

StarWind Virtual HCI Appliance: Configuration Guide for VMware vSphere [ESXi], VHCA Deployed using Automated Installation

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

StarWind Virtual HCI Appliance (VHCA)

Purpose

This document outlines how to configure a StarWind Virtual HCI Appliance (VHCA) based on VMware vSphere [ESXi], with VSAN running as a Controller Virtual Machine (CVM). The guide includes steps to prepare ESXi hosts for clustering, configure physical and virtual networking, and set up the Virtual SAN Controller Virtual Machine.

Audience

This technical guide is intended for storage and virtualization architects, system administrators, and partners designing virtualized environments using StarWind Virtual HCI Appliance (VHCA).

Expected result

The end result of following this guide will be a fully configured high-availability StarWind Virtual HCI Appliance (VHCA) powered by VMware vSphere [ESXi] that includes virtual machine shared storage provided by StarWind VSAN.

Prerequisites

Prior to configuring StarWind Virtual HCI Appliance (VHCA), please make sure that the system meets the requirements, which are available via the following link:

<https://www.starwindsoftware.com/system-requirements>

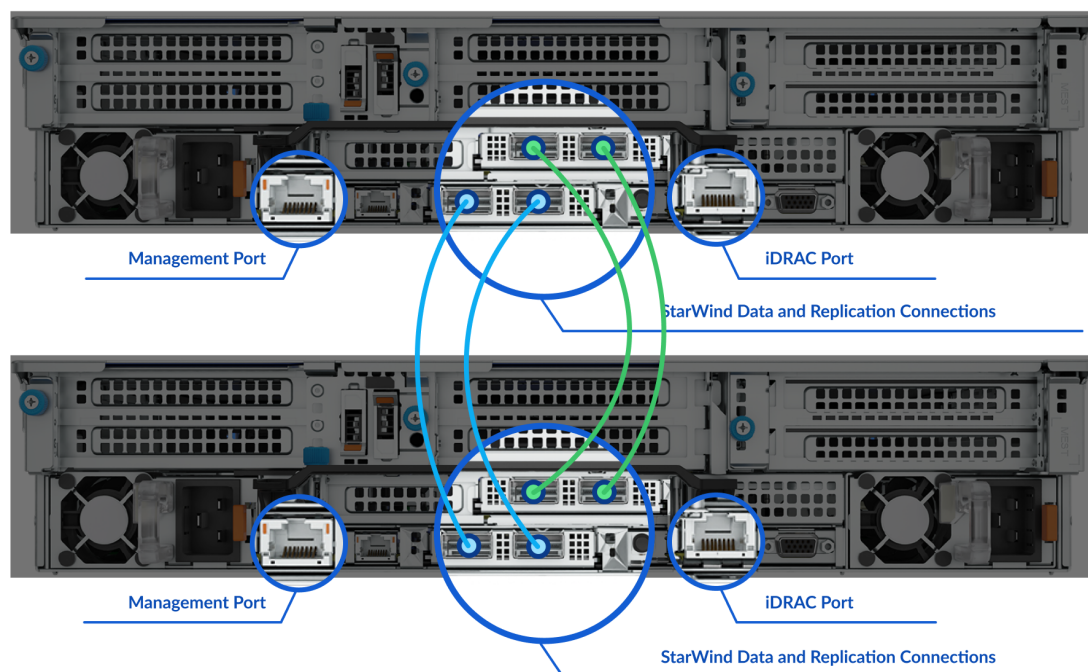
Recommended RAID settings for HDD and SSD disks:

<https://knowledgebase.starwindsoftware.com/guidance/recommended-raid-settings-for-hdd-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>

Solution Diagram:



Prerequisites:

1. 2 servers with local storage, which have direct network connections for Synchronization and iSCSI/StarWind heartbeat traffic.
2. Servers should have local storage available for VMware vSphere [ESXi] and StarWind VSAN Controller Virtual Machine. CVM utilizes local storage to create replicated shared storage connected to VMware vSphere [ESXi] nodes via iSCSI.
3. StarWind HA devices require at least 2 separate network links between the nodes. The first one is used for iSCSI traffic, the second one is used for Synchronization traffic.
Note. 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.

Hardware Configuration

Access the BIOS on each server:

1. Change "Boot mode select" to [UEFI]

System BIOS Settings • Boot Settings

Boot Mode ☐ BIOS ☒ UEFI
 Boot Sequence Retry ☐ Enabled ☒ Disabled ☐ Reset

2. Enable AC Power Recovery to On;

AC Power Recovery ☐ Last ☒ On ☐ Off

3. Set System Profile Settings to Performance;

System BIOS Settings • System Profile Settings

System Profile Performance

4. Disable Patrol Read in case of SSD disks;

RAID Controller in Slot 6: Dell PERC H750 Adapter Configuration Utility

Dashboard View • Main Menu • Patrol Read

Start
Suspend
Resume
Stop
 State Stopped
 Iterations 8
 Mode ☐ Auto ☐ Manual ☒ Disabled
Apply Changes

5. Enable SR-IOV for network cards;

Integrated NIC 1 Port 1: Mellanox ConnectX-4 LX 25GbE SFP Rack NDC - 0C:42:A1:F3:FA:50

Main Configuration Page • Device Level Configuration

Virtualization Mode ☐ None ☒ SR-IOV
 PCI Virtual Functions Advertised 8

6. Configure the storage for OS and for data, or single RAID for OS and Data according to Supported RAID configurations [here](#).

Settings for OS RAID1:

Virtual disk name: OS

Disk cache policy: Default (enabled by default)

Write policy: Write Through

Read policy: No read ahead

Stripe Size: 64K

BOSS-S1 Configuration Utility • Create RAID Configuration Menu • Create Virtual Disk

RAID Level	<input checked="" type="radio"/> RAID1
Stripe Size	<input checked="" type="radio"/> 64K
Virtual Disk Size	223GB
Quick Initialization	<input type="radio"/> No <input checked="" type="radio"/> Yes
Name	<input type="text" value="OS"/>
Would you like to create this virtual disk?	<input type="radio"/> No <input checked="" type="radio"/> Yes

[\[Next\]](#)

Storage for data:

Find supported RAID configurations for main data storage [here](#).

Dashboard View • Main Menu • Virtual Disk Management

[Virtual Disk 239: SSD-RAID5, RAID5, 8.729TB, Ready](#)

Files For Starwind Vhci Configuration:

The StarWind files for vHCI configuration should be downloaded to Windows machine, which will be used for configuration. Run "StarWind Folders.ps1" script to form StarWind Files folder.

Structure of the StarWind Files folder:

C:\StarWind Files

C:\StarWind Files\ESXi Automatization configuration

C:\StarWind Files\ISOs

C:\StarWind Files\StarWindOVF

C:\StarWind Files\Temp

:) > StarWind Files >		
Name	Date modified	Type
ESXi Automatization configuration	1/31/2023 5:09 AM	File folder
ISOs	1/27/2023 4:09 AM	File folder
StarWindOVF	1/27/2023 5:04 AM	File folder
Temp	2/7/2023 9:29 AM	File folder

Scripts that are included in the “StarWind Folders.ps1” script.

C:\StarWind Files\ESXi Automatization configuration\Esxi+configuration.ps1

C:\StarWind Files\Temp\ISOs Download.ps1

ISOs Download.ps1 allows to download the customized ISOs and OVF for vHCI configuration:

Windows 2019/2022

ESXi 7/8 / vCenter 7/8

StarWind VSAN for vSphere OVF

The Esxi+configuration.ps1 allows performing the ESXi configuration.

Esxi Configuration Part:

Node 1

1. Start the “C:\StarWind Files\ESXi Automatization configuration\Esxi+configuration.ps1” with administrator rights.

2. Installation of the components:

Nuget provider

PSGallery for Modules

.net 3.5

PowerCLI Module

BitsTransfer Module

```
Installing NuGet package provider OK
Allow to install modules from PSGallery to install powercli module OK
Downloading .Net 3.5 framework OK
Installing .Net 3.5 framework OK
Check VMware PowerCLI module
PowerCLI module is installed
Welcome to VMware PowerCLI!

Log in to a vCenter Server or ESX host: Connect-VIServer
To find out what commands are available, type: Get-VICommand
To show searchable help for all PowerCLI commands: Get-PowerCLIHelp
Once you've connected, display all virtual machines: Get-VM
If you need more help, visit the PowerCLI community: Get-PowerCLICommunity

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Import-Module BitsTransfer
```

3. ESXi server details:
IP address/user/password

```
Type IP address of the local ESXi server: 172.16.2.33
Type user of the local ESXi server: root
Please enter your password: *****
```

4. Connection to the server

```
Connect ESXI server
Perform operation?
Performing operation 'Update PowerCLI configuration.'?
[Y] Yes [A] Yes to All [N] No [L] No to All [S] Suspend [?] Help (default is "Y"): a
WARNING:
The Get-ESXCLI cmdlet provides a new interface to the ESXCLI functionality.
Use the -V2 parameter to switch to the new cmdlet interface.
Check the cmdlet help for more information.

Scripts that use the old cmdlet interface may not be compatible across two different versions of the ESX server.
The old cmdlet interface is deprecated and will be removed in a future version.
```

Type "a" to perform the operation.

5. Choose [1] to change the ESXi server name:

```
Change ESXi Host Name
Do you want to change the ESXi Host name? [y/n] : y
Do you want a specific ESXi Host name? [y/n] : n
Enter the Appliance type[]: Node1 (ESXi01)[1]; Node2 (ESXi02)[2]; Node3 (ESXi03)[3]; Backup (ESXi-BA)[4]; VTL (ESXi-VTL)[5]; :
true
```

The specific name for ESXi could be set when you choose it:

```
Change ESXi Host Name
Do you want to change ESXi Host name? [y/n] : y
Do you want a specific ESXi Host name? [y/n] : y_
```

6. Set the 'CommunitySupported' level for ESXi and install VIBs.

```
Change the acceptance level
Host acceptance level changed to 'CommunitySupported'.
Who is the hardware vendor? Please specify [D] for Dell ESXi 7, [S] for SuperMicro ESXi 7, [08] for Dell ESXi8, [S8] for SuperMicro ESXi8 or [none]: _
```

```

Message      : Operation finished successfully.
RebootRequired : false
VIBsInstalled : {DEL_bootbank_mrvl9230_1.0.13.1003-10EM.800.1.0.20143090}
VIBsRemoved   :
VIBsSkipped   :

Message      : Operation finished successfully.
RebootRequired : false
VIBsInstalled : {DEL_bootbank_racadm_11.0.0.0.5139-DEL.700.0.0.15843807}
VIBsRemoved   :
VIBsSkipped   :

Message      : Operation finished successfully.
RebootRequired : false
VIBsInstalled : {BCM_bootbank_vmware-perccli64-esxi8_007.2110.0000.0000-02}
VIBsRemoved   :
VIBsSkipped   :

```

7. Autostart for ESXi server and default NTP server

```

Host VMs autostart
-----
VMHost      Enabled StartDelay StopAction StopDelay WaitForHeartbeat
-----
HostSystem-ha-host True      120      GuestSh... 120      False
Set NTP server and start it
Configure NTP service
pool.ntp.org

VMHostId    : HostSystem-ha-host
VMHost      : 172.16.2.33
Name        : NTP Client
Enabled     : True
IncomingPorts :
OutgoingPorts : 123
Protocols    : UDP
ServiceRunning : False
Uid         : /VIServer=root@172.16.2.33:443/VMHost=HostSystem-ha-host/VMHostFirewallException=NTP Client/
ExtensionData : VMware.Vim.HostFirewallRuleset

Key         : ntpd
Label       : NTP Daemon
Policy      : off
Required    : False
Ruleset     : {ntpClient}
Running     : True
Uninstallable : False
VMHostId    : HostSystem-ha-host
VMHost      : 172.16.2.33
VMHostUid   : /VIServer=root@172.16.2.33:443/VMHost=HostSystem-ha-host/
Uid         : /VIServer=root@172.16.2.33:443/VMHost=HostSystem-ha-host/HostService=ntpd/
ExtensionData : VMware.Vim.HostService

Key         : ntpd
Label       : NTP Daemon
Policy      : automatic
Required    : False
Ruleset     : {ntpClient}
Running     : True
Uninstallable : False
VMHostId    : HostSystem-ha-host
VMHost      : 172.16.2.33
VMHostUid   : /VIServer=root@172.16.2.33:443/VMHost=HostSystem-ha-host/
Uid         : /VIServer=root@172.16.2.33:443/VMHost=HostSystem-ha-host/HostService=ntpd/
ExtensionData : VMware.Vim.HostService

```

8. Choose network interfaces for iSCSI and Synchronization.

For 2 node configuration (1 iSCSI and 1 Sync) we need to choose iSCSI1 and Sync1

For 3 node configuration (2 iSCSI and 2 Sync) we need to choose iSCSI1, iSCSI2, and Sync1, Sync2

```

Name       : vmnic0
BitRatePerSec : 25000
Mac        : 0c:42:a1:f3:fa:50
PciId      : 0000:19:00.0

Name       : vmnic1
BitRatePerSec : 25000
Mac        : 0c:42:a1:f3:fa:51
PciId      : 0000:19:00.1

Name       : vmnic2
BitRatePerSec : 10000
Mac        : b4:96:91:f2:fe:8c
PciId      : 0000:86:00.0

Name       : vmnic3
BitRatePerSec : 0
Mac        : b4:96:91:f2:fe:8d
PciId      : 0000:86:00.1

Name       : vmnic4
BitRatePerSec : 0
Mac        : b4:96:91:f2:fe:8e
PciId      : 0000:86:00.2

Name       : vmnic5
BitRatePerSec : 0
Mac        : b4:96:91:f2:fe:8f
PciId      : 0000:86:00.3

Name       : vmk0
BitRatePerSec :
Mac        : b4:96:91:f2:fe:8c
PciId      :

Choose NICs for iSCSI and Snchronization
Write name of the vmnic for iSCSI1 : vmnic0
Write name of the vmnic for iSCSI2 :
Write name of the vmnic for Sync1 : vmnic1
Write name of the vmnic for Sync2 :
  
```

9. The script will create vSwitches, VMKernel, and Port Groups with default StarWind names if you did not choose the 'specific ESXi vSwitch name'. When 'specific ESXi vSwitch name' is chosen, vSwitches, VMKernel, Port Groups, and iSCSI discovery will need specific names and IP addresses.

```

Do you want a specific ESXi vSwitch names ? [y/n] : y_
  
```

```

Do you want a specific ESXi vSwitch names ? [y/n] : n
Creating vSwitches
Creating vSwitch vSwitch-iSCSI-1-2
Id : key-vim.host.VirtualSwitch-vSwitch-iSCSI-1-2
Key : key-vim.host.VirtualSwitch-vSwitch-iSCSI-1-2
Name : vSwitch-iSCSI-1-2
NumPorts : 9216
NumPortsAvailable : 9204
Nic : {vmnic0}
Mtu : 9000
VMHostId : HostSystem-ha-host
VMHost : 172.16.2.31
VMHostUid : /VServer=root@172.16.2.31:443/VMHost=HostSystem-ha-host/
Vm : /VServer=root@172.16.2.31:443/VMHost=HostSystem-ha-host/VirtualSwitch=key-vim.host.VirtualSwitch-vSwitch-iSCSI-1-2/
ExtensionData : VMware.Vim.HostVirtualSwitch

Creating vSwitch vSwitch-Sync-1-2
Id : key-vim.host.VirtualSwitch-vSwitch-Sync-1-2
Key : key-vim.host.VirtualSwitch-vSwitch-Sync-1-2
Name : vSwitch-Sync-1-2
NumPorts : 9216
NumPortsAvailable : 9202
Nic : {vmnic1}
Mtu : 9000
VMHostId : HostSystem-ha-host
VMHost : 172.16.2.31
VMHostUid : /VServer=root@172.16.2.31:443/VMHost=HostSystem-ha-host/
Vm : /VServer=root@172.16.2.31:443/VMHost=HostSystem-ha-host/VirtualSwitch=key-vim.host.VirtualSwitch-vSwitch-Sync-1-2/
ExtensionData : VMware.Vim.HostVirtualSwitch

```

10. VMKernel will be created automatically in case of default names.

```

VMotionEnabled : True
FaultToleranceLoggingEnabled : False
ManagementTrafficEnabled : False
IPv6 : {fe80::250:56ff:fe6e:a18b/64}
AutomaticIPv6 : False
IPv6ThroughDhcp : False
IPv6Enabled : False
Mtu : 9000
VsanTrafficEnabled : False
PortGroupName : iSCSI-1-2
Id : key-vim.host.VirtualNic-vmk1
VMHostId : HostSystem-ha-host
VMHost : 172.16.2.31
VMHostUid : /VServer=root@172.16.2.31:443/VMHost=HostSystem-ha-host/
DeviceName : vmk1
Mac : 00:50:56:6e:a1:8b
DhcpEnabled : False
IP : 172.16.10.249
SubnetMask : 255.255.255.0
Vm : /VServer=root@172.16.2.31:443/VMHost=HostSystem-ha-host/HostVMKernelVirtualNic=key-vim.host.VirtualNic-vmk1/
ExtensionData : VMware.Vim.HostVirtualNic

```

11. Port Groups will be created automatically in case of default names.

```

Name : iSCSI-1-2-for-VMs
VirtualSwitchId : key-vim.host.VirtualSwitch-vSwitch-iSCSI-1-2
VirtualSwitchUid : /VServer=root@172.16.2.31:443/VMHost=HostSystem-ha-host/VirtualSwitch=key-vim.host.VirtualSwitch-vSwitch-iSCSI-1-2/
VirtualSwitch : vSwitch-iSCSI-1-2
Key : key-vim.host.PortGroup-iSCSI-1-2-for-VMs
Port : 0
VlanId : 0
VirtualSwitchName : vSwitch-iSCSI-1-2
VMHostId : HostSystem-ha-host
VMHost : 172.16.2.31
VMHostUid : /VServer=root@172.16.2.31:443/VMHost=HostSystem-ha-host/
Vm : /VServer=root@172.16.2.31:443/VMHost=HostSystem-ha-host/VirtualSwitch=key-vim.host.VirtualSwitch-vSwitch-iSCSI-1-2/VirtualPortGroup=key-vim.host.PortGroup-iSCSI-1-2-for-VMs/
ExtensionData : VMware.Vim.HostPortGroup

Name : Sync-1-2-for-VMs
VirtualSwitchId : key-vim.host.VirtualSwitch-vSwitch-Sync-1-2
VirtualSwitchUid : /VServer=root@172.16.2.31:443/VMHost=HostSystem-ha-host/VirtualSwitch=key-vim.host.VirtualSwitch-vSwitch-Sync-1-2/
VirtualSwitch : vSwitch-Sync-1-2
Key : key-vim.host.PortGroup-Sync-1-2-for-VMs
Port : 0
VlanId : 0
VirtualSwitchName : vSwitch-Sync-1-2
VMHostId : HostSystem-ha-host
VMHost : 172.16.2.31
VMHostUid : /VServer=root@172.16.2.31:443/VMHost=HostSystem-ha-host/
Vm : /VServer=root@172.16.2.31:443/VMHost=HostSystem-ha-host/VirtualSwitch=key-vim.host.VirtualSwitch-vSwitch-Sync-1-2/VirtualPortGroup=key-vim.host.PortGroup-Sync-1-2-for-VMs/
ExtensionData : VMware.Vim.HostPortGroup

```

12. iSCSI initiator and iSCSI discovery IP addresses will be created automatically in case of default names.

```

VMHost : 172.16.2.31
FilesystemVolumeInfo : {datastore1, OSDATA-6411c30a-049f29d0-f38f-b49691f2fe8c, BOOTBANK1, BOOTBANK2}
SoftwareScsiEnabled : True
ScsiLun : (mpx.vmhba33:C0:T0:L0, mpx.vmhba33:C0:T0:L1, t10.NVMe_De11_Express_Flash_NVMe_P4800X_375GB_SFF000142FD7AE4D25C, naa.6f4ee0803e09f4002b5d249ae91d0291...)
Id : HostStorageSystem-storageSystem
VMHostId : HostSystem-ha-host
Uid : /VLServer=root@172.16.2.31:443/VMHost=HostSystem-ha-host/VMHostStorage=HostStorageSystem-storageSystem/
ExtensionData : VMware.Vim.HostStorageSystem
Name :
Address : 172.16.10.1
Port : 3260
IScsiHbaKey : key-vim.host.InternetScsiHba-vmhba64
AuthenticationProperties : Chap:Prohibited
Type : Send
Uid : /VLServer=root@172.16.2.31:443/VMHost=HostSystem-ha-host/Hba=key-vim.host.InternetScsiHba-vmhba64/IScsiHbaTarget=172.16.10.1:3260:Send/
Name : 172.16.10.1:3260
IScsiHbaName : 1qn.1998-01.com.vmware:esxi01:653703096:64
ExtensionData : VMware.Vim.HostInternetScsiHbaSendTarget
VMHostId : HostSystem-ha-host
HostStorageSystemId : HostStorageSystem-storageSystem
Address : 172.16.10.2
Port : 3260
IScsiHbaKey : key-vim.host.InternetScsiHba-vmhba64
AuthenticationProperties : Chap:Prohibited
Type : Send
Uid : /VLServer=root@172.16.2.31:443/VMHost=HostSystem-ha-host/Hba=key-vim.host.InternetScsiHba-vmhba64/IScsiHbaTarget=172.16.10.2:3260:Send/
Name : 172.16.10.2:3260
IScsiHbaName : 1qn.1998-01.com.vmware:esxi01:653703096:64
ExtensionData : VMware.Vim.HostInternetScsiHbaSendTarget
VMHostId : HostSystem-ha-host
HostStorageSystemId : HostStorageSystem-storageSystem

```

13. StarWind ESXi user for ProActive monitoring creation.

```

Create ESXi User / Role / Permission
Description : StarWind
IsSystem : False
PrivilegeList : {Global.CancelTask, Global.CapacityPlanning, Global.Diagnostics, Global.DisableMethods...}
ServerId : /VLServer=root@172.16.2.31:443/
Server : 172.16.2.31
Id : 10
Name : StarWind
Uid : /VLServer=root@172.16.2.31:443/Role=10/
ExtensionData : VMware.Vim.AuthorizationRole

```

14. StarWind Virtual Machine installation. Choose "I" for StarWind Virtual SAN (vSAN) for vSphere.

It is possible to change the default ESXi name by specifying a name for Virtual Machine.

```

Set name for StarWind VM
ESXi01
StarWind VM Creation
Choose type of the StarWind VM Windows[w] / Linux [l] : l
StarWind OVF exist
WARNING: The size of the file 'StarWindVSA_vSphere_20211124_14398-disk1.vmdk' is 2019257856 bytes where 2188326400 bytes is expected.
Confirm
Are you sure you want to perform this action?
Performing the operation "Setting NetworkName: iSCSI-1-2-for-VMs" on target "Network adapter 2".
[Y] Yes [A] Yes to All [N] No [L] No to All [S] Suspend [?] Help (default is "Y"): a
Confirm
Are you sure you want to perform this action?
Performing the operation "Setting NetworkName: Sync-1-2-for-VMs" on target "Network adapter 3".
[Y] Yes [A] Yes to All [N] No [L] No to All [S] Suspend [?] Help (default is "Y"): a

```



```

Confirmation
Proceed to configure the following parameters of the virtual machine with name 'SW-HCA-VM-01'?
New NumCpu: 8
[Y] Yes [A] Yes to All [N] No [L] No to All [S] Suspend [?] Help (default is "Y"): a
WARNING: The 'Version' property of VirtualMachine type is deprecated. Use the 'HardwareVersion' property instead.
PowerState      : PoweredOff
Version         : v10
HardwareVersion : vmx-10
Notes          : StarWind Virtual SAN for vSphere
Guest          : SW-HCA-VM-01:
NumCpu         : 8
CoresPerSocket : 4
MemoryMB       : 8192
MemoryGB       : 8
VMHostId       : HostSystem-ha-host
VMHost         : 172.16.2.33
VApp           :
FolderId       : Folder-ha-folder-vm
Folder         : vm
ResourcePoolId : ResourcePool-ha-root-pool
ResourcePool   : Resources
PersistentId    : 526bb498-0410-739c-a2b9-c9e0b3a79687
UsedSpaceGB    : 16.000008087605237960815429688
ProvisionedSpaceGB : 16.993893573991954326629638672
DatastoreIdList : {Datastore-641c3db7-60d58d0a-d8d0-b49691f2fe8c}
HARestartPriority :
HAIsolationResponse :
DrsAutomationLevel :
VMSwapFilePolicy : Inherit
VMResourceConfiguration : CpuShares:Normal/8000 MemShares:Normal/81920
GuestId        : rhel7_64Guest
CreateDate     : 3/23/2023 12:23:18 PM
SEVEnabled     : False
Name          : SW-HCA-VM-01
CustomFields   : {}
ExtensionData  : VMware.Vim.VirtualMachine
Id            : VirtualMachine-1
Uid          : /VIServer=root@172.16.2.33:443/VirtualMachine=VirtualMachine-1/

Recover RAM for VM
Type : Task
Value : haTask-1-vim.VirtualMachine.reconfigure-130

Autostart for VM
WARNING: The 'VirtualMachineId' property of VMStartPolicy type is deprecated. Use the 'VMId' property instead.
VirtualMachineId : VirtualMachine-1
VMId            : VirtualMachine-1
VM             : SW-HCA-VM-01
VirtualMachineName : SW-HCA-VM-01
VMHostId       : HostSystem-ha-host
StartAction    : PowerOn
StartDelay     : 120
StartOrder    : 1
StopAction     : GuestShutdown
StopDelay     : 120
WaitForHeartbeat : False
IsStartDelayInherited : True
IsStopActionInherited : False
IsStopDelayInherited : True
IsWaitForHeartbeatInherited : True
Uid          : /VIServer=root@172.16.2.33:443/VMHost=HostSystem-ha-host/VMStartPolicy=VirtualMachine-1/
ExtensionData : VMware.Vim.AutoStartPowerInfo

```

Note: OVF will be downloaded if it is not present. CPU and RAM memory will be configured according to our best practices.
Storage drives for StarWind devices should be added manually.

Node 2

1. Start the "C:\StarWind Files\ESXi Automatization configuration\Esxi+configuration.ps1" with administrator rights.

2. Installation of the components:

Nuget provider

PSGallery for Modules

.net 3.5

PowerCLI Module

BitsTransfer Module

```
Installing NuGet package provider OK
Allow to install modules from PSGallery to install powercli module OK
Downloading .Net 3.5 framework OK
Installing .Net 3.5 framework OK
Check VMware PowerCLI module
PowerCLI module is installed
Update PowerCLI module
Welcome to VMware PowerCLI!

Log in to a vCenter Server or ESX host:      Connect-VIServer
To find out what commands are available, type:  Get-VICommand
To show searchable help for all PowerCLI commands:  Get-PowerCLIHelp
Once you've connected, display all virtual machines:  Get-VM
If you need more help, visit the PowerCLI community:  Get-PowerCLICommunity

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Import-Module BitsTransfer
```

3. ESXi server details:
IP address/user/password

```
Import-Module BitsTransfer
Type IP address of the local ESXi server: 172.16.2.31
Type user of the local ESXi server: root
Please enter your password: *****
```

4. Connection to the server

```
Connect ESXi server
Perform operation?
Performing operation 'Update PowerCLI configuration.'?
[Y] Yes [A] Yes to All [N] No [L] No to All [S] Suspend [?] Help (default is "Y"): a
```

Type "a" to perform the operation.

5. Changing the ESXi server name: We need to choose [2]

```
Change ESXi Host Name
Do you want to change ESXi Host name? [y/n] : y
Do you want a specific ESXi Host name ? [y/n] : n
Enter the Appliance type: Node1 [1]; Node2 [2]; Node3 [3]; Backup [4]; VTL [5]; : 2
true
```

The specific name for ESXi could be set when you choose it:

```
Change ESXi Host Name
Do you want to change ESXi Host name? [y/n] : y
Do you want a specific ESXi Host name ? [y/n] : y_
```

6. Set the 'CommunitySupported' level for ESXi and install VIBs.

```
Host acceptance level changed to 'CommunitySupported'.
Who is the hardware vendor? Please specify [D] for Dell ESXi 7, [S] for SuperMicro ESXi 7, [D8] for Dell ESXi8, [S8] for SuperMicro ESXi8 or [none]: _
```

```

Message      : Operation finished successfully.
RebootRequired : false
VIBsInstalled : {DEL_bootbank_mrvl9230_1.0.13.1003-10EM.800.1.0.20143090}
VIBsRemoved   :
VIBsSkipped   :

Message      : Operation finished successfully.
RebootRequired : false
VIBsInstalled : {DEL_bootbank_racadm_11.0.0.0.5139-DEL.700.0.0.15843807}
VIBsRemoved   :
VIBsSkipped   :

Message      : Operation finished successfully.
RebootRequired : false
VIBsInstalled : {BCM_bootbank_vmware-percccli64-esxi8_007.2110.0000.0000-02}
VIBsRemoved   :
VIBsSkipped   :

```

7. Autostart for ESXi server and default NTP server

```

VMHostId      : HostSystem-ha-host
VMHostUid     : /VIServer=root@172.16.2.31:443/VMHost=HostSystem-ha-host/
Enabled       : True
StartDelay    : 120
StopAction    : GuestShutdown
StopDelay     : 120
WaitForHeartbeat : False
Uid          : /VIServer=root@172.16.2.31:443/VMHost=HostSystem-ha-host/VMHostStartPolicy=/
ExtensionData : VMware.Vim.HostAutoStartManager

Configure NTP service
pool.ntp.org
VMHostId      : HostSystem-ha-host
VMHost       : 172.16.2.31
Name         : NTP Client
Enabled      : True
IncomingPorts :
OutgoingPorts : 123
Protocols    : UDP
ServiceRunning : False
Uid         : /VIServer=root@172.16.2.31:443/VMHost=HostSystem-ha-host/VMHostFirewallException=NTP Client/
ExtensionData : VMware.Vim.HostFirewallRuleset

Key          : ntpd
Label       : NTP Daemon
Policy      : off
Required    : False
Ruleset     : {ntpClient}
Running     : True
Uninstallable : False
VMHostId    : HostSystem-ha-host
VMHost      : 172.16.2.31
VMHostUid   : /VIServer=root@172.16.2.31:443/VMHost=HostSystem-ha-host/
Uid         : /VIServer=root@172.16.2.31:443/VMHost=HostSystem-ha-host/HostService=ntpd/
ExtensionData : VMware.Vim.HostService

Key          : ntpd
Label       : NTP Daemon
Policy      : automatic
Required    : False
Ruleset     : {ntpClient}
Running     : True
Uninstallable : False
VMHostId    : HostSystem-ha-host
VMHost      : 172.16.2.31
VMHostUid   : /VIServer=root@172.16.2.31:443/VMHost=HostSystem-ha-host/
Uid         : /VIServer=root@172.16.2.31:443/VMHost=HostSystem-ha-host/HostService=ntpd/
ExtensionData : VMware.Vim.HostService

```

8. Choose network interfaces for iSCSI and Synchronization.

For 2 node configuration (1 iSCSI and 1 Sync) we need to choose iSCSI1 and Sync1

For 3 node configuration (2 iSCSI and 2 Sync) we need to choose iSCSI1, iSCSI2, and Sync1, Sync2

```

Name       : vmnic0
BitRatePerSec : 25000
Mac        : 0c:42:a1:f3:fa:50
PciId      : 0000:19:00.0

Name       : vmnic1
BitRatePerSec : 25000
Mac        : 0c:42:a1:f3:fa:51
PciId      : 0000:19:00.1

Name       : vmnic2
BitRatePerSec : 10000
Mac        : b4:96:91:f2:fe:8c
PciId      : 0000:86:00.0

Name       : vmnic3
BitRatePerSec : 0
Mac        : b4:96:91:f2:fe:8d
PciId      : 0000:86:00.1

Name       : vmnic4
BitRatePerSec : 0
Mac        : b4:96:91:f2:fe:8e
PciId      : 0000:86:00.2

Name       : vmnic5
BitRatePerSec : 0
Mac        : b4:96:91:f2:fe:8f
PciId      : 0000:86:00.3

Name       : vmk0
BitRatePerSec :
Mac        : b4:96:91:f2:fe:8c
PciId      :

Choose NICs for iSCSI and Snchronization
Write name of the vmnic for iSCSI1 : vmnic0
Write name of the vmnic for iSCSI2 :
Write name of the vmnic for Sync1 : vmnic1
Write name of the vmnic for Sync2 :
  
```

9. The script will create vSwitches, VMKernel, and Port Groups with default StarWind names if you did not choose the 'specific ESXi vSwitch name'. When 'specific ESXi vSwitch name' is chosen vSwitches, VMKernel, Port Groups, and iSCSI discovery will need specific names and IP addresses.

```

Do you want a specific ESXi vSwitch names ? [y/n] : y_
  
```

```
Do you want specific ESXi vSwitch names? [y/n] : n
Creation vSwitches
Creating vSwitch vSwitch-iSCSI-2-1
Id                : key-vim.host.VirtualSwitch-vSwitch-iSCSI-2-1
Key               : key-vim.host.VirtualSwitch-vSwitch-iSCSI-2-1
Name              : vSwitch-iSCSI-2-1
NumPorts          : 9216
NumPortsAvailable : 9204
Nic               : {vmnic0}
Mtu               : 9000
VMHostId          : HostSystem-ha-host
VMHost            : 172.16.2.33
VMHostUid         : /VIServer=root@172.16.2.33:443/VMHost=HostSystem-ha-host/
Uid               : /VIServer=root@172.16.2.33:443/VMHost=HostSystem-ha-host/VirtualSwitch=key-vim.host.VirtualSwitch-vSwitch-iSCSI-2-1/
ExtensionData     : VMware.Vim.HostVirtualSwitch

Creating vSwitch vSwitch-Sync-2-1
Id                : key-vim.host.VirtualSwitch-vSwitch-Sync-2-1
Key               : key-vim.host.VirtualSwitch-vSwitch-Sync-2-1
Name              : vSwitch-Sync-2-1
NumPorts          : 9216
NumPortsAvailable : 9202
Nic               : {vmnic1}
Mtu               : 9000
VMHostId          : HostSystem-ha-host
VMHost            : 172.16.2.33
VMHostUid         : /VIServer=root@172.16.2.33:443/VMHost=HostSystem-ha-host/
Uid               : /VIServer=root@172.16.2.33:443/VMHost=HostSystem-ha-host/VirtualSwitch=key-vim.host.VirtualSwitch-vSwitch-Sync-2-1/
ExtensionData     : VMware.Vim.HostVirtualSwitch
```

10. VMKernel will be created automatically in case of default names.

```
Creation VMKernel
VMotionEnabled    : True
FaultToleranceLoggingEnabled : False
ManagementTrafficEnabled : False
IPV6               : {fe80::250:56ff:fe6b:6ee/64}
AutomaticIPv6     : False
IPv6ThroughDhcp    : False
IPv6Enabled        : False
Mtu                : 9000
VsanTrafficEnabled : False
PortGroupName     : iSCSI-2-1
Id                : key-vim.host.VirtualNic-vmk1
VMHostId          : HostSystem-ha-host
VMHost            : 172.16.2.33
VMHostUid         : /VIServer=root@172.16.2.33:443/VMHost=HostSystem-ha-host/
DeviceName        : vmk1
Mac               : 00:50:56:6b:06:ee
DhcpEnabled        : False
IP                : 172.16.10.250
SubnetMask         : 255.255.255.0
Uid               : /VIServer=root@172.16.2.33:443/VMHost=HostSystem-ha-host/HostVMKernelVirtualNic=key-vim.host.VirtualNic-vmk1/
Name              : vmk1
ExtensionData      : VMware.Vim.HostVirtualNic
```

11. Port Groups will be created automatically in case of default names.

```
Creation Port Groups
WARNING: The 'VMHostId' property of VirtualPortGroup type is deprecated. Access the host id through the VirtualSwitch property instead (e.g. 'VirtualSwitch.VMHostId').
Name              : iSCSI-2-1-for-VMs
VirtualSwitchId   : key-vim.host.VirtualSwitch-vSwitch-iSCSI-2-1
VirtualSwitchUid  : /VIServer=root@172.16.2.33:443/VMHost=HostSystem-ha-host/VirtualSwitch=key-vim.host.VirtualSwitch-vSwitch-iSCSI-2-1/
VirtualSwitch     : vSwitch-iSCSI-2-1
Key               : key-vim.host.PortGroup-iSCSI-2-1-for-VMs
Port              : 0
VlanId            : 0
VirtualSwitchName : vSwitch-iSCSI-2-1
VMHostId          : HostSystem-ha-host
VMHostUid         : /VIServer=root@172.16.2.33:443/VMHost=HostSystem-ha-host/
Uid               : /VIServer=root@172.16.2.33:443/VMHost=HostSystem-ha-host/VirtualSwitch=key-vim.host.VirtualSwitch-vSwitch-iSCSI-2-1/VirtualPortGroup=key-vim.host.PortGroup-iSCSI-2-1-for-VMs/
ExtensionData     : VMware.Vim.HostPortGroup

Name              : Sync-2-1-for-VMs
VirtualSwitchId   : key-vim.host.VirtualSwitch-vSwitch-Sync-2-1
VirtualSwitchUid  : /VIServer=root@172.16.2.33:443/VMHost=HostSystem-ha-host/VirtualSwitch=key-vim.host.VirtualSwitch-vSwitch-Sync-2-1/
VirtualSwitch     : vSwitch-Sync-2-1
Key               : key-vim.host.PortGroup-Sync-2-1-for-VMs
Port              : 0
VlanId            : 0
VirtualSwitchName : vSwitch-Sync-2-1
VMHostId          : HostSystem-ha-host
VMHostUid         : /VIServer=root@172.16.2.33:443/VMHost=HostSystem-ha-host/
Uid               : /VIServer=root@172.16.2.33:443/VMHost=HostSystem-ha-host/VirtualSwitch=key-vim.host.VirtualSwitch-vSwitch-Sync-2-1/VirtualPortGroup=key-vim.host.PortGroup-Sync-2-1-for-VMs/
ExtensionData     : VMware.Vim.HostPortGroup
```

12. iSCSI initiator and iSCSI discovery IP addresses will be created automatically in case of default names.

```

Enable iSCSI initiator
WARNING: The 'ScsiLun' property of VMHostStorageInfo type is deprecated. Use 'Get-ScsiLun' cmdlet instead.
VMHost : 172.16.2.33
FilesystemVolumeInfo : {datastore1, OSDATA-641c3db7-3c2d243e-231d-b49691f2fe8c, BOOTBANK1, BOOTBANK2}
SoftwareISCSIEnabled : True
ScsiLun : {t10.WME____Dell_Express_Flash_WMe_P4800X_375GB_SFF000142FD7AE4D25C, naa.6f4ee0803e09f4002b5d249ae91d0291, t10.ATA____DELL_B0SS_VD____674f916e681d001000000000,
t10.WME____Dell_Express_Flash_WMe_P4800X_375GB_SFF00014F24AE4D25C...}
Id : HostStorageSystem-storageSystem
VMHostId : HostSystem-ha-host
ExtensionData : /VIServer=root@172.16.2.33:443/VMHost=HostSystem-ha-host/VMHostStorage=HostStorageSystem-storageSystem/
Name : VMware.Vim.HostStorageSystem

Address : 172.16.10.1
Port : 3260
ISCSIHbaKey : key=vim.host.InternetScsiHba-vmhba64
AuthenticationProperties : Chap:Prohibited
Type : Send
Uid : /VIServer=root@172.16.2.33:443/VMHost=HostSystem-ha-host/Hba=key-vim.host.InternetScsiHba-vmhba64/ISCSIHbaTarget=172.16.10.1:3260:Send/
Name : 172.16.10.1:3260
ISCSIHbaName : tqn.1998-01.com.vmware:esxi01:1937441933:64
ExtensionData : VMware.Vim.HostInternetScsiHbaSendTarget
VMHostId : HostSystem-ha-host
HostStorageSystemId : HostStorageSystem-storageSystem

Address : 172.16.10.2
Port : 3260
ISCSIHbaKey : key=vim.host.InternetScsiHba-vmhba64
AuthenticationProperties : Chap:Prohibited
Type : Send
Uid : /VIServer=root@172.16.2.33:443/VMHost=HostSystem-ha-host/Hba=key-vim.host.InternetScsiHba-vmhba64/ISCSIHbaTarget=172.16.10.2:3260:Send/
Name : 172.16.10.2:3260
ISCSIHbaName : tqn.1998-01.com.vmware:esxi01:1937441933:64
ExtensionData : VMware.Vim.HostInternetScsiHbaSendTarget
VMHostId : HostSystem-ha-host
HostStorageSystemId : HostStorageSystem-storageSystem

```

13. StarWind ESXi user for ProActive monitoring creation.

```

Create ESXi User / Role / Permission
Description : StarWind
IsSystem : False
PrivilegeList : {Global.CancelTask, Global.CapacityPlanning, Global.Diagnostics, Global.DisableMethods...}
ServerId : /VIServer=root@172.16.2.31:443/
Server : 172.16.2.31
Id : 10
Name : StarWind
Uid : /VIServer=root@172.16.2.31:443/Role=10/
ExtensionData : VMware.Vim.AuthorizationRole

```

14. StarWind Virtual Machine installation. Choose "I" for StarWind Virtual SAN (vSAN) for vSphere

You can specify the specific name for Virtual Machine in case of not default ESXi name.

```

Set name for StarWind VM
ESXi02
StarWind VM Creation
Choose type of the StarWind VM Windows[w] / Linux [l] : l
StarWind OVF exist
WARNING: The size of the file 'StarWindVSA_vSphere_20211124_14398-disk1.vmdk' is 2019257856 bytes where 2188326400 bytes is expected.

Confirm
Are you sure you want to perform this action?
Performing the operation "Setting NetworkName: iSCSI-2-1-for-VMs" on target "Network adapter 2".
[Y] Yes [A] Yes to All [N] No [L] No to All [S] Suspend [?] Help (default is "Y"): a

Confirm
Are you sure you want to perform this action?
Performing the operation "Setting NetworkName: Sync-2-1-for-VMs" on target "Network adapter 3".
[Y] Yes [A] Yes to All [N] No [L] No to All [S] Suspend [?] Help (default is "Y"): a

```

```

Confirmation
Proceed to configure the following parameters of the virtual machine with name 'SW-HCA-VM-02'?
New NumCpu: 8
[Y] Yes [A] Yes to All [N] No [L] No to All [S] Suspend [?] Help (default is "Y"): a
WARNING: The 'Version' property of VirtualMachine type is deprecated. Use the 'HardwareVersion' property instead.
PowerState : PoweredOff
Version : v10
HardwareVersion : vmx-10
Notes : StarWind Virtual SAN for vSphere
Guest : SW-HCA-VM-02:
NumCpu : 8
CoresPerSocket : 4
MemoryMB : 8192
MemoryGB : 8
VMHostId : HostSystem-ha-host
VMHost : 172.16.2.33
VApp :
FolderId : Folder-ha-folder-vm
Folder : vm
ResourcePoolId : ResourcePool-ha-root-pool
ResourcePool : Resources
PersistentId : 5270c85c-73d7-5195-42fb-6e19d06aea2d
UsedSpaceGB : 16.00008087605237960815429688
ProvisionedSpaceGB : 16.993893573991954326629638672
DatastoreIdList : {Datastore-641c3db7-60d58d0a-d8d0-b49691f2fe8c}
HARestartPriority :
HAIsolationResponse :
DrsAutomationLevel :
VMSwapFilePolicy : Inherit
VMResourceConfiguration : CpuShares:Normal/8000 MemShares:Normal/81920
GuestId : rhel7_64Guest
CreateDate : 3/23/2023 12:42:13 PM
SEVENabled : False
Name : SW-HCA-VM-02
CustomFields : {}
ExtensionData : VMware.Vim.VirtualMachine
Id : VirtualMachine-2
Uid : /VIServer=root@172.16.2.33:443/VirtualMachine=VirtualMachine-2/

Reserve RAM for VM
Type : Task
Value : haTask-2-vim.VirtualMachine.reconfigure-319

Autostart for VM
WARNING: The 'VirtualMachineId' property of VMStartPolicy type is deprecated. Use the 'VMId' property instead.
VirtualMachineId : VirtualMachine-2
VMId : VirtualMachine-2
VM : SW-HCA-VM-02
VirtualMachineName : SW-HCA-VM-02
VmHostId : HostSystem-ha-host
StartAction : PowerOn
StartDelay : 120
StartOrder : 1
StopAction : GuestShutdown
StopDelay : 120
WaitForHeartbeat : False
IsStartDelayInherited : True
IsStopActionInherited : False
IsStopDelayInherited : True
IsWaitForHeartbeatInherited : True
Uid : /VIServer=root@172.16.2.33:443/VMHost=HostSystem-ha-host/VMStartPolicy=VirtualMachine-2/
ExtensionData : VMware.Vim.AutoStartPowerInfo

```

Note: OVF will be downloaded if it is not present. CPU and RAM memory will be configured according to our best practices.
Storage drives for StarWind devices should be added manually.

Storage Configuration Part

Three options to add storage for StarWind VM:

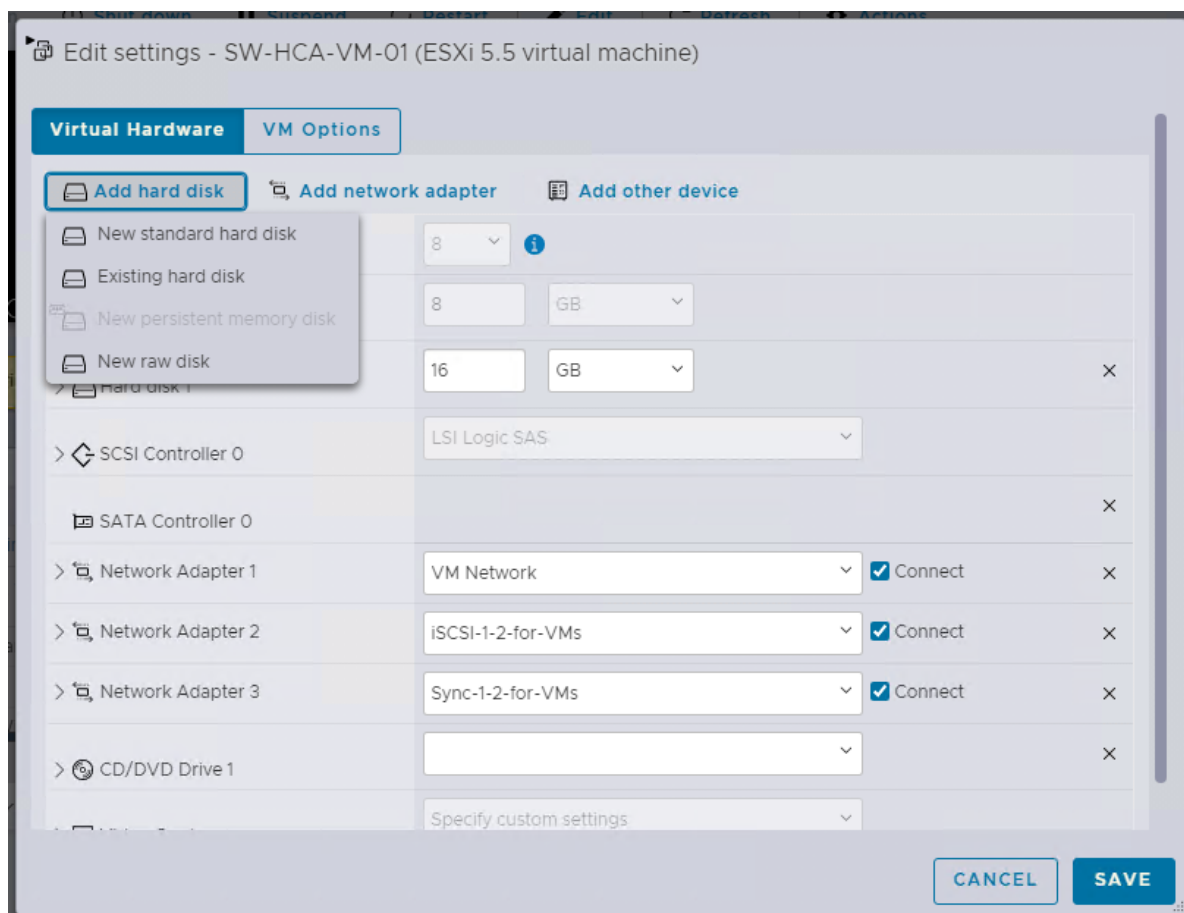
VMDK when ESXi is located on the same RAID array with DATA.

RDM when ESXi RAID array and DATA RAID array are located on the same RAID Controller,

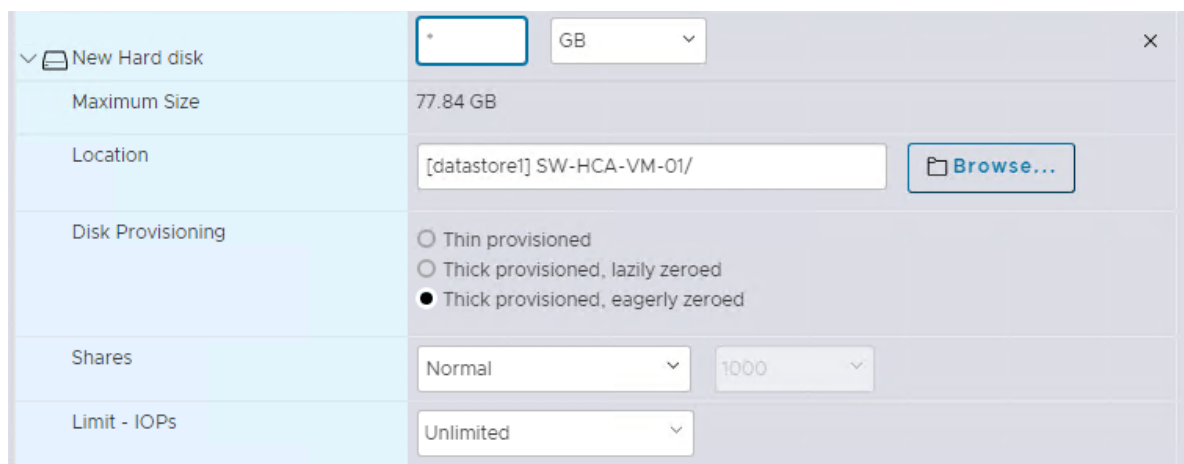
PCI when servers have two RAID controllers one for ESXi and the second for DATA or HBA physical disks.

VDMK

1. Add the new standard hard disk to StarWind VM from the existing datastore:



2. Specify the size and type of the new hard disk.
The type of Disk Provisioning should be Thick Provision Eager Zeroed



3. Modify the StarWind VM file to resolve the issue with ESXi: [VMware Knowledge Base](#)

Edit and save the VMX file of the StarWind VM by adding the following lines:

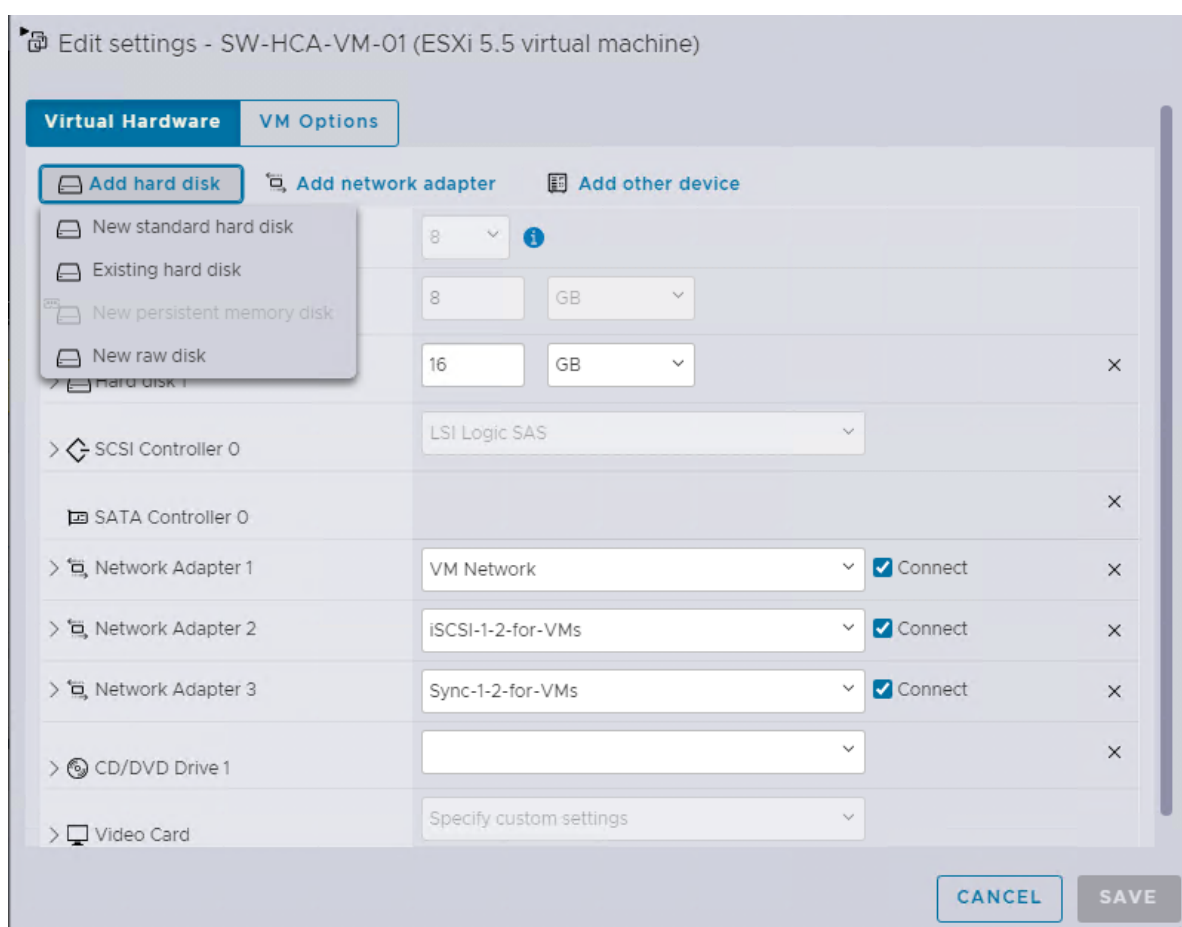
```
scsi0.async = "FALSE"
scsi0:0.canBlock = "TRUE"
scsi0:1.canBlock = "TRUE"
```

Line 1 shall be introduced for every SCSI controller your VM has got (0, 1, or whatever its number is). Line 2 shall be introduced for every port on that controller (here is why we use line 3 – just for example purposes in case of two disks attached to the VM using 1 SCSI controller).

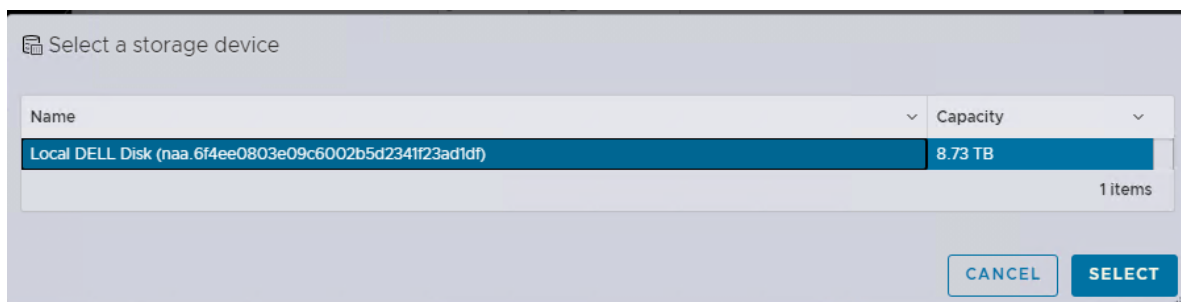
In this example, VM got one SCSI adapter and two disks assigned to it.

RDM

1. Add the new raw disk to StarWind VM.

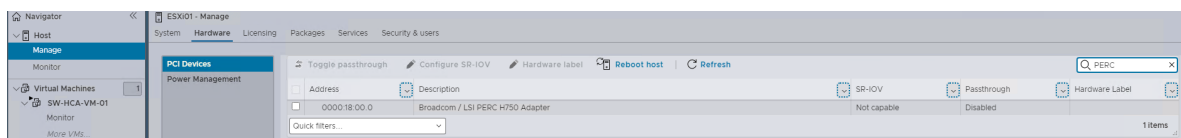


2. Select the RAID array for StarWind devices

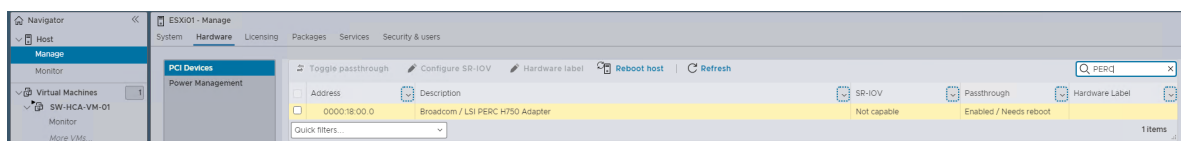


PCI

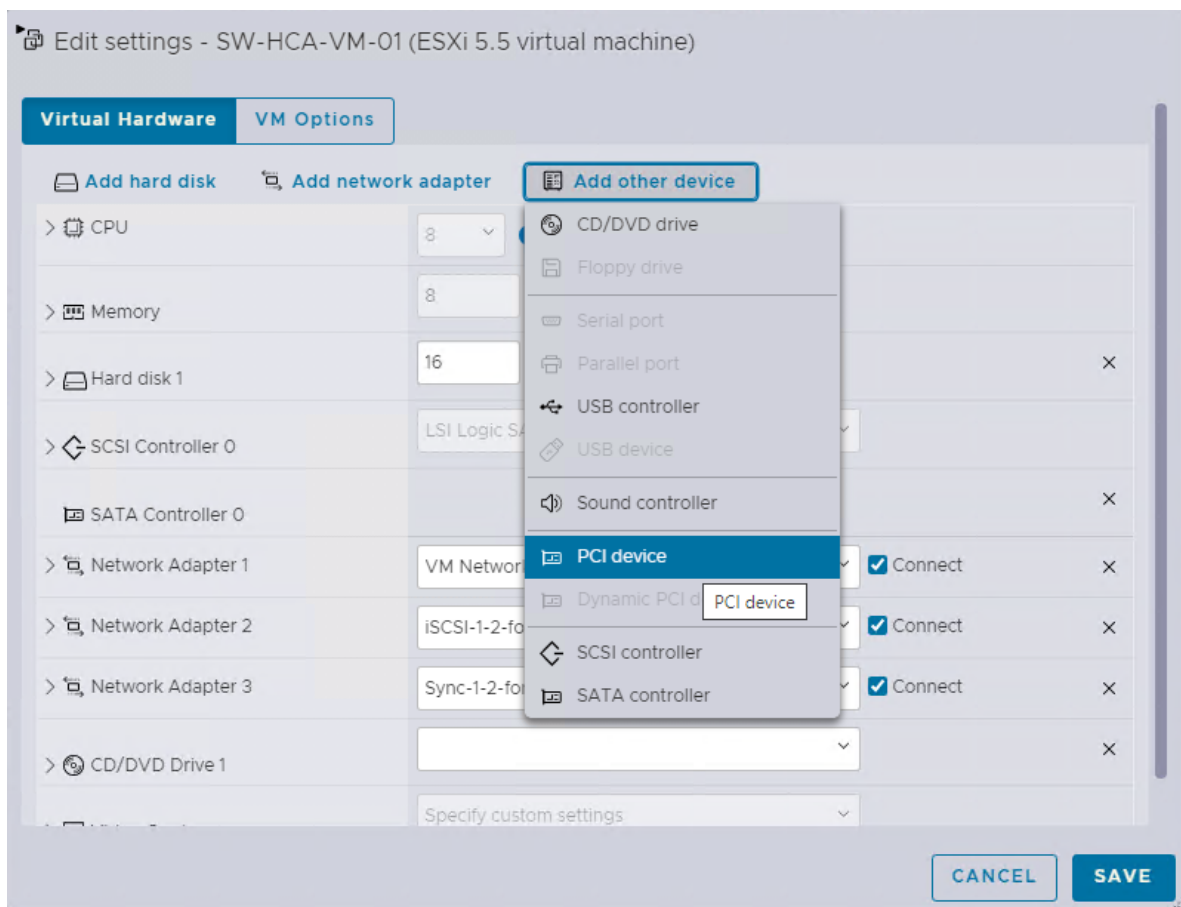
1. Open ESXi web → Manage → Hardware → PCI Devices. Find the RAID Controller or HBA disks.

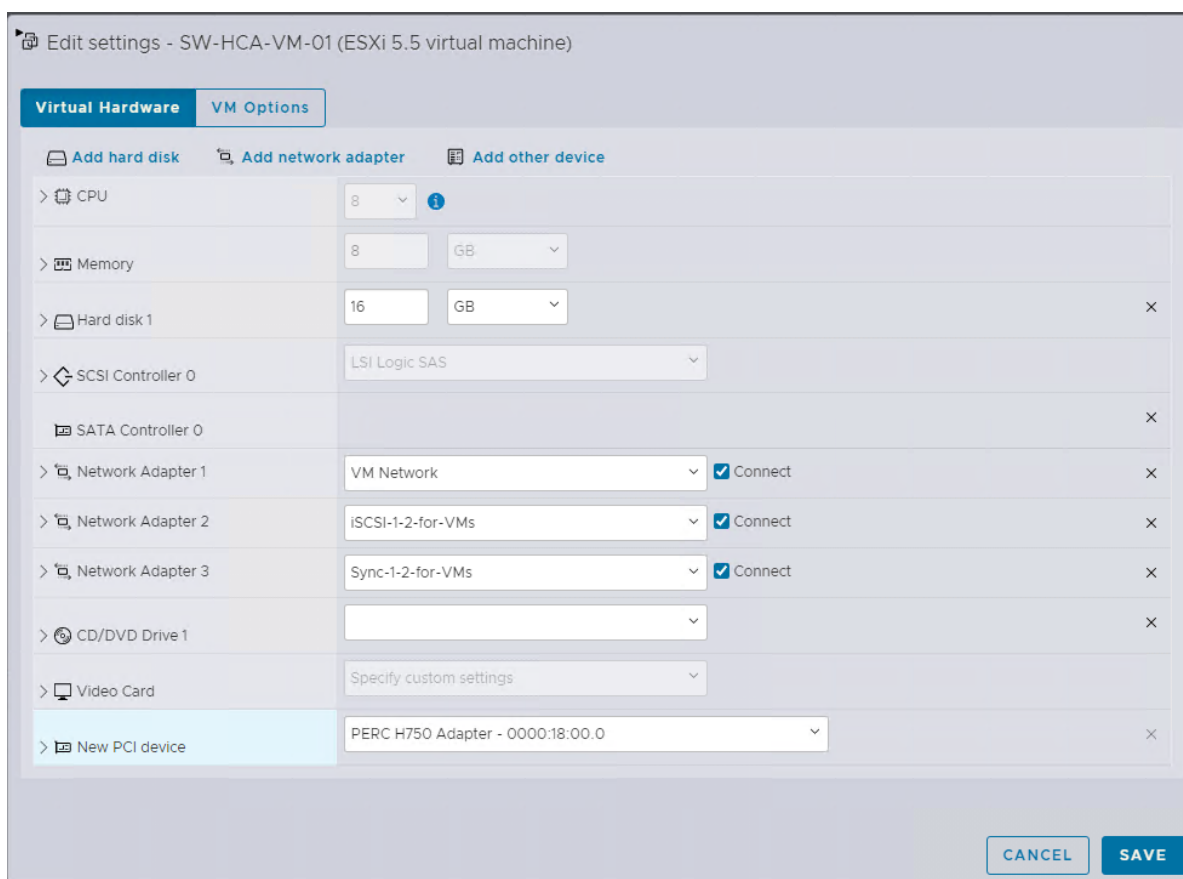


2. Toggle passthrough for the RAID Controller or HBA disks, and refresh a page.



3. Reboot the ESXi server.
4. Add PCI devices to StarWind VM.





5. Save the configuration.

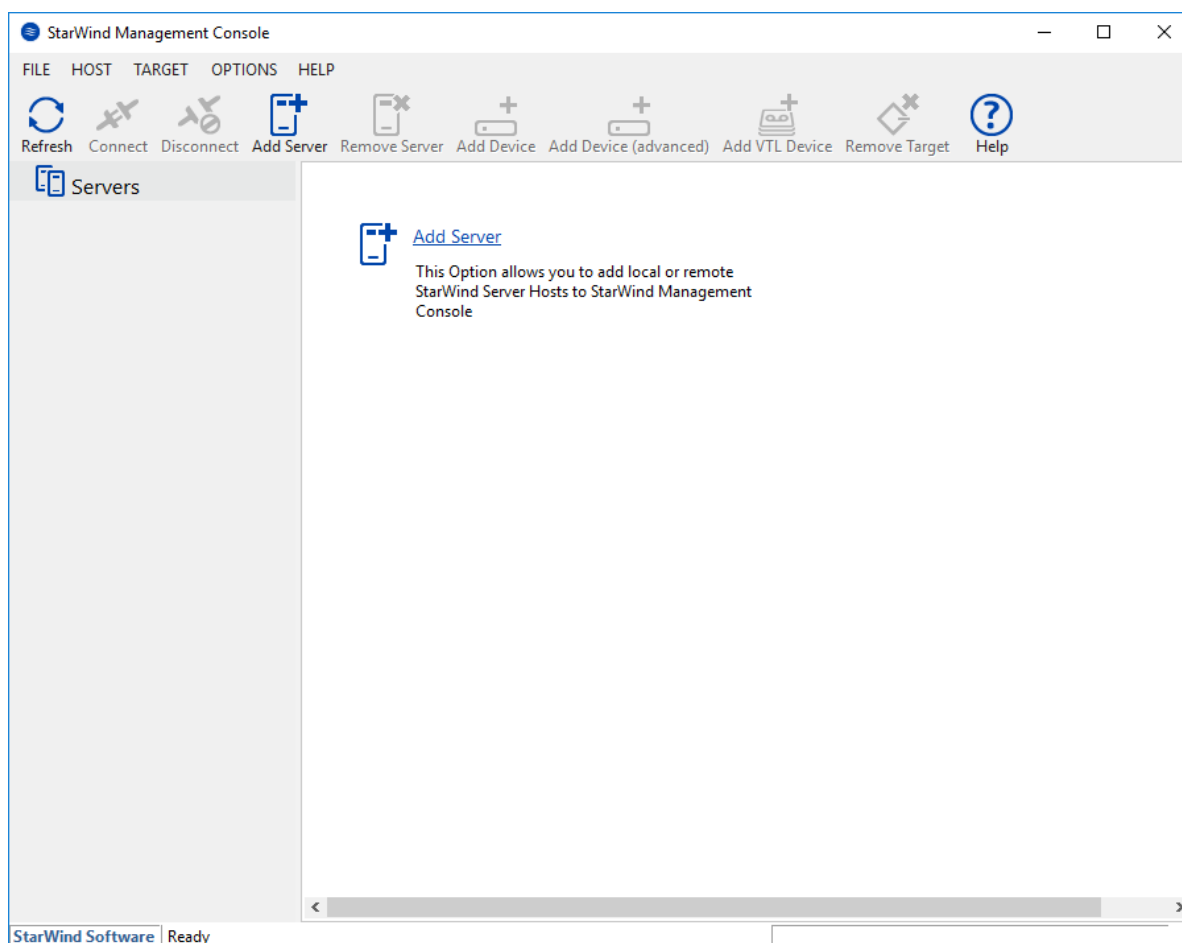
Starwind Configuration Part

To manage StarWind service you need to download and install StarWind Management Console.

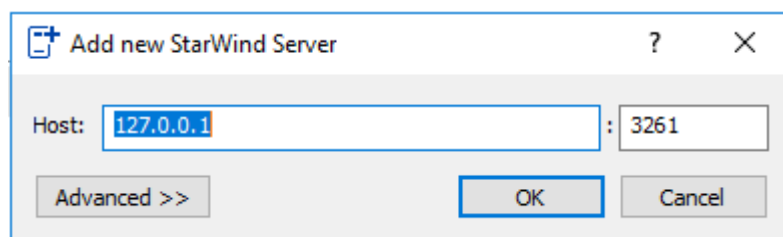
1. Install StarWind Management Console on a workstation with Windows OS (Windows 7 or higher, Windows Server 2008 R2 and higher) using the installer available [here](#).
NOTE: StarWind Management Console and PowerShell Management Library components are required.

2. Select the appropriate option to apply the StarWind License key.
Once the appropriate license key has been received, it should be applied to StarWind Virtual SAN service via Management Console or PowerShell.

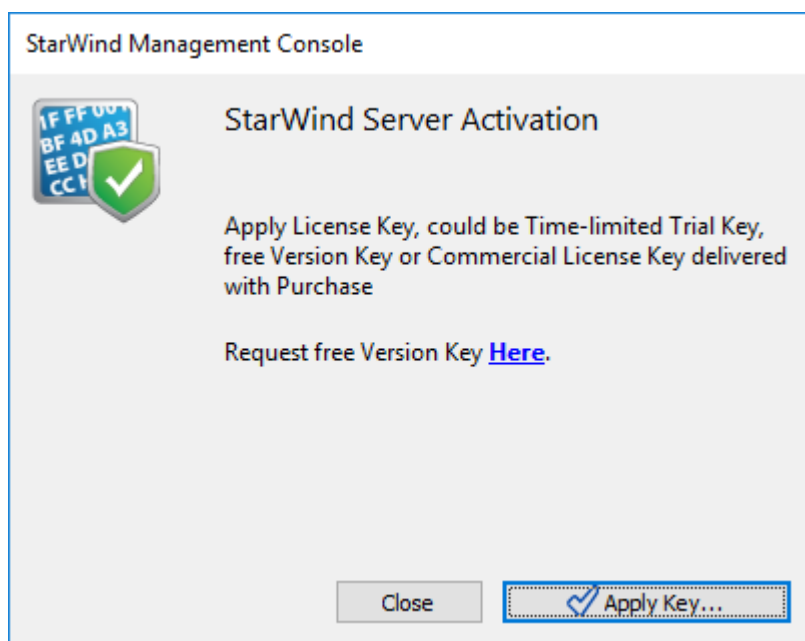
3. Open StarWind Management Console and click Add Server.



4. Type the IP address of the StarWind Virtual SAN in the pop-up window and click OK.



5. Select the server and click Connect.



6. Click Apply Key... on the pop-up window.
7. Select Load license from the file and click the Load button.
8. Select the appropriate license key.

As an alternative, PowerShell can be used. Open StarWind InstallLicense.ps1 script with PowerShell ISE as administrator. It can be found here:

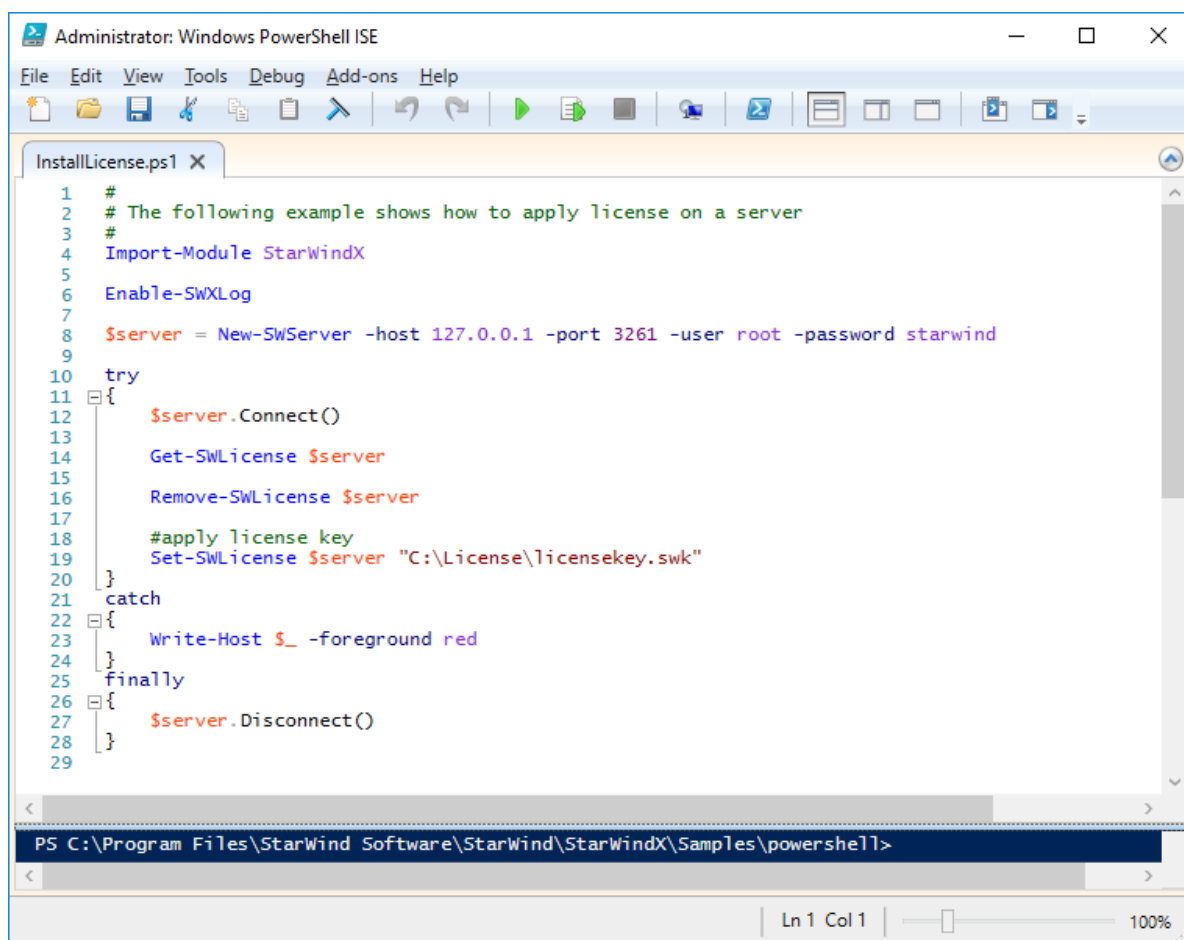
C:\Program Files\StarWind

Software\StarWind\StarWindX\Samples\powershell\InstallLicense.ps1

Type the IP address of StarWind Virtual SAN VM and credentials of StarWind Virtual SAN service (defaults

login: root, password: starwind).

Add the path to the license key.



```

Administrator: Windows PowerShell ISE
File Edit View Tools Debug Add-ons Help
InstallLicense.ps1 X
1 #
2 # The following example shows how to apply license on a server
3 #
4 Import-Module StarWindX
5
6 Enable-SWXLog
7
8 $server = New-SWServer -host 127.0.0.1 -port 3261 -user root -password starwind
9
10 try
11 {
12     $server.Connect()
13     Get-SWLicense $server
14     Remove-SWLicense $server
15     #apply license key
16     Set-SWLicense $server "C:\License\licensekey.swk"
17 }
18 catch
19 {
20     Write-Host $_ -foreground red
21 }
22 finally
23 {
24     $server.Disconnect()
25 }
26
27
28
29
PS C:\Program Files\StarWind Software\StarWind\StarWindX\Samples\powershell>
Ln 1 Col 1 100%

```

9. After the license key is applied, StarWind devices can be created.
NOTE: In order to manage StarWind Virtual SAN service (e.g. create ImageFile devices, VTL devices, etc.), StarWind Management Console can be used.

Configure Starwind Vm

Names:

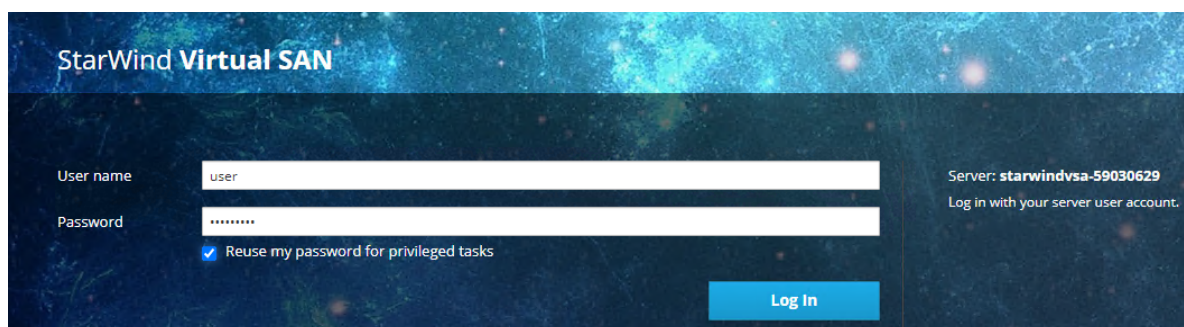
1. To log in to the StarWind VSAN VM web console you need to type the VM IP address and port 9090

Example: 192.168.1.1:9090

The default credentials:

Login: user

Password: rds123RDS



StarWind Virtual SAN

User name:

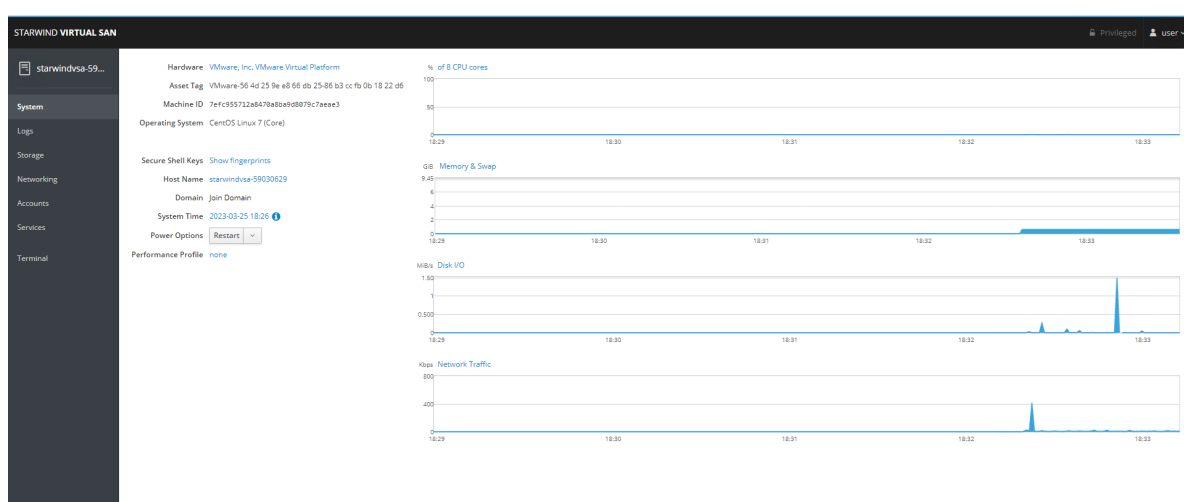
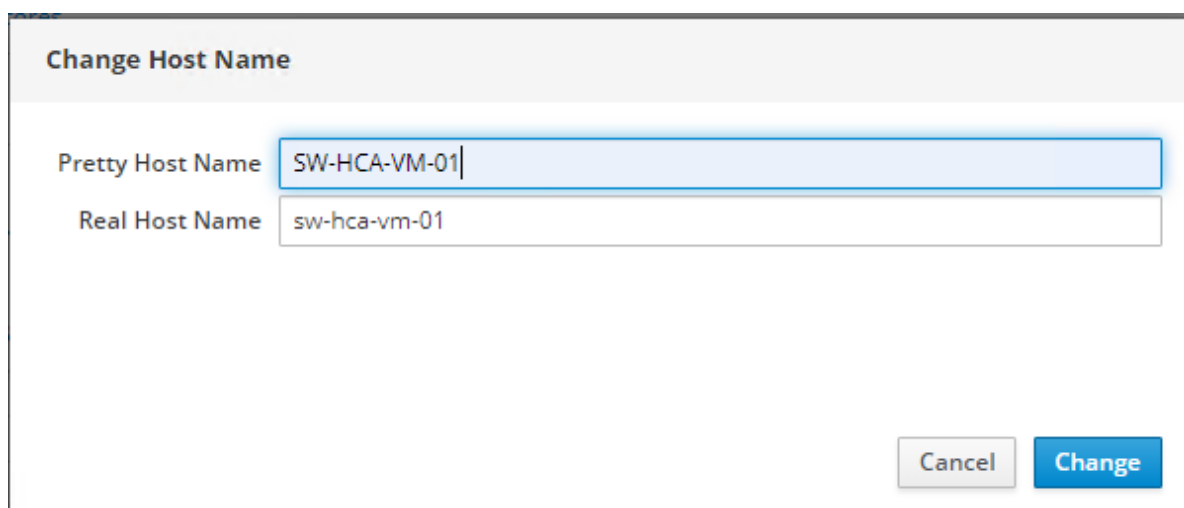
Password:

☒ Reuse my password for privileged tasks

Log In

Server: starwindvsa-59030629
Log in with your server user account.

2. On the “System” page click on the “Host Name” and change it according to the default StarWind names or a specific name.

Change Host Name

Pretty Host Name:

Real Host Name:

Cancel Change

Networks:

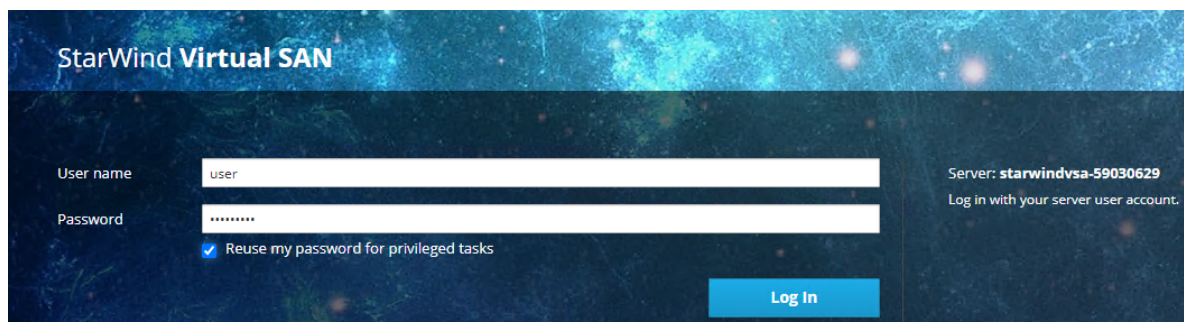
1. To log in to the StarWind VSAN VM web console you need to type the VM IP address and port 9090

Example: 192.168.1.1:9090

The default credentials:

Login: user

Password: rds123RDS



The image shows the StarWind Virtual SAN login interface. It has a dark blue header with the product name. Below, there are input fields for 'User name' (containing 'user') and 'Password' (masked with dots). A checkbox labeled 'Reuse my password for privileged tasks' is checked. A 'Log In' button is on the right. To the right of the password field, it says 'Server: starwindvsa-59030629' and 'Log in with your server user account.'

2. On the “Networking” page click on the “ens192” to set the management IP-address.

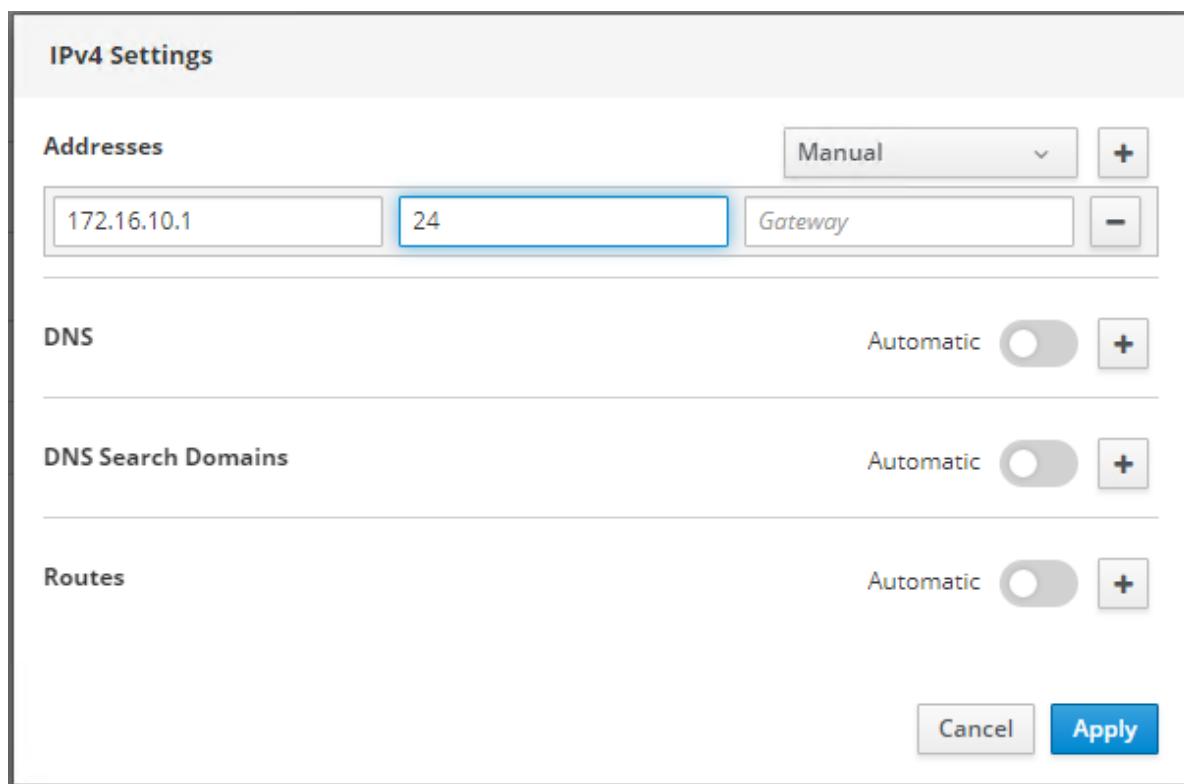
“ens224” – is for iSCSI and should have the following IP-address 172.16.10*/24

“ens256” – is for Synchronization and should have following IP-address 172.16.20*/24

3. iSCSI and Synchronization networks should have the following settings:

Node 1:

iSCSI 172.16.10.1/24



The image shows the 'IPv4 Settings' configuration window. It has a title bar 'IPv4 Settings'. Below, there's a section 'Addresses' with a dropdown menu set to 'Manual' and a '+' button. Below this, there are input fields for '172.16.10.1', '24', and 'Gateway', with a '-' button. Below the 'Addresses' section, there are three sections: 'DNS', 'DNS Search Domains', and 'Routes'. Each section has a toggle switch set to 'Automatic' and a '+' button. At the bottom right, there are 'Cancel' and 'Apply' buttons.

IPv6 should be disabled and MTU set to 9000.

ens224 VMware VMXNET3 Ethernet Controller vmxnet3 00:0C:29:18:22:E0

Status: 172.16.10.1/24
Carrier: 10 Gbps

General ☒ Connect automatically

IPv4 Address: 172.16.10.1/24
IPv6: ignore
MTU: 9000

Synchronization 172.16.20.1/24

IPv4 Settings

Addresses Manual +

172.16.20.1 24 Gateway -

DNS Automatic +

DNS Search Domains Automatic +

Routes Automatic +

Cancel Apply

IPv6 should be disabled and MTU set to 9000.

ens256 VMware VMXNET3 Ethernet Controller vmxnet3 00:0C:29:18:22:EA

Status: 172.16.20.1/24
Carrier: 10 Gbps

General ☒ Connect automatically

IPv4 Address: 172.16.20.1/24
IPv6: Automatic
MTU: Automatic

Node 2:
iSCSI 172.16.10.2/24

IPv4 Settings

Addresses

Manual

+

172.16.10.2

24

Gateway

-

DNS

Automatic

+

DNS Search Domains

Automatic

+

Routes

Automatic

+

Cancel

Apply

IPv6 should be disabled and MTU set to 9000.

ens224 VMware VMXNET3 Ethernet Controller vmxnet3 000C:29:18:22:E0

Status 172.16.10.2/24

Carrier 10 Gbps

General ☒ Connect automatically

IPv4 Address 172.16.10.2/24

IPv6 ignore

MTU 9000

Synchronization 172.16.20.2/24

IPv4 Settings

Addresses

Manual

+

172.16.20.2

24

Gateway

-

DNS

Automatic

+

DNS Search Domains

Automatic

+

Routes

Automatic

+

Cancel

Apply

IPv6 should be disabled and MTU set to 9000.

ens256 VMware VMXNET3 Ethernet Controller vmxnet3 00:0C:29:18:22:EA

Status 172.16.20.2/24

Carrier 10 Gbps

General ☒ Connect automatically

IPv4 Address 172.16.20.2/24

IPv6 Automatic

MTU Automatic

Storage:

Single disk based on hardware:

1. Login to StarWind VSAN VM web console and find in the Storage section under Drives the Disk that was recently added and choose it.

Note: To log in to the StarWind VSAN VM web console you need to type the VM IP address and port 9090

Example: 192.168.1.1:9090

The default credentials:

Login: user

Password: rds123RDS

StarWind Virtual SAN

User name

Password

☒ Reuse my password for privileged tasks

Log In

Server: starwindvsa-59030629

Log in with your server user account.

starwindvsa-59...

System

Log

Storage

Networking

Accounts

Services

Terminal

KB/s Reading

KB/s Writing

Name	Mount Point	Size
/dev/centos/root	/	3.16 / 13.4 GB
/dev/sda1	/boot	158 / 1014 MB

Storage Logs

March 25, 2023

18:139 g_object_notify: object class 'UDisksLinuxBlockObject' has no property named 'physical-volume'

18:139 g_object_notify: object class 'UDisksLinuxBlockObject' has no property named 'block-lvm2'

18:139 g_object_notify: object class 'UDisksLinuxLogicalVolumeObject' has no property named 'logical-volume'

18:139 g_object_notify: object class 'UDisksLinuxVolumeGroupObject' has no property named 'volume-group'

18:139 g_object_notify: object class 'UDisksObjectSkeleton' has no property named 'manager-lvm2'

18:139 Loading module libudisks2_lvm2.so...

18:139 Loading module libudisks2_iscsi.so...

RAID Devices

No storage set up as RAID

Volume Groups

centos 15.0 GB

VDO Devices

No storage set up as VDO

Drives

VMware Virtual disk 16 GB Hard Disk R: 0 B/s W: 0 B/s

DELL PERC H730 Adp (0091021de99a245... 8.73 TB Solid-State Disk R: 0 B/s W: 0 B/s

VMware Virtual SATA CD/DVD Drive (00000... Optical Drive R: 0 B/s W: 0 B/s

2. The added disk does not have any partitions and filesystem.
Press on Create Partition Table button to create the partition and format it.

Format Disk /dev/sdb

Erase

Don't overwrite existing data

Partitioning

Compatible with modern system and hard disks > 2TB (GPT)

Formatting a disk will erase all data on it.

Cancel

Format

Press on Format button to create the partition and format it.

3. Press on Create Partition button to create the partition and format it.
Create the XFS partition. Specify the name and erase option. The mount point should be as following: /mnt/sw . Click Create Partition.

Create Partition on /dev/sdb

Size

8939

GiB

Erase

Don't overwrite existing data

Type

XFS - Recommended default

Name

*

☐ Encrypt data

Mounting

Custom

Mount Point

/mnt/sw

Mount Options

☒ Mount at boot
☐ Mount read only
☐ Custom mount options

Cancel

Create Partition

4. On the storage page of the disk, navigate to the Filesystem tab. Click Mount.

Storage > DELL PERC H750 Adp (0091021de99a245d2b00f4093e80e04e)

Drive

Model: PERC H750 Adp

Firmware Version: 5.21

Serial Number: 0091021de99a245d2b00f4093e80e04e

World Wide Name: 0x6f4ee0803e09f400265d249ae91d0291

Capacity: 8.73 TiB, 9.60 TB, 9598580817920 bytes

Device File: /dev/sdb

Content

8.73 TiB xfs File System /dev/sdb1

Partition

Filesystem

Delete

Format

Name *

Mount Point /mnt/sw

Mount Options defaults

Used -

Mount

8.73 TiB xfs File System /dev/sdb1

Partition

Filesystem

Delete

Format

Name *

Mount Point /mnt/sw

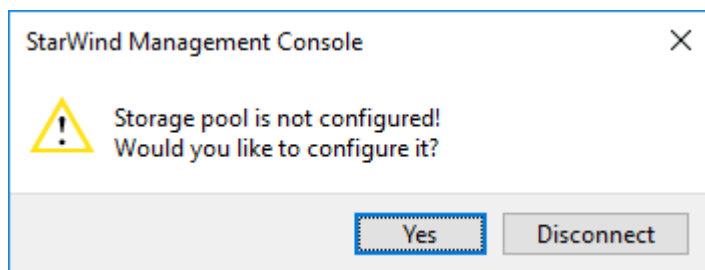
Mount Options defaults

Mounted At /mnt/sw

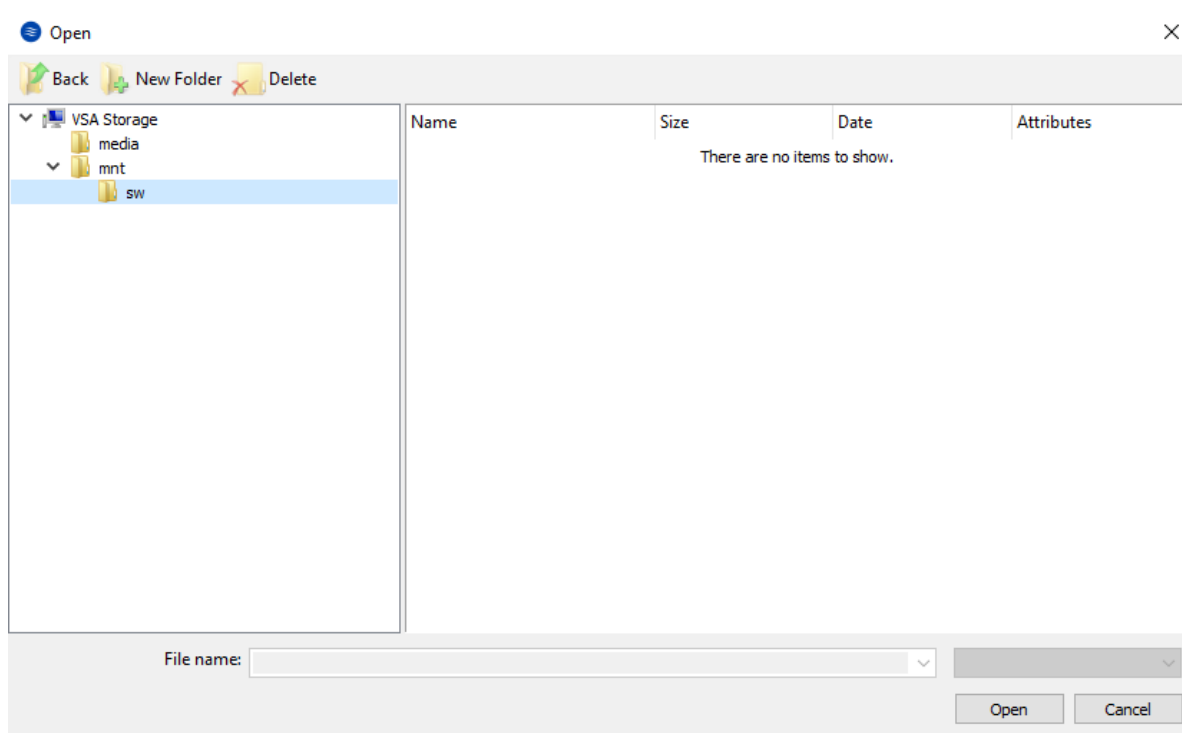
Used 33.5 MiB of 8.73 TiB

Unmount

5. Connect to StarWind Virtual SAN from the StarWind Management Console. Click Yes.



6. Select the disk which was recently mounted.



Several disks for Software RAID:

1. Login to StarWind VSAN VM web console and find in the Storage section under Drives the Virtual Disk that was recently added and choose it.

Note: To log in to the StarWind VSAN VM web console you need to type the VM IP address and port 9090

Example: 192.168.1.1:9090

The default credentials:

Login: user

Password: rds123RDS

StarWind Virtual SAN

User name

user

Password

☒ Reuse my password for privileged tasks

Log In

Server: starwindvsa-59030629

Log in with your server user account.

2. Go to the Storage page. The Drives section shows the drives connected to HBA/RAID Controller (if available).

Filesystems

Name	Mount Point	Size
/dev/centos/root	/	3.16 / 13.4 GiB
/dev/sda1	/boot	158 / 1014 MiB

Storage Logs

```

18:47 Cleaning up mount point /mnt/sw (device 8:17 is not mounted)
18:45 Mounted /dev/sdb1 (system) at /mnt/sw on behalf of uid 1002
18:25 g_object_notify: object class 'UDisksLinuxBlockObject' has no property named 'physical-volume'
18:25 g_object_notify: object class 'UDisksLinuxBlockObject' has no property named 'block-lvm2'
18:25 g_object_notify: object class 'UDisksLinuxLogicalVolumeObject' has no property named 'logical-volume'
18:25 g_object_notify: object class 'UDisksLinuxVolumeGroupObject' has no property named 'volume-group'
18:25 g_object_notify: object class 'UDisksObjectSkeleton' has no property named 'manager-lvm2'
18:25 g_object_notify: object class 'UDisksObjectSkeleton' has no property named 'manager-iscsi-initiator'
18:25 Loading module libudisks2_lvm2.so...
18:25 Loading module libudisks2_iscsi.so...
        
```

15.0 GiB

VDO Devices

No storage set up as VDO

Drives

- VMware Virtual disk
16 GiB Hard Disk
R: 0 B/s W: -8.21 B/s
- VMware Virtual SATA CDRW Drive (0000...
Optical Drive
R: 0 B/s W: 0 B/s
- HFS1T9G32FEH-BA10A (KNOBNT7071020...
1.75 TiB Solid-State Disk
R: 0 B/s W: 0 B/s
- HFS1T9G32FEH-BA10A (KNA6N78673300...
1.75 TiB Solid-State Disk
R: 0 B/s W: 0 B/s
- HFS1T9G32FEH-BA10A (KSACN8146020...
1.75 TiB Solid-State Disk
R: 0 B/s W: 0 B/s
- HFS1T9G32FEH-BA10A (KNA6N78673300...
1.75 TiB Solid-State Disk
R: 0 B/s W: 0 B/s

3. Click “+” in the RAID Devices section to create Software RAID. (In the current example, RAID 10 will be created with 4 HDD drives). StarWind recommendations of RAID configurations depending on the number of disks, chunk size, and array level are shown in the table below:

RAID Level	Chunk size for HDD Arrays	Chunk size for SSD Arrays
0	Disk quantity * 4Kb	Disk quantity * 8Kb
5	(Disk quantity - 1) * 4Kb	(Disk quantity - 1) * 8Kb
6	(Disk quantity - 2) * 4Kb	(Disk quantity - 2) * 8Kb
10	(Disk quantity * 4Kb)/2	(Disk quantity * 8Kb)/2

StarWind Software RAID recommended settings can be found here:

[Recommended RAID settings for HDD and SSD disks – StarWind Knowledge Base](#)

4. Select the drives to add to the array.

Create RAID Device

Name

RAID Level

Chunk Size

Disks

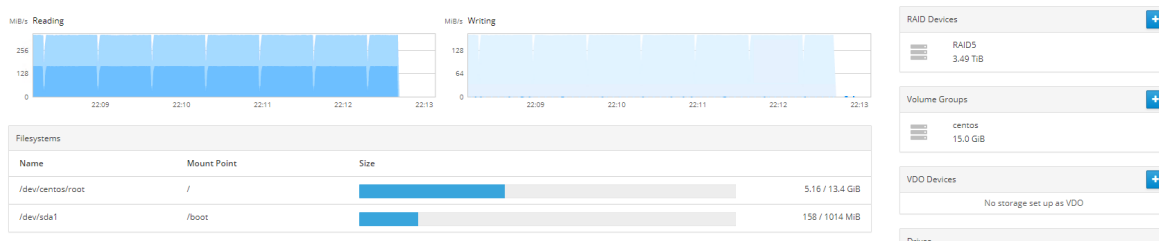
☒ 1.75 TiB HFS1T9G32FEH-BA10A (KNA6N7867I300774S) /dev/sdc

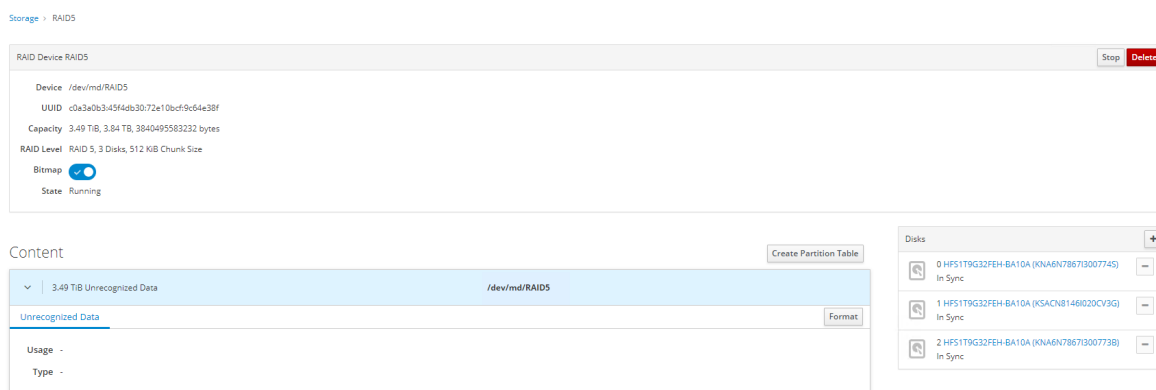
☒ 1.75 TiB HFS1T9G32FEH-BA10A (KSACN8146I020CV3G) /dev/sdd

☒ 1.75 TiB HFS1T9G32FEH-BA10A (KNA6N7867I300773B) /dev/sde

☐ 1.75 TiB unpartitioned space on HFS1T9G32FEH-BA10A (KN08N7077I0208L4U) /dev/sdb

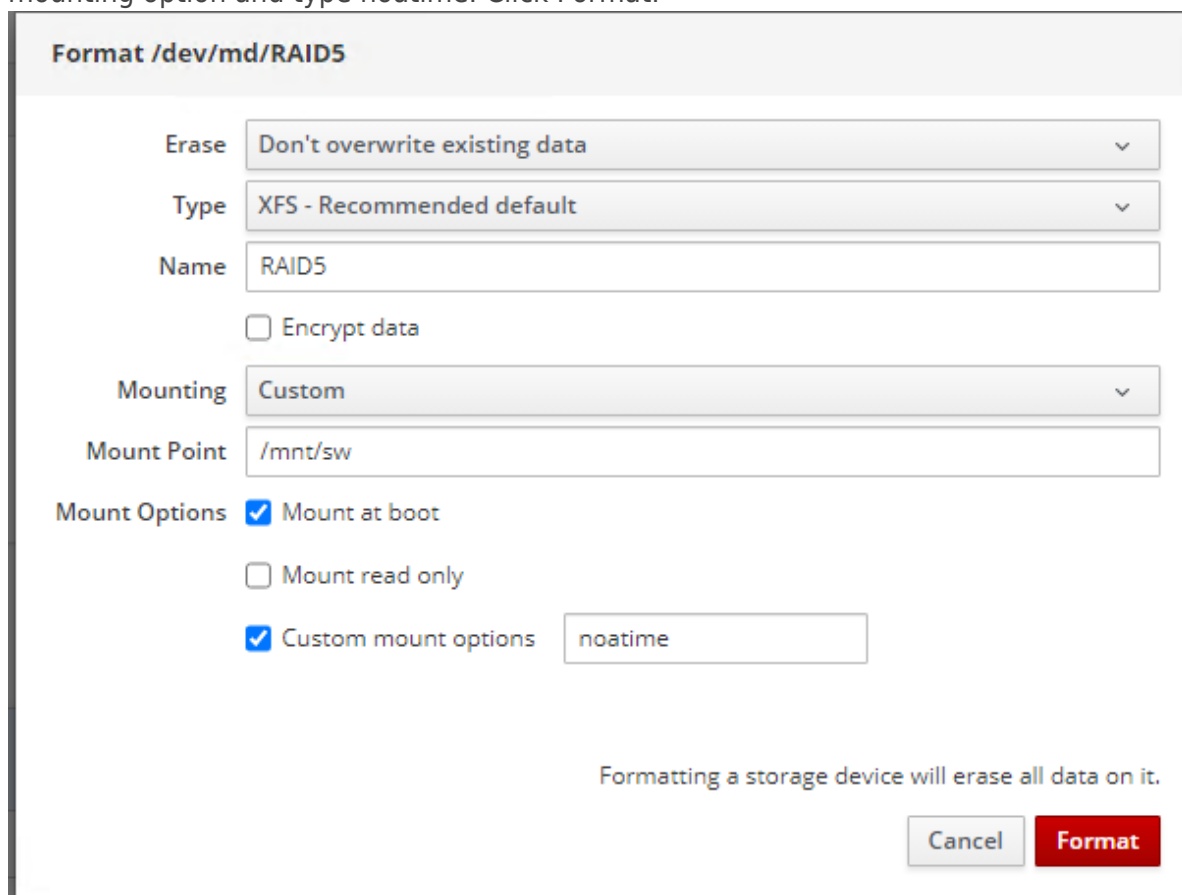
5. After the synchronization is finished, find the RAID array created.



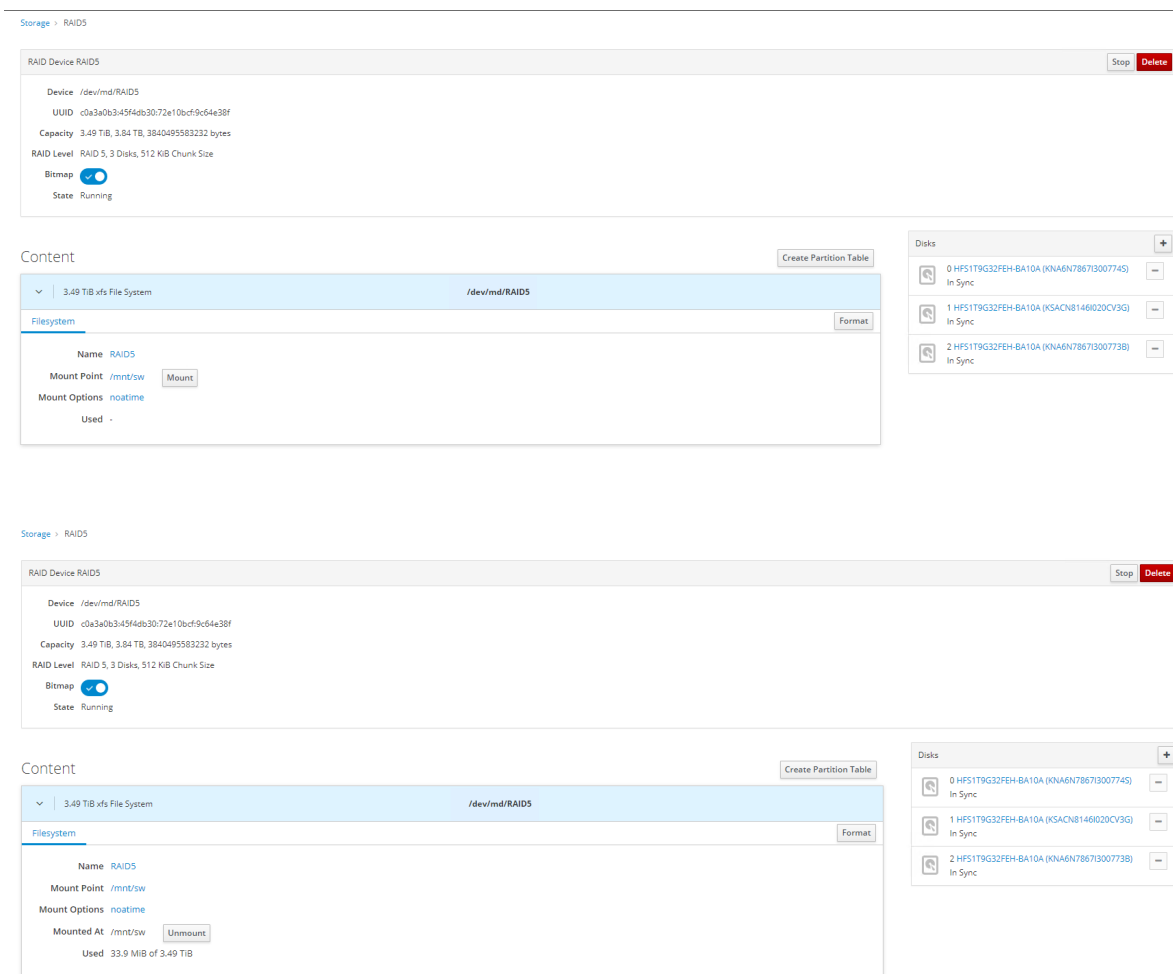


NOTE: The disk created will not have any partitions and file system. Click Format.

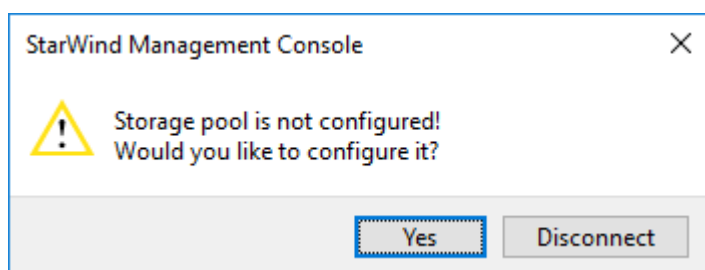
6. Create the XFS partition. Mount point should be as follows: /mnt/sw. Select the Custom mounting option and type noatime. Click Format.



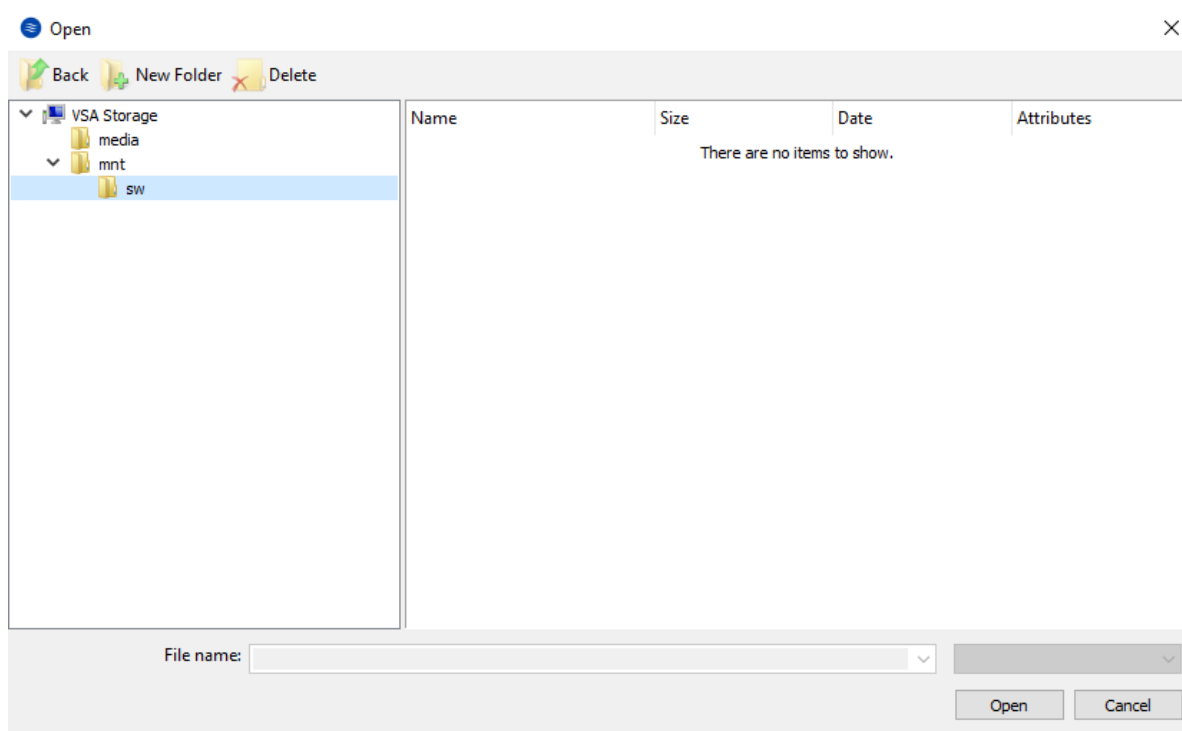
7. On the storage page of the disk, navigate to the Filesystem tab. Click Mount.



8. Connect to StarWind Virtual SAN from StarWind Management Console or from Web Console. Click Yes.



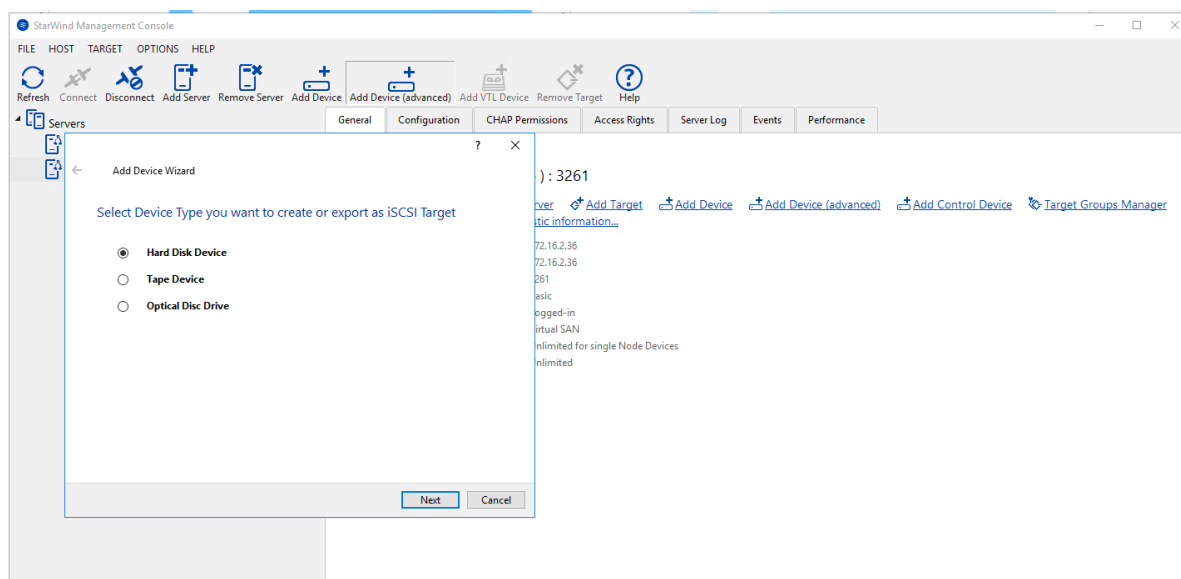
9. Select the disk recently mounted.



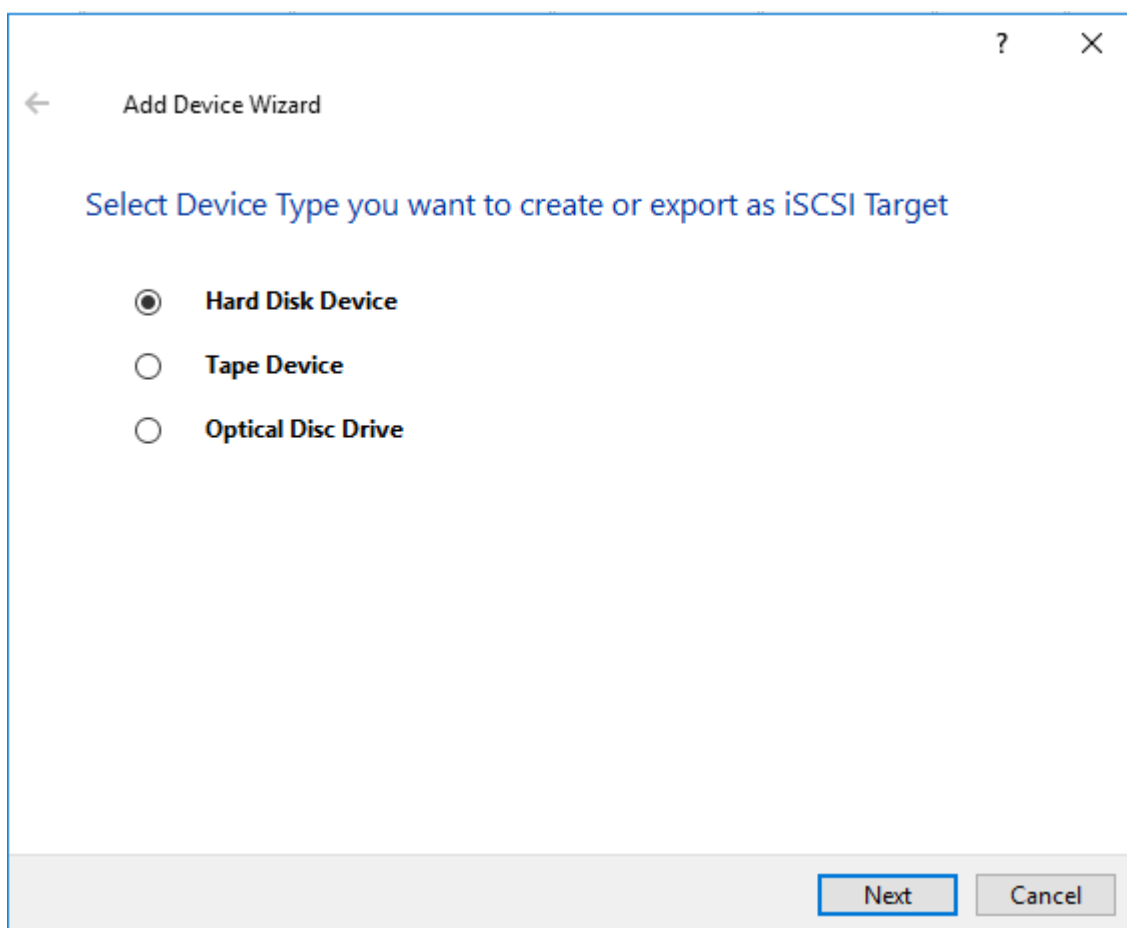
Starwind Devices Creation

For VMware the default number of StarWind devices is two DS1 and DS2.

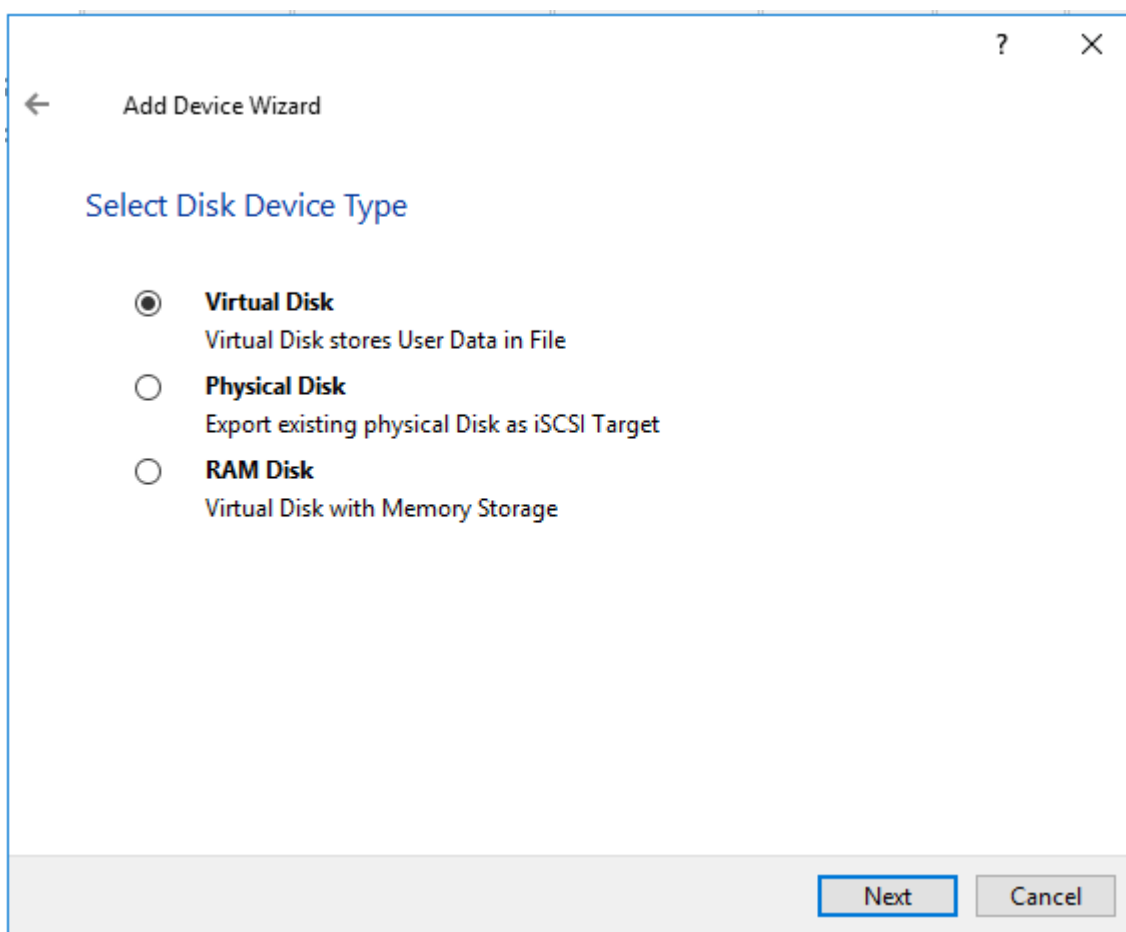
1. In the StarWind Management Console click on to Add Device (advanced) button and open Add Device (advanced) Wizard.



2. Select Hard Disk Device as the type of device to be created.



3. Select Virtual Disk.



4. Specify a virtual disk Name, Location, and Size.
The size should be 1GB to do a quick synchronization.

← Add Device Wizard

Virtual Disk Location

☒ Create a New Virtual Disk

Name:

Location:

Size: GB

☐ Use an Existing Virtual Disk

Location:

☐ Read-Only Mode

Next **Cancel**

5. Select the Thick provisioned disk type and block size.

NOTE: Use 4096 sector size for targets, connected on Windows-based systems and 512 bytes sector size for targets, connected on Linux-based systems (ESXi/Xen/KVM).

The screenshot shows a window titled "Add Device Wizard" with a back arrow and help/close icons. The main heading is "Virtual Disk Options". There are three radio button options: "Thick-provisioned" (selected), "Thick-provisioned with Log-structured Write-Back Cache (experimental)", and "LSFS". Below these is a checkbox for "Deduplication". A "StarPack Cache Size:" field shows "16" and a unit dropdown set to "MB". A "Block Size" section has two radio button options: "Use 512 bytes sector size" (selected) and "Use 4096 bytes sector size. May be incompatible with some clients". At the bottom right are "Next" and "Cancel" buttons.

6. Define a caching policy and specify a cache size (in MB). Also, the maximum available cache size can be specified by selecting the appropriate checkbox. Optionally, define the L2 caching policy and cache size.

?
×

←
Add Device Wizard

Specify Device RAM Cache Parameters

Mode

☐ **Write-Back**
Writes are performed asynchronously, actual Writes to Disk are delayed, Reads are cached

☐ **Write-Through**
Writes are performed synchronously, Reads are cached

☒ **N/A**
Reads and Writes are not cached

☐ Set Maximum available Size

Size:

Next
Cancel

← Add Device Wizard

Specify Flash Cache Parameters

☒ No Flash Cache

☐ Use Flash Cache

Name:

Location:

Size: GB

Next Cancel

7. Specify Target Parameters. Select the Target Name checkbox to enter a custom target name. Otherwise, the name is generated automatically in accordance with the specified target alias.

← Add Device Wizard

Target Parameters

Choose a Target Attachment Method

Create new Target

Target Alias

DS1

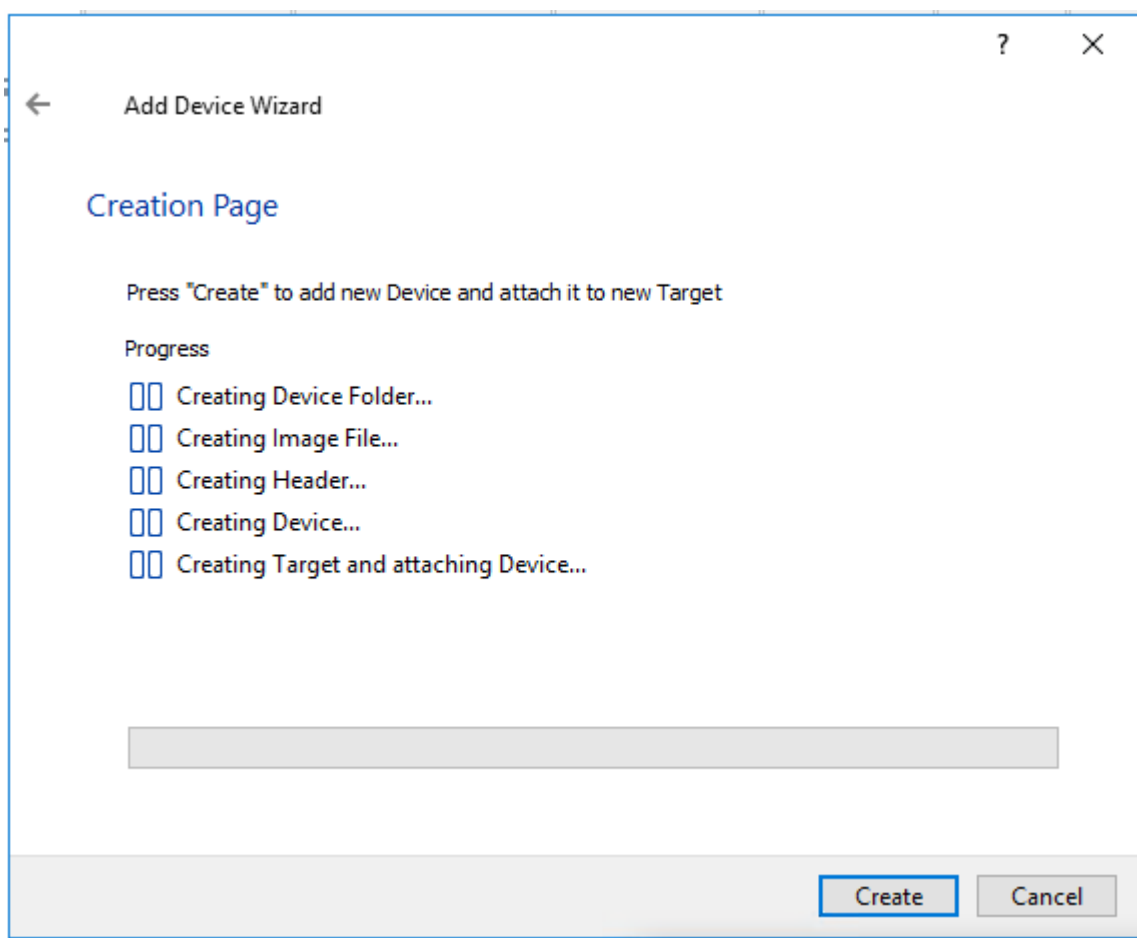
☒ Target Name

iqn.2008-08.com.starwindsoftware:DS1-SW-VM-01

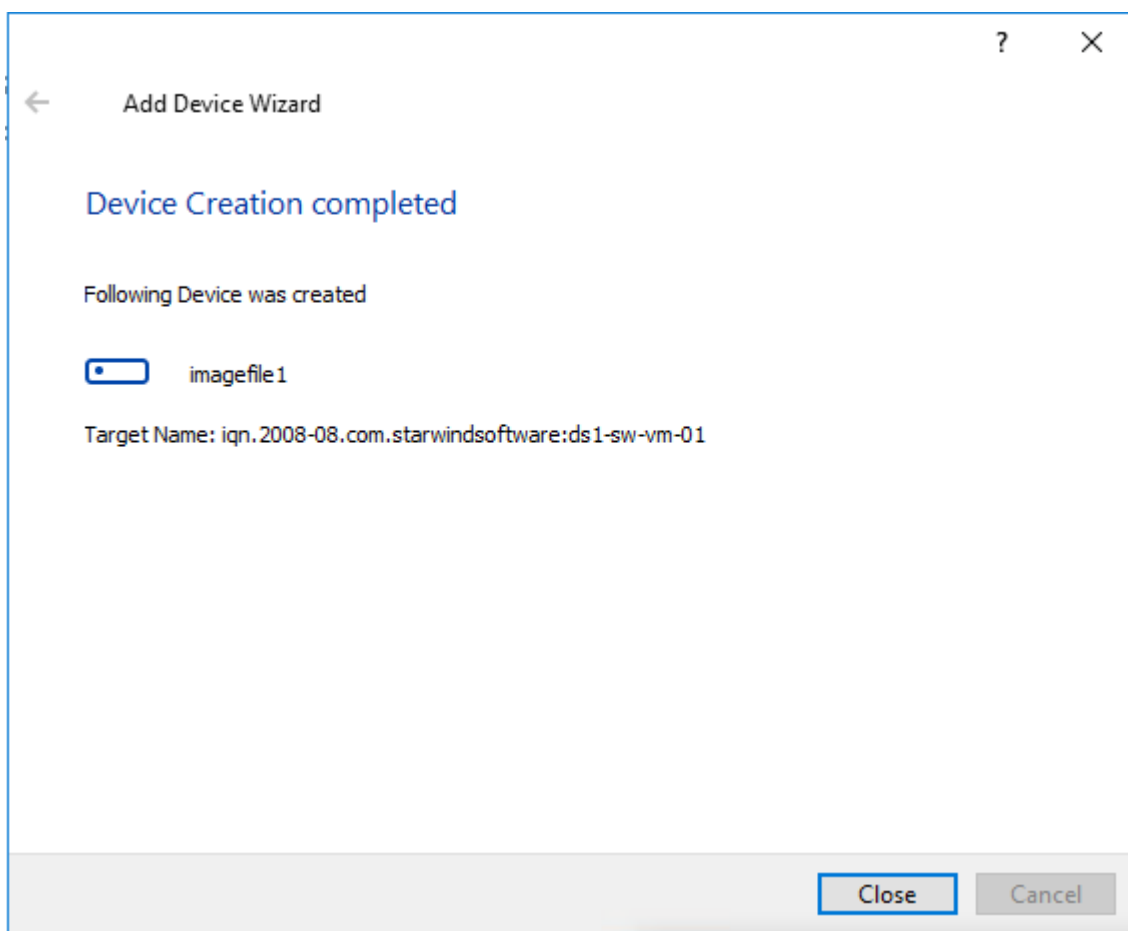
☒ Allow multiple concurrent iSCSI Connections

Next Cancel

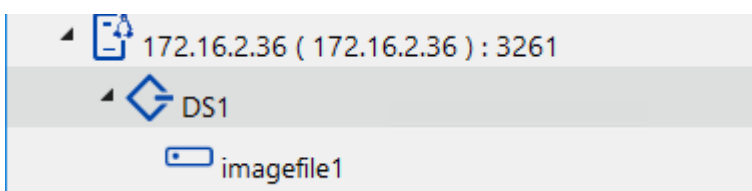
8. Click Create to add a new device and attach it to the target.



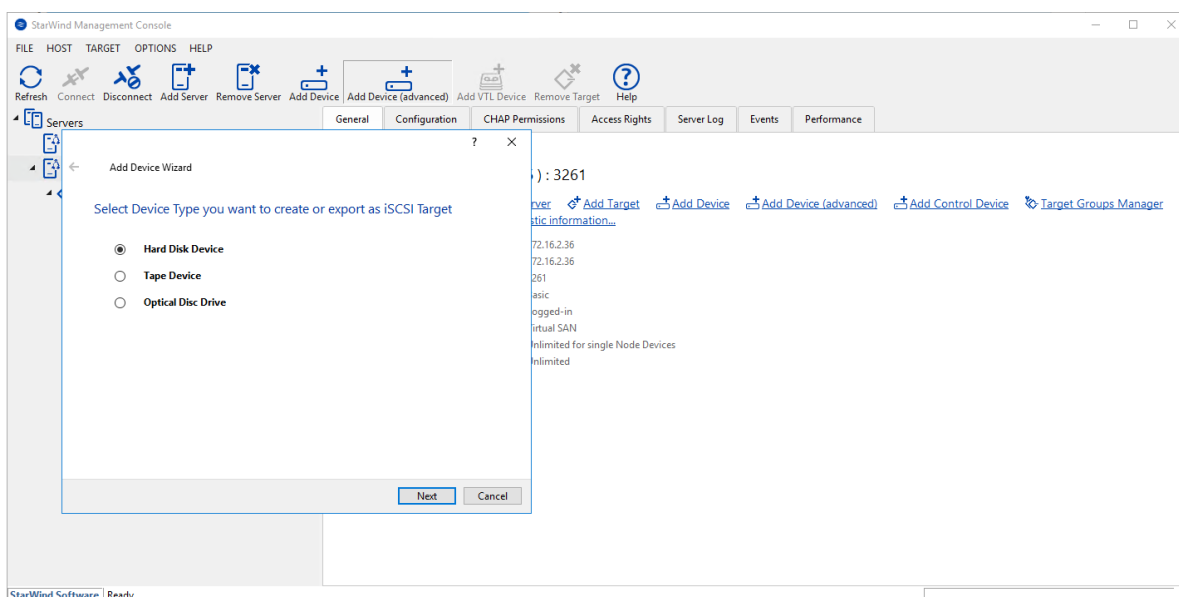
9. Click Close to finish the device creation.



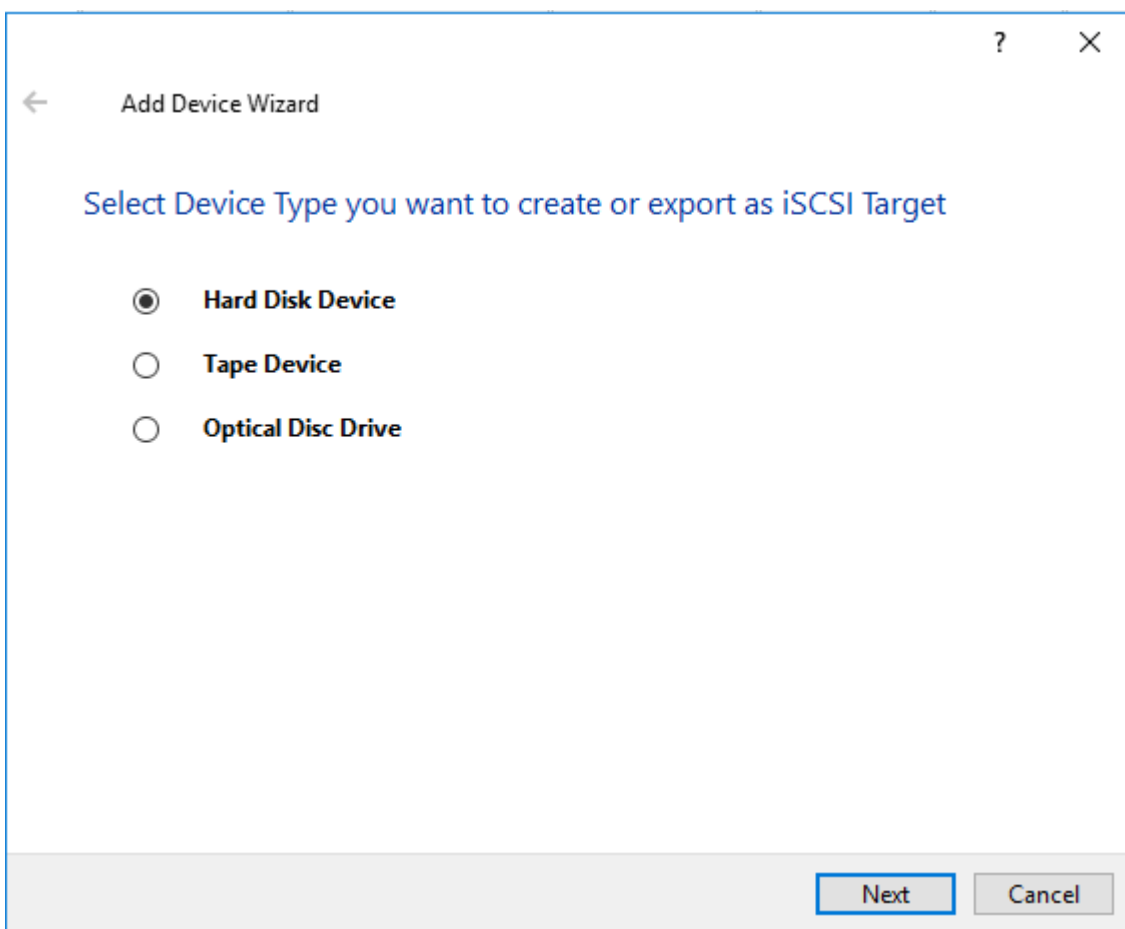
10. The successfully added devices appear in the StarWind Management Console.



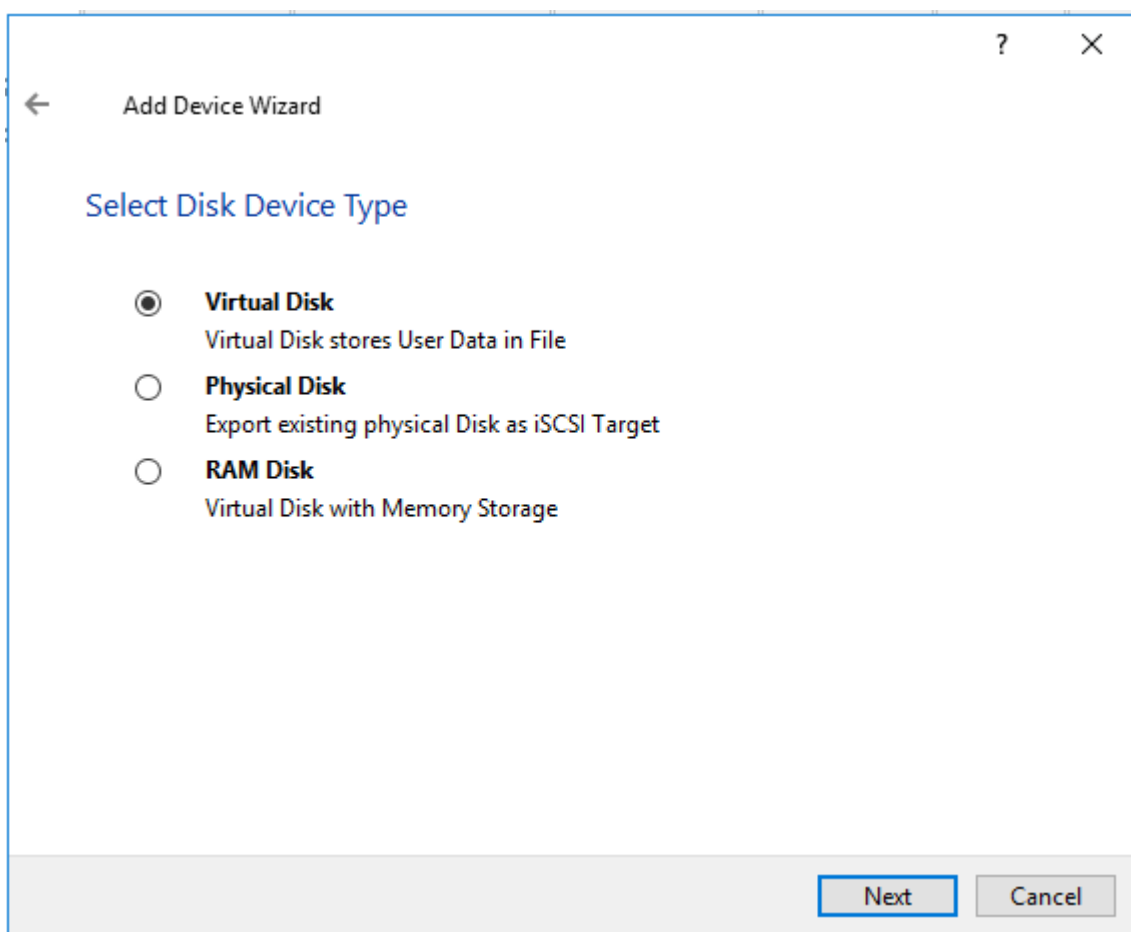
11. Click on to Add Device (advanced) button and open Add Device (advanced) Wizard.



12. Select Hard Disk Device as the type of device to be created.



13. Select Virtual Disk.



14. Specify a virtual disk Name, Location, and Size.
The size should be 1GB to do a quick synchronization.

← Add Device Wizard

Virtual Disk Location

☒ Create a New Virtual Disk

Name:

Location: ...

Size: GB ▾

☐ Use an Existing Virtual Disk

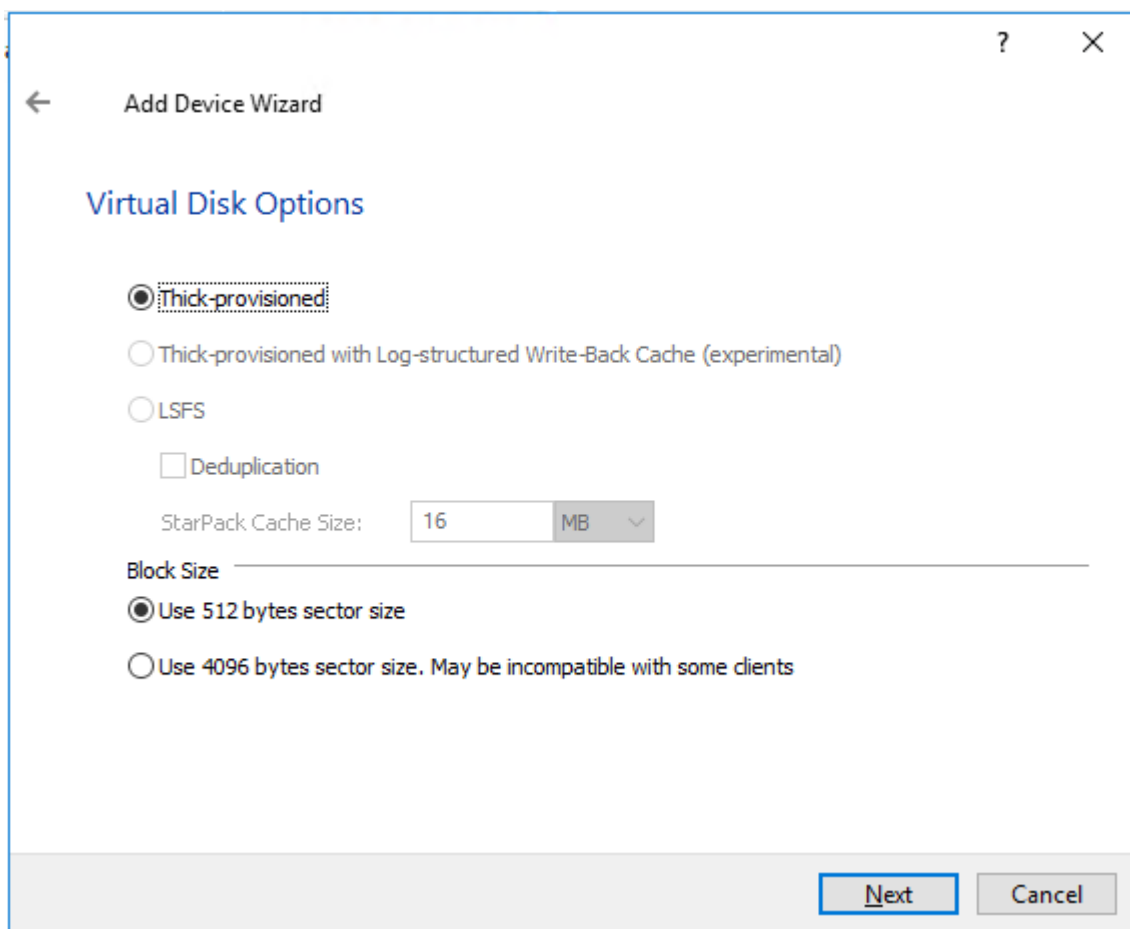
Location: ▾ ...

☐ Read-Only Mode

Next Cancel

15. Select the Thick provisioned disk type and block size.

NOTE: Use 4096 sector size for targets, connected on Windows-based systems and 512 bytes sector size for targets, connected on Linux-based systems (ESXi/Xen/KVM).



← Add Device Wizard

Virtual Disk Options

☒ Thick-provisioned

☐ Thick-provisioned with Log-structured Write-Back Cache (experimental)

☐ LSFS

☐ Deduplication

StarPack Cache Size: MB

Block Size

☒ Use 512 bytes sector size

☐ Use 4096 bytes sector size. May be incompatible with some clients

Next **Cancel**

16. Define a caching policy and specify a cache size (in MB). Also, the maximum available cache size can be specified by selecting the appropriate checkbox. Optionally, define the L2 caching policy and cache size.

?
×

←
Add Device Wizard

Specify Device RAM Cache Parameters

Mode

☐ **Write-Back**
Writes are performed asynchronously, actual Writes to Disk are delayed, Reads are cached

☐ **Write-Through**
Writes are performed synchronously, Reads are cached

☒ **N/A**
Reads and Writes are not cached

☐ Set Maximum available Size

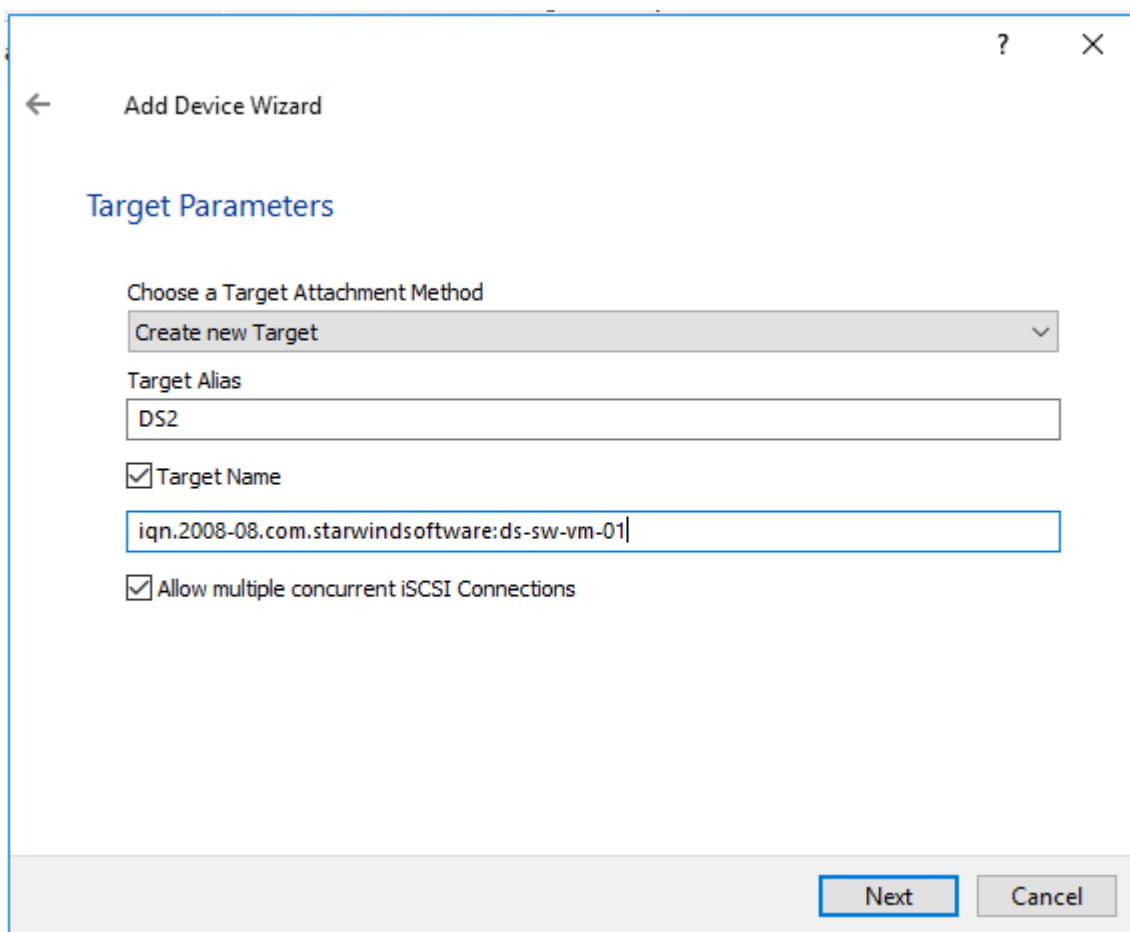
Size: MB ▼

Next

Cancel

The screenshot shows a window titled "Add Device Wizard" with a back arrow and help/close icons. The main heading is "Specify Flash Cache Parameters". There are two radio buttons: "No Flash Cache" (selected) and "Use Flash Cache". Below these is a form with three fields: "Name:" with the value "Flash-DS1", "Location:" with the value "VSA Storage\mnt\" and a browse button "...", and "Size:" with the value "1" and a unit dropdown menu set to "GB". At the bottom right are "Next" and "Cancel" buttons.

17. Specify Target Parameters. Select the Target Name checkbox to enter a custom target name. Otherwise, the name is generated automatically in accordance with the specified target alias.



The screenshot shows a 'Add Device Wizard' window with a 'Target Parameters' section. It includes a dropdown for 'Choose a Target Attachment Method' set to 'Create new Target', a text field for 'Target Alias' containing 'DS2', a checked checkbox for 'Target Name' with a text field containing 'iqn.2008-08.com.starwindsoftware:ds-sw-vm-01', and another checked checkbox for 'Allow multiple concurrent iSCSI Connections'. 'Next' and 'Cancel' buttons are at the bottom right.

← Add Device Wizard

Target Parameters

Choose a Target Attachment Method

Create new Target

Target Alias

DS2

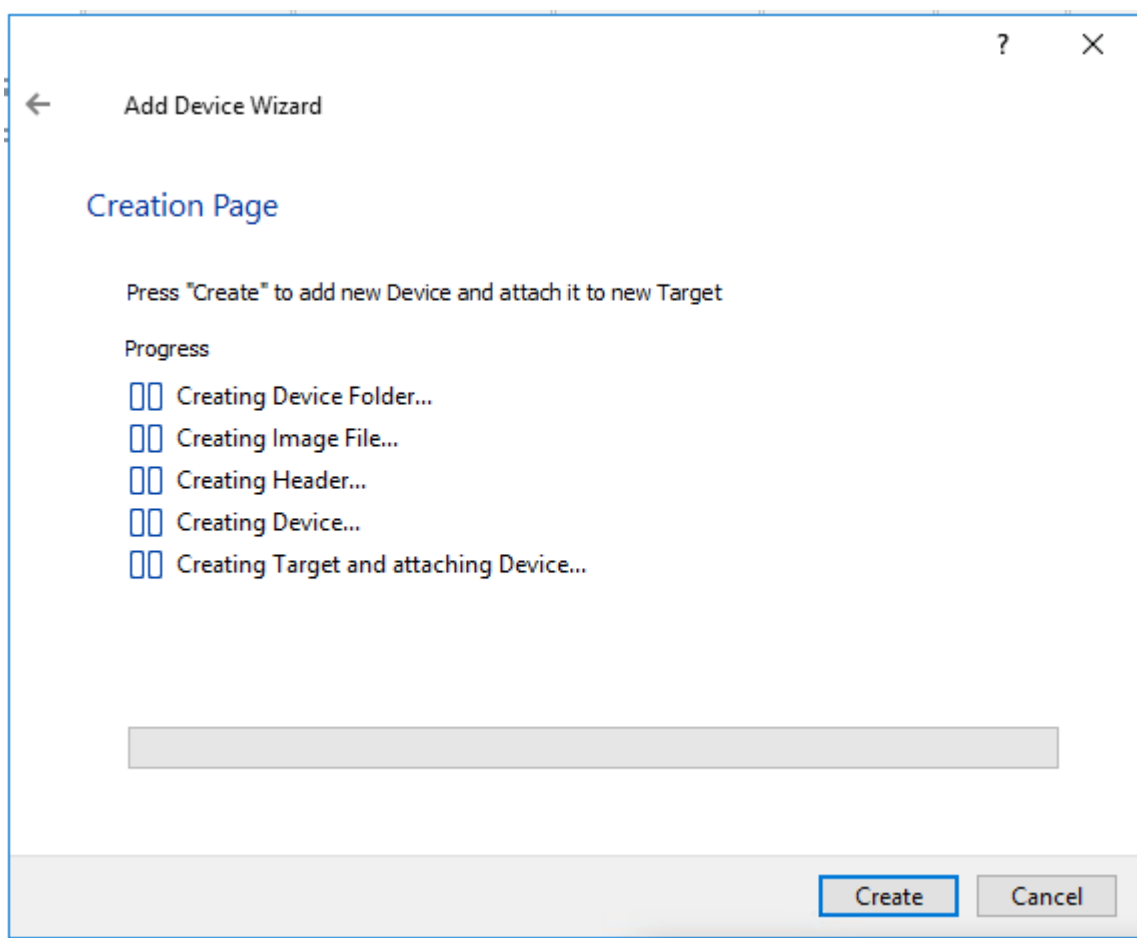
☒ Target Name

iqn.2008-08.com.starwindsoftware:ds-sw-vm-01

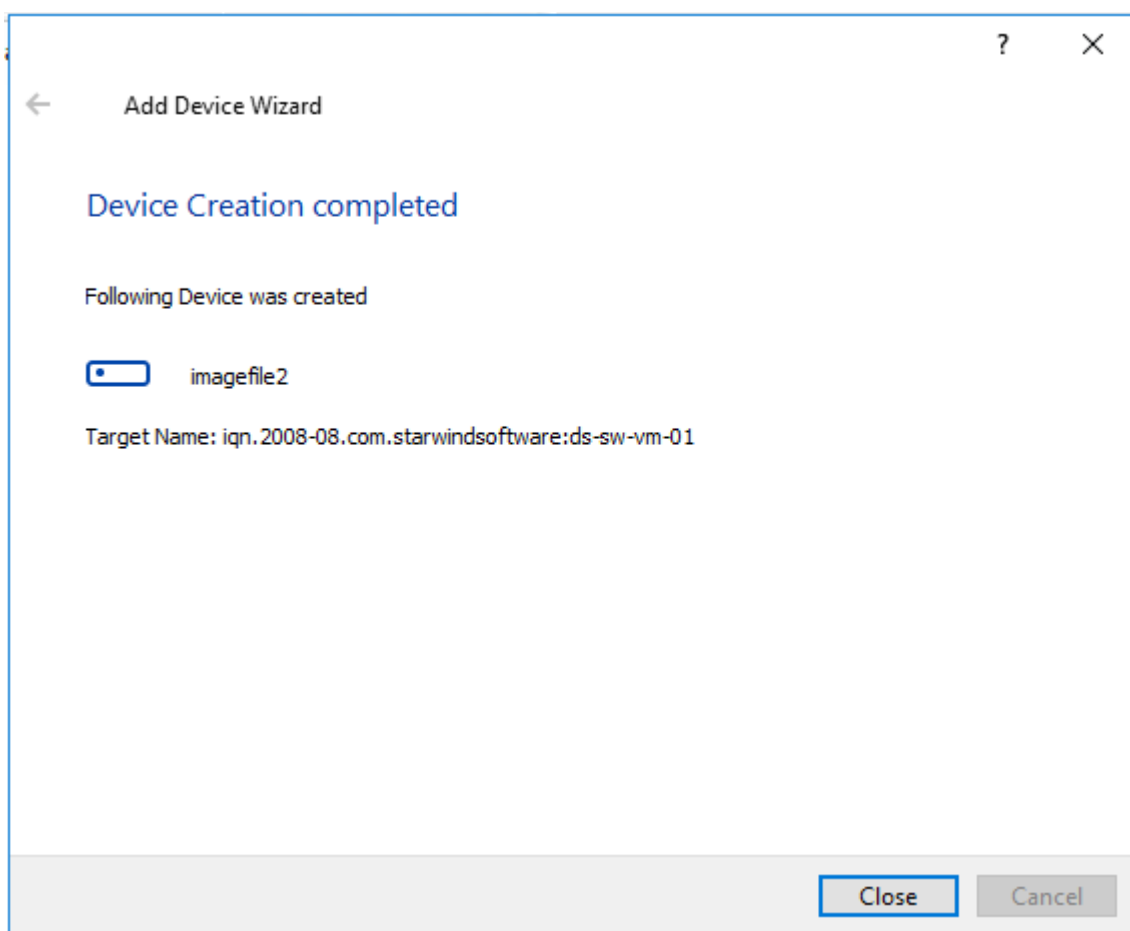
☒ Allow multiple concurrent iSCSI Connections

Next Cancel

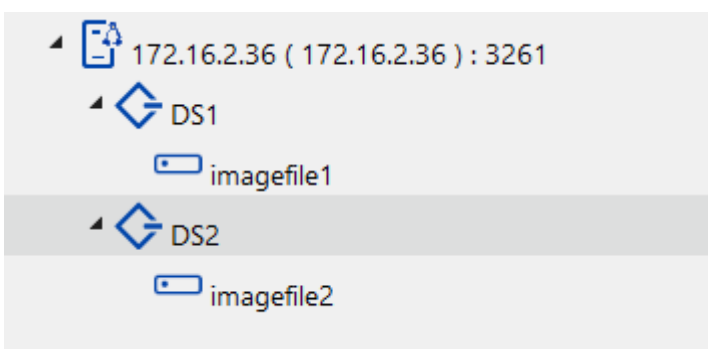
18. Click Create to add a new device and attach it to the target.



19. Click Close to finish the device creation.



20. The successfully added devices appear in the StarWind Management Console.

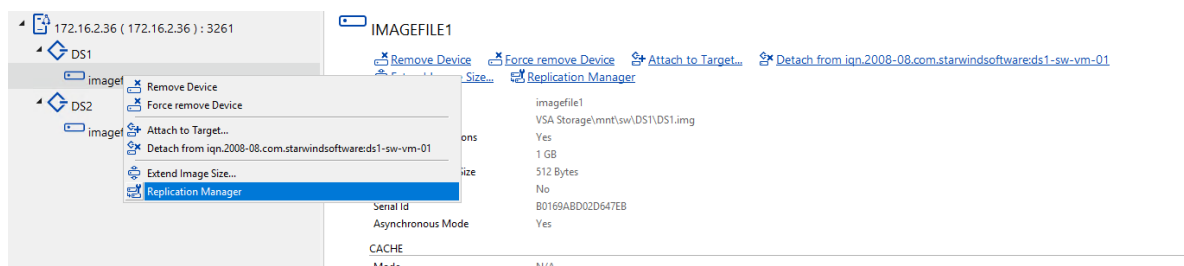


Starwind Replication Of Devices

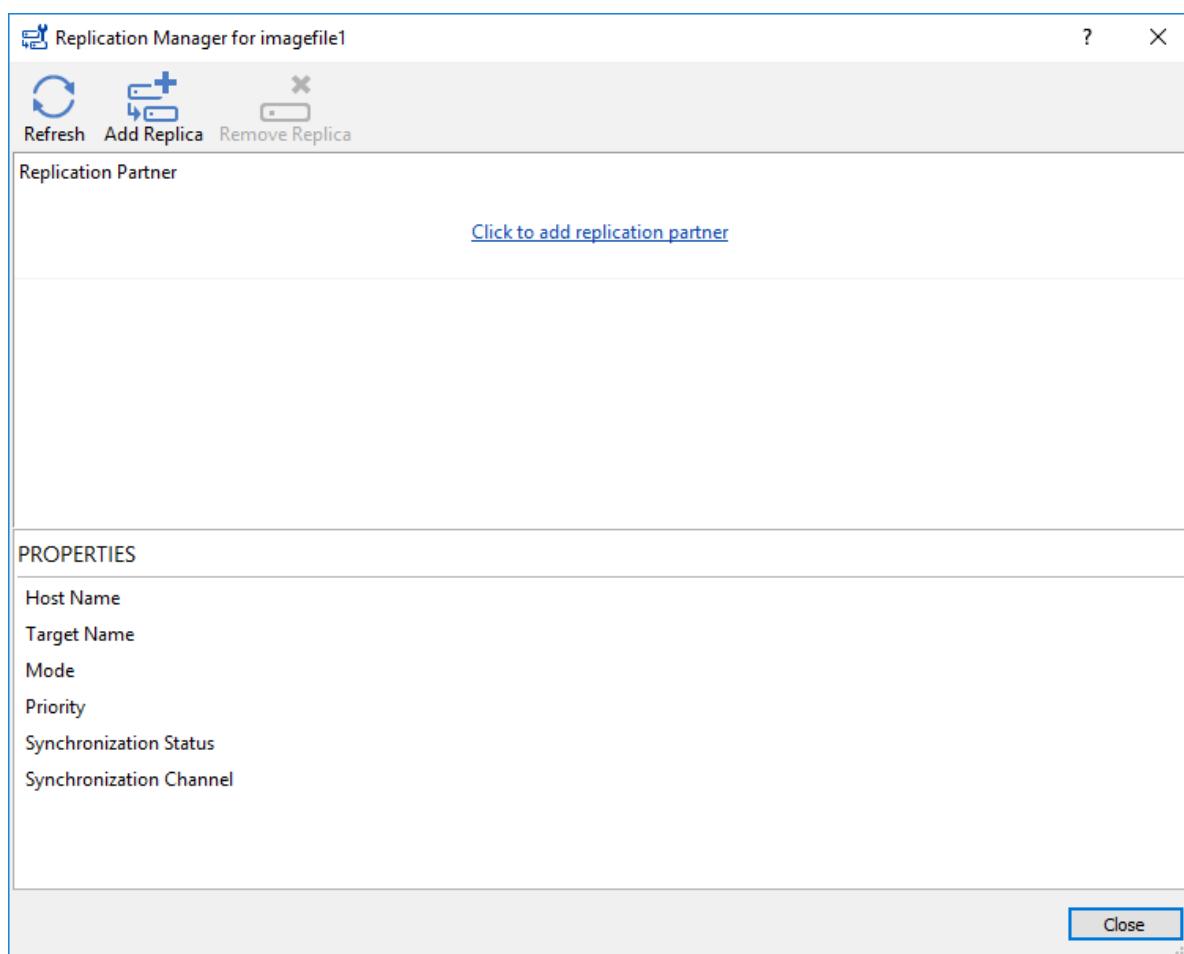
The replication should be configured using Synchronous “Two-Way” Replication mode: Synchronous or active-active replication ensures real-time synchronization and load balancing of data between two or three cluster nodes. Such a configuration tolerates the

failure of two out of three storage nodes and enables the creation of an effective business continuity plan. With synchronous mirroring, each write operation requires control confirmation from both storage nodes. It guarantees the reliability of data transfers but is demanding in bandwidth since mirroring will not work on high-latency networks.

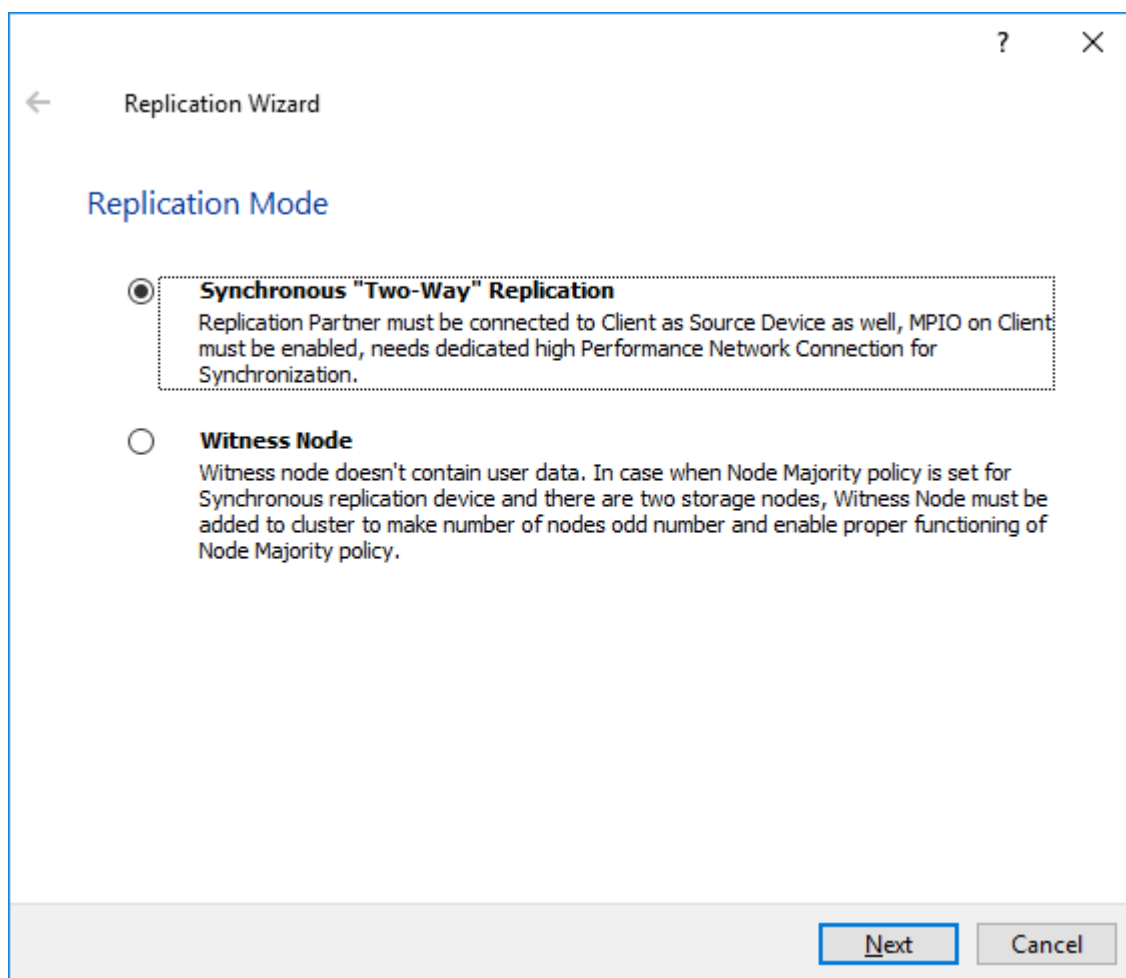
1. Right-click on the DS1 device and select Replication Manager from the shortcut menu.



2. Select the Add Replica button in the top menu.



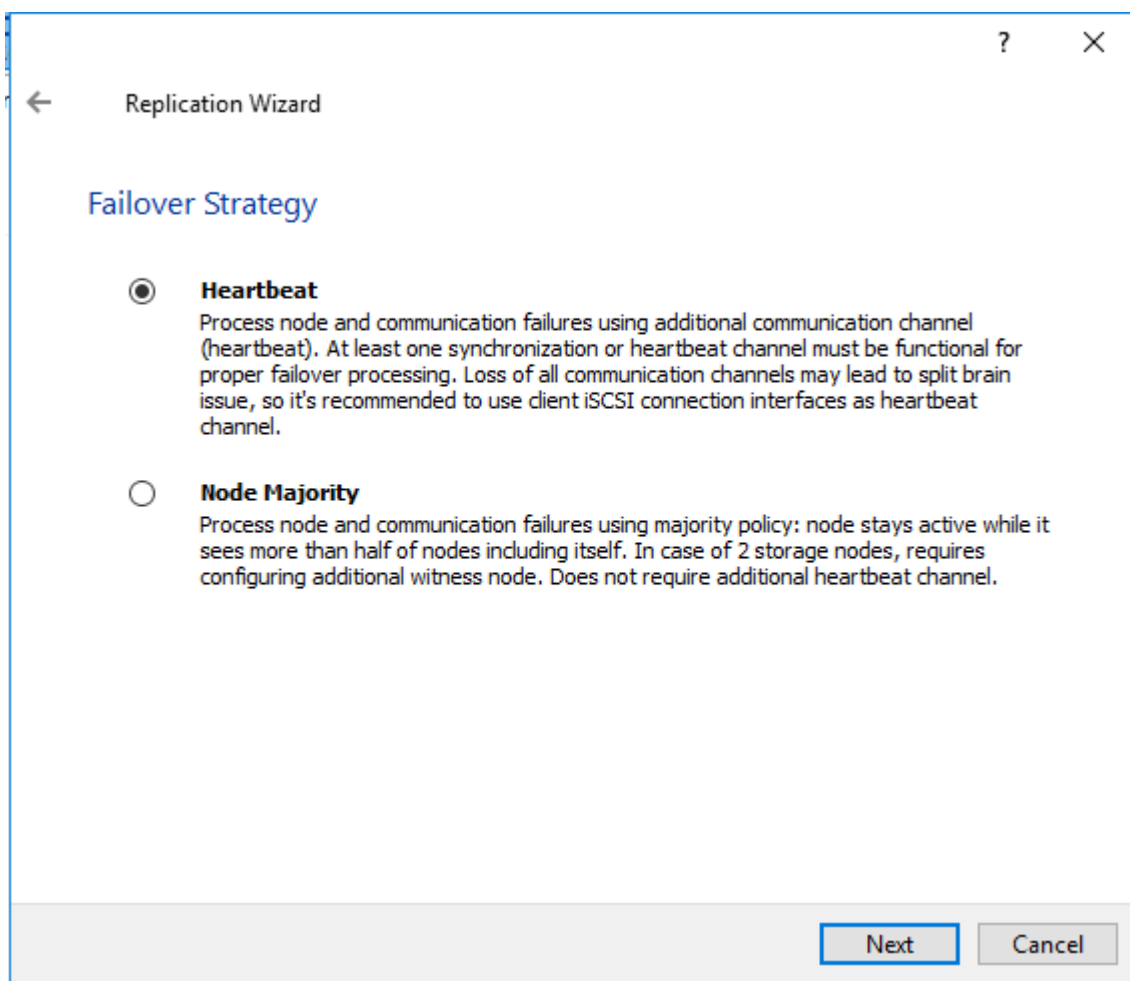
3. Select Synchronous “Two-Way” replication as a replication mode.



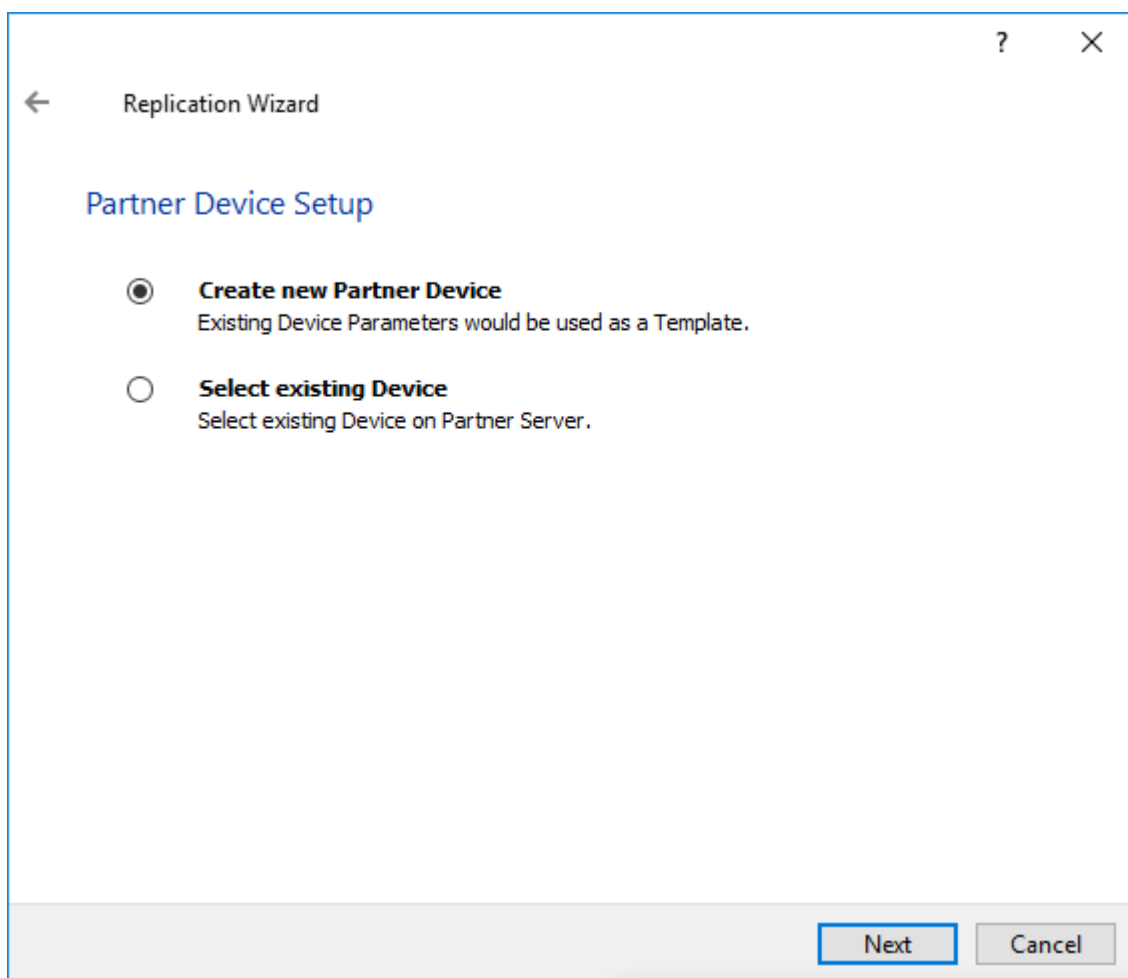
4. Specify a partner Host name or IP address and Port Number.

The screenshot shows a window titled "Replication Wizard" with a back arrow and help/cancel icons. The main heading is "Add Partner Node". Below it, a text label reads "Specify Partner Host Name or IP Address where Replication Node would be created". There are two input fields: "Host Name or IP Address" which is a dropdown menu, and "Port Number" which is a text box containing the value "3261". At the bottom right, there are "Next" and "Cancel" buttons.

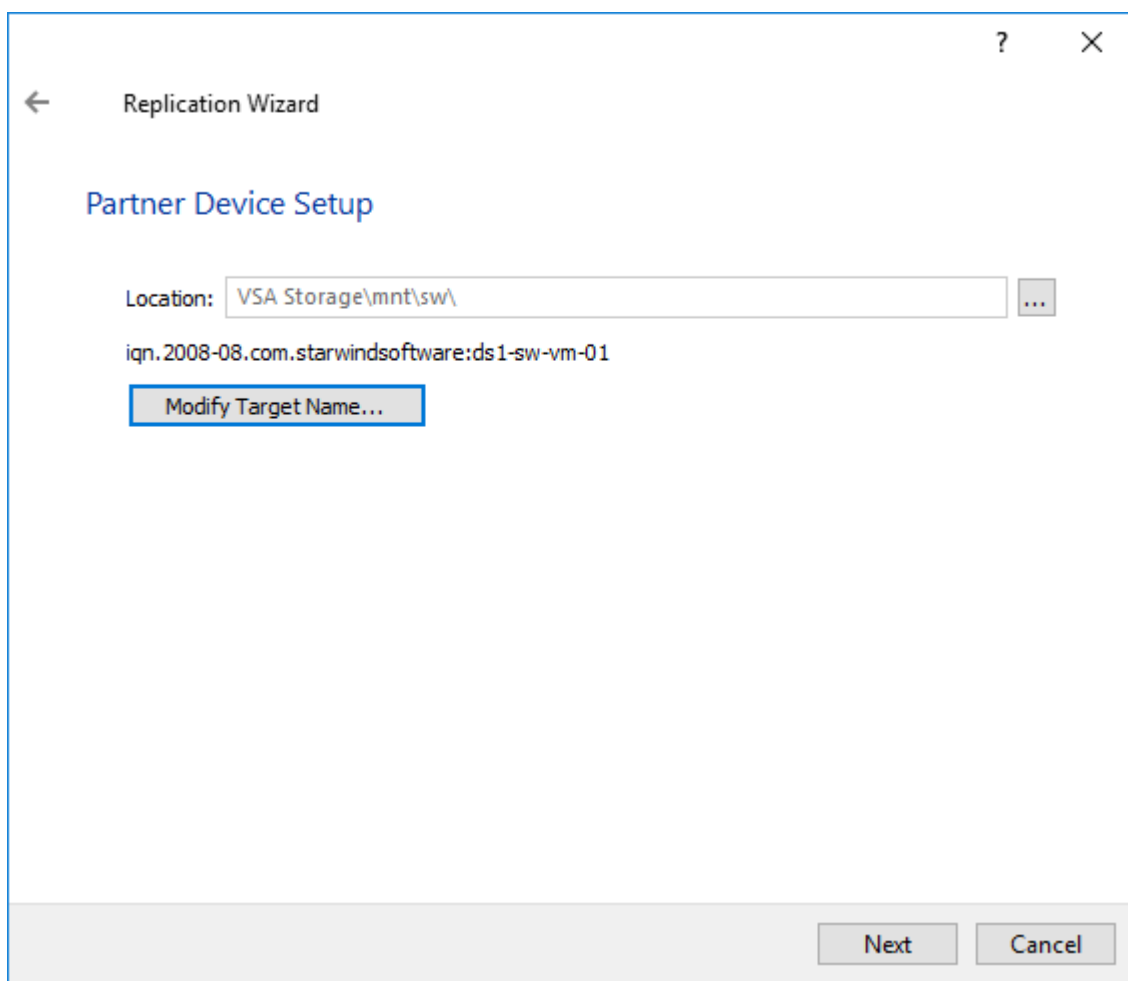
5. Select Failover Strategy.



6. Select Create new Partner Device and click Next.



7. Select a partner device Location and click Next.



8. Select Synchronization Journal Strategy and click Next.

NOTE: There are several options – RAM-based journal (default) and Disk-based journal with failure and continuous strategy, that allow to avoid full synchronization cases.

RAM-based (default) synchronization journal is placed in RAM. Synchronization with RAM journal provides good I/O performance in any scenario. Full synchronization could occur in the cases described in this KB: [Reasons why Full Synchronization may start – StarWind Knowledge Base](#)

Disk-based journal placed on a separate disk from StarWind devices. It allows to avoid full synchronization for the devices where it's configured even when StarWind service is being stopped on all nodes.

Disk-based synchronization journal should be placed on a separate, preferably faster disk from StarWind devices. SSDs and NVMe disks are recommended as the device performance is defined by the disk speed, where the journal is located. For example, it can be placed on the OS boot volume.

It is required to allocate 2 MB of disk space for the synchronization journal per 1 TB of HA device size with a disk-based journal configured and 2-way replication and 4MB per 1 TB

of HA device size for 3-way replication.

Failure journal – provides good I/O performance, as a RAM-based journal, while all device nodes are in a healthy synchronized state. If a device on one node went into a not synchronized state, the disk-based journal activates and a performance drop could occur as the device performance is defined by the disk speed, where the journal is located. Fast synchronization is not guaranteed in all cases. For example, if a simultaneous hard reset of all nodes occurs, full synchronization will occur.

Continuous journal – guarantees fast synchronization and data consistency in all cases. Although, this strategy has the worst I/O performance, because of frequent write operations to the journal, located on the disk, where the journal is located.

Replication Wizard

Synchronization Journal Setup

☒ **RAM-based journal**
Synchronization journal placed in RAM. Synchronization with RAM journal provides good IO performance in any scenario.

☐ **Disk-based journal**
Synchronization journal placed on disk.

☐ **Failure journal**
The strategy provides good IO performance while all device nodes are in a healthy state.

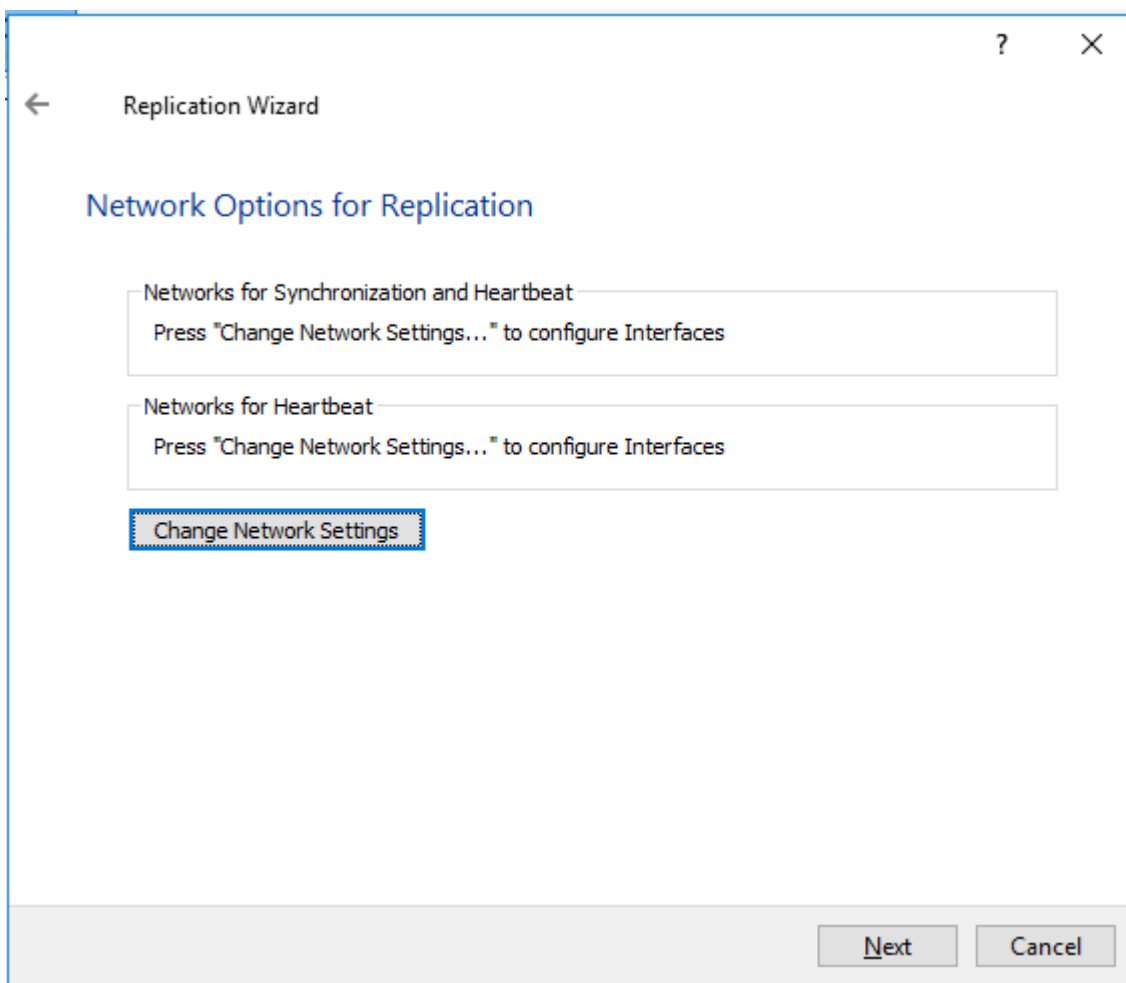
☐ **Continuous journal**
The strategy guarantees fast synchronization and data consistency in all cases.

Current Node:

Partner Node:

Next **Cancel**

9. Click Change Network Settings.



10. Specify the interfaces for Synchronization and Heartbeat Channels. Click OK and then click Next.

172.16.20.* -Synchronization

172.16.10.* and Management as HeartBeat

Specify Interfaces for Synchronization Channels

Select synchronization channel

Interfaces	Networks	Synchronization and H...	Heartbeat
<div> Host Name: 172.16.2.31 </div>			
172.16.10.1	172.16.10.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>
172.16.2.31	172.16.2.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>
172.16.20.1	172.16.20.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<div> Host Name: 172.16.2.36 </div>			
172.16.10.2	172.16.10.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>
172.16.2.36	172.16.2.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>
172.16.20.2	172.16.20.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>

☐ Allow Free Select Interfaces

OK

Cancel

Replication Wizard

Network Options for Replication

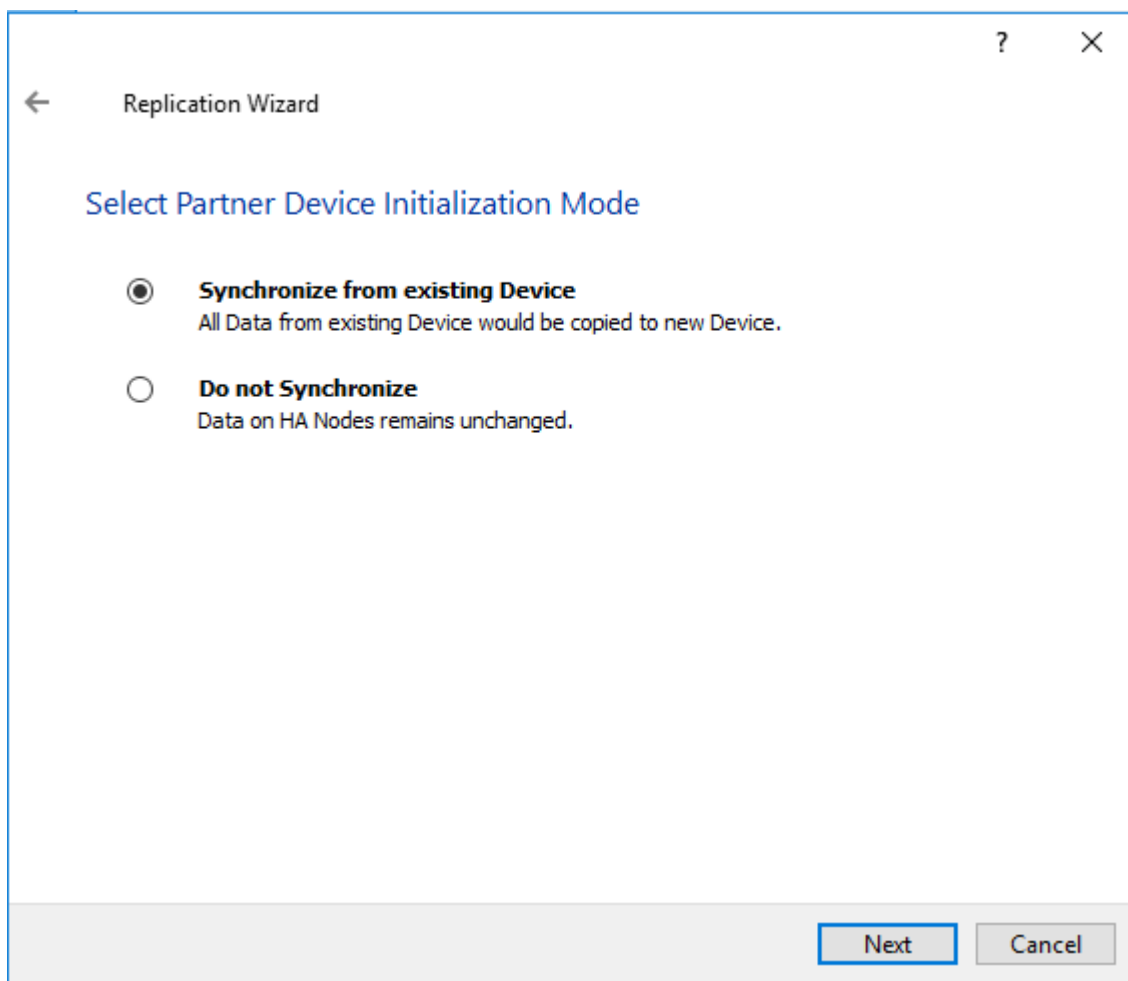
Networks for Synchronization and Heartbeat
172.16.20.0

Networks for Heartbeat
172.16.10.0;172.16.2.0

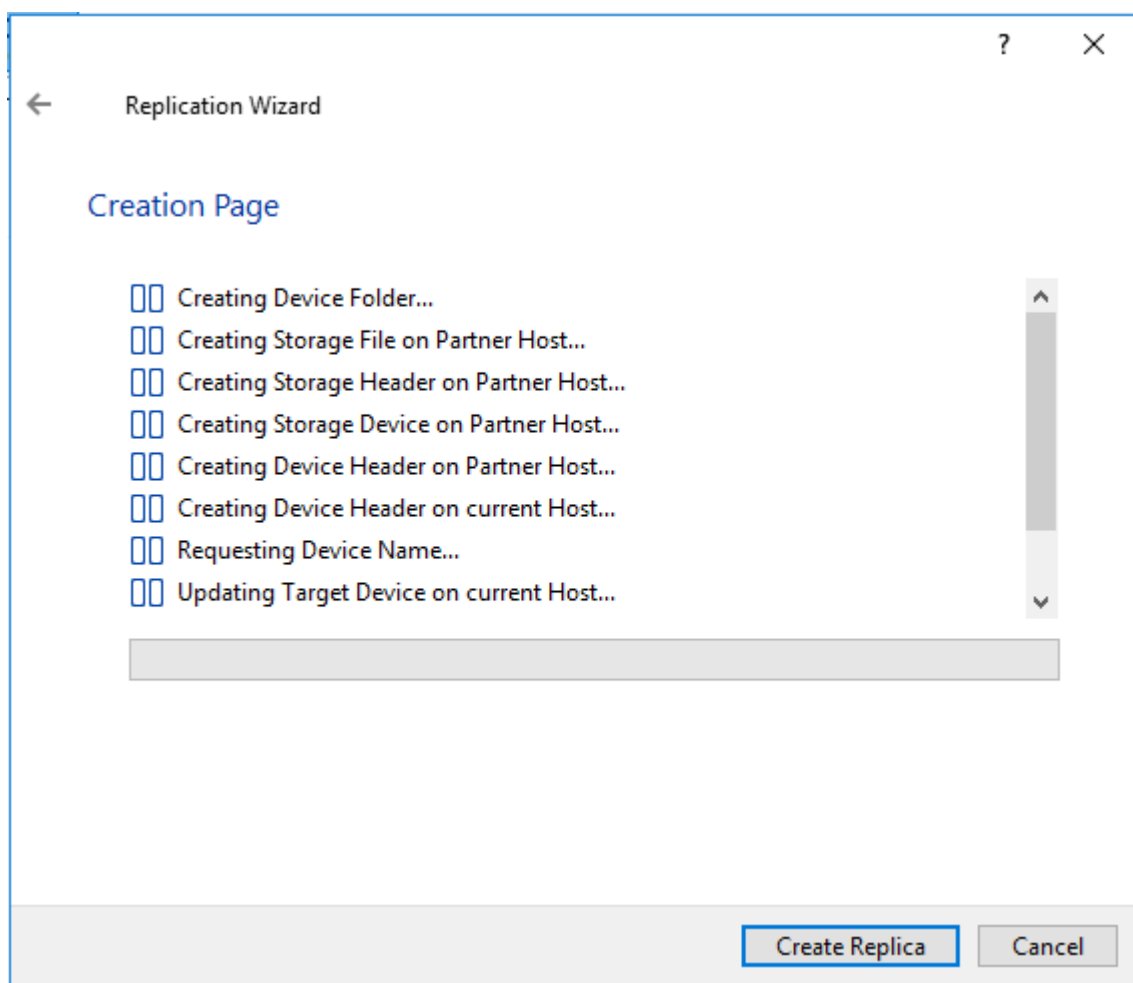
Change Network Settings

Next Cancel

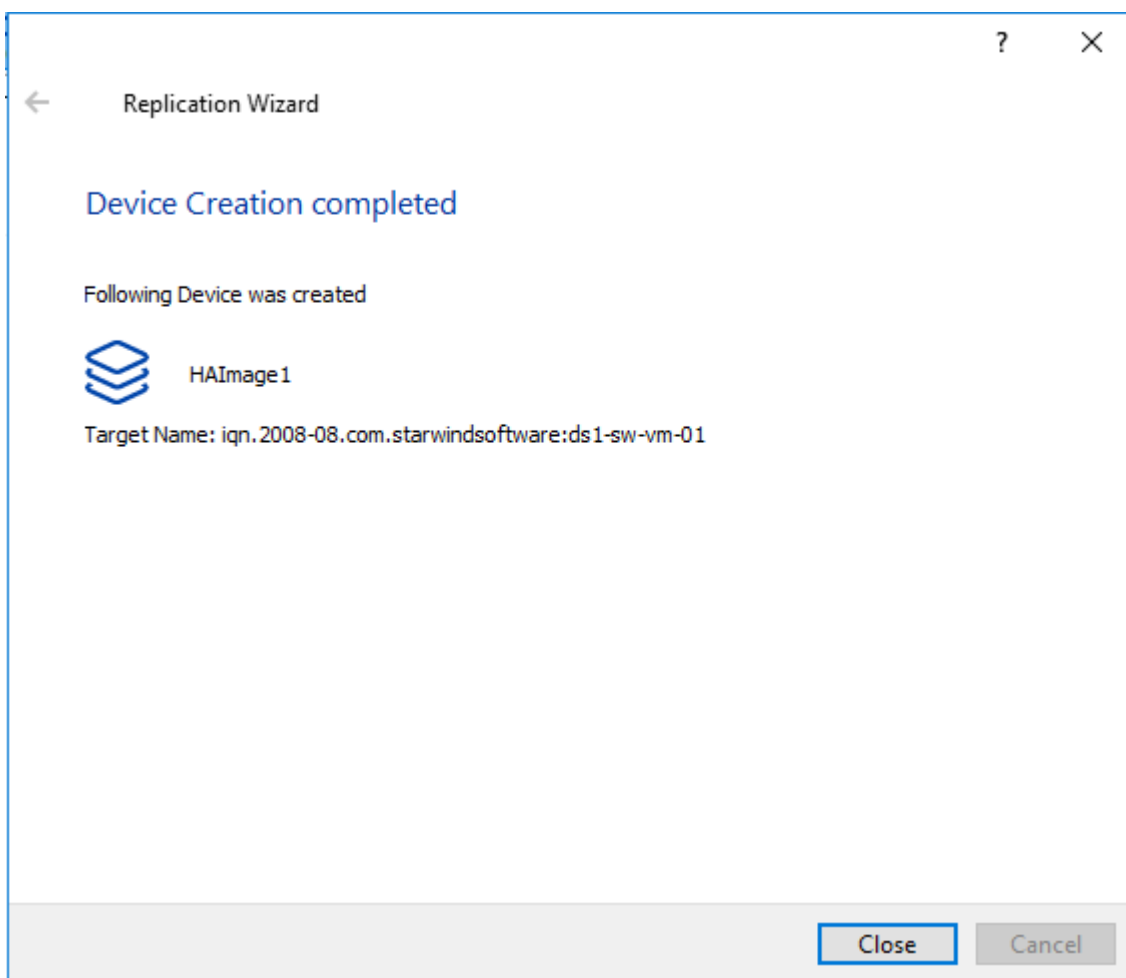
11. In Select Partner Device Initialization Mode, select Synchronize from existing Device and click Next.

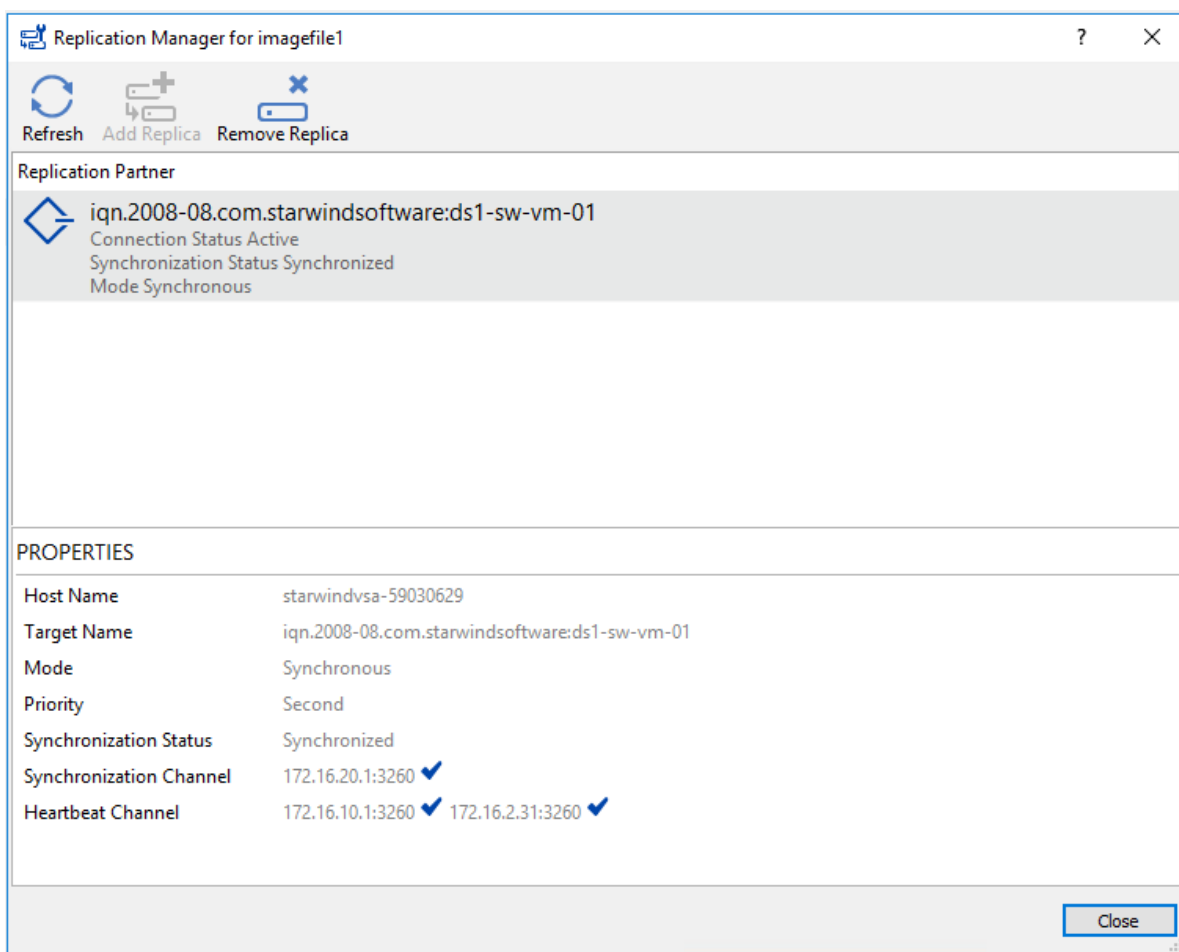


12. Click Create Replica.

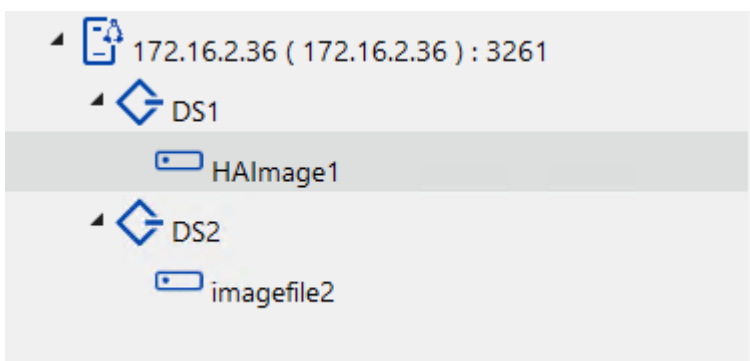


13. Click Close to close the wizard.

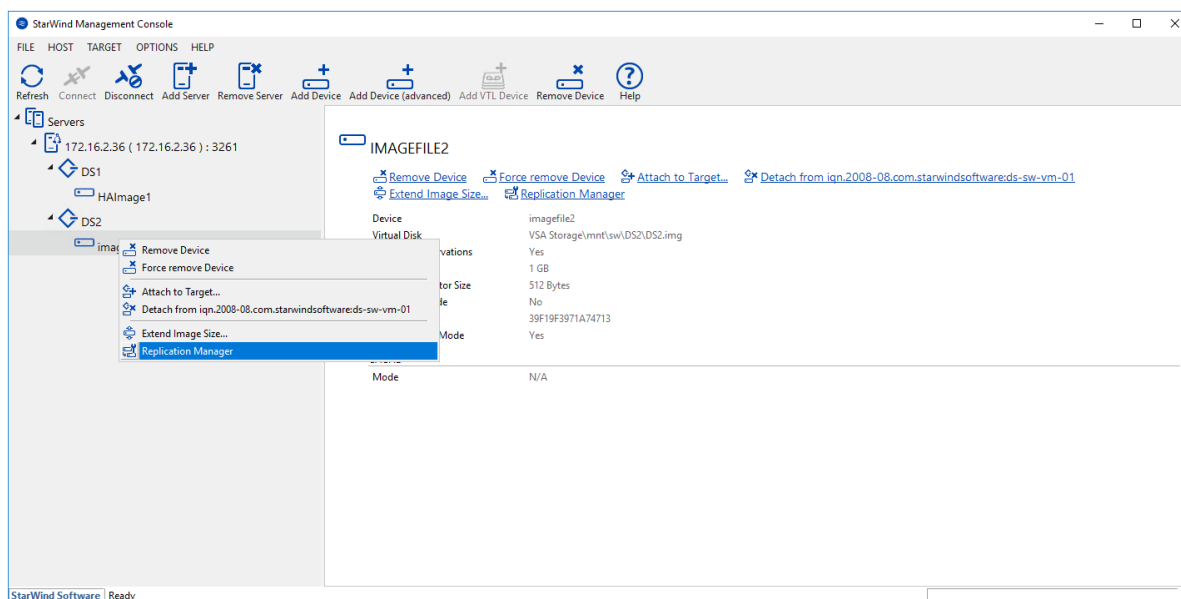




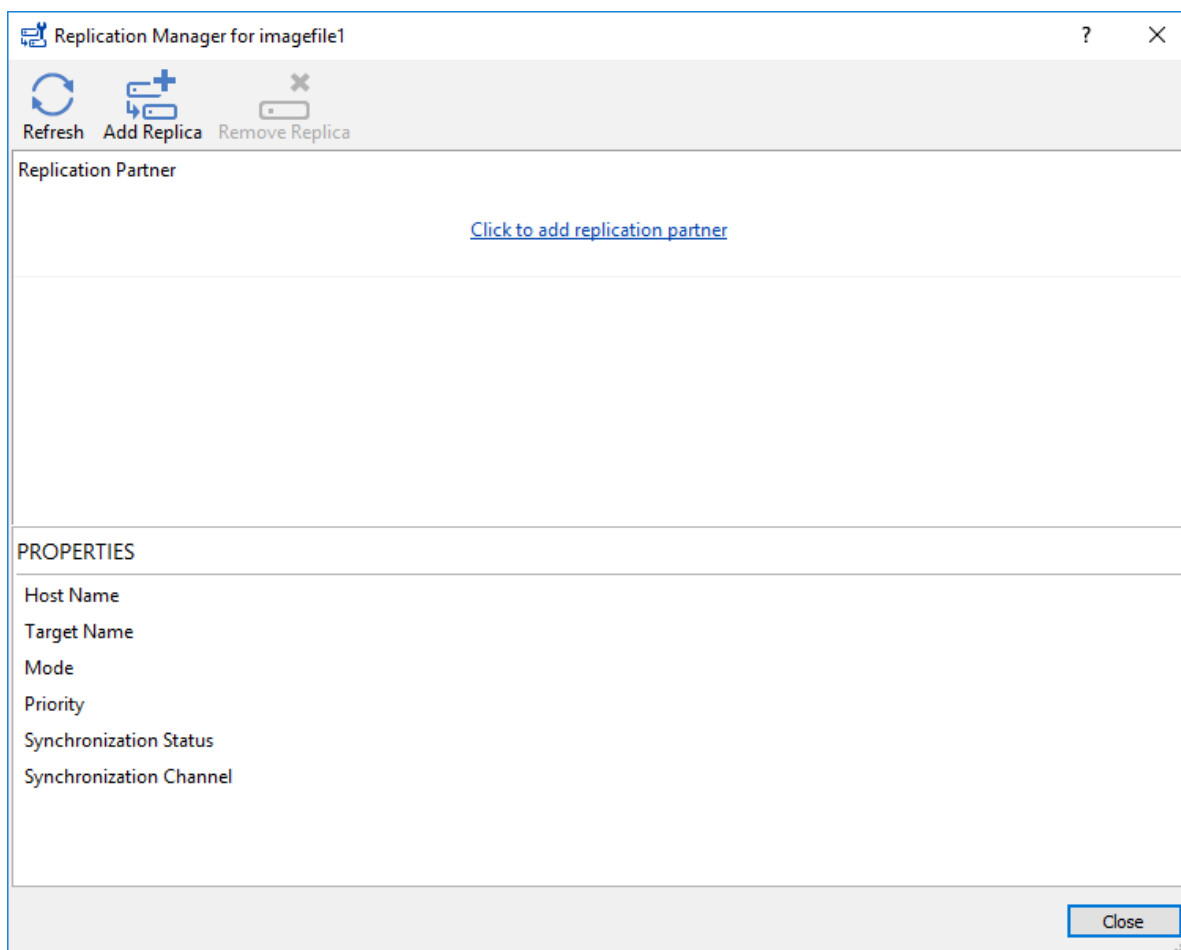
14. The successfully added device appears in StarWind Management Console.



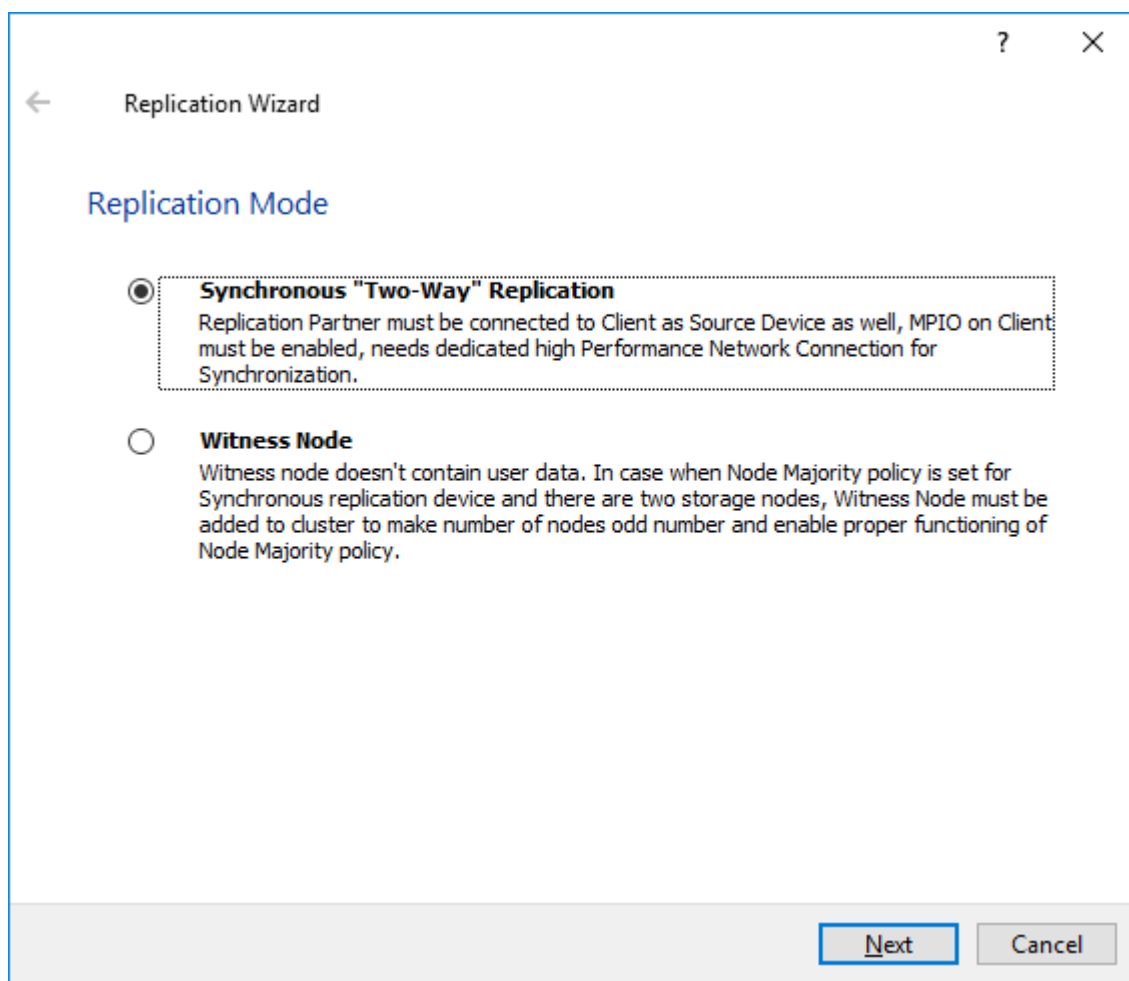
15. Right-click on the DS2 device and select Replication Manager from the shortcut menu.



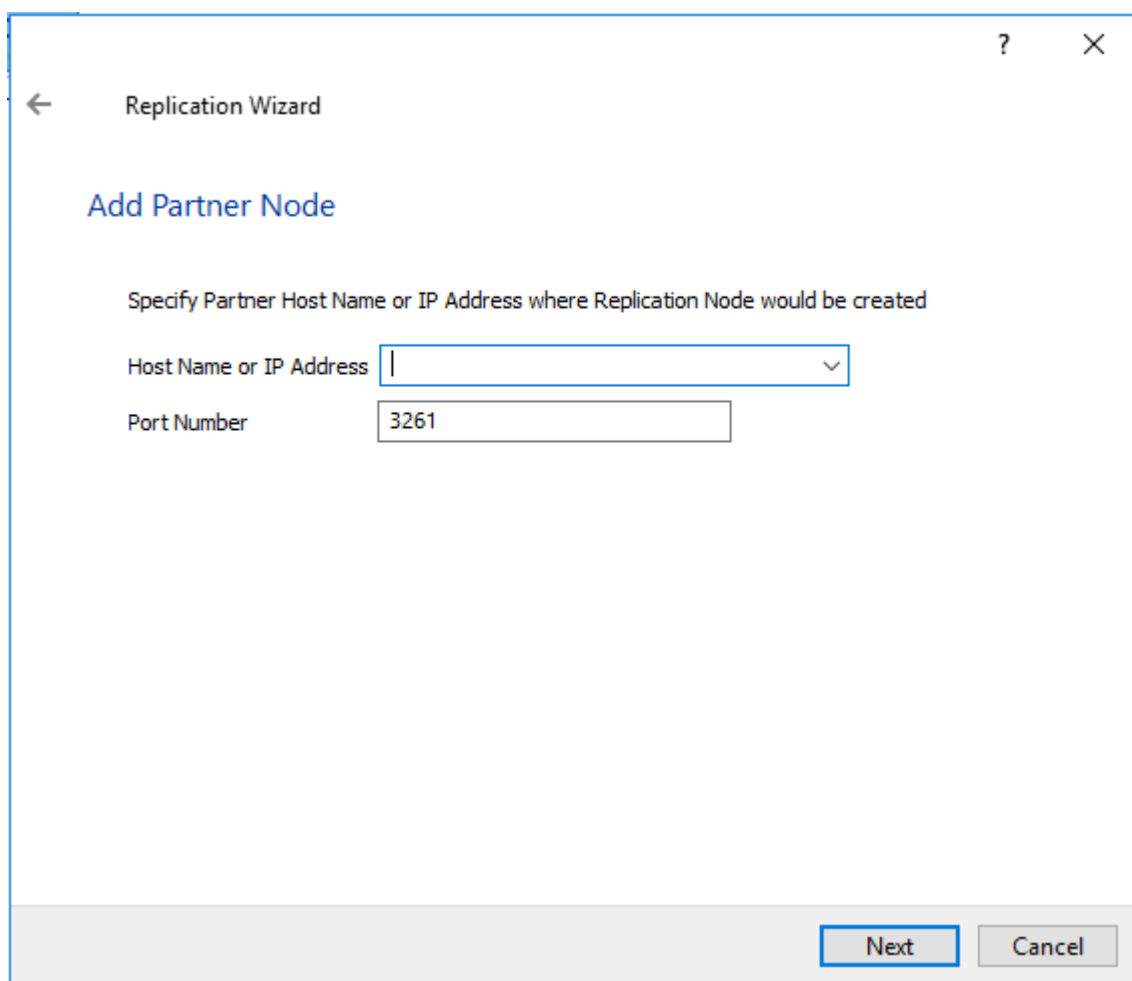
16. Select the Add Replica button in the top menu.



17. Select Synchronous “Two-Way” replication as a replication mode.

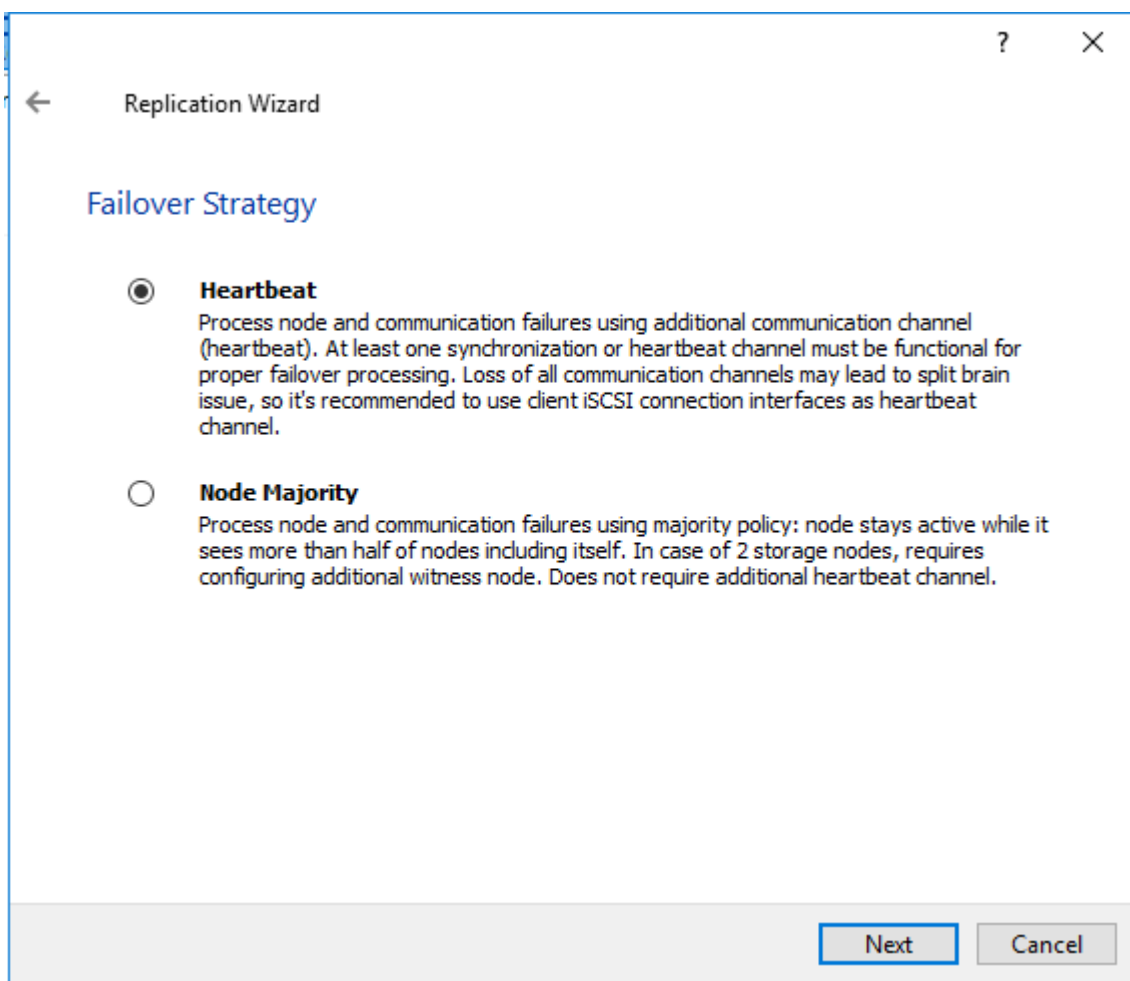


18. Specify a partner Host name or IP address and Port Number.

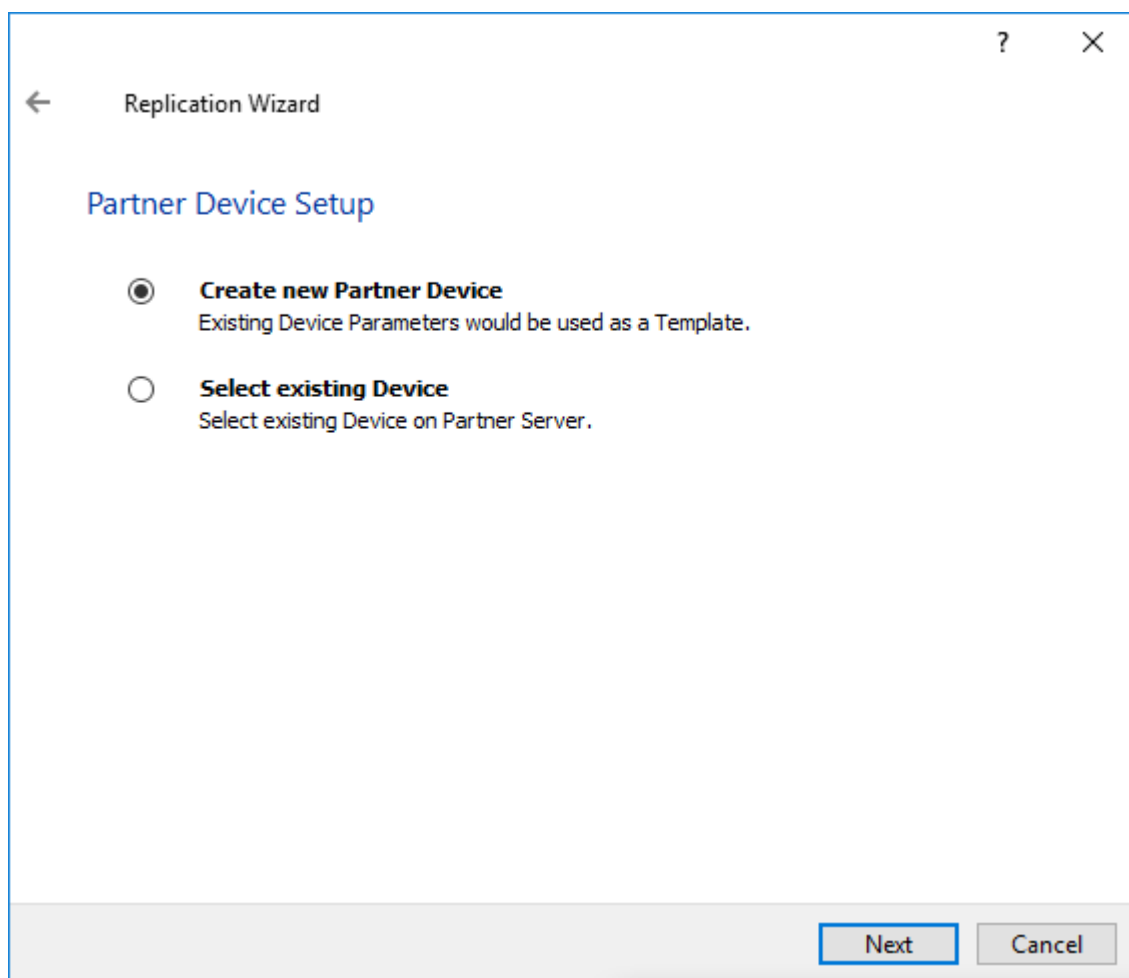


The image shows a 'Replication Wizard' window with a title bar containing a question mark and a close button. Inside the window, there is a back arrow and the text 'Replication Wizard'. Below this is the section header 'Add Partner Node'. A descriptive text reads: 'Specify Partner Host Name or IP Address where Replication Node would be created'. There are two input fields: 'Host Name or IP Address' which is a dropdown menu, and 'Port Number' which is a text box containing the value '3261'. At the bottom right of the window are two buttons: 'Next' and 'Cancel'.

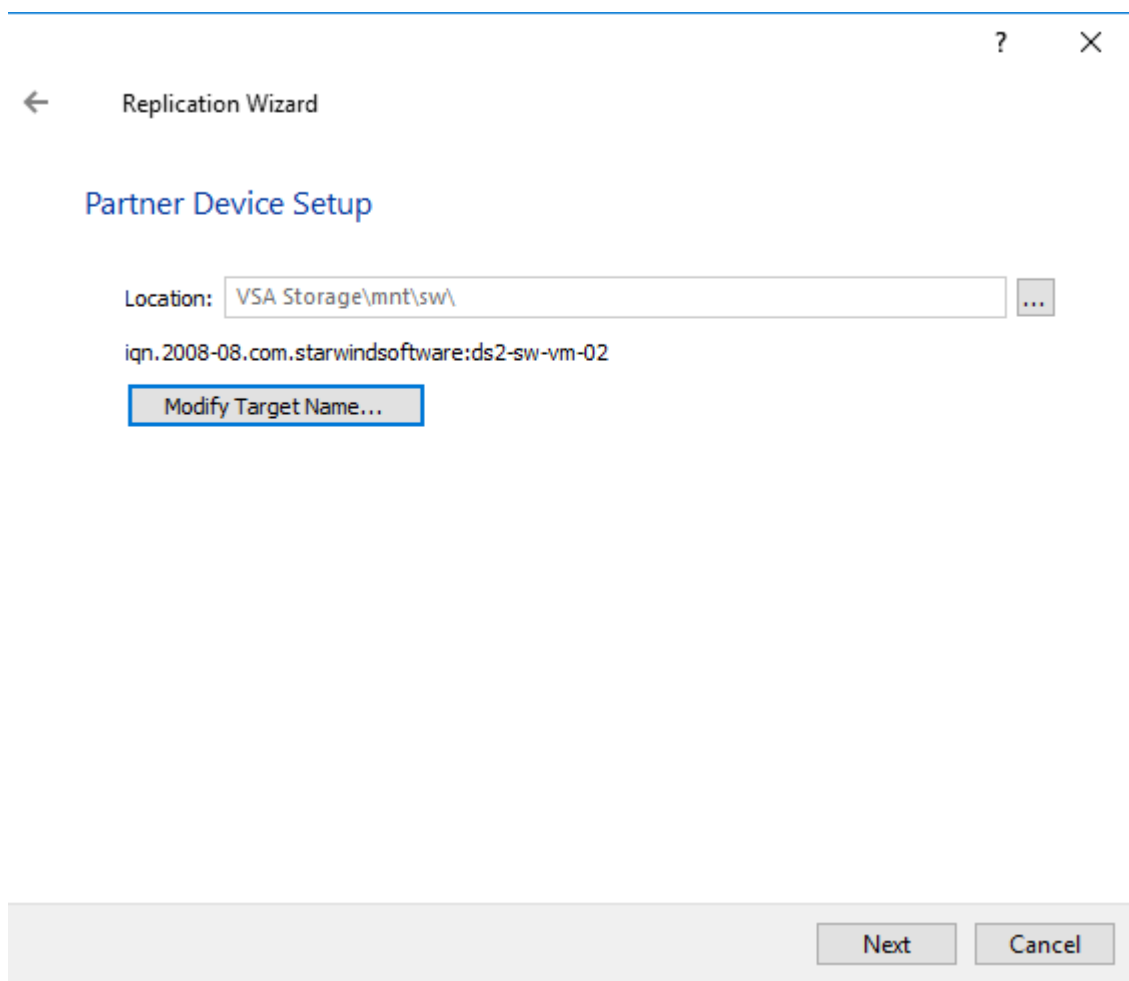
19. Select Failover Strategy.



20. Select Create new Partner Device and click Next.



21. Select a partner device Location and click Next.



22. Select Synchronization Journal Strategy and click Next.

NOTE: There are several options – RAM-based journal (default) and Disk-based journal with failure and continuous strategy, that allow to avoid full synchronization cases.

RAM-based (default) synchronization journal is placed in RAM. Synchronization with RAM journal provides good I/O performance in any scenario. Full synchronization could occur in the cases described in this KB: [Reasons why Full Synchronization may start – StarWind Knowledge Base](#)

Disk-based journal placed on a separate disk from StarWind devices. It allows to avoid full synchronization for the devices where it's configured even when StarWind service is being stopped on all nodes.

Disk-based synchronization journal should be placed on a separate, preferably faster disk from StarWind devices. SSDs and NVMe disks are recommended as the device performance is defined by the disk speed, where the journal is located. For example, it can be placed on the OS boot volume.

It is required to allocate 2 MB of disk space for the synchronization journal per 1 TB of HA device size with a disk-based journal configured and 2-way replication and 4MB per 1 TB

of HA device size for 3-way replication.

Failure journal – provides good I/O performance, as a RAM-based journal, while all device nodes are in a healthy synchronized state. If a device on one node went into a not synchronized state, the disk-based journal activates and a performance drop could occur as the device performance is defined by the disk speed, where the journal is located. Fast synchronization is not guaranteed in all cases. For example, if a simultaneous hard reset of all nodes occurs, full synchronization will occur.

Continuous journal – guarantees fast synchronization and data consistency in all cases. Although, this strategy has the worst I/O performance, because of frequent write operations to the journal, located on the disk, where the journal is located.

Replication Wizard

Synchronization Journal Setup

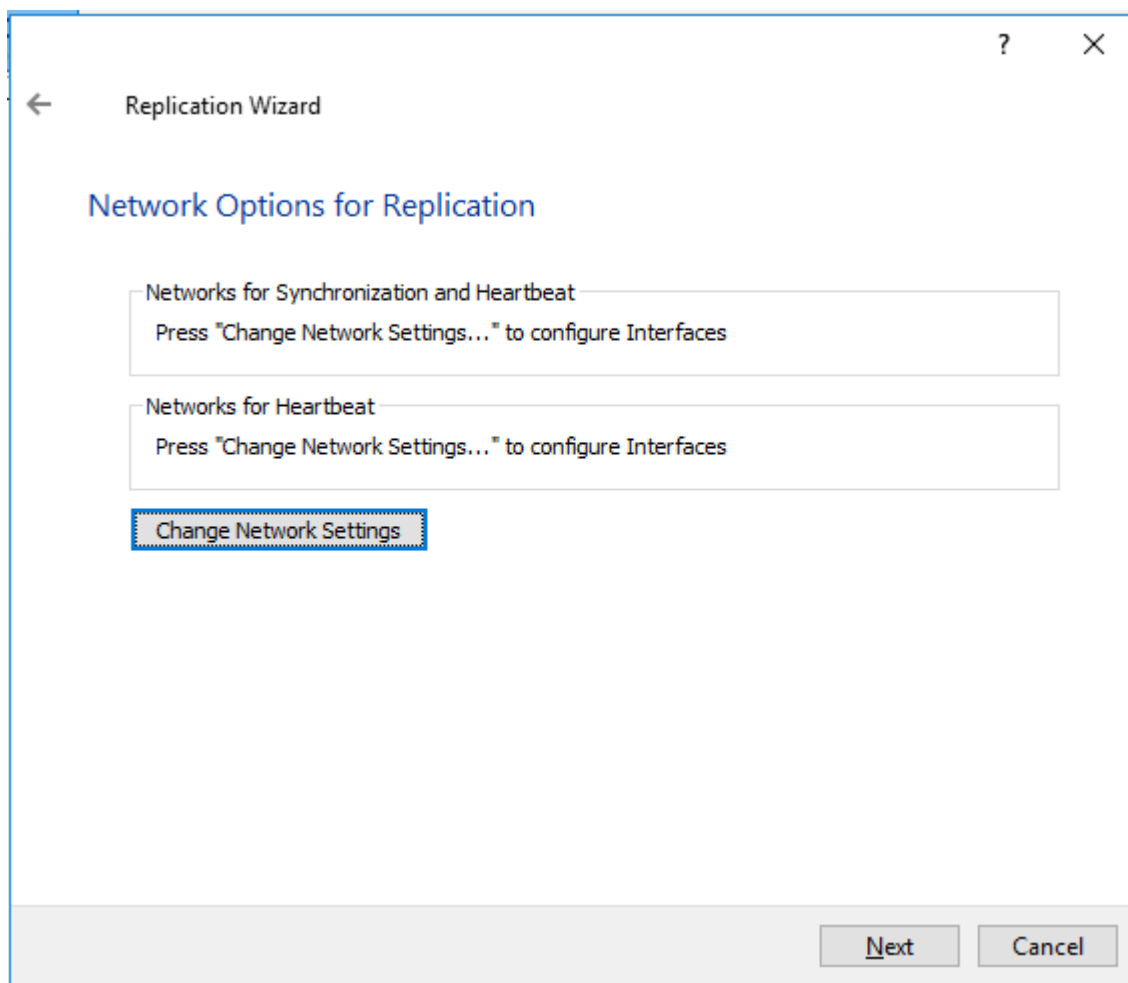
- ☒ **RAM-based journal**
Synchronization journal placed in RAM. Synchronization with RAM journal provides good IO performance in any scenario.
- ☐ **Disk-based journal**
Synchronization journal placed on disk.
- ☐ **Failure journal**
The strategy provides good IO performance while all device nodes are in a healthy state.
- ☐ **Continuous journal**
The strategy guarantees fast synchronization and data consistency in all cases.

Current Node:

Partner Node:

Next **Cancel**

23. Click Change Network Settings.



24. Specify the interfaces for Synchronization and Heartbeat Channels. Click OK and then click Next.

172.16.20.* -Synchronization

172.16.10.* and Management as HeartBeat

Specify Interfaces for Synchronization Channels

Select synchronization channel

Interfaces	Networks	Synchronization and H...	Heartbeat
<div> Host Name: 172.16.2.31 </div>			
172.16.10.1	172.16.10.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>
172.16.2.31	172.16.2.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>
172.16.20.1	172.16.20.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<div> Host Name: 172.16.2.36 </div>			
172.16.10.2	172.16.10.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>
172.16.2.36	172.16.2.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>
172.16.20.2	172.16.20.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>

☐ Allow Free Select Interfaces

OK

Cancel

Replication Wizard

Network Options for Replication

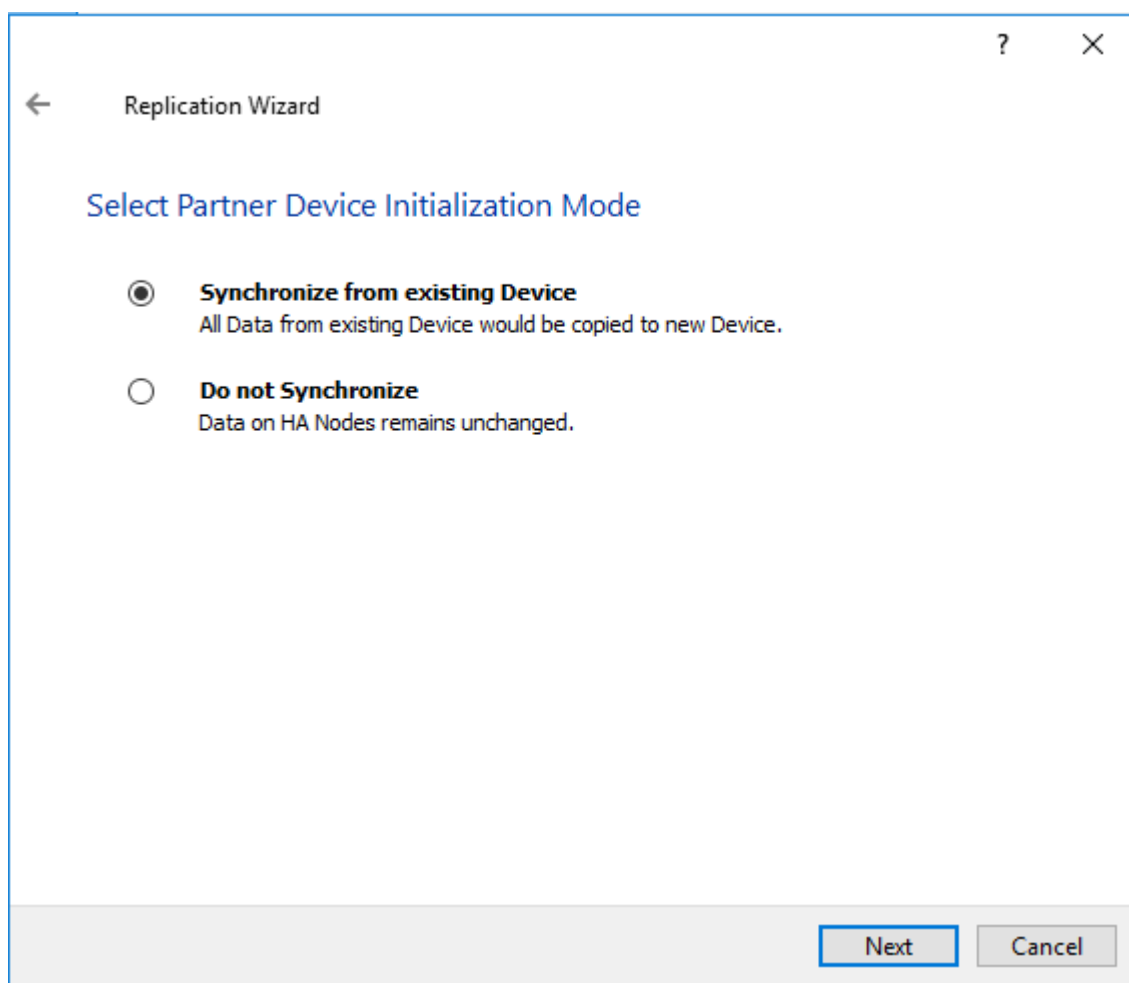
Networks for Synchronization and Heartbeat
172.16.20.0

Networks for Heartbeat
172.16.10.0;172.16.2.0

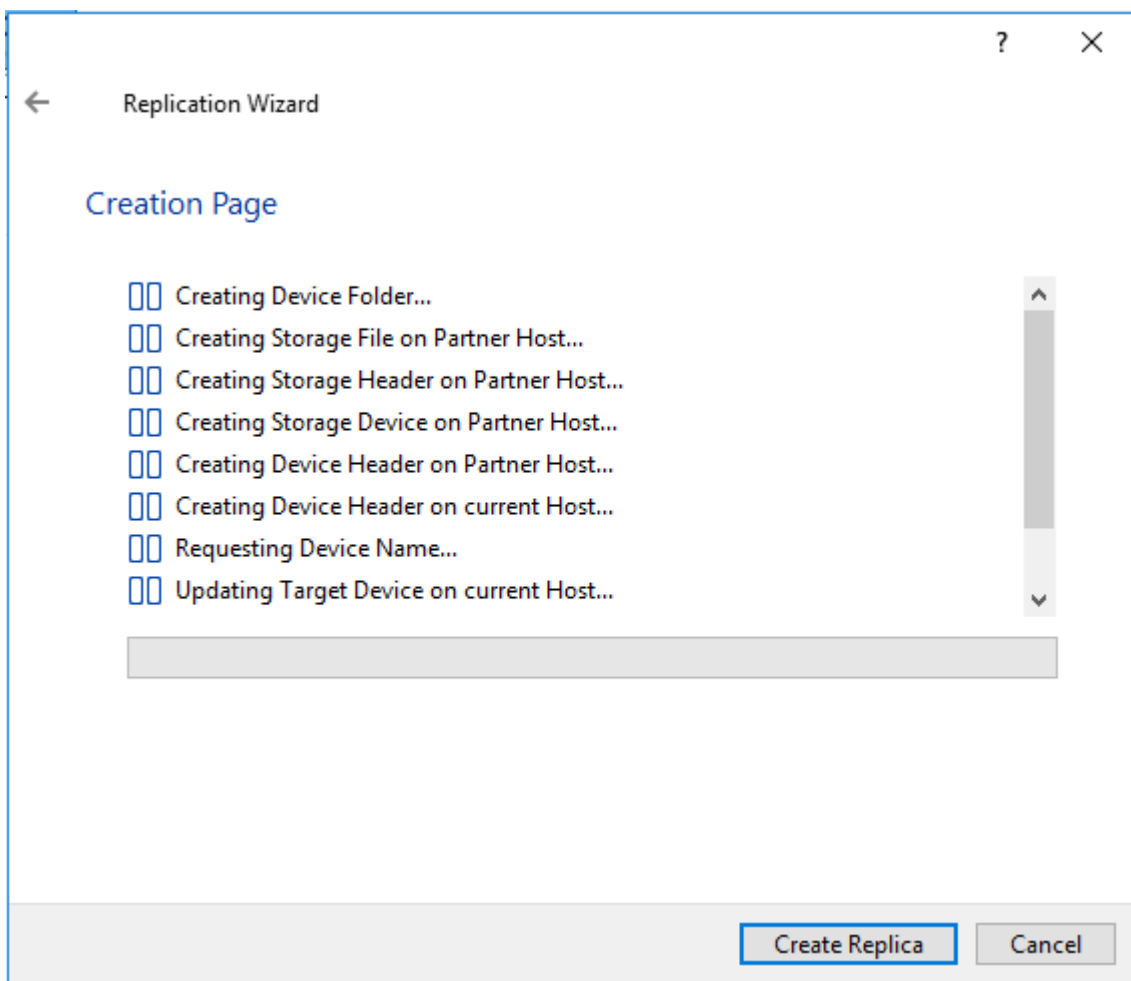
Change Network Settings

Next Cancel

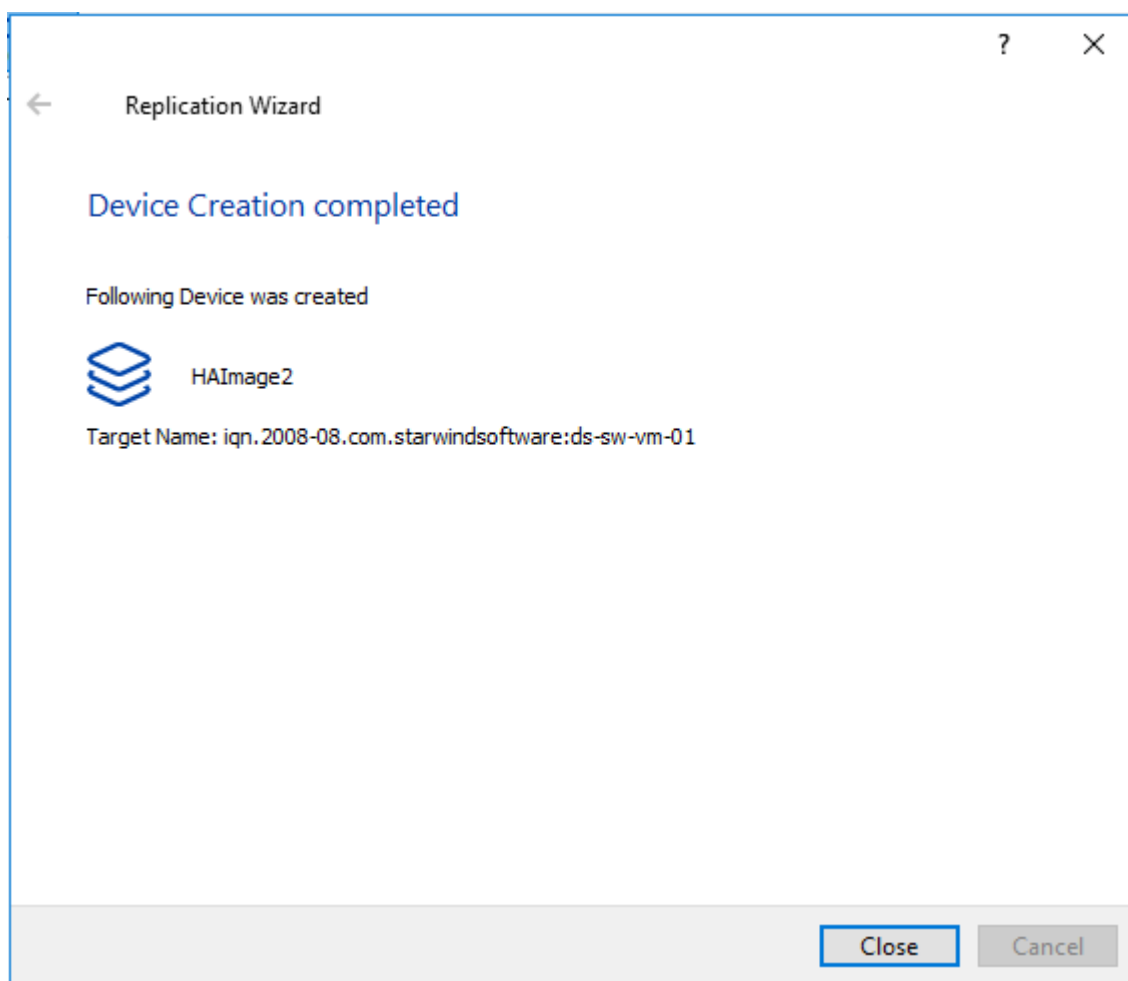
25. In Select Partner Device Initialization Mode, select Synchronize from existing Device and click Next.

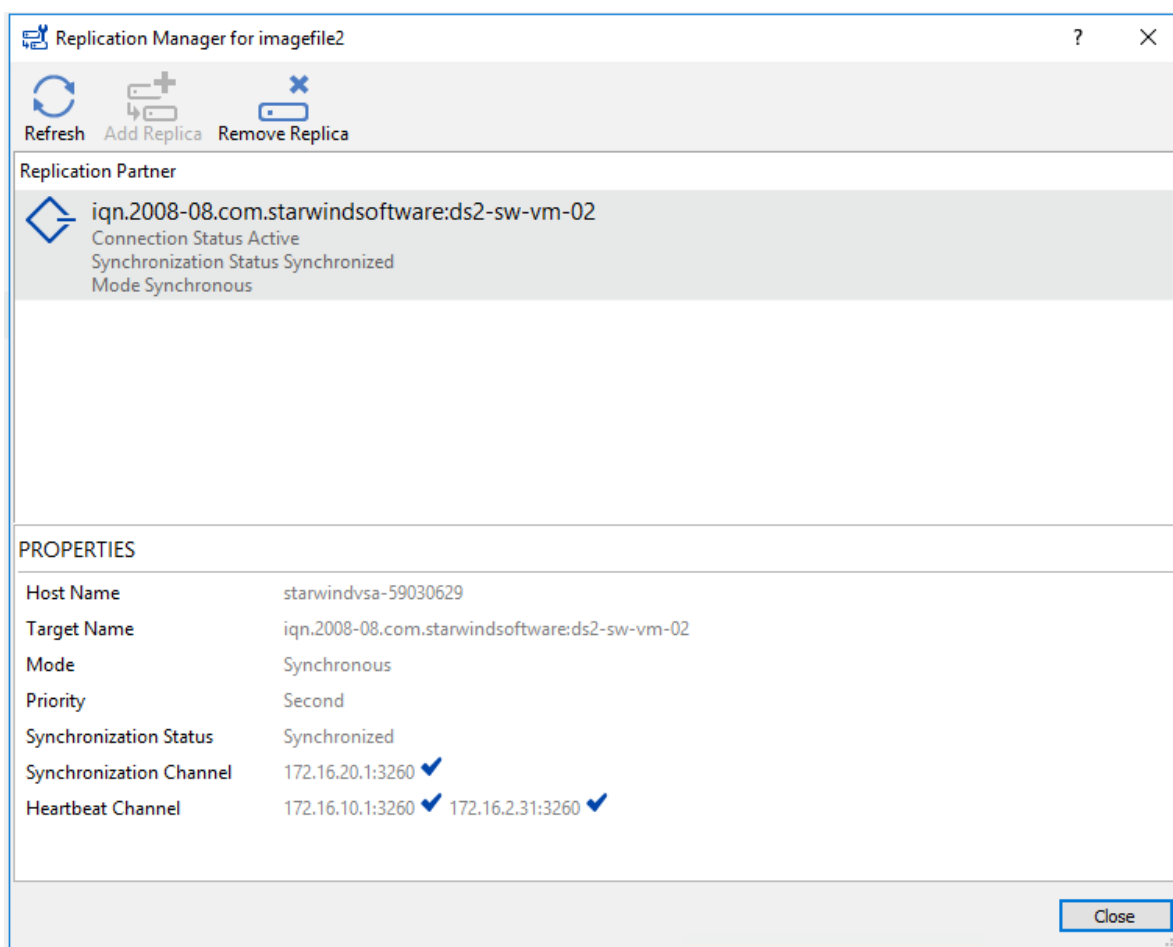


26. Click Create Replica.

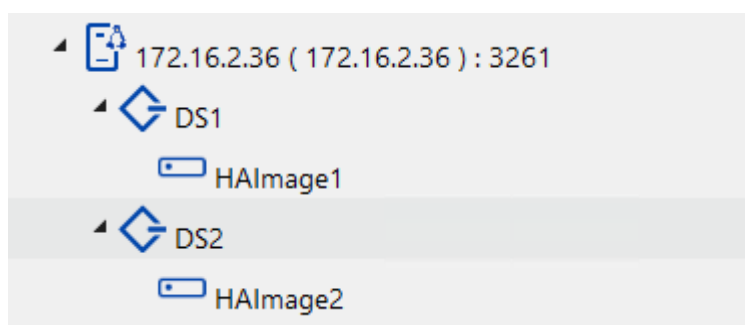


27. Click Close to close the wizard.



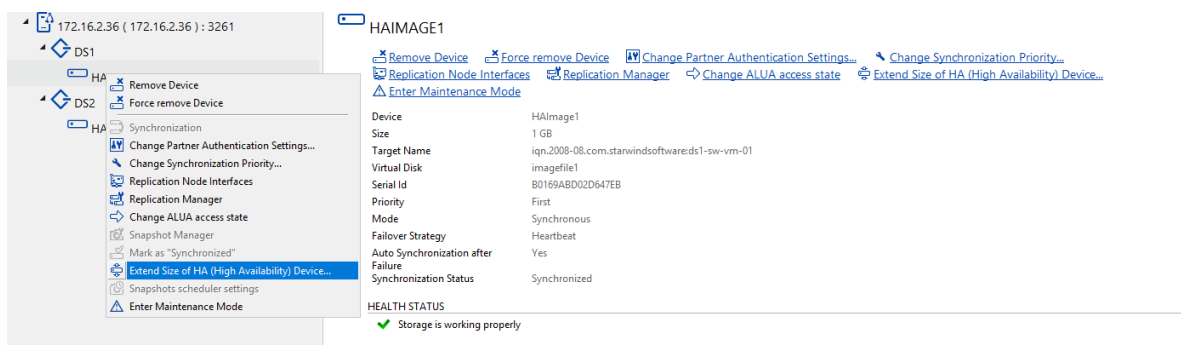


28. The successfully added device appears in StarWind Management Console.



Extend StarWind devices:

1. Right-click on the DS1 device and select (Extending Size of HA (High Availability Device) from the shortcut menu.



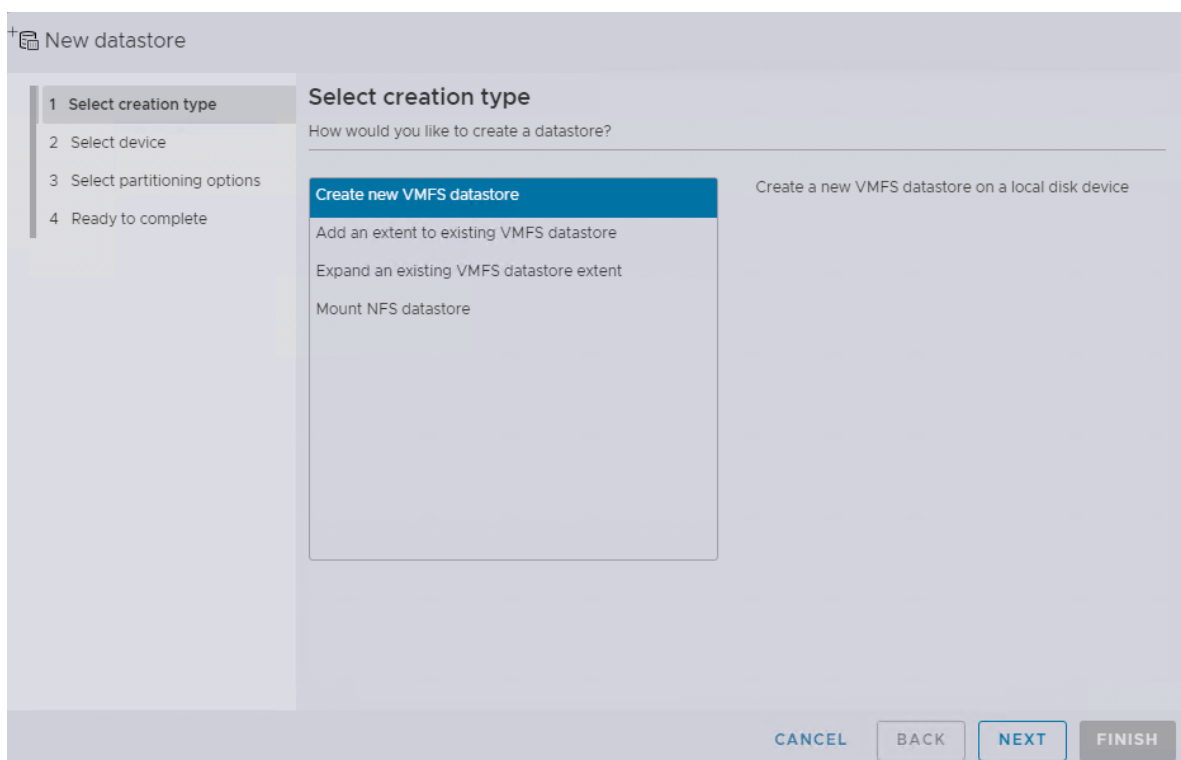
2. Enter the Amount of space to extend.

DS1 need to add 511GB

DS2 need to add 1023GB

Datastore Creation On Top Of Starwind Devices

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



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

+ New datastore - DS*

- 1 Select creation type
- 2 Select device
- 3 Select partitioning options
- 4 Ready to complete

Select device

Select a device on which to create a new VMFS partition

Name

The following devices are unclaimed and can be used to create a new VMFS datastore

Name	Type	Capacity	Free space
STARWIND iSCSI Disk (eui.8b8977a1c9f06bd9)	Disk	1 GB	1 GB
STARWIND iSCSI Disk (eui.69d3728f5331429b)	Disk	2 GB	2 GB

3. Enter the datastore size and click Next.

+ New datastore - DS1

- 1 Select creation type
- 2 Select device
- 3 Select partitioning options
- 4 Ready to complete

Select partitioning options

Select how you would like to partition the device

Use full disk VMFS 6

Before, select a partition

Free space (1 GB)

After

1. VMFS (1 GB)

CANCEL BACK NEXT FINISH

4. Verify the settings and click Finish.

New datastore - DS1

1 Select creation type
2 Select device
3 Select partitioning options
4 Ready to complete

Ready to complete

Summary

Name	DS1
Disk	STARWIND iSCSI Disk (eui.8b8977a1c9f06bd9)
Partitioning	Use full disk
VMFS version	6

VMFS (1 GB)

CANCEL BACK NEXT 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.

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.

Configuration Of I/o Scheduler

1. Login to StarWind VSAN VM web console and find in the Storage section under Drives the Virtual Disk that was recently added and choose it.

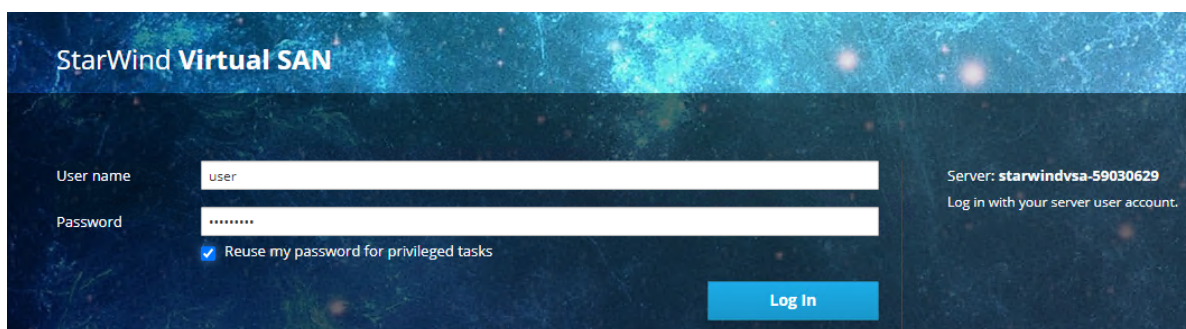
Note: To log in to the StarWind VSAN VM web console you need to type the VM IP address and port 9090

Example: 192.168.1.1:9090

The default credentials:

Login: user

Password: rds123RDS



StarWind Virtual SAN

User name:

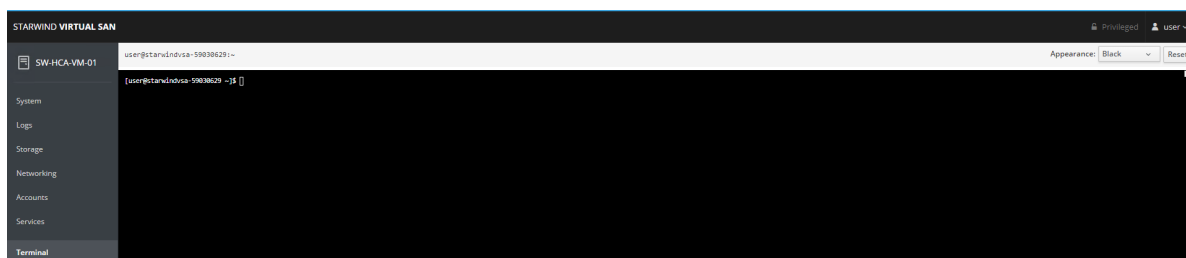
Password:

☒ Reuse my password for privileged tasks

Log In

Server: **starwindvsa-59030629**
Log in with your server user account.

2. Open the “Terminal” page.



3. Check the storage to identify the disks, type lsblk.

```
user@sw-hca-vm-01:~
[user@sw-hca-vm-01 ~]$ lsblk
NAME        MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
sda          8:0    0   16G  0 disk
├─sda1       8:1    0    1G  0 part /boot
└─sda2       8:2    0   15G  0 part
   ├─centos-swap 253:0  0   1.6G  0 lvm  [SWAP]
   └─centos-root 253:1  0  13.4G  0 lvm  /
sdb          8:16   0   8.7T  0 disk
└─sdb1       8:17   0   8.7T  0 part /mnt/sw
sr0         11:0    1 1024M  0 rom
[user@sw-hca-vm-01 ~]$
```

4. Checking the scheduler settings:
type cat /sys/block/sd*/queue/scheduler.

```
user@sw-hca-vm-01:~

[user@sw-hca-vm-01 ~]$ lsblk
NAME        MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
sda          8:0    0   16G  0 disk
├─sda1       8:1    0    1G  0 part /boot
├─sda2       8:2    0   15G  0 part
│   └─centos-swap 253:0    0   1.6G  0 lvm [SWAP]
│   └─centos-root 253:1    0  13.4G  0 lvm /
sdb          8:16    0   8.7T  0 disk
└─sdb1       8:17    0   8.7T  0 part /mnt/sw
sr0         11:0    1 1024M  0 rom
[user@sw-hca-vm-01 ~]$ cat /sys/block/sdb/queue/scheduler
noop [deadline] cfq
[user@sw-hca-vm-01 ~]$
```

Result: [[bfq] mq-deadline none] OR [noop deadline [cfq]]

5. Set the scheduler settings:

type `sudo nano /etc/udev/rules.d/89-disk-scheduler.rules`.

```
[user@sw-hca-vm-01 ~]$ sudo nano /etc/udev/rules.d/89-disk-scheduler.rules
[sudo] password for user:
```

Password: rds123RDS

#Set none scheduler for non-rotating disks

```
user@sw-hca-vm-01:~
GNU nano 2.3.1 File: /etc/udev/rules.d/89-disk-scheduler.rules
#Set none scheduler for non-rotating disks
#ACTION=="add|change", SUBSYSTEM=="block", KERNEL=="sd[a-z]", ATTR{queue/rotational}=="0", ATTR{queue/scheduler}=="none", ATTR{queue/read_ahead_kb}=="0"
#ACTION=="add|change", SUBSYSTEM=="block", KERNEL=="sd[b-d]", ATTR{queue/scheduler}=="noop", ATTR{queue/read_ahead_kb}=="0"

#Set bfq scheduler, rq_affinity, read_ahead_kb, nr_requests for rotating disks
ACTION=="add|change", SUBSYSTEM=="block", KERNEL=="sd[a-z]", ATTR{queue/rotational}=="1", ATTR{queue/scheduler}=="cfq", ATTR{queue/rq_affinity}=="2", ATTR{queue/read_ahead_kb}=="2048", ATTR{queue/nr_requests}=="1024"
```

`ACTION=="add|change", SUBSYSTEM=="block", KERNEL=="sd[b-d]",`
`ATTR{queue/scheduler}=="noop", ATTR{queue/read_ahead_kb}=="0"`

where `sd[b-d]` are disks settings that should be applied. For a single disk use `sdb` or `sd c` .
 Note: For SSD disks scheduler should be "noop" , for HDD "cfq"

6. Check the rule:

type `udevadm test /sys/block/sd*`

```
user@sw-hca-vm-01:~

[user@sw-hca-vm-01 ~]$ udevadm test /sys/block/sdb
```

7. Check settings:

```
type cat /sys/block/sd*/queue/scheduler
```

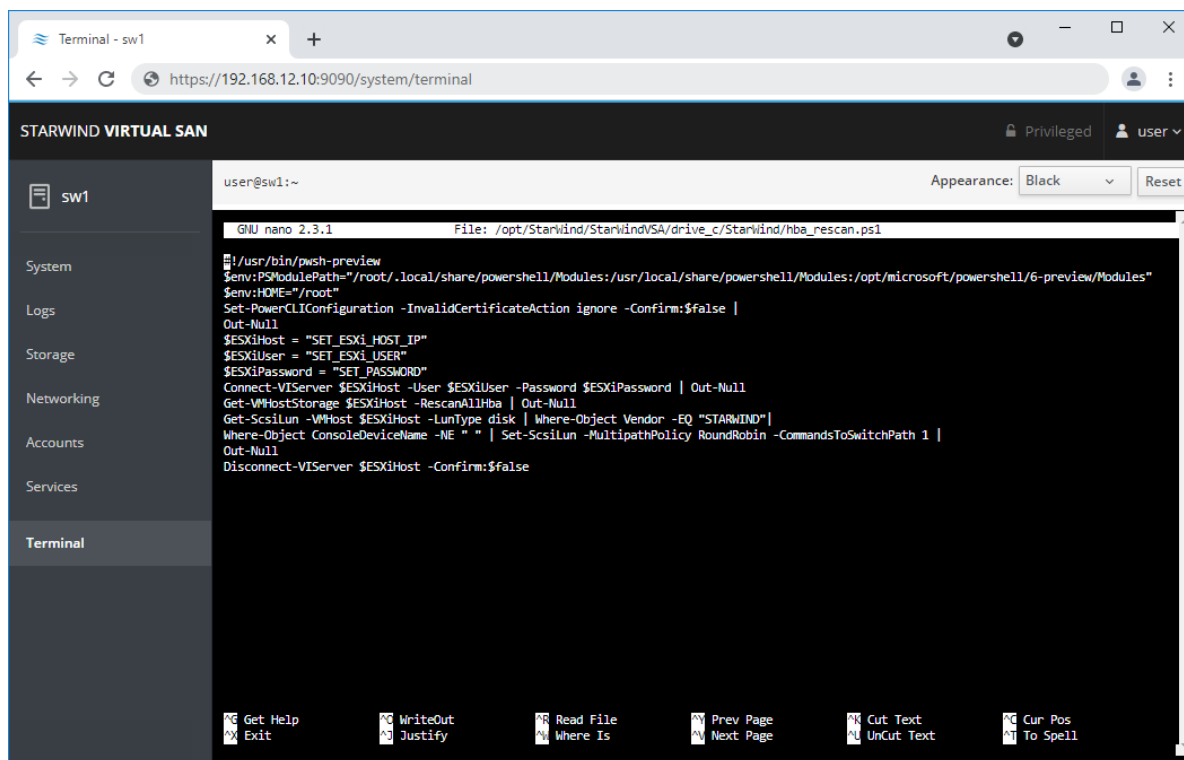
8. Do the above changes for all StarWind Virtual machines.

Configuring An Automatic Storage Rescan

1. Open the Terminal page.

2. Edit file `/opt/StarWind/StarWindVSA/drive_c/StarWind/hba_rescan.ps1` with the following command:

```
sudo nano /opt/StarWind/StarWindVSA/drive_c/StarWind/hba_rescan.ps1
```



The screenshot shows a web-based terminal interface for 'STARWIND VIRTUAL SAN'. The browser address bar shows 'https://192.168.12.10:9090/system/terminal'. The terminal window title is 'Terminal - sw1'. The user is 'user@sw1:~'. The terminal content shows the nano editor editing the file `/opt/StarWind/StarWindVSA/drive_c/StarWind/hba_rescan.ps1`. The script content is as follows:

```
GNU nano 2.3.1 File: /opt/StarWind/StarWindVSA/drive_c/StarWind/hba_rescan.ps1
#!/usr/bin/pwsh-preview
$env:PSModulePath="/root/.local/share/powershell/Modules:/usr/local/share/powershell/Modules:/opt/microsoft/powershell/6-preview/Modules"
$env:HOME="/root"
Set-PowerCLIConfiguration -InvalidCertificateAction ignore -Confirm:$false | Out-Null
$ESXiHost = "SET_ESXI_HOST_IP"
$ESXiUser = "SET_ESXI_USER"
$ESXiPassword = "SET_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 -CommandsToSwitchPath 1 | Out-Null
Disconnect-VIServer $ESXiHost -Confirm:$false
```

At the bottom of the terminal window, there are several keyboard shortcuts listed:

- Get Help
- Exit
- WriteOut
- Justify
- Read File
- Where Is
- Prev Page
- Next Page
- Cut Text
- UnCut Text
- Cur Pos
- To Spell

3. In the appropriate lines, specify the IP address and login credentials of the ESXi host (see NOTE below) on which the current StarWind VM is stored and running:

```
$ESXiHost = "IP address"
```

```
$ESXiUser = "Health"
```

```
$ESXiPassword = "StarWind2015!"
```

NOTE: In some cases the rescan script can be changed and storage rescan added for another ESXi host. Appropriate lines should be duplicated and changed with properly edited variables if required.

Make sure that rescan script is working and execute it from the VM:
`sudo /opt/StarWind/StarWindVSA/drive_c/StarWind/hba_rescan.ps1`

4. Repeat all steps from this section on the all other StarWind Virtual machines.

Proactive Agent Configuration

1. Stop the StarWindHealth

`systemctl stop StarWindHealth.service`

2. Change a line in `/etc/systemd/system/StarWindHealth.service`

`ExecStart=/opt/StarWind/StarWindHealth/bin/nxagentd -d -c /etc/StarWindHealth.conf -M freepas.starwind.com`

to

`ExecStart=/opt/StarWind/StarWindHealth/bin/nxagentd -d -c /etc/StarWindHealth.conf -M pas.starwind.com`

3. Reload the configuration for systemd

`systemctl daemon-reload`

4. Start the StarWindHealth








`systemctl start StarWindHealth`

5. Repeat all steps from this section on the all other StarWind Virtual machines.

Conclusion

Following this guide, a StarWind Virtual HCI Appliance (VHCA) powered by VMware vSphere was deployed and configured with StarWind Virtual SAN (VSAN) running in a CVM on each host. As a result, a virtual shared storage “pool” accessible by all cluster nodes was created for storing highly available virtual machines.

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	 +33 788 60 30 06 (France)

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Support Forum: <https://www.starwind.com/forums>

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