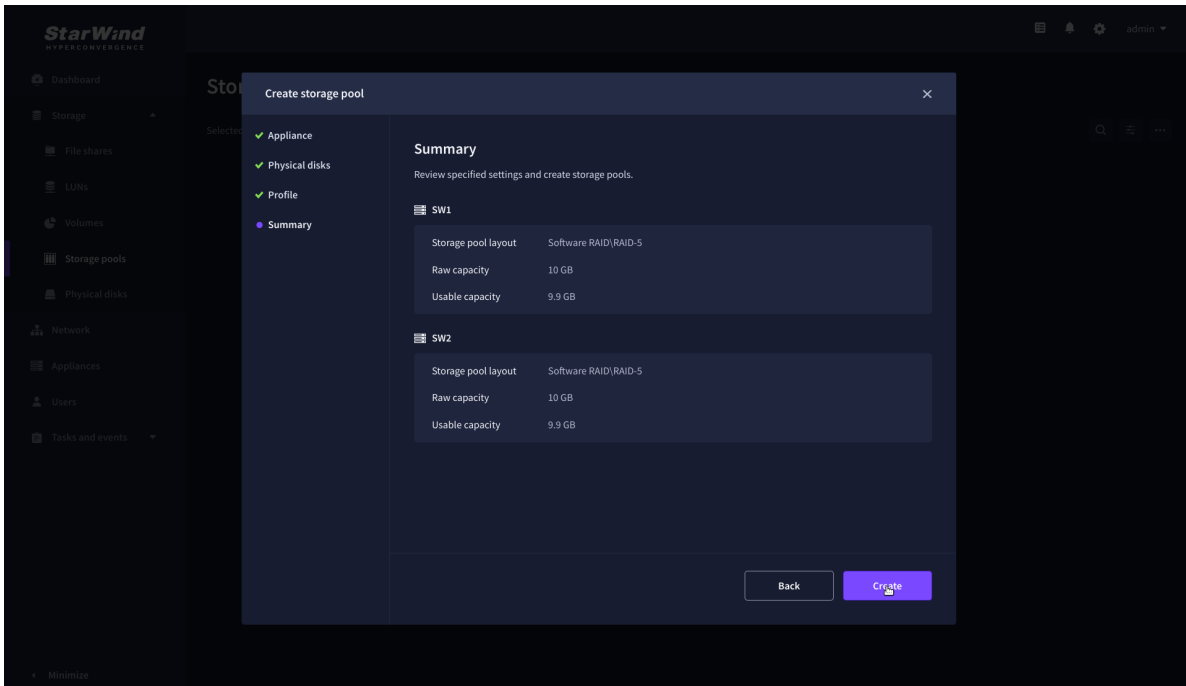
4. Select one of the preconfigured storage profiles or create a redundancy layout for the new storage pool manually according to your redundancy, capacity, and performance requirements.



Hardware RAID, Linux Software RAID, and ZFS storage pools are supported and integrated into the StarWind CVM web interface. To make easier the storage pool configuration, the preconfigured storage profiles are provided to configure the recommended pool type and layout according to the direct-attached storage:

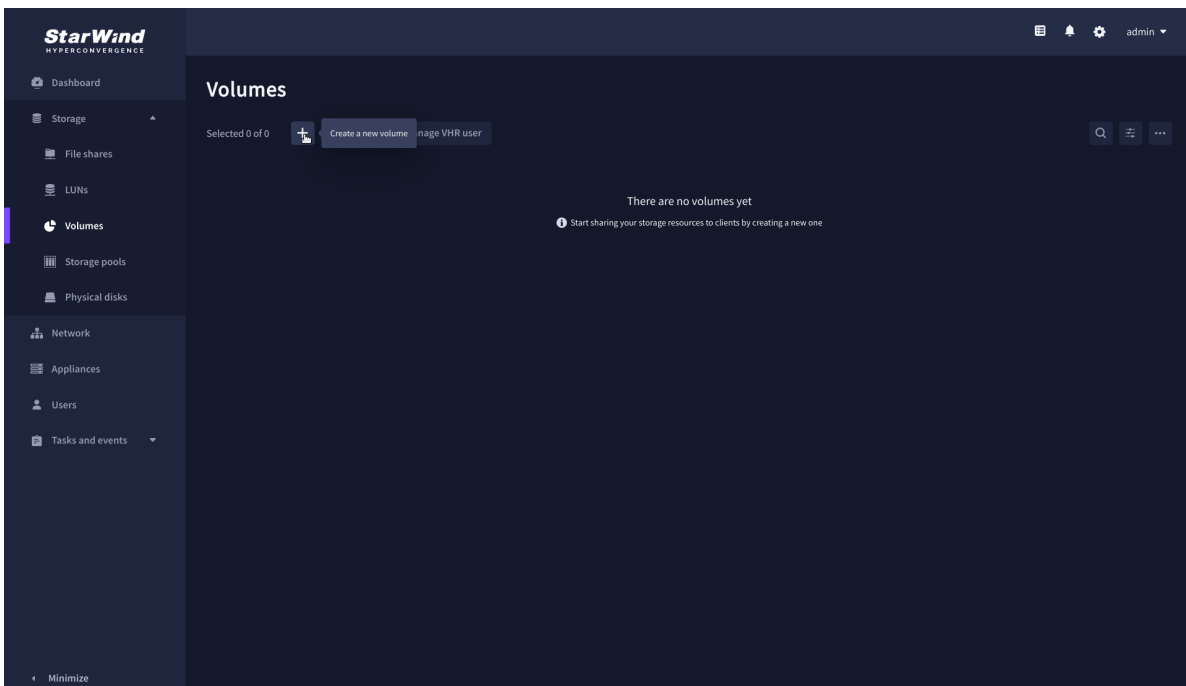
- hardware RAID – configures Hardware RAID’s virtual disk as a storage pool. It is available only if a hardware RAID controller is passed through to the CVM
- high performance – creates Linux Software RAID-10 to maximize storage performance while maintaining redundancy
- high capacity – creates Linux Software RAID-5 to maximize storage capacity while maintaining redundancy
- better redundancy – creates ZFS Stripped RAID-Z2 (RAID 60)) to maximize redundancy while maintaining high storage capacity
- manual – allows users to configure any storage pool type and layout with attached storage

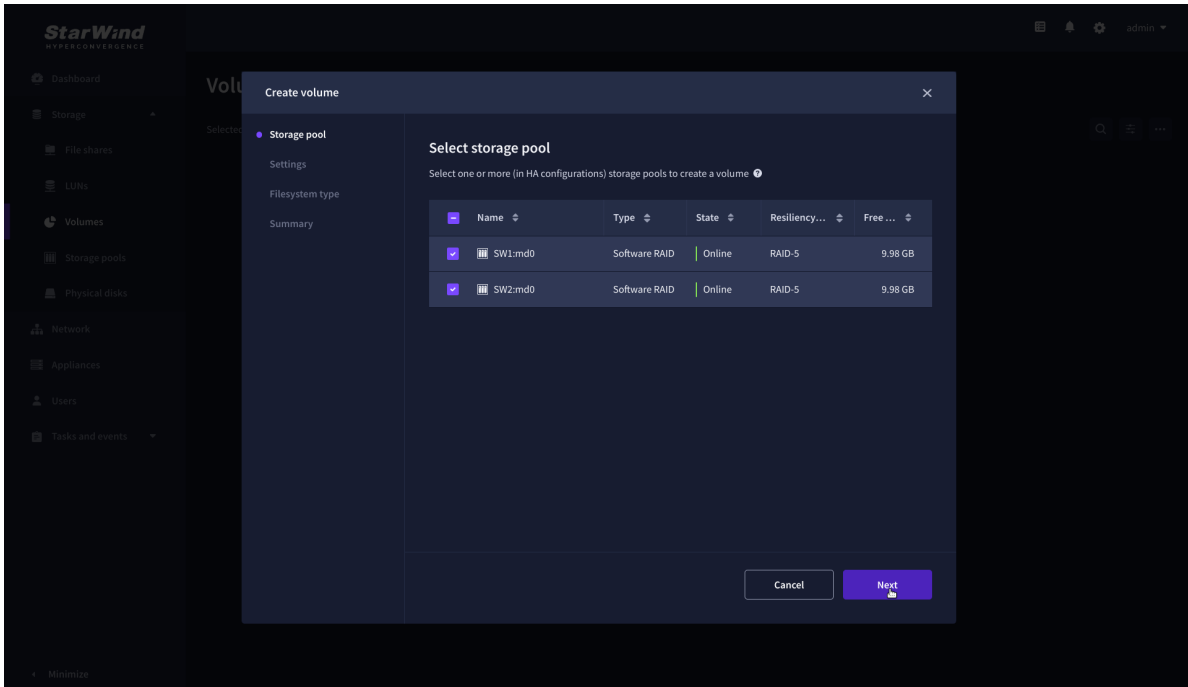
5. Review “Summary” and click the “Create” button to create the pools on storage servers simultaneously.



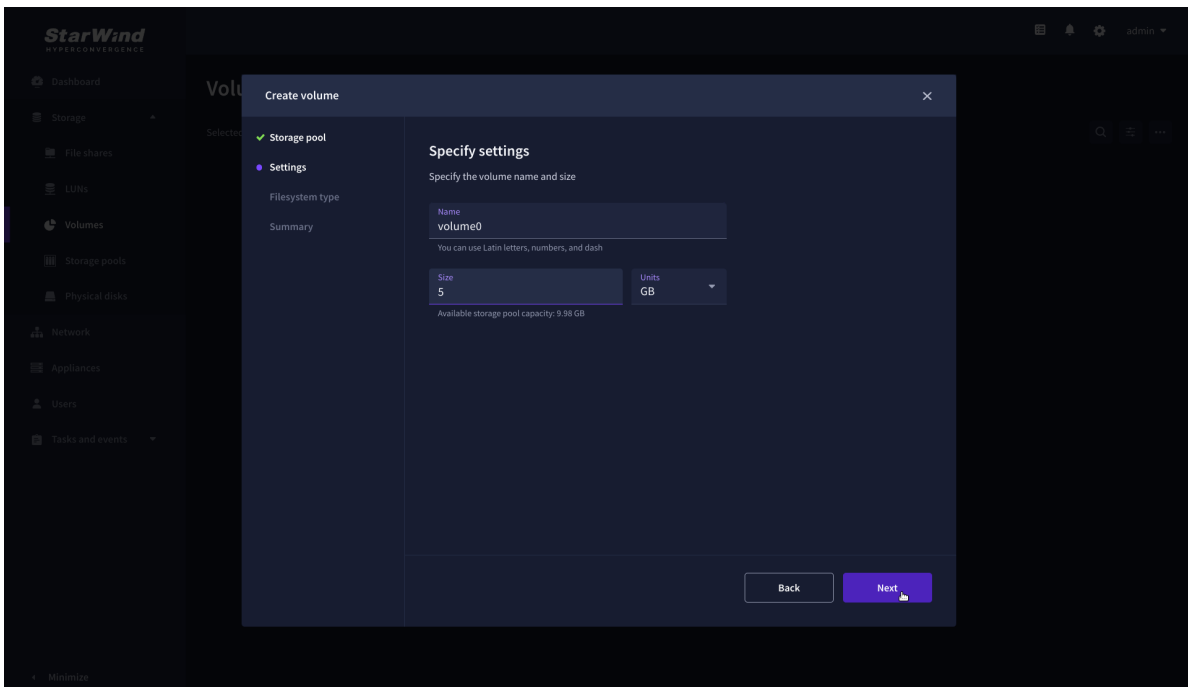
Create Volume

1. To create volumes, click the “Add” button.
2. Select two identical storage pools to create a volume simultaneously.

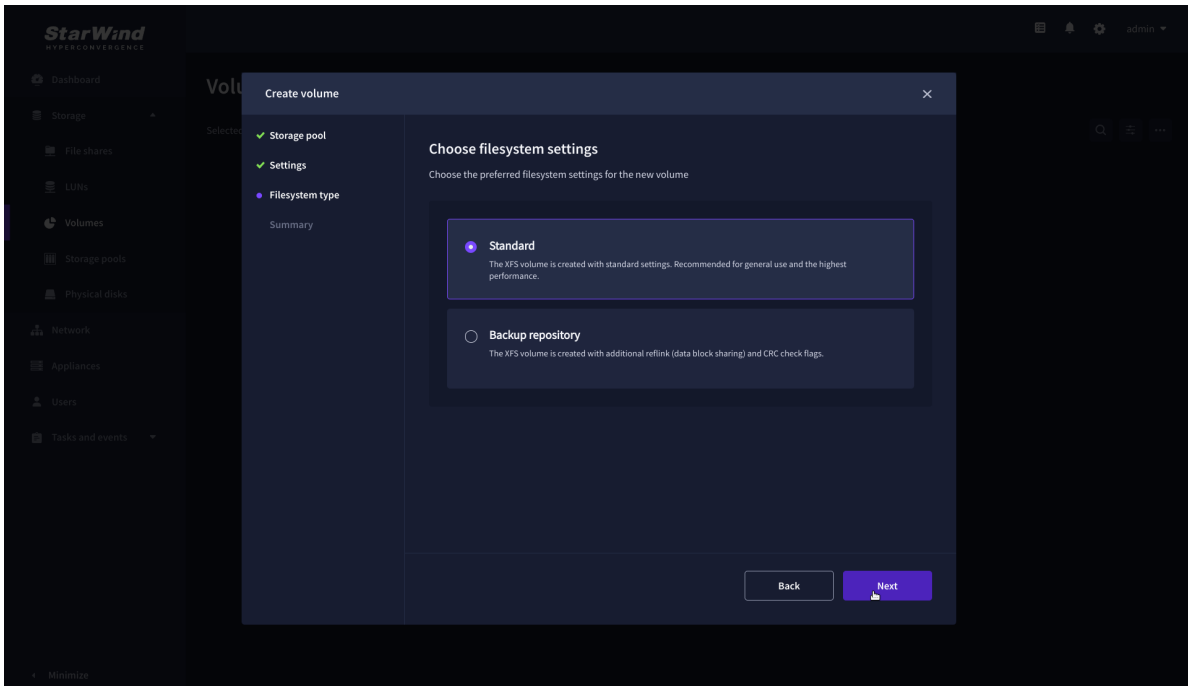




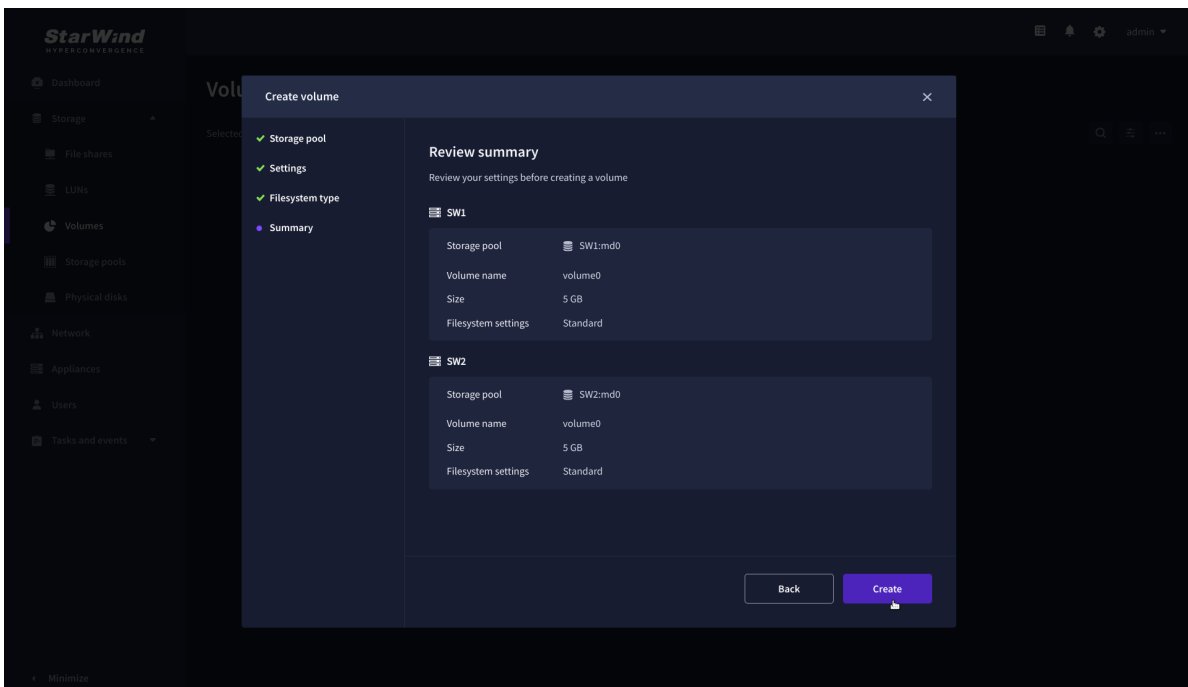
3. Specify volume name and capacity.



4. Select the Standard volume type.



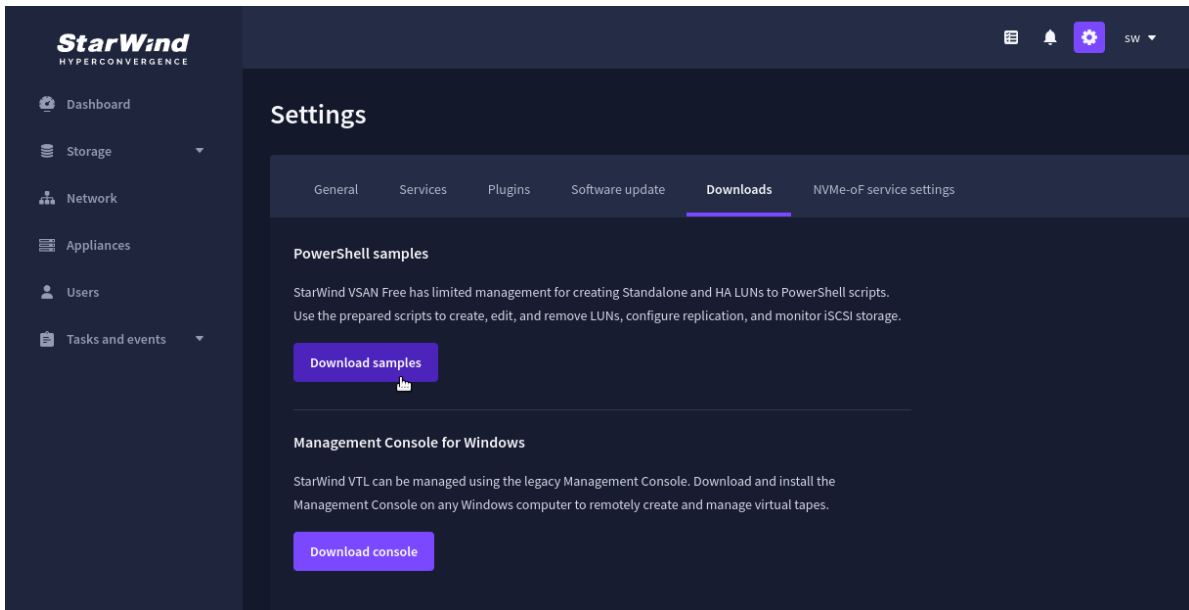
5. Review “Summary” and click the “Create” button to create the pool.



Install Powershell Samples

1. Open Settings and go to the Downloads tab.

2. Click Download samples to download the installer to any Windows machine.



3. Run the downloaded installation file.
4. Choose “Install StarWindX” to install the StarWindX PowerShell IDE and sample scripts.

Creating Starwind Ha Luns Using Powershell

1. Open PowerShell ISE as Administrator.
2. Open StarWindX sample CreateHA_2.ps1 using PowerShell ISE. It can be found here:
C:\Program Files\StarWind Software\StarWind\StarWindX\Samples\


```

1 param($addr="192.168.12.10", $port=3261, $user="root", $password="starwind",
2 $addr2="192.168.12.11", $port2=$port, $user2=$user, $password2=$password,
3
4 #common
5 $initMethod="Clear",
6 $size=2048,
7 $sectorSize=512,
8 $failover=0,
9 $bmpType=1,
10 $bmpStrategy=0,
11
12 #primary node
13 $imagePath="VSA Storage\mnt\crypted1",
14 $imageName="testha02",
15 $createImage=$true,
16 $storageName="",
17 $targetAlias="target02",
18 $autoSynch=$true,
19 $poolName="pool1",
20 $syncSessionCount=1,
21 $saluaOptimized=$true,
22 $cacheMode="none",
23 $cacheSize=0,
24 $syncInterface="#p2={0}:3260" -f "172.16.10.20",
25 $hbInterface="#p2=172.16.20:3260",
26 $createTarget=$true,
27 $bmpFolderPath=""
28
29 #secondary node
30 $imagePath2="VSA Storage\mnt\crypted1",
31 $imageName2="testha02",
32 $createImage2=$true,
33 $storageName2="",
34 $targetAlias2="target02",
35 $autoSynch2=$true,
36 $poolName2="pool1",
37 $syncSessionCount2=1,
38 $saluaOptimized2=$false,
39 $cacheMode2=$cacheMode,
40 $cacheSize2=$cacheSize,
41 $syncInterface2="#p1={0}:3260" -f "172.16.10.10",
42 $hbInterface2="#p1=172.16.10:3260",
43 $createTarget2=$true,
44 $bmpFolderPath2=""
45 )
46
47 Import-Module StarWindX
48
49 try
50 {
51 Enable-SwXLog -Level SW_LOG_LEVEL_DEBUG
52
53 $server = New-SWServer -host $addr -port $port -user $user -password $password
54 $server.Connect()
55
56 #Secondary Node - Object Node
57
58 }
59 catch {
60 }
61
62 }

```

2. Configure script parameters according to the following example:

```

param($addr="192.168.12.10", $port=3261, $user="root",
$password="starwind",
$addr2="192.168.12.11", $port2=$port, $user2=$user,
$password2=$password,
#common
$initMethod="Clear",
$size=2048,
$sectorSize=512,
$failover=0,
$bmpType=1,
$bmpStrategy=0,
#primary node
$imagePath="VSA Storage\mnt\crypted1",
$imageName="testha02",
$createImage=$true,
$storageName="",
$targetAlias="target02",
$autoSynch=$true,

```

```

    $poolName="pool1",
    $syncSessionCount=1,
    $aluaOptimized=$true,
    $cacheMode="none",
    $cacheSize=0,
    $syncInterface="#p2={0}:3260" -f "172.16.20.20",
    $hbInterface="#p2={0}:3260" -f "172.16.10.20",
    $createTarget=$true,
    $bmpFolderPath="",
#secondary node
    $imagePath2="VSA Storage\mnt\crypted1",
    $imageName2="testha02",
    $createImage2=$true,
    $storageName2="",
    $targetAlias2="target02",
    $autoSynch2=$true,
    $poolName2="pool1",
    $syncSessionCount2=1,
    $aluaOptimized2=$false,
    $cacheMode2=$cacheMode,
    $cacheSize2=$cacheSize,
    $syncInterface2="#p1={0}:3260" -f "172.16.20.10",
    $hbInterface2="#p1={0}:3260" -f "172.16.10.10",
    $createTarget2=$true,
    $bmpFolderPath2=""
)
Import-Module StarWindX

try
{
    Enable-SWXLog -level SW_LOG_LEVEL_DEBUG

    $server = New-SWServer -host $addr -port $port -user
$user -password $password

    $server.Connect()

    $firstNode = new-Object Node

    $firstNode.HostName = $addr
    $firstNode.HostPort = $port
    $firstNode.Login = $user
    $firstNode.Password = $password
    $firstNode.ImagePath = $imagePath

```

```

$firstNode.ImageName = $imageName
$firstNode.Size = $size
$firstNode.CreateImage = $createImage
$firstNode.StorageName = $storageName
$firstNode.TargetAlias = $targetAlias
$firstNode.AutoSynch = $autoSynch
$firstNode.SyncInterface = $syncInterface
$firstNode.HBInterface = $hbInterface
$firstNode.PoolName = $poolName
$firstNode.SyncSessionCount = $syncSessionCount
$firstNode.ALUAOptimized = $aluaOptimized
$firstNode.CacheMode = $cacheMode
$firstNode.CacheSize = $cacheSize
$firstNode.FailoverStrategy = $failover
$firstNode.CreateTarget = $createTarget
$firstNode.BitmapStoreType = $bmpType
$firstNode.BitmapStrategy = $bmpStrategy
$firstNode.BitmapFolderPath = $bmpFolderPath
#
# device sector size. Possible values: 512 or 4096(May
be incompatible with some clients!) bytes.
#
$firstNode.SectorSize = $sectorSize
$secondNode = new-Object Node

$secondNode.HostName = $addr2
$secondNode.HostPort = $port2
$secondNode.Login = $user2
$secondNode.Password = $password2
$secondNode.ImagePath = $imagePath2
$secondNode.ImageName = $imageName2
$secondNode.CreateImage = $createImage2
$secondNode.StorageName = $storageName2
$secondNode.TargetAlias = $targetAlias2
$secondNode.AutoSynch = $autoSynch2
$secondNode.SyncInterface = $syncInterface2
$secondNode.HBInterface = $hbInterface2
$secondNode.SyncSessionCount = $syncSessionCount2
$secondNode.ALUAOptimized = $aluaOptimized2
$secondNode.CacheMode = $cacheMode2
$secondNode.CacheSize = $cacheSize2
$secondNode.FailoverStrategy = $failover
$secondNode.CreateTarget = $createTarget2
$secondNode.BitmapFolderPath = $bmpFolderPath2

```

```

        $device = Add-HADevice -server $server -firstNode
$firstNode -secondNode $secondNode -initMethod $initMethod
        while ($device.SyncStatus -ne
[SwHaSyncStatus]::SW_HA_SYNC_STATUS_SYNC)
        {
                $syncPercent =
$device.GetPropertyValue("ha_synch_percent")
                Write-Host "Synchronizing: $($syncPercent)%" -
foreground yellow

                Start-Sleep -m 2000

                $device.Refresh()
        }
}
catch
{
        Write-Host $_ -foreground red
}
finally
{
        $server.Disconnect()
}

```

Detailed explanation of script parameters:

-addr, -addr2 — partner nodes IP address.

Format: string. Default value: 192.168.0.1, 192.168.0.1

allowed values: localhost, IP-address

-port, -port2 — local and partner node port.

Format: string. Default value: 3261

-user, -user2 — local and partner node user name.

Format: string. Default value: root

-password, -password2 — local and partner node user password.

Format: string. Default value: starwind

#common

-initMethod -

Format: string. Default value: Clear

-size - set size for HA-devcie (MB)

Format: integer. Default value: 12

-sectorSize - set sector size for HA-device

Format: integer. Default value: 512

allowed values: 512, 4096

-failover – set type failover strategy
 Format: integer. Default value: 0 (Heartbeat)
 allowed values: 0, 1 (Node Majority)
 -bmpType – set bitmap type, is set for both partners at once
 Format: integer. Default value: 1 (RAM)
 allowed values: 1, 2 (DISK)
 -bmpStrategy – set journal strategy, is set for both partners at once
 Format: integer. Default value: 0
 allowed values: 0, 1 – Best Performance (Failure), 2 – Fast Recovery (Continuous)

#primary node

-imagePath – set path to store the device file
 Format: string. Default value: My computer\C\starwind”. For Linux the following format should be used: “VSA Storage\mnt\mount_point”
 -imageName – set name device
 Format: string. Default value: masterImg21
 -createImage – set create image file
 Format: boolean. Default value: true
 -targetAlias – set alias for target
 Format: string. Default value: targetha21
 -poolName – set storage pool
 Format: string. Default value: pool1
 -aluaOptimized – set Alua Optimized
 Format: boolean. Default value: true
 -cacheMode – set type L1 cache (optional parameter)
 Format: string. Default value: wb
 allowed values: none, wb, wt
 -cacheSize – set size for L1 cache in MB (optional parameter)
 Format: integer. Default value: 128
 allowed values: 1 and more
 -syncInterface – set sync channel IP-address from partner node
 Format: string. Default value: “#p2={0}:3260”
 -hbInterface – set heartbeat channel IP-address from partner node
 Format: string. Default value: “”
 -createTarget – set creating target
 Format: string. Default value: true
 Even if you do not specify the parameter -createTarget, the target will be created automatically.
 If the parameter is set as -createTarget \$false, then an attempt will be made to create the device with existing targets, the names of which are specified in the -targetAlias (targets must already be created)
 -bmpFolderPath – set path to save bitmap file
 Format: string.

```
#secondary node
-imagePath2 - set path to store the device file
Format: string. Default value: "My computer\C\starwind". For Linux the following format
should be used: "VSA Storage\mnt\mount_point"
-imageName2 - set name device
Format: string. Default value: masterImg21
-createImage2 - set create image file
Format: boolean. Default value: true
-targetAlias2 - set alias for targetFormat: string.
Default value: targetha22
-poolName2 - set storage pool
Format: string. Default value: pool1
-aluaOptimized2 - set Alua Optimized
Format: boolean. Default value: true
-cacheMode2 - set type L1 cache (optional parameter)
Format: string. Default value: wb
allowed values: wb, wt
-cacheSize2 - set size for L1 cache in MB (optional parameter)
Format: integer. Default value: 128
allowed values: 1 and more
-syncInterface2 - set sync channel IP-address from partner node
Format: string. Default value: "#p1={0}:3260"
-hbInterface2 - set heartbeat channel IP-address from partner node
Format: string. Default value: ""
-createTarget2 - set creating target
Format: string. Default value: true
Even if you do not specify the parameter -createTarget, the target will be created
automatically.If the parameter is set as -createTarget $false, then an attempt will be
made to create the device with existing targets, the names of which are specified in the -
targetAlias (targets must already be created)
-bmpFolderPath2 - set path to save bitmap file
Format: string.
```

Selecting The Failover Strategy

StarWind provides 2 options for configuring a failover strategy:

Heartbeat

The Heartbeat failover strategy allows avoiding the "split-brain" scenario when the HA cluster nodes are unable to synchronize but continue to accept write commands from the initiators independently. It can occur when all synchronization and heartbeat channels

disconnect simultaneously, and the partner nodes do not respond to the node's requests. As a result, StarWind service assumes the partner nodes to be offline and continues operations on a single-node mode using data written to it.

If at least one heartbeat link is online, StarWind services can communicate with each other via this link. The device with the lowest priority will be marked as not synchronized and get subsequently blocked for the further read and write operations until the synchronization channel resumption. At the same time, the partner device on the synchronized node flushes data from the cache to the disk to preserve data integrity in case the node goes down unexpectedly. It is recommended to assign more independent heartbeat channels during the replica creation to improve system stability and avoid the "split-brain" issue.

With the heartbeat failover strategy, the storage cluster will continue working with only one StarWind node available.

Node Majority

The Node Majority failover strategy ensures the synchronization connection without any additional heartbeat links. The failure-handling process occurs when the node has detected the absence of the connection with the partner.

The main requirement for keeping the node operational is an active connection with more than half of the HA device's nodes. Calculation of the available partners is based on their "votes".

In case of a two-node HA storage, all nodes will be disconnected if there is a problem on the node itself, or in communication between them. Therefore, the Node Majority failover strategy requires the addition of the third Witness node or file share (SMB) which participates in the nodes count for the majority, but neither contains data on it nor is involved in processing clients' requests. In case an HA device is replicated between 3 nodes, no Witness node is required.

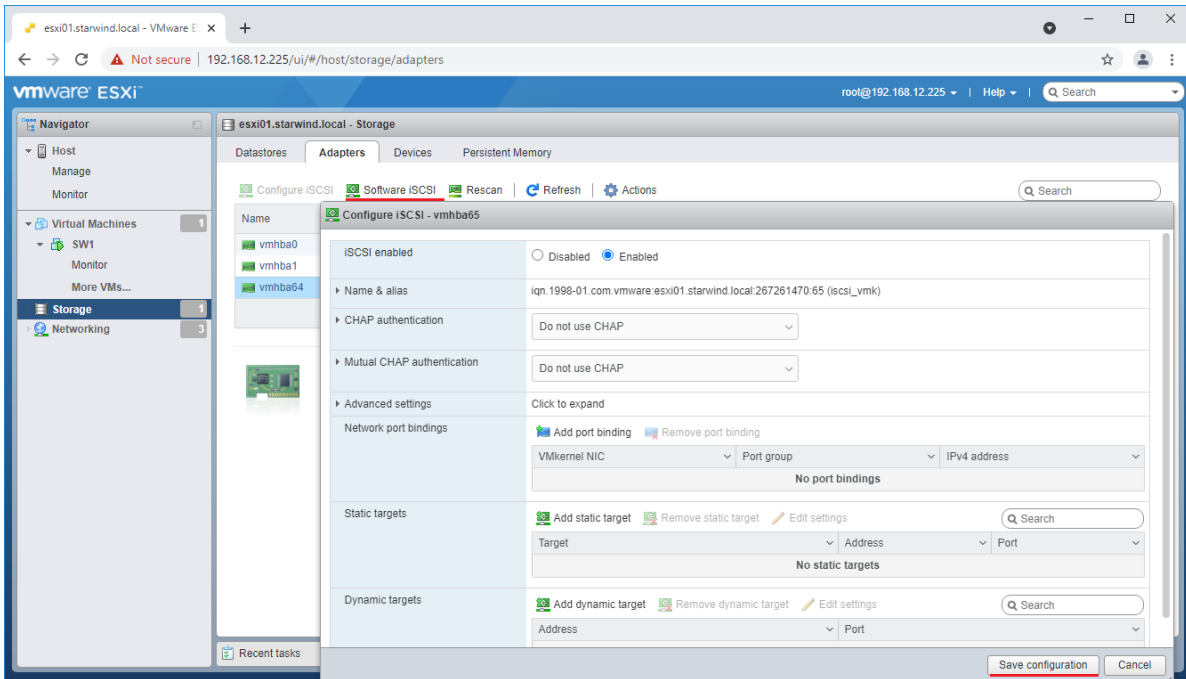
With Node Majority failover strategy, failure of only one node can be tolerated. If two nodes fail, the third node will also become unavailable to clients' requests.

Please select the required option:

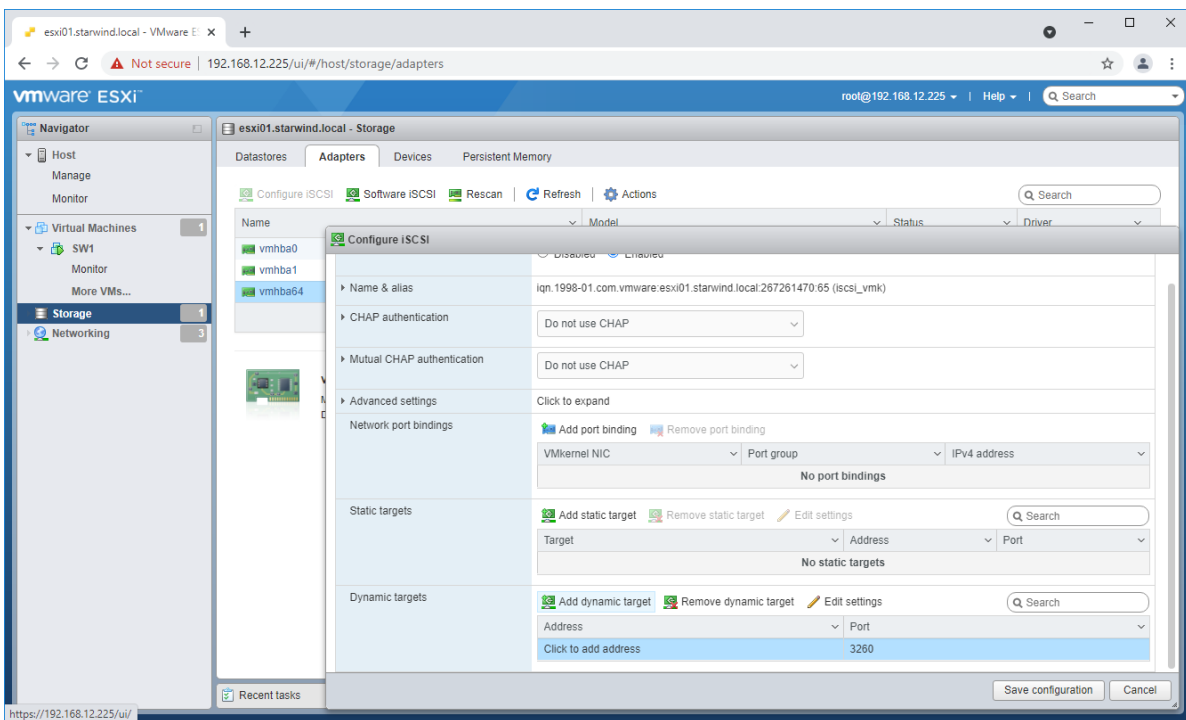
Preparing Datastores

Adding Discover Portals

1. To connect the previously created devices to the ESXi host, click on the Storage -> Adapters -> Software iSCSI and in the appeared window choose the Enabled option to enable Software iSCSI storage adapter. Push the Save configuration button.



2. In the Configure iSCSI window, under Dynamic Targets, click on the Add dynamic target button to specify iSCSI interfaces.



3. Enter the iSCSI IP addresses of all StarWind nodes for the iSCSI traffic.

Address	Port
172.16.10.10	3260
Click to add address	3260

Address	Port
172.16.10.10	3260
172.16.10.20	3260

Confirm the actions by pressing Save configuration.

4. The result should look like in the image below.

Configure iSCSI

iSCSI enabled: Disabled Enabled

Name & alias: iqn.1998-01.com.vmware:sw-mar-pc3-6fbab48a

CHAP authentication: Do not use CHAP

Mutual CHAP authentication: Do not use CHAP

Advanced settings: Click to expand

Network port bindings: Add port binding Remove port binding

VMkernel NIC	Port group	IPv4 address
No port bindings		

Static targets:

Target	Address	Port
iqn.2008-08.com.starwindsoftware:sw1-ds1	172.16.10.10	3260
iqn.2008-08.com.starwindsoftware:sw1-ds2	172.16.10.10	3260
iqn.2008-08.com.starwindsoftware:sw2-ds1	172.16.10.20	3260
iqn.2008-08.com.starwindsoftware:sw2-ds2	172.16.10.20	3260

Dynamic targets:

Address	Port
172.16.10.10	3260
172.16.10.20	3260

5. Click on the Rescan button to rescan storage.

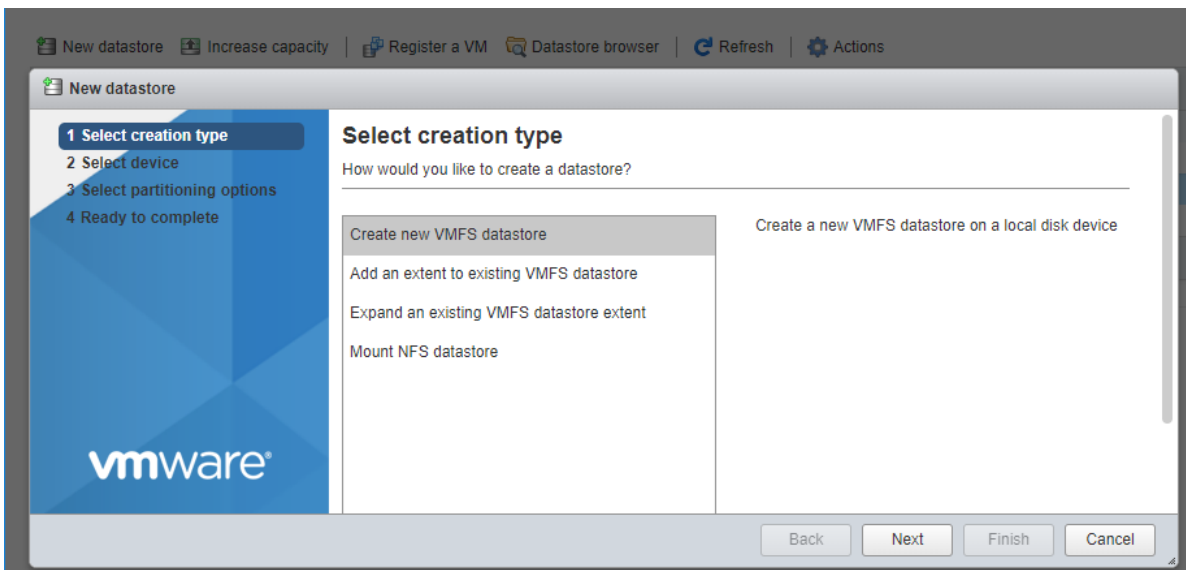
Datastores Adapters Devices Persistent Memory			
New datastore Increase capacity Rescan Refresh Actions			
Name	Status	Type	Capacity
Local NECVMWar CD-ROM (mpx.vmhba1:C0:T0:L0)	✓ Normal	CDROM	Unknown
Local VMware Disk (mpx.vmhba0:C0:T1:L0)	✓ Normal	Disk	50 GB
Local VMware Disk (mpx.vmhba0:C0:T0:L0)	✓ Normal	Disk	40 GB
STARWIND iSCSI Disk (eui.60e7edcceeae5b4e)	✓ Normal	Disk	3 GB
STARWIND iSCSI Disk (eui.4649d8befbe79223)	✓ Normal	Disk	3 GB

6. Now, the previously created StarWind devices are visible to the system.

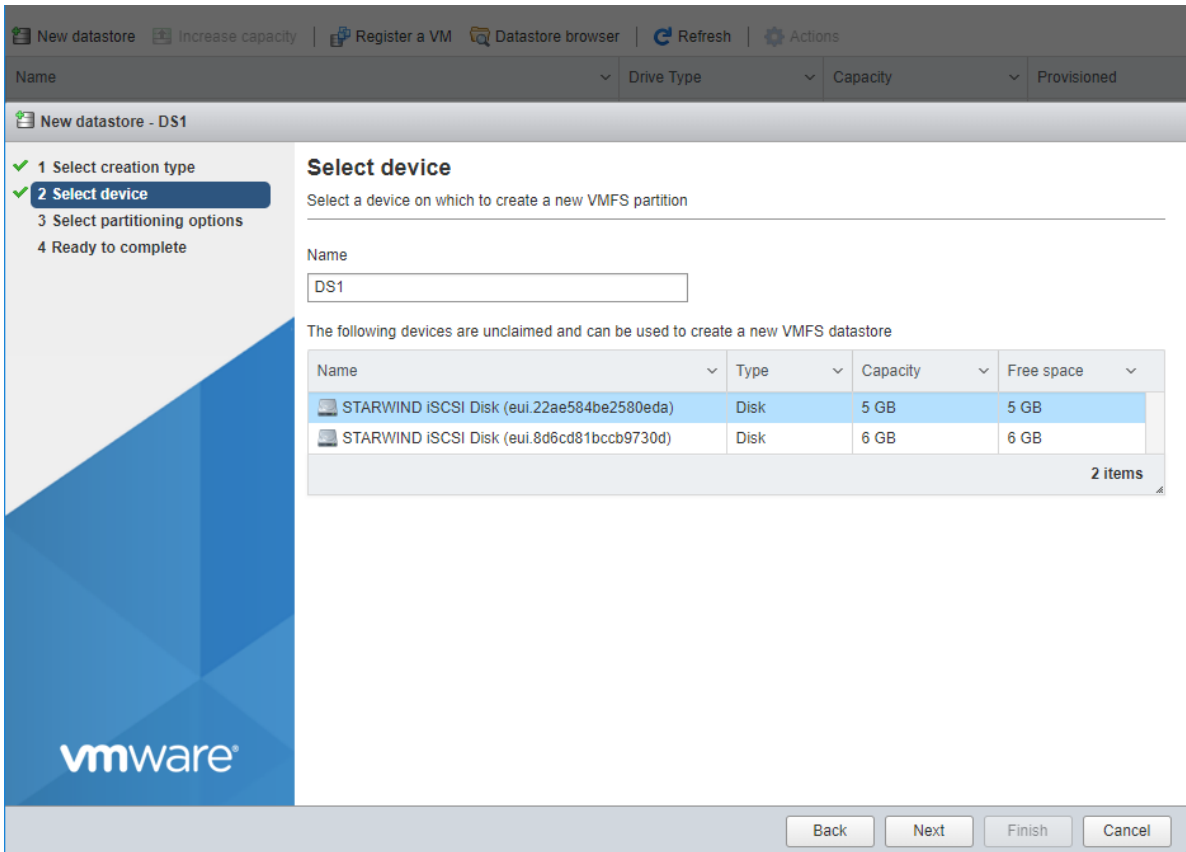
7. Repeat all the steps from this section on the other ESXi host, specifying corresponding IP addresses for the iSCSI subnet.

Creating Datastores

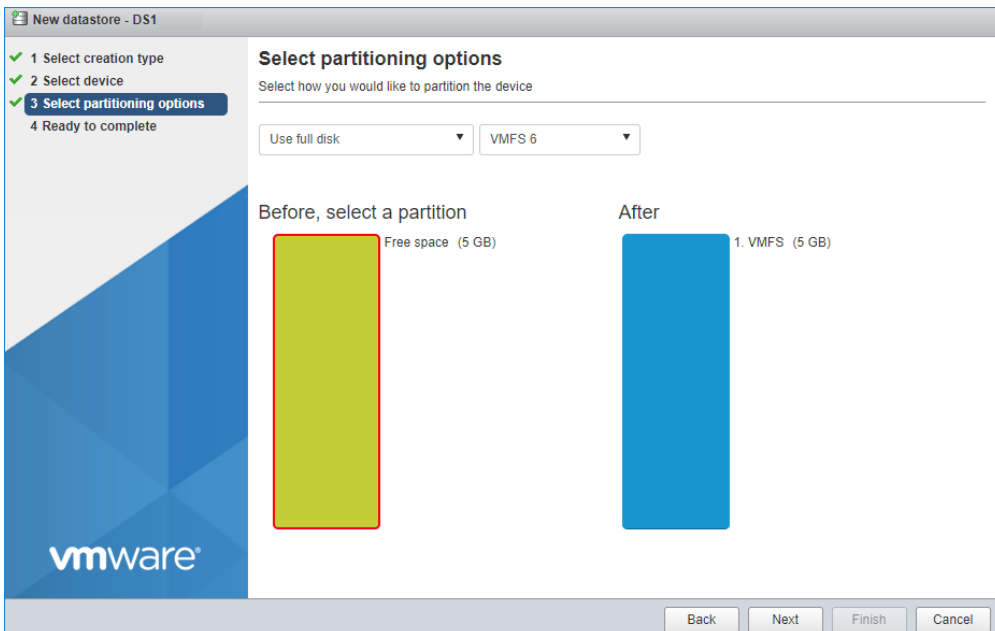
1. Open the Storage tab on one of your hosts and click on New Datastore.



2. Specify the Datastore name, select the previously discovered StarWind device, and click Next.



3. Enter datastore size and click Next.



4. Verify the settings and click Finish.

5. Add another Datastore (DS2) in the same way but select the second device for the second datastore.

6. Verify that your storages (DS1, DS2) are connected to both hosts. Otherwise, rescan the storage adapter.

Name	Drive Type	Capacity	Provisioned	Free
datastore1 (1)	Non-SSD	32.5 GB	972 MB	31.55 GB
DS1	Non-SSD	4.75 GB	1.41 GB	3.34 GB
DS2	Non-SSD	5.75 GB	1.41 GB	4.34 GB

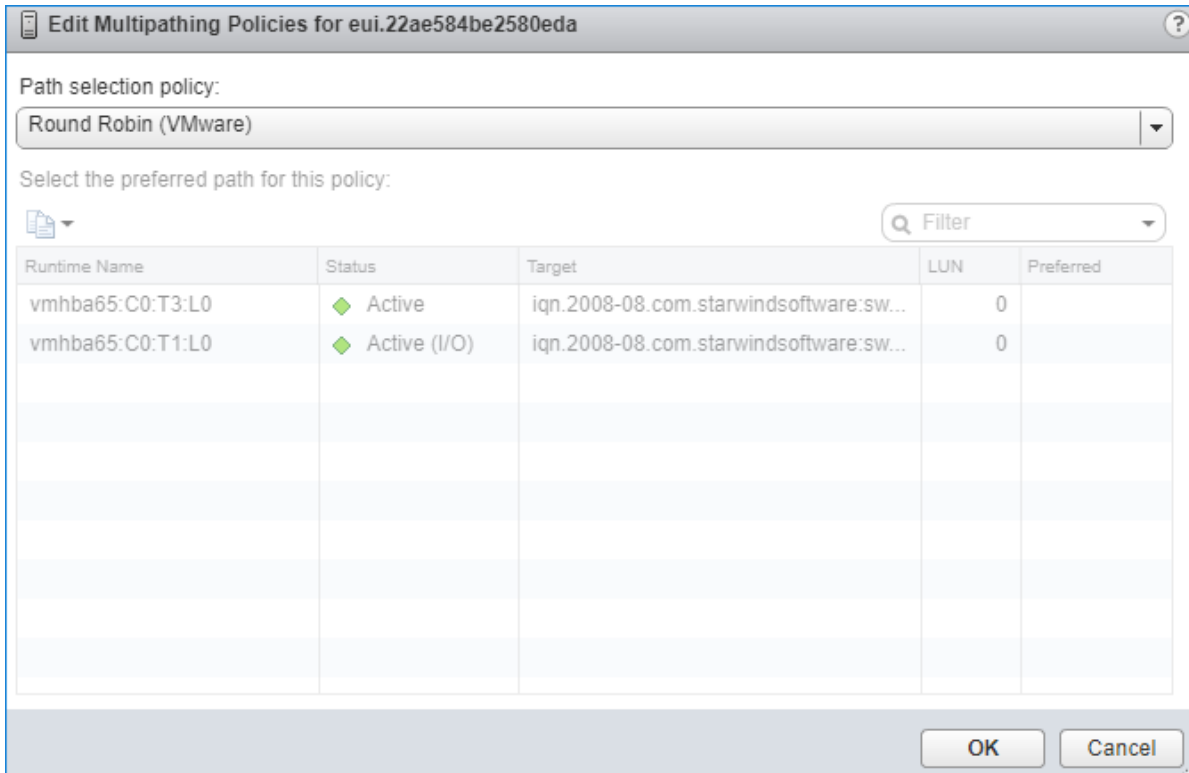
NOTE: Path Selection Policy changing for Datastores from Most Recently Used (VMware) to Round Robin (VMware) is added into the Rescan Script, and this action is performed automatically. For checking and changing this parameter manually, the hosts should be connected to vCenter.

Multipathing configuration can be checked only from vCenter. To check it, click the Configure button, choose the Storage Devices tab, select the device, and click the Edit Multipathing button.

Name	LUN	Type	Capacity	Operational State	Hardware Acceleration	Drive Type	Transport
Local VMware Disk (mpx.vmhba0:C0:T0:L0)	0	disk	40.00 GB	Attached	Not supported	HDD	Parallel SCSI
Local NECVMWar CD-ROM (mpx.vmhba64:C0:T0:...	0	cdrom		Attached	Not supported	HDD	Block Adapter
STARWIND iSCSI Disk (eui.22ae584be2580eda)	0	disk	5.00 GB	Attached	Supported	HDD	iSCSI
STARWIND iSCSI Disk (eui.8d5cd81bccb9730d)	0	disk	6.00 GB	Attached	Supported	HDD	iSCSI

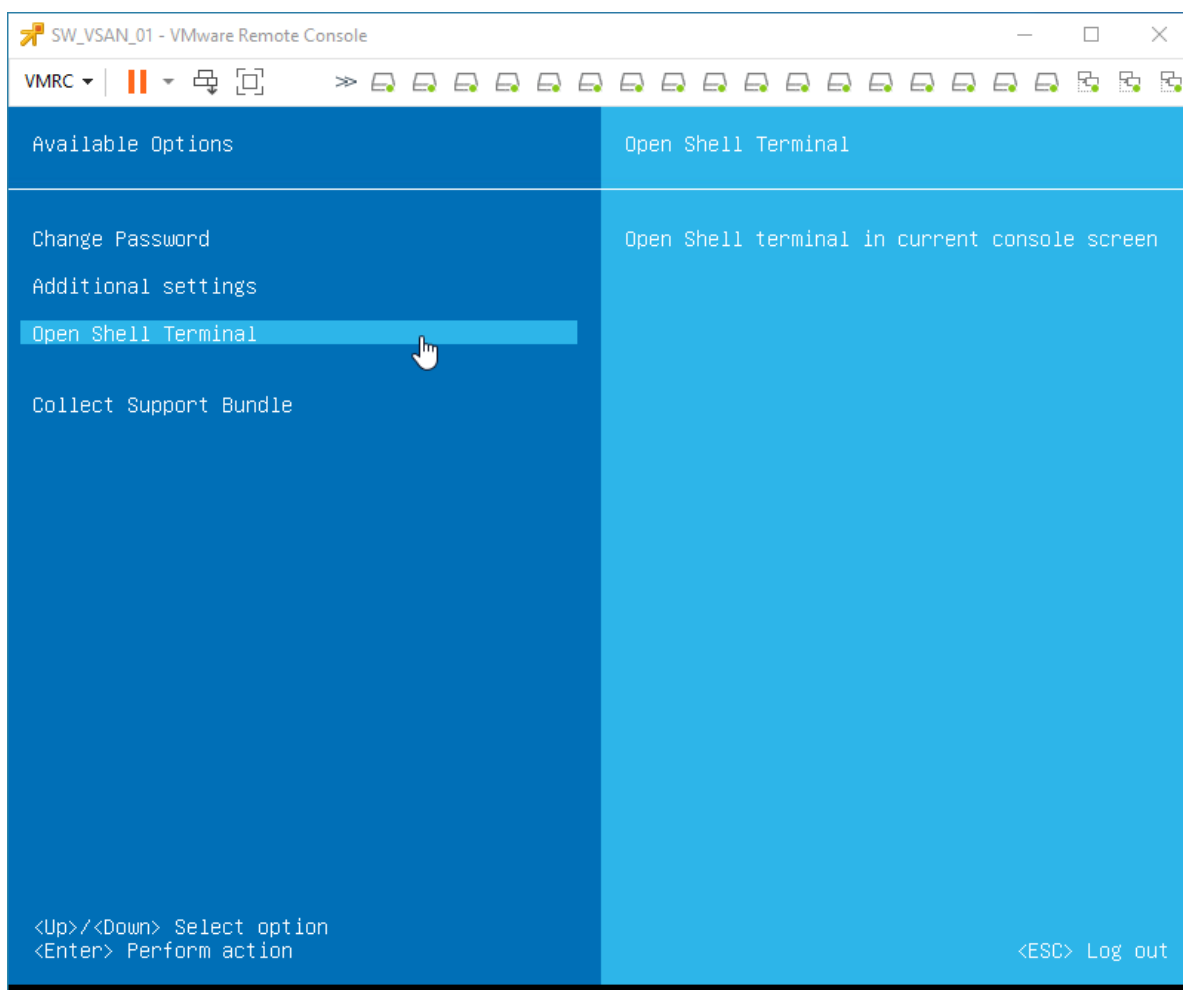
Multipathing Policies

- Path Selection Policy: Most Recently Used (VMware)
- Storage Array Type Policy: VMW_SATP_ALUA

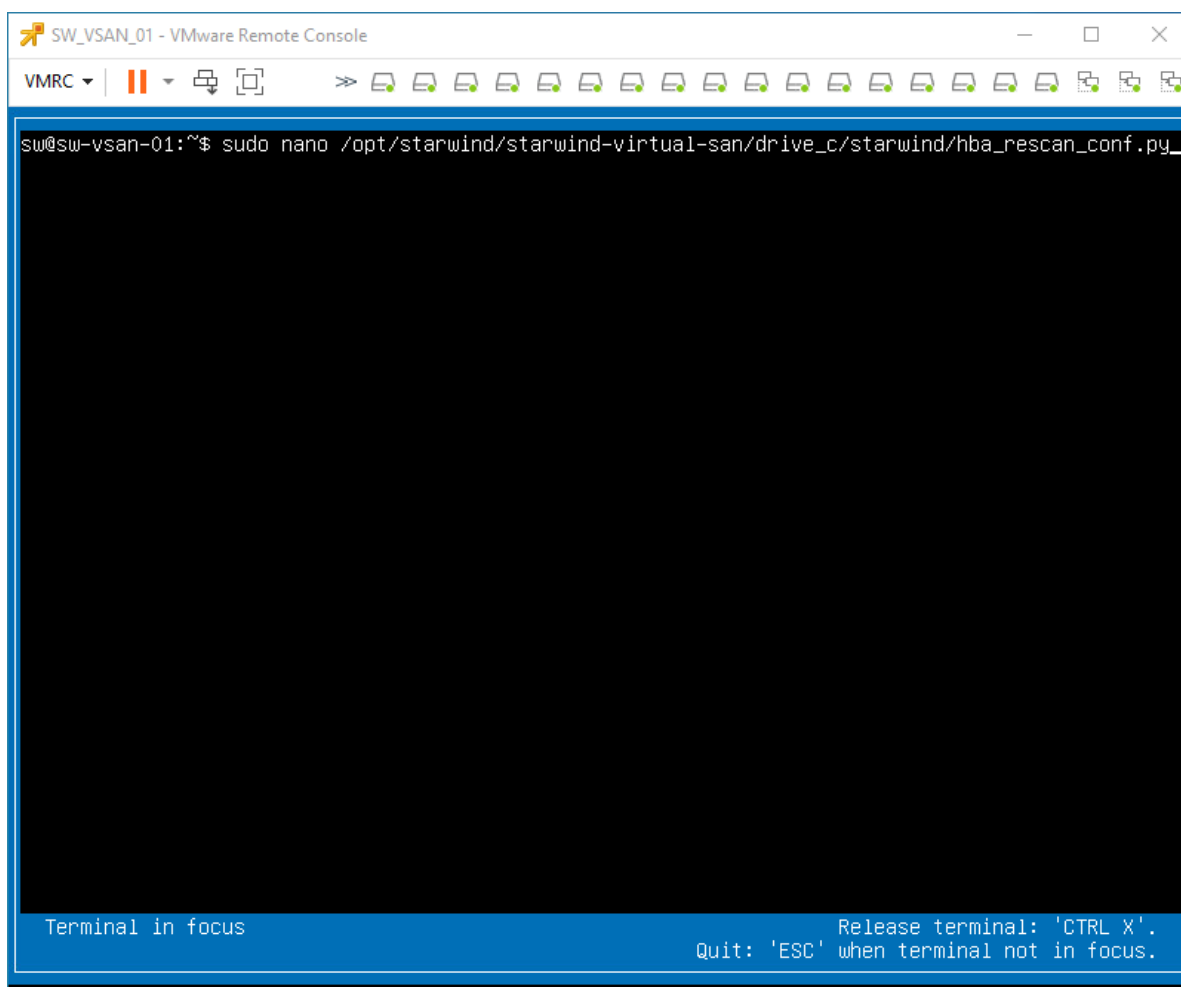


Configuring An Automatic Storage Rescan

1. Connect to the appliance via Shell Terminal in a Text-based User Interface (TUI) or using a remote SSH terminal.



2. Edit file `/opt/starwind/starwind-virtual-san/drive_c/starwind/hba_rescan_config.py` with the following command: `sudo nano /opt/starwind/starwind-virtual-san/drive_c/starwind/hba_rescan_config.py`



3. In the appropriate lines, specify the IP address and login credentials of the single or multiple ESXi hosts (see NOTE below) on which the current StarWind VM is stored and will trigger the storage rescan task:

```
$esxi_host_list = ['IP address']
$username = 'Login'
$password = 'Password'
```

The screenshot shows a VMware Remote Console window titled 'SW_VSAN_01 - VMware Remote Console'. The window contains a terminal running GNU nano 4.8, editing a file at '/opt/starwind/starwind-virtual-san/drive_c/starwind/hba_rescan_conf.py'. The script content is as follows:

```

# ESXi/vSphere connection details
# for multiple hosts enter IPs in format esxi_host_list = ['SET_ESXi_HOST_IP_1', 'SET_ESXi_HOST_IP_2']
# the username and password should be the same for multiple ESXi servers specified
# for a single host enter IP in format esxi_host_list = ['SET_ESXi_HOST_IP_1']
esxi_host_list = ['SET_ESXi_HOST_IP_1']
username = 'SET_ESXi_USER'
password = 'SET_ESXi_PASSWORD'

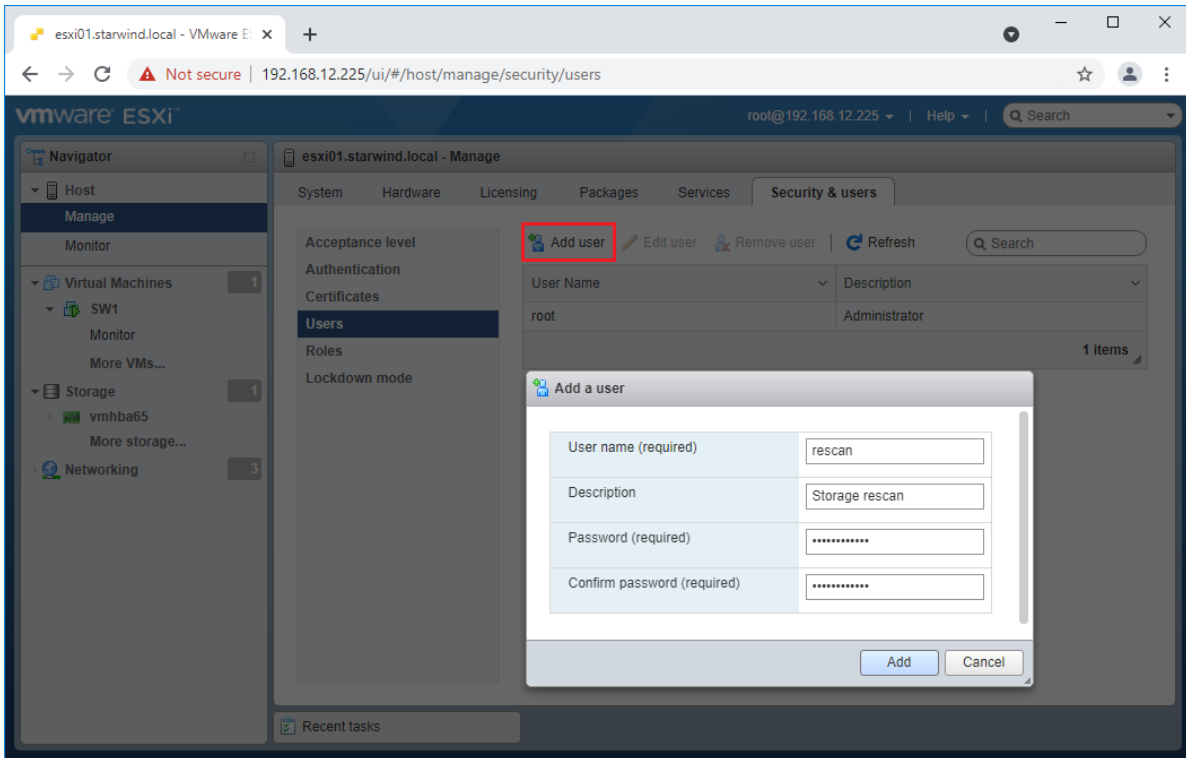
```

The nano editor interface includes a status bar at the bottom with the following information:

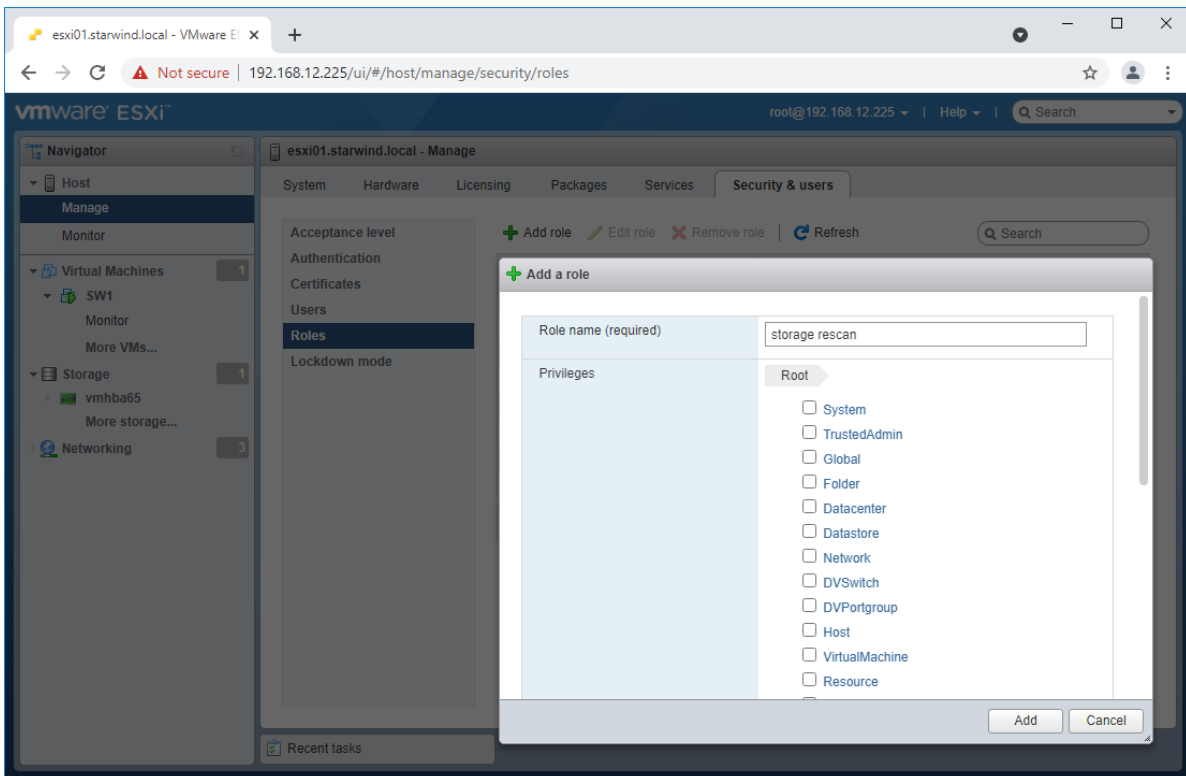
- Terminal in focus
- Release terminal: 'CTRL X'.
- Quit: 'ESC' when terminal not in focus.
- Navigation and editing shortcuts: ^G Get Help, ^O Write Out, ^W Where Is, ^K Cut Text, ^J Justify, ^C Cur Pos, ^X Exit, ^R Read File, ^\ Replace, ^U Paste Text, ^T To Spell, ^_ Go To Line.
- A message '[Read 7 lines]' is displayed in the center.

NOTE: In some cases, it makes sense to create a separate ESXi user for storage rescans. To create the user, please follow the steps below:

4. Log in to ESXi with the VMware Host Client. Click Manage, and under Security & users tab, in the Users section click Add user button. In the appeared window, enter a user name, and a password.



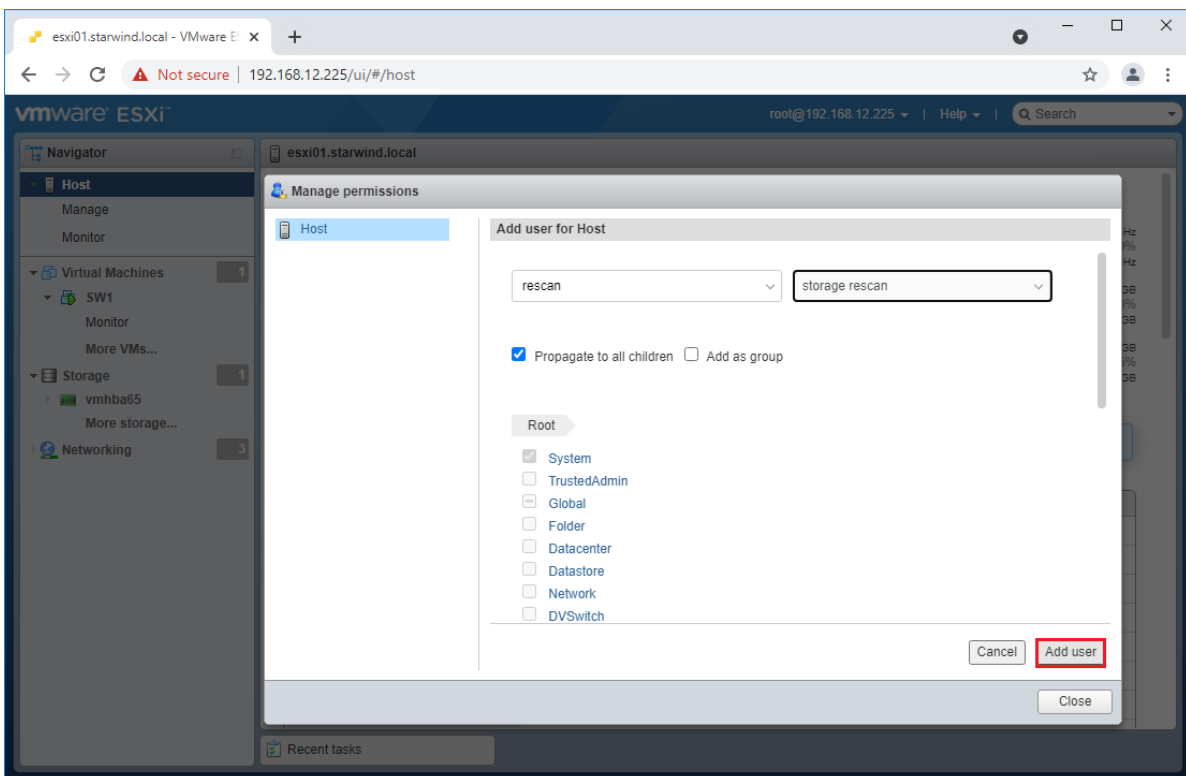
5. Create a new Role, under Roles section, and click New Role button. Type a name for the new role. Select privileges for the role and click OK. The following privileges might be assigned: Host - Inventory, Config, Local Cim, and Global - Settings.



6. Assign permission to the storage rescan user for an ESXi host – right-click Host in the VMware Host Client inventory and click Permissions. In the appeared window click Add user.

7. Click the arrow next to the Select a user text box and select the user that you want to assign a role to. Click the arrow next to the Select a role text box and select a role from the list.

(Optional) Select Propagate to all children or Add as group. Click Add user and click Close.

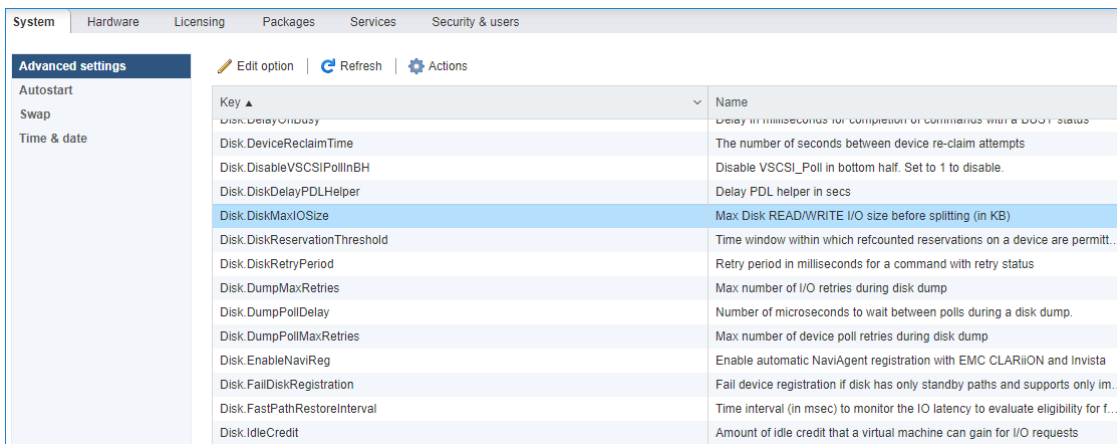


Make sure that rescan script is working and execute it from the VM: `sudo python3 /opt/starwind/starwind-virtual-san/drive_c/starwind/hba_rescan.py`

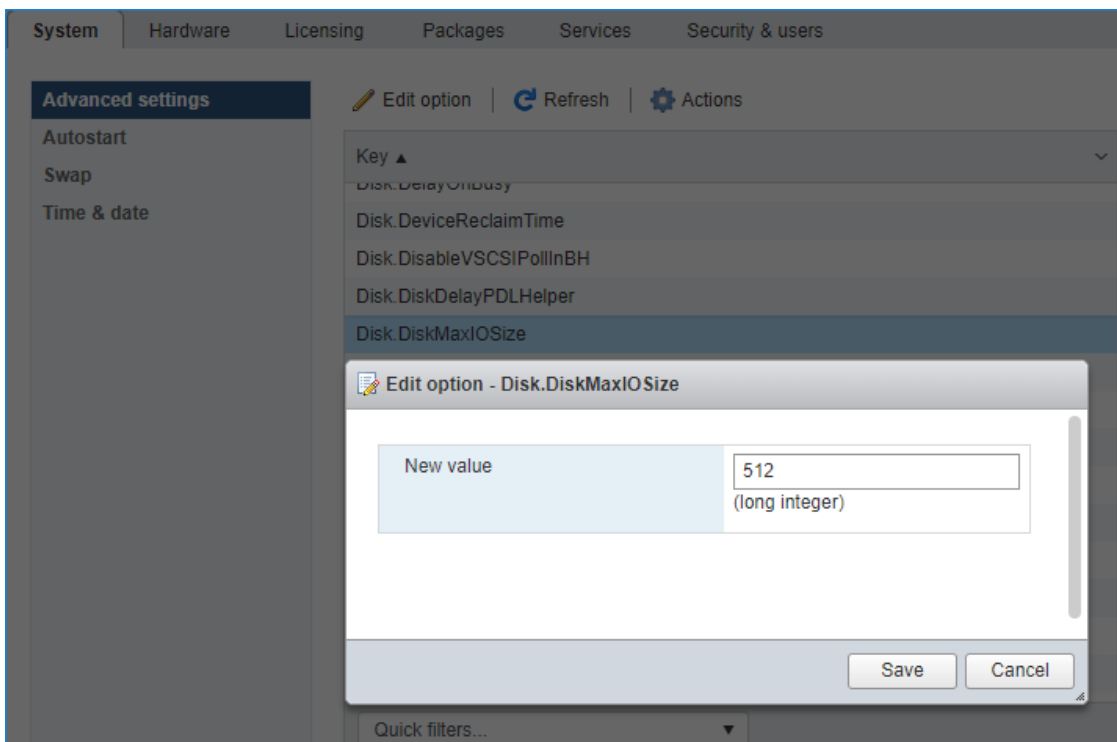
4. Repeat all steps from this section on the other ESXi hosts.

Performance Tweaks

1. Click on the Configuration tab on all of the ESXi hosts and choose Advanced Settings.



2. Select Disk and change the Disk.DiskMaxIOSize parameter to 512.



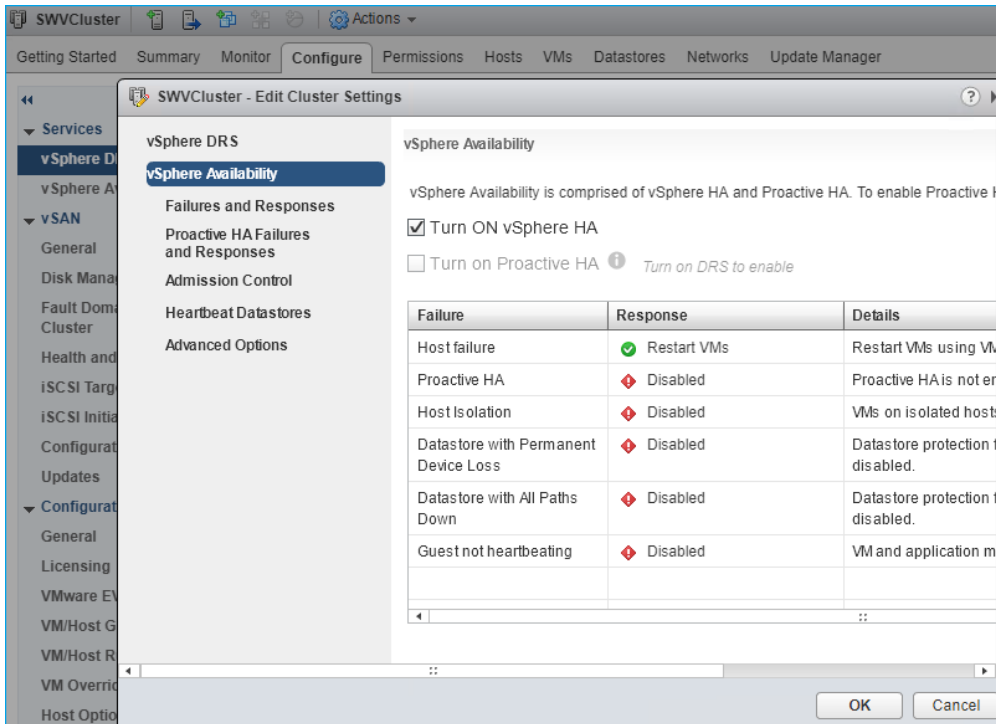
3. To optimize performance change I/O scheduler options according to the article below:
<https://knowledgebase.starwindsoftware.com/guidance/starwind-vsan-for-vsphere-changing-linux-i-o-scheduler-to-optimize-storage-performance/>

NOTE: Changing Disk.DiskMaxIOSize to 512 might cause startup issues with Windows-based VMs, located on the datastore where specific ESX builds are installed. If the issue with VMs start appears, leave this parameter as default or update the ESXi host to the next available build.

NOTE: To provide high availability for clustered VMs, deploy vCenter and add ESXi hosts to the cluster.

Click on Cluster -> Configure -> Edit and check the turn on vSphere HA option if it's








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Conclusion

By following this guide the end-user can get a StarWind Virtual SAN deployed on VMware vSphere, with VSAN set up as a Controller Virtual Machine (CVM). The guide offers key insights and steps to ensure a seamless deployment.

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