

# StarWind Virtual SAN for vSphere 3-Node Hyperconverged Scenario with VMware vSphere

2024

**TECHNICAL PAPERS** 





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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 SAN (VSAN)

Purpose

This guide details the deployment and configuration of StarWind Virtual SAN for vSphere in a 3-node hyperconverged scenario within a VMware vSphere environment. The process involves pre-configuring servers, setting up network and storage configurations as per best practices, and installing the StarWind Virtual SAN as a Controller Virtual Machine on each ESXi host.

Audience

This guide is aimed at system administrators, virtualization specialists, and IT professionals managing VMware vSphere environments.

**Expected Result** 

Following this guide, users should achieve a seamless integration of StarWind Virtual SAN with VMware vSphere, resulting in a high-performance and fault-tolerant storage pool across three nodes.

### **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

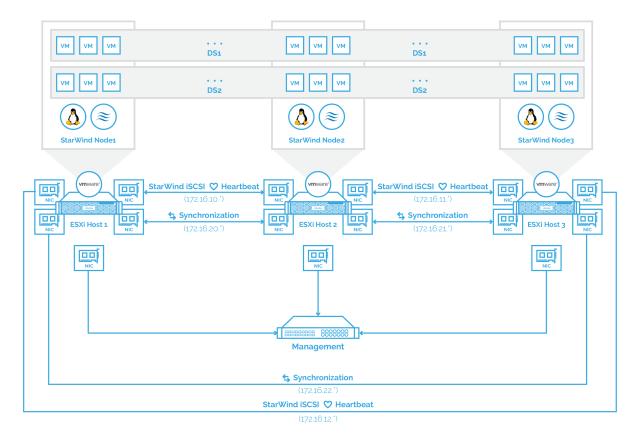
Recommended RAID settings for HDD and SSD disks: https://knowledgebase.starwindsoftware.com/guidance/recommended-raid-settings-for-h dd-and-ssd-disks/

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. The vCenter server should be deployed.

3. 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.huild.vsan.for.vmware.vsphere.

https://www.starwindsoftware.com/release-notes-build-vsan-for-vmware-vsphere

4. 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, 172.16.10.x, 172.16.11.x, 172.16.12.x subnets are used for the iSCSI/StarWind heartbeat traffic, while 172.16.20.x, 172.16.21.x, 172.16.20.x subnets are 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.

## **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).

Navigator		Q Networking		
Host Manage Monitor			es Physical NICs VMkernel Ni Add uplink / Edit settings C	
🔓 Virtual Machines		Name	~	Port groups
Storage Networking	1	vSwitch0		2
		Add standard virtual switch	vSwitch1	
		MTU	9000	
		Uplink 1	vmnic1 - Up, 10000 mbps	•
		► Link discovery	Click to expand	
		▶ Security	Click to expand	

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



👰 sw-mar-pc3.starwind	l.local - Network	king						
Port groups Virt	ual switches	Physical NICs	VMke	rnel NICs	TCP/IP stacks	Firewall rules		
🕍 Add VMkernel NIC	🔁 Add VMk	ernel NIC						٦
Name	Port grou	p		New port of	group	•		
	New port	group		ISCSI_VM	Kernel			IJ
	Virtual sv	vitch		vSwitch1		•		l
	VLAN ID			0				l
	MTU			9000				l
	IP version	n		IPv4 only	•			l
	✓ IPv4 setti	ings						Ш
	Config	juration		O DHCP .	Static			U
	Addre	SS		172.16.10.	251			U
	Subne	et mask		255.255.25	5.0			U
	TCP/IP s	tack		Default TC	P/IP stack	•		
	Services			vMotion	Provisioning	Fault tolerance logging	Management	
							Create Cancel	

3. Add a Virtual Machine Port Groups on the vSwitch for iSCSI traffic (vSwtich1) and on the vSwitch for Synchronization traffic (vSwitch2).

Dertgroup ISCSI_for_VMs removed - dismission_VMs							
▼ 🗍 Host	Port groups Virtual switches	Physical NICs VMkerne	el NICs TCP/IP stacks	Firewall rules			
Manage Monitor	👲 Add port group 🥒 Edit settings	CRefresh   🎲 Actions					
Figure 1 Virtual Machines	Name	~	Active ports ~	VLAN ID			
Storage	🧕 VM Network		0	0			
🛛 💇 Networking 👘 1	Management Network		1	0			
	SCSI_VMKernel		1	0			
Monitor	Add port group - ISCSI_for_VMs						
More networks							
	Name	ISCSI_for_VMs					
	VLAN ID	0					
	Virtual switch	vSwitch1	¥				
	▶ Security	Click to expand					
				Add Cancel			

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



traffic on ESXi hosts.

# **Installing 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 virtual machine files.

3. Deploy a virtual machine to the vSphere. Right-click on the host and select "Deploy OVF template" from a drop-down menu.

<b>vm</b> vSph	Actions - 192.168.13.191	Search in all (	environmen C.	? v	
	🛅 New Virtual Machine	<u> </u>	$\bigcirc$		
	🎲 Deploy OVF Template		ACTIONS 🗸		
✓	🟀 New Resource Pool	Moni Confid	g Permissi	V Datasto	Netwo Upda
V Support	🚼 New vApp		-		
∨ 📋 Post-	Maintenance Mode	Hypervisor:	VMware ESXi, 6.7.0, 10302608		Free: 24.69 GHz
192	Connection ►	Model: Processor Type:	PowerEdge R720 Intel(R) Xeon(R) CPU	Used: 10.5 GHz E5- Memory	Capacity: 35.18 GHz Free: 39 GB
<b>1</b> 92	Power 🕨		2660 0 @ 2.20GHz	Used: 88.94 GB	Capacity: 127.94 GB
	Certificates ►	Logical Processors: NICs:	: 32 7	Storage	Free: 1.86 TB
	Storage 🕨	Virtual Machines: State:	25 Connected	Used: 4.49 TB	Capacity: 6.35 TB
	复 Add Networking	Jptime:	12 days		
	Host Profiles	DELLEI	MC 🛋		
	Export System Logs				~
	Reconfigure for vSpher				
	🖓 Assign License	cturer	Dell Inc.		
	Settings		PowerEdge F	2720	
	Move To		16 CPUs x	2.2 GHz	
	Tags & Custom Attribut 🕨	У	88.94 GB	/ 127.94 GB	
	Remove from Inventory	Flash Resource	0 B / 0 B		

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

1 Select an OVF template 2 Select a name and folder	Select an OVF template Select an OVF template from remote URL or local file system
<ul><li>3 Select a compute resource</li><li>4 Review details</li><li>5 Select storage</li><li>6 Ready to complete</li></ul>	Enter a URL to download and install the OVF package from the Internet, or browse to a location accessible from your computer, such as a local hard drive, a network share, or a CD/DVD drive. O URL
	http   https://remoteserver-address/filetodeploy.ovf   .ova
	Choose Files       No file chosen
	CANCEL BACK NEX

5. Specify the name and location for the StarWind Virtual SAN VM.



Deploy OVF Template	5
<ul> <li>1 Select an OVF template</li> <li>2 Select a name and folder</li> </ul>	Select a name and folder Specify a unique name and target location
3 Select a compute resource 4 Review details	Virtual machine name: SW1
5 Select storage 6 Ready to complete	Select a location for the virtual machine.
	<ul> <li>✓          <sup>[2]</sup> sw-sup-vcenter.starwind.local         </li> <li>&gt;          <sup>[1]</sup> Support         </li> </ul>
	CANCEL BACK NEXT

6. Select a resource for the StarWind Virtual SAN VM.



Deploy OVF Template	2
<ul> <li>1 Select an OVF template</li> <li>2 Select a name and folder</li> </ul>	Select a compute resource Select the destination compute resource for this operation
<ul> <li>3 Select a compute resource</li> <li>4 Review details</li> <li>5 Select storage</li> <li>6 Ready to complete</li> </ul>	<ul> <li>Support</li> <li>Post-Sale</li> <li>192.168.12.10</li> <li>192.168.12.20</li> <li>192.168.12.30</li> </ul>
	Compatibility  Compatibility checks succeeded.  CANCEL BACK NEXT

7. Review the information about the VM.

8. Select the storage for the VM.



<ul> <li>1 Select an OVF template</li> <li>2 Select a name and folder</li> </ul>	Select storage Select the storage for the configuration and disk files Encrypt this virtual machine (Requires Key Management Server)						
<ul> <li>3 Select a compute resource</li> <li>4 Review details</li> <li>5 License agreements</li> </ul>							
6 Select storage	Select virtual disk format: VM Storage Policy:		Thick Provision La	zy Zeroed 🗸			
7 Select networks			Datastore Default 🗸 🗸				
8 Ready to complete	Name	Capacity	Provisioned	Free	Typ		
	🗐 HDD	4.55 TB	3.41 TB	1.25 TB	VN 4		
	ISO	851.87 GB	702.82 GB	149.06 GB	NF		
	SSD SSD	893 GB	485.18 GB	432.23 GB	VN		
	🗐 vCenter-DS	99.75 GB	54.88 GB	44.87 GB	VN		
	4				•		
	Compatibility						
	✓ Compatibility checks s	ucceeded.					

9. Select networks for the VM.



<ul> <li>Deploy OVF Template</li> <li>1 Select an OVF template</li> <li>2 Select a name and folder</li> </ul>	Select networks Select a destination network	or each source i	network.		
✓ 3 Select a compute resource	Source Network	Ŧ	Destination Network	T	
<ul> <li>4 Review details</li> <li>5 License agreements</li> </ul>	ISCSI		ISCSI_VMs	~	
<ul> <li>✓ 6 Select storage</li> </ul>	Management		VM Network	~	
7 Select networks	Sync		Sync_VMs	~	-
8 Ready to complete				3 iten	ns
	IP allocation: IP protocol:	Sta IPv	tic - Manual 4		
			CANCEL	BACK	EXT

10. Click Finish to start the deployment process.

11. Add additional network interfaces for iSCSI and SYNC (can be configured for redundancy or 3-way replica, if required)



Edit Settings sw1						$\times$
Virtual Hardware VM Options						
					ADD NEW DE	VICE
> CPU	4 ~					0
> Memory	8	GB	$\sim$			
> Hard disk 1	16	GB	$\sim$			
> SCSI controller 0	LSI Logic SAS					
> Network adapter 1	VM Network $ \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! $	-			Connected	
> Network adapter 2	iSCSI_VMs ∨				Connected	
> Network adapter 3	Sync_VMs ∨				Connected	
✓ New Network *	Sync_VMs ~				Connected	
Status	🗹 Connect At Po	ower Or	n			
Adapter Type	VMXNET 3	~				
DirectPath I/O	Enable					
MAC Address				Automatic ~		
> CD/DVD drive 1	Client Device		~			<b>.</b>
					CANCEL	ок

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

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 in under load may lead to split-brain issues in synchronous replication devices, thus to data corruption.

# **Configuring Starwind Virtual San Vm Settings**

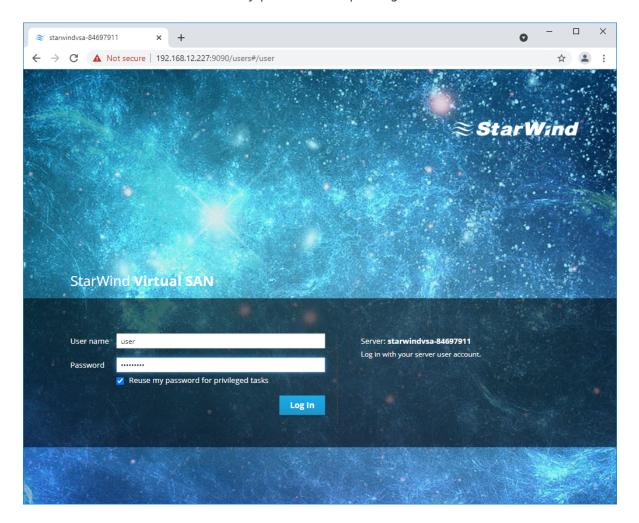
By default, the StarWind Virtual SAN virtual machine receives an IP address



automatically via DHCP. It is recommended to create a DHCP reservation and set a static IP address for this VM. In order to access StarWind Virtual SAN VM from the local network, the virtual machine must have access to the network. In case there is no DHCP server, the connection to the VM can be established using the VMware console and static IP address can be configured manually.

1. Open a web browser and enter the IP address of the VM, which it had received via DHCP (or had it assigned manually), and log in to StarWind Virtual SAN for vSphere using the following default credentials:

Username: user Password: rds123RDS NOTE: Make sure to tick Reuse my password for privileged tasks check box.



- 2. After the successful login, on the left sidebar, click Accounts.
- 3. Select a user and click Set Password.



≈ Accounts - starwindvsa-84	1697911 × +			• <sup>–</sup>		×
← → C ▲ Not se	cure   192.168.12.2	227:9090/users#/user			☆ .	:
STARWIND VIRTUAL SAN					ged 💄 (	user 🗸
🗐 starwindvsa-84	Accounts > user	Set Password				
System	user	Old Password		S:	ion Dele	te
Logs	Full Name	New Password				
Storage	User Name u	Confirm New Password				
Networking	Roles 星					
Accounts	Last Login N			Cancel		
Services	Access	Cock Account	Never lock account			
Terminal	Password	Set Password Force Chang	Rever expire password			
	Authorized Pub	lic SSH Keys				+
		lic SSH Keys uthorized public keys for this	account.		1	+
			account.			+
			account.			+
			account.			+
			account.		1	+
			account.			+

4. On the left sidebar, click Networking.



≈ Networking - starwindvsa-84	1697: × +			• - • ×		
← → C ▲ Not secu	re   192.168.12.227:9090/	network		☆ 😩 :		
STARWIND VIRTUAL SAN						
starwindvsa-84	Kbps Sending		Kbps Receiving	<b>A</b>		
System	400		400			
Logs	0		o	A		
Storage	03:48 03:49	03:50 03:51 03:52		:50 03:51 03:52		
Networking	Firewall			0		
Accounts	0 Active Rules					
Services						
Terminal	Interfaces		Add Bond Add Team	Add Bridge Add VLAN		
remina	Name	IP Address	Sending	Receiving		
	ens192	192.168.12.227/23	5.40 Kbps	4.60 Kbps		
	ens224		Inactive			
	ens256		Inactive			
	Networking Logs			•		

Here, the Management IP address of the StarWind Virtual SAN Virtual Machine, as well as IP addresses for iSCSI and Synchronization networks can be configured.

In case the Network interface is inactive, click on the interface, turn it on, and set it to "Connect automatically".



	84697: × +	o - 🗆 ×
← → C ▲ Not se	cure   192.168.12.227:9090/network#/ens224	☆ 💄 :
STARWIND VIRTUAL SAN		🔒 Privileged 💄 user 🗸
starwindvsa-84	Networking > ens224	
System	Kbps Sending Kbps Receiving	
Logs	400 400	
Storage	。	
Networking		04:25 04:26 04:27 04:28
Accounts	ens224 VMware VMXNET3 Ethernet Controller vmxnet3 00:0C:29:A6:D6:F6	0
Services	Status Inactive	
Terminal	Carrier 10 Gbps General Connect automatically IPv4 Automatic (DHCP) IPv6 Automatic MTU Automatic	

5. Click on Automatic (DHCP) to set the IP address (DNS and gateway – for Management).

Networking - starwindvsa	-846976 × +			• - • ×
← → C ▲ Not se	ecure   192.168.12.227:9090/network#/	ens224		☆ 😩 :
STARWIND VIRTUAL SAN				🔒 Privileged 💄 user 🗸
starwindvsa-84	Networking > ens224	IPv4 Settings	_	
System	Kbps Sending 800	Addresses	Manual ~ +	
Logs	400	172.16.10.10 255.255.255.0	Ga Automatic (DHCP)	
Storage	0	DNS	Manual	
Networking	05:57 05:58	DIVS	Shared + Disabled	06:00 06:01
Accounts	ens224 VMware VMXNET3 Etherne	DNS Search Domains	Automatic +	
Services	Status Configuring IP			
Terminal	Carrier 10 Gbps General 🔽 Connect automatically	Routes	Automatic 🗸 +	
	General Connect automatically IPv4 Automatic (DHCP) IPv6 Automatic MTU Automatic		Cancel Apply	

6. The result should look like on the picture below:



Retworking - starwindvsa-84	4697: × +			• - • ×
← → C ▲ Not secu	ure   192.168.12.10:9090/network			☆ 😩 🗄
STARWIND VIRTUAL SAN				🔒 Privileged 💄 user 🗸
starwindvsa-84	Kbps Sending		Kbps Receiving	
System Logs	400		400	
Storage	0 06:02 06:03	06:04 06:05 06:06	0 06:02 06:03	06:04 06:05 06:06
Networking	Firewall			
Accounts	0 Active Rules			
Services				
Terminal	Interfaces		A	dd Bond Add Team Add Bridge Add VLAN
	Name	IP Address	Sending	Receiving
	ens192	192.168.12.10/24	8.74 Kbps	7.54 Kbps
	ens224	172.16.10.10/24	0 bps	0 bps
	ens256	172.16.20.10/24	0 bps	0 bps
	Networking Logs			

NOTE: It is recommended to set MTU to 9000 on interfaces, dedicated for iSCSI and Synchronization traffic. Change Automatic to 9000, if required.

≈ Networking - sw1	× +	• <sup>–</sup>	
$\leftarrow$ $\rightarrow$ C S https:/	//192.168.12.10:9090/network#/ens224		<b>.</b> :
STARWIND VIRTUAL SAN		🔓 Privileged	🛓 user 🗸
🗐 sw1	Networking > ens224		
System	Kbps Sending Kbps Receiving		
Logs	400 400		
Storage			
Networking	18:44 18:45 18:46 18:47 18:48 18:44 18:45	18:46 18:47	18:48
Accounts	ens224 VMware VMXNET3 Ethernet Controller vmxnet3 00:0C:29:A6:D6:F6		
Services	Status 172.16.10.10/24		
Terminal	Carrier 10 Gbps General Connect automatically		
	IPv4 Address 172.16.10.10/24 IPv6 Automatic		
	MTU 9000		

6. Alternatively, log in to the VM via the VMware console and assign a static IP address by editing the configuration file of the interface located by the following path: /etc/sysconfig/network-scripts



📓 SW1	🖬 🖬 🔤 🍪 Actions ⊗
Meb console: https://starwindvsa-84697911:9090/ or https://192.168.12.227:9090/	
<pre>starwindvsa-84697911 login: Password: Last login: Tue Aug 12 04:43:59 on ttu1 Iuser@starwindvsa-84697911 ~ 15 is zetc/sysconfig/network-scripts/ Ifclg-ens122 ifdown ifdown-ippp ifdown-ppp ifdown-transfer ifup-th ifup-tion ifup-pps ifup-Team init.ipv6-global ifcfg-ens225 ifdown-beep ifdown-ipv ifdown-tutts ifdown-tunnel ifup-th ifup-tion ifup-pps ifup-TeamPort network-functions ifcfg-ens256 ifdown-eth ifdown-isdw ifdown-team ifup- aliases ifup-ippp ifup-plusb ifup-sit ifup-wireless Iuser@starwindvsa-84697911 ~ 3; foronfig ens192: flags=4163</pre> UP_BROADCAST, RUNNING, MULTICAST> mtu 1500 inet 192. 160.12.227 netwask 255.255.254.0 broadcast 192.168.13.255 ether 00:80:23:46:163:etx	iµv6
RX packets 3057 bytes 277047 (271.3 KiB) RX errors 0 dropped 0 overruns 0 frame 0 TX packets 1067 bytes 1554056 (1.4 MiB) TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0 device interrupt 19 memory 0xfd3a0000-fd3c0000	
ems224: flags=41634UP.BR60bCAST.RUNNING.MULTICAST> mtu 1500 ether 80:80:229:a6:46:f6 txqueuelen 100000 (Ethernet) RK packets 2 bytes 120 (120.0 B) RX errors 0 dropped 0 overruns 0 frame 0 TX packets 0 bytes 0 (0.0 B) TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0	
ens256: flags=4163 <up,broadcast,running,multicast> mtu 1500 ether 00:8c:23:a6:46:00 txqueuelen 10000 (Ethernet) RX packets 2 bytes 120 (122.0.8 B) RX errors 0 dropped 0 overruns 0 frame 0 TX packets 0 bytes 0 (0.8 B) TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0</up,broadcast,running,multicast>	
lo: flags=73(UP,LOOPBACK,RUNNING> mtu 65536 inet 127.0.0.1 netmask 255.0.0.0 loop tsqueuelen 1000 (Local Loopback) RX packets 172 bytes 147586 (144.1 KiB) RX errors 0 dropped 0 overruns 0 frame 0 TX packets 172 bytes 147586 (144.1 KiB) TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0	
Euser@starwindvsa-84697911 ~1\$ sudo nano /etc/sysconfig/network-scripts/ifcfg-ens192	.at.

7. Open the file, corresponding to the Management interface using text editor, for example:

sudo nano /etc/sysconfig/network-scripts/ifcfg-ens192

8. Edit the file:

Change the line BOOTPROTO=dhcp to: BOOTPROTO=static

Add the IP settings needed to the file: IPADDR=192.168.12.10 NETMASK=255.255.255.0 GATEWAY=192.168.12.1 DNS1=192.168.1.1 By default, the Management link should have an ens192 interface name. The configuration file should look as follows



SW1					💷 🗆 🚈 🏠 Ac	tions
GNU nano 2.3.1		File: /etc/sysconfig/networ	rk-scripts∕ifcfg-ens192		Modi	
	2-prívacy	File: /etc/sysconfig/networ	rk-scripts∕ifcfg-ens192			
^G Get Help ^X Exit	^D WriteOut ^J Justify	îE Bead File <sup>↑</sup> Wenere Is	₩ Prev Page ₩ Next Page	îK Cut Text ^U UnCut Text	i Cur Pos 1 To Spell	

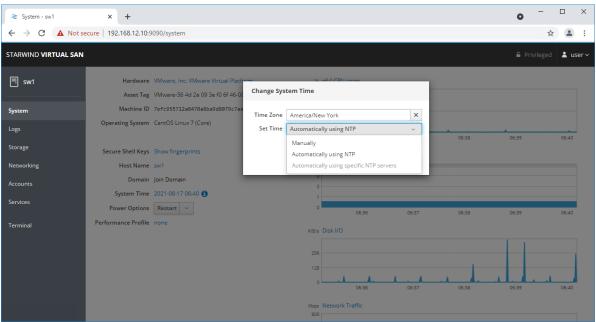
9. Restart interface using the following cmdlet: sudo if down ens192 , sudo if up ens192 or restart the VM.

10. Change the Host Name from the System tab by clicking on it

≈ System - starwindvsa-846	97911 × +								0	- 0	×
$\leftrightarrow$ $\rightarrow$ C $\blacktriangle$ Not set	ecure   192.168.12.10:9	0090/system								\$	:
STARWIND VIRTUAL SAN									🔓 Priv	vileged 💄 us	ser ~
starwindvsa-84		VMware, Inc. VM VMware-56 4d 2	Change Host Nam	e	94 - DE A C	DILCORE					
System	Machine ID	7efc955712a847	Pretty Host Name	sw1							
Logs	Operating System	CentOS Linux 7 (	Real Host Name								
Storage	Secure Shell Keys	Show fingerprin							06:08	06:09	
Networking		starwindvsa-846									
Accounts		Join Domain 2021-08-17 06:0					Cancel	Change			
Services	Power Options		_		0	06:05	06:06	06:07	06:08	06:09	
Terminal	Performance Profile	none			KiB/s Disk I		UE:UE	06:07	06:08	08:09	
					96 64 32 0	06:05	06:06	06:07	06:08	06:09	
11 Channed				:6	Kbps Netw	ork Traffic					

11. Change System time and NTP settings if required





12. Repeat the steps above on each StarWind VSAN VM.

# **Configuring 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 installator available here. NOTE: StarWind Management Console and PowerShell Management Library components are required.

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.



StarWind Management Console		-	×
FILE HOST TARGET OPTIONS HELP			
Refresh Connect Disconnect Add Server Remove Server Add Device Add Device (advanced) Add VTL Device Remove Target	<b>?</b> Help		
Servers			
Add Server This Option allows you to add local or remote StarWind Server Hosts to StarWind Management Console			
(			 >
StarWind Software Ready			

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

📑 Ad	d new StarWind Server		?	×
Host:	192. 168. 12. 10		: 3261	
Adva	anced >>	ОК	Cano	el

- 5. Select the server and click Connect.
- 6. Click Apply Key... on the pop-up window.



StarWind Manag	gement Console
IF FF 00 BF 4D A3 EE D CC1	StarWind Server Activation
	Apply License Key, could be Time-limited Trial Key, free Version Key or Commercial License Key delivered with Purchase
	Request free Version Key <u>Here</u> .
	Close 🔗 Apply Key

7. Select Load license from 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 – 🗆	×
<u>File Edit View Tools D</u> ebug <u>A</u> dd-ons <u>H</u> elp	
1 ◎ 🔒 🠇 🕤 እ 🖉 ୯ 🕨 🕒 🖬 🛛 🐼 🗖 🗖 🗖 🔹	
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	^
<pre>     server = New-SWServer -host 127.0.0.1 -port 3261 -user root -password starwind     y     try </pre>	
11 ⊡{ 12   \$server.Connect() 13	
14 Get-SwLicense Sserver 15	
16 Remove-SWLicense Sserver 17 18 #apply license key	
<pre>19 Set-SWLicense Sserver "C:\License\licensekey.swk" 20 } 21 catch</pre>	
22 ⊡{ 23   Write-Host \$foreground red 24  }	
25 finally 26 ⊟{ 27 Sserver.Disconnect() 28 }	
29	$\sim$
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.

## **Configuring Starwind Vms Startup/shutdown**

1. Setup the VMs startup policy on both ESXi hosts from Manage -> System tab in the ESXi web console. In the appeared window, check Yes to enable the option and choose the stop action as Shut down. Click Save to proceed.



<b>vm</b> ware <sup>°</sup> ESXi <sup>°°</sup>			root@1
Navigator	sxi01.starwind.local - Manage		
	System Hardware Licensi	ng Packages Services	Security & users
Manage Monitor	Advanced settings Autostart	Edit settings	No
→ <sup>1</sup>	Swap Time & date	Change autostart configuration	
<ul> <li>Switch2</li> <li>Switch0</li> </ul>		Enabled	⊙ Yes ◯ No
More networks		Start delay	120 🗘 seconds
		Stop delay	120 🗘 seconds
		Stop action	Shut down ~
		Wait for heartbeat	O Yes 💿 No
			Save Cancel

2. To configure a VM autostart, right-click on the VM, navigate to Autostart and click Enable.

<b>vm</b> ware <sup>®</sup> ESXi <sup>™</sup>				roo	ot⊚
"E" Navigator	sxi01.starwind.local - Manage		F SW1		
▼ 🗐 Host	System Hardware Licer	nsing Packages	Power	•	
Manage Monitor Gravital Machines Storage Networking Networking Networking Networks	System Hardware Licer Advanced settings Autostart Swap Time & date	Edit settings Edit settings Enabled Start delay Stop delay Stop action Wait for heartbest Enable & S Virtual machine Wittual machine Quick filters	Image: Guest OS         Image: Snapshots         Image: Console         Image: Autostart         Image: Opgrade VM Compatibility         Image: Export         Image: Export With Images         Image: Export With Images	Refresh   Actions	
			Help	· · ·	
	🗊 Recent tasks		둼 Open in a new window		

- 3. Complete the actions above on StarWind VM located on all ESXi hosts.
- 4. Start the virtual machines on all ESXi hosts.



# **Configuring Storage**

StarWind Virtual SAN for vSphere can work on top of Hardware RAID or Linux Software RAID (MDADM) inside of the Virtual Machine. Please select the required option:

## **Configuring Starwind Storage On Top Of Hardware** Raid

1. Add a new virtual disk to the StarWind Virtual SAN VM. Make sure it is Thick Provisioned Eager Zeroed. Virtual Disk should be located on the datastore provided by hardware RAID.

StarWindVSAN_vSphere - Edit	Settings	· ? 🕨
Virtual Hardware VM Options S	DRS Rules vApp Options	
▶	Client Device Connected	
▶ I Video card	Specify custom settings	
SATA controller 0		
▶ ∰ VMCI device		
<ul> <li>Other Devices</li> </ul>		
▶ Upgrade	Schedule VM Compatibility Upgrade	
👻 🥅 New Hard disk	20 GB 🔻	
Maximum Size	435,91 GB	
VM storage policy	Datastore Default	
Location	Store with the virtual machine	
Disk Provisioning	Thick provision eager zeroed	::
Sharing	Unspecified -	
Shares	Normal 🚽 1 000	
Limit - IOPs	Unlimited	
Virtual flash read cache	0 GB 🔻 Advanced	
Disk Mode	Dependent 🗸	
Virtual Device Node	SCSI controller 0 🛛 🔹 SCSI(0:1) 🔹	•
New device:	Add	
Compatibility: ESXi 5.5 and later (VM	version 10) OK C	ancel

NOTE: Alternatively, the disk can be added to StarWind VSAN VM as RDM. The link to



VMware documentation is below:

https://docs.vmware.com/en/VMware-vSphere/7.0/com.vmware.vsphere.vm\_admin.doc/G UID-4236E44E-E11F-4EDD-8CC0-12BA664BB811.html

NOTE: If a separate RAID controller is available, it can be used as dedicated storage for StarWind VM, and RAID controller can be added to StarWind VM as a PCI device. In this case RAID volume will be available as a virtual disk in the Drives section in the Web console. Follow the instructions in the section below on how to add RAID controller as PCI device to StarWind VM.

2. 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.

Storage - StarWindVSA-92154	28: × +	-		×
$\leftrightarrow$ $\rightarrow$ C $$ https://19	92.168.12.10:9090/system	\$		:
STARWIND VIRTUAL SAN		🔓 Privilegeo	1	root 🗸
StarWindVSA-92	RAID Devices		+	•
	No storage set up as RAID			
System Logs	Volume Groups		+	
Storage	centos 15.0 GIB			
Networking				
Accounts	VDO Devices		+	
Services	No storage set up as VDO			
Terminal	Drives			
	VMware Virtual disk 16 GiB Hard Disk R: 0 B/s W: 10.0 KiB/s			
	VMware Virtual SATA CDRW Drive (000000000000000000000000000000000000	0001)		
	VMware Virtual disk 20 GiB Hard Disk R: 0 B/s W: 0 B/s			
				*

3. The added disk does not have any partitions and filesystem. Press Create partition table and press Format afterward to create the partition and format it.

NOTE: It is not necessary to overwrite data while creating partition.



Storage - StarWindVSA-9215	4285 × +			-	
$\leftrightarrow$ $\rightarrow$ C $$ https://	192.168.12.10:9090/sys	tem		\$	:
STARWIND VIRTUAL SAN				🔓 Privileged	💄 root 🗸
StarWindVSA-92	Storage » VMware Virtu	ual disk			
System	Drive				
Logs	Model V	/irtual disk			
Storage	Firmware Version 1				
Networking	Device File /	-			
Accounts					
Services	Content			Create partitio	n table
Terminal	✓ 20 GiB Unrecognize	ed Data	/dev/sdb		
	Unrecognized Data	_			
	Usage -			ł	Format
	Туре -				
Networking Accounts Services	Capacity 2 Device File // Content 20 GiB Unrecognize Unrecognized Data Usage -	20 GiB, 21.5 GB, 21474836480 bytes dev/sdb	/dev/sdb		

4. Create the XFS partition. Specify the name and erase option. The mount point should be as following: /mnt/%yourdiskname% . Click Format. To enable OS boot when mount point is missing (e.g., hardware failure), add *nofail* as a boot option.



📚 Storage - SW1	× +	-	
← → C 🔒 192.168	.12.57:9090/storage	e#/sdb	☆ :
STARWIND VIRTUAL SAN			💄 root 🗸
🗐 sw1	Format /dev/so	lb	
System	Erase Type	Overwrite existing data with zeros XFS - Recommended default	~
Logs	Name	disk1	
Storage		Encrypt data	
Networking	Mounting	Custom	~
Accounts	Mount Point	/mnt/disk1	
Services	Mount Options	✔ Mount at boot Mount read only	
Terminal		Custom mount options	
		Formatting a storage device will erase a	ill data on it. <b>Format</b>

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



Storage - StarWindVSA-921	5428: × +	-	
$\leftrightarrow$ $\rightarrow$ C $$ https://1	92.168.12.10:9090/system	☆	:
STARWIND VIRTUAL SAN		🔓 Privileged	💄 root 🗸
StarWindVSA-92	Storage » VMware Virtual disk		•
System	Drive		
Logs	Model Virtual disk		
Storage	Firmware Version 1.0 Capacity 20 GiB, 21.5 GB, 21474836480 bytes		
Networking	Device File /dev/sdb		
Accounts			
<ul> <li>Storage - StarWindVSA-9215428: × +</li> <li>         ← → C  https://192.168.12.10:9090/system         <ul> <li>Mathematical Storage → VMware Virtual disk</li> <li>Storage → VMware Virtual disk</li> <li>Drive</li> <li>Model Virtual disk</li> <li>Firmware Version 1.0 Capacity 20 GiB, 21.5 GB, 21474836480 bytes Device File /dev/sdb</li> </ul> </li> </ul>		able	
Terminal	✓ 20 GiB xfs File System /dev/sdb		
	Filesystem		
	Name disk1	For	mat
	Mount Point /mnt/disk1 Mount		
	Used -		-

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

StarWi	nd Management Console	×
	Storage pool is not configured! Would you like to configure it?	
	Yes Disconnect	

7. Select the disk which was recently mounted.



S Open				×
👔 Back 矈 New Folder 🚬	Delete			
VSA Storage media mnt	Nam	Size	Date 05/10/2019 07:24	Attributes
File name:			V	~
			Op	en Cancel

### **Configuring Starwind Storage On Top Of Software** Raid

Make sure that the prerequisites for deploying Software RAID with StarWind Virtual SAN are met:

- the ESXi hosts have all the drives connected through HBA or RAID controller in HBA mode
- StarWind Virtual SAN for vSphere is installed on the ESXi server
- StarWind Virtual SAN must be installed on a separate storage device available to the ESXi host (e.g. SSD, HDD etc.)
- HBA or RAID controller will be added via a DirectPath I/O passthrough device to a StarWind VM
- vCenter is installed in the environment to manage ESXi hosts

PCI Device Configuration

1. Login to the vCenter via vSphere Client. Select the host where StarWind Virtual SAN VM is installed.



🖉 vSphere Web Client	× +				-		×
← → C ▲ Not sec	cure   https://sw-sup-vcenter.starwind.loca	l/vsphere-client/?csp	ħ	$\stackrel{\wedge}{\simeq}$	iD	Θ	:
<b>vm</b> ware <sup>.</sup>							
User name:	example@domain.local	VMware®vCenter® S	ing	le S	Sign	-On	
Password:	Use Windows session authentication						
Download Enhanced Aut	hentication Plugin						



192.168	B.12.11	<b>2</b>		💽   🐼	Actions	Ŧ		≡▼
Gettin	Sum	Monitor	Config	Permi	VMs	Datast	Netwo	Updat
		192.168.1 Hyperviso		VMw are ES	Vi	CPU		FF
9			и.	6.7.0, 10302	608	USED: 6,25	i GHz	CAPAC
		Model:		Dell Inc. Pow R720	erEdge	MEMORY		F
		Processo	г Туре:	Intel(R) Xeor CPU E5-266		USED: 43,1 STORAGE	I2 GB	CAPAC
		Lesie d D		2.20GHz		USED: 3,36	TR	CAP
		Logical Pr NICs:	ocessors:	32 7		0020.0,00	, 10	<u> </u>
		Virtual Ma	chines:	, 16				
		State:		Connected				
		Uptime:		24 days				
• Hard	dware					Co	nfiguration	1
▼ Tags	s					Cu	stom Attrik	outes
Assigned	Тад	Category		Description		Attribute		Value
4		This list is	emntv ::			AutoD	oploy Mo	¥

2. Go to the Configure tab. In the Hardware section, select PCI Devices. Click Edit.



] 192.168.12.11 🛛 🛃 🛃	Ū		👸 Actions 👻				=
Getting S Summary Monitor	Co	onfigure	Permissio	VMs	Datastores	Netwo	rks Update
		DirectPa	th I/O PCI Dev	ices Availa	ble to VMs		
Power Management	*		- Cl		0	Filter	-
Advanced System Settings			Č	Status	6	r Name	Device Name
System Resource Reservation							
Security Profile							
System Swap							
Host Profile							
Processors					=		
Memory							
Power Management							
PCI Devices							
▼ Virtual Flash				No devid	ce selecte	d	
Virtual Flash Resource Management	**						
Virtual Flash Host Swap Cache Configuration	•						
4	1						

3. Locate the HBA/RAID Controller of the ESXi host. Check the box on the appropriate PCI device. Click OK.



<b>P</b> -				Q Filte	r	-
ID		Status	Vendor Name	Device Name	ESX Name	
0000:01	1:00.1	Unavailable	Broadcom Corporation	NetXtreme B		4
	0:02.2	Not Configurable	Intel Corporation	Xeon E5/Cor		
	0000:03:00.0	Available (pendi	LSI / Symbios Logic	PERC H710	vmhba1	
000 📷 📃	0:00:1A.0	Unavailable	Intel Corporation	C600/X79 ser		
000 📷 🗌	0:00:1D.0	Unavailable	Intel Corporation	C600/X79 ser		
- 0000:0	0:01.0	Not Configurable	Intel Corporation	Xeon E5/Cor		
	0000:02:00.1	Unavailable	Broadcom Corporation	NetXtreme B		:
	0000:02:00.0	Unavailable	Broadcom Corporation	NetXtreme B		
000 📷 🗌	0:00:1F.2	Unavailable	Intel Corporation	Patsburg 6 P		
This device is not Name		vill become available aft ini (for monolithics)		LSI / Symbios Logic	:	
Device ID	5B	,		1000		
Subdevice ID	1E38		Subvendor ID	1028		
Class ID	104		Subvenuor ID	1020		
Bus Location	104					
ID	0000:03:00.0		Slot	0		
Bus	3		Function	NAN		
ESX/ESXi Devic	e vmhba1					

4. The device will appear in the Direct I/O PCI Devices Available to VMs table in the Available (pending) status.



Betting Started Summary Mon	itor	Configure Permissi	ons VM	ls Datastore	es Networks Up	date Manager			
44		DirectPath I/O PCI De	vices Avai	lable to VMs					
	-	/ 🗈 - C		Q Filter					
Storage Adapters				atus	Vendor Name	Device Name			
Storage Devices		▼ 0000:00:02.2	N			Xeon E5/Core			
Datastores	::	0000:03:00	0.0 A	vailable (pen.	LSI / Symbios	PERC H710 M.			
Host Cache Configuration									
Protocol Endpoints									
I/O Filters		1 device will become available when this host is rebooted. Reboot This Host							
<ul> <li>Networking</li> </ul>									
Virtual switches		0000:00:02.2							
VMkernel adapters		This device cannot be made available for VMs to use							
Physical adapters		Name		CI Express	Vendor Name	Intel Corporation			
TCP/IP configuration			IIO PCI I Root Po		Vendor ID	8086			
		Device ID	3C06		Subvendor ID	0			
Advanced		Subdevice ID	0						
Haranood									
Advanced Virtual Machines VM Startup/Shutdown		Class ID	604						

5. Reboot ESXi host. After the reboot, the status changes to Available.

📱 192.168.12.11 🛛 🛃 📳 🕞 🔯 Actions 🗸 🚍										
Getting Started Summary Monitor	Configure Permissi	ons VI	Vis Datastores N	etworks Update Ma	inager					
DirectPath I/O PCI Devices Available to VMs										
Storage     Storage Adapters	/ 🗈 - C			Q Filter -						
Storage Devices	ID • 0000:00:02.2		Status Not Configurable	Vendor Name Intel Corporation	Device Name Xeon E5/Core i7					
Datastores :: Host Cache Configuration	0000:03:00	0.0	Available	LSI / Symbios L	PERC H710 Mini					
Protocol Endpoints										
I/O Filters										
✓ Networking Virtual switches	0000:00:02.2									
VMkernel adapters	ters This device cannot be made available for VMs to use									
Physical adapters	Name	Xeon E5/Core i7 IIO PCI Express Root Port 2c								
TCP/IP configuration	Device ID	3C06								
Advanced	Subdevice ID	0								
✓ Virtual Machines	Class ID	604								
VM Startup/Shutdown	Bus Location									
Agent VM Settings	• ID 0000:00:02.2									

6. Right-click on the StarWind Virtual SAN VM. Select Edit Settings.



Getting Started Summary Monito	r Permissions VMs Update Manager
✓      ✓      Sw-sup-vo     Actions - StarWindVSAN_vSphere	
▼ Suppo Power	objects Folder
▶ 🔚 Bits Guest OS	Folders
Dis Snapshots	
▶ Gat	ventory W.
▼ Oni Template	
▶ <mark></mark> Par	
Fault Tolerance	
► Rer VM Policies ►	
Compatibility	
▶ Tall	
Yur Export System Logs	•••
Edit Resource Settings	
Edit Settings	
Move To	
Rename	Explore Further
Edit Notes	Learn more about folders
Tags & Custom Attributes	

7. Click ADD NEW DEVICE. Select PCI Device.



StarWindVSAN_vSphere - Edit Settings					
Virtual Hardware VM C	ptions SDRS Rules vAp	p Options			
► 🔲 CPU	4	0			
• Memory		MB			
▶ □ Hard disk 1	🛄 New Hard Disk	GB 🚽			
► → Hard disk 2	Existing Hard Disk	GB 🔻			
▶ G SCSI controller 0	🔒 RDM Disk				
Network adapter 1	Network	Connected			
Network adapter 2	[]	▼ Connected			
▶ 📻 Network adapter 3	CD/DVD Drive	Connected			
▶ <ul> <li>▶ OD/DVD drive 1</li> </ul>	Floppy Drive	Connected			
Video card	Serial Port	•			
SATA controller 0	Parallel Port				
VMCI device	Host USB Device				
<ul> <li>Other Devices</li> </ul>	🖶 USB Controller				
▶ Upgrade	SCSI Device	y Upgrade			
	The second secon				
	SCSI Controller				
New device:	Select	- Add			
Compatibility: ESXi 5.5 an	d later (VM version 10)	ОК	Cancel		

8. Add HBA/RAID Controller to the VM. Reserve memory for the StarWind Virtual Machine. Click OK.

9. Boot StarWind Virtual SAN VM.

10. Repeat steps 1-8 for all hosts where StarWind Virtual SAN for vSphere is deployed.

11. Login to StarWind Virtual SAN VM via IP. The default credentials:

Login: user Password: rds123RDS NOTE: Please make sure that the default password is changed.



StarWindVSA-92154285 × +	-		×
← → C 🔒 https://192.168.12.10:9090/system	☆		:
≈ Sta StarWind Virtual SAN	r Wan	đ	
	WindVSA-9215		
Password Log in with yo	our server user a	account.	
Reuse my password for privileged tasks			
Log In			

12. Go to the Storage page. The Drives section shows the drives connected to HBA/RAID Controller (if available). For each disk, create partition table.



≈ Storage - StarWindVSA-92	15428: × +				-		×
$\leftrightarrow$ $\rightarrow$ C $$ https://	/ 192.168.12.10:9090/sy	stem			☆		0 0 0
STARWIND VIRTUAL SAN					🔒 Privileged	<b>2</b> 1	root ~
StarWindVSA-92	MiB/s Reading						
System	512	<u> </u>					
Logs	0 14:59	15:00	15:01	15:02	15:03		
<b>Storage</b> Networking	KiB/s Writing						1
Accounts	64 32						-
Services	0 14:59	15:00	15:01	15:02	15:03		
Terminal	Filesystems						
	Name	Mount Point	Size				
	/dev/centos/root	/			2.35 / 13	.4 GiB	
	/dev/sda1	/boot			133 / 101	4 MiB	
	disk1	/mnt/disk1			0.0315 / 20.	0 GiB	
							•

13. 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:

RA	ID 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: https://knowledgebase.starwindsoftware.com/guidance/recommended-raid-settings-for-h dd-and-ssd-disks/



14. Select the drives to add to the array.

Storage - StarWindVSA-92	15428: × +		- 🗆 ×
$\leftrightarrow$ $\rightarrow$ C $$ https://	192.168.12.10:9	090/system	\$
STARWIND VIRTUAL SAN			🔒 Privileged 💄 root 🗸
StarWindVSA-92	Create RAID	Device	
System	Name RAID Level	RAID10 RAID 10 (Stripe of Mirrors)	~
Logs	Chunk Size	512 KiB	~
Storage	Disks	I6 GiB DELL PERC H710F	/dev/sdc
Networking		✓ 16 GiB DELL PERC H710F	/dev/sdd
Accounts		✓ 16 GiB DELL PERC H710F	/dev/sde
Services		I6 GiB DELL PERC H710F	/dev/sdf
Terminal			
			Cancel Create
		No storage set up as VDO	
	Drives		
		/Mware Virtual disk 16 GiB Hard Disk R: 0 B/s W: 0 B/s	

15. After the synchronization is finished, find the RAID array created. Press Create partition table and press Format afterward to create the partition and format it.

NOTE: It is not necessary to overwrite data while creating a partition.



Storage - StarWindVSA-92154	428 × +	-	
$\leftrightarrow$ $\rightarrow$ $C$ $$ https://1	92.168.12.10:9090/system	☆	:
STARWIND VIRTUAL SAN		Privileged	💄 root 🗸
StarWindVSA-92	Storage » RAID10		A
System	RAID Device RAID10	Stop De	lete
Logs	Device /dev/md/RAID10		
Storage	UUID fd81b6ab:31d1c828:1f0cbefb:a84290b3		
Networking	Capacity 32.0 GiB, 34.3 GB, 34324086784 bytes		
Networking	RAID Level RAID 10, 4 Disks, 512 KiB Chunk Size		
Accounts	Bitmap ON		
Services	State Running		
Terminal			
Services	Bitmap ON		

16. Create the XFS partition. Mount point should be as follows: /mnt/%yourdiskname% . Select the Custom mounting option and type noatime. To enable OS boot when mount point is missing (e.g., hardware failure), add *nofail* as a boot option. Click Format.



Storage - StarWindVSA-9215428: x +							
$\leftarrow$ $\rightarrow$ C $\square$ https:/	/192.168.12.10:909	0/system	\$		:		
STARWIND VIRTUAL SAN							
StarWindVSA-92	Format /dev/m	d/RAID10			Т		
System Logs	Erase Type	Don't overwrite existing data XFS - Red Hat Enterprise Linux 7 default		~			
Storage	Name Mounting	raid10 Custom		~			
Networking Accounts Services		mnt/raid10  Mount at boot Mount read only Custom mount options noatime					
Terminal		Formatting a storage devi		ta on i ormat	t.		
	Unrecognized I Usage - Type -	Data	Fc	ormat			

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



Storage - StarWindVSA-921	5428: × +	-		×
$\leftrightarrow$ $\rightarrow$ C $$ https://	/192.168.12.10:9090/system	☆		:
STARWIND VIRTUAL SAN		🔓 Privileged	<b>å</b> r	oot ~
StarWindVSA-92	Content	Create partition	table	•
System	✓ 32.0 GiB xfs File System /dev/md/RAID10			
Logs	Filesystem			-
Storage	Name raid10	F	ormat	
Networking	Mount Point mnt/raid10 Mount			
Accounts	Mount Options noatime Used -			
Services				
Terminal				~

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

StarWind Management Console		
	Storage pool is not configured! Would you like to configure it?	
	Yes Disconnect	

19. Select the disk recently mounted.



S Open X					
👔 Back 🝌 New Folder 🚬 Delete					
VSA Storage media	Name	Size	Date 05/10/2019 07:24	Attributes	
File name:	]			en Cancel	

# **Creating Starwind Devices**

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

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



			?	×
$\leftarrow$	Add D	evice Wizard		
	Select [	Device Type you want to create or export as iSCSI Target		
		Hard Disk Device		
	۲	Hard Disk Device		
	0	Tape Device		
	0	Optical Disc Drive		
		<u>N</u> ext	Car	ncel

### 3. Select Virtual Disk.



			?	×
←	Add [	Device Wizard		
	Select I	Disk Device Type		
	۲	Virtual Disk		
		Virtual Disk stores User Data in File		
	0	Physical Disk		
		Export existing physical Disk as iSCSI Target		
	0	RAM Disk		
		Virtual Disk with Memory Storage		
		Next	Can	cel

4. Specify a virtual disk Name, Location, and Size.



			?	×
←	Add Device Wiza	rd		
	Marcal Distance			
	Virtual Disk Loc	ation		
	Create a New	/irtual Disk		
	Name:	<pre><device name=""></device></pre>	]	
	Location:	My Computer\D\		
	Size:	<size> GB ~</size>		
	OUse an Existing	Virtual Disk		
	Location:	~		
	Read-On	ly Mode		
		Next	Cano	:el

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).

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 Dev	vice Wizard		
Sp	ecify [	Device RAM Cache Parameters		
	Mode			
	0	Write-Back Writes are performed asynchronously, actual Writes to Disk are delayed, Read are cached	s	
	0	Write-Through Writes are performed synchronously, Reads are cached		
	۲	N/A Reads and Writes are not cached		
	Set M	1aximum available Size		
	Size:	128 MB ~		
		Next	Cano	cel

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		_
	<target alias="" name=""></target>		
	Target Name		
	iqn.2008-08.com.starwindsoftware:sw1- <target alias="" name=""></target>		
	Allow multiple concurrent iSCSI Connections		
	<u>N</u> ext	Can	icel

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



	? )	<
←	Add Device Wizard	
	Creation Page	
	Press "Create" to add new Device and attach it to new Target	
	Progress	
	Creating Device Folder	
	Creating Image File	
	Creating Header	
	Creating Device	
	Creating Target and attaching Device	
		_
	Create Cancel	

9. Click Close to finish the device creation.

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

## **Select The Required Replication Mode**

The replication can 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.



# Synchronous "Two-Way" Replication

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

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

Replication Manager for imagefile1					
Refresh Add Replica Remove Replica					
Replication Partner					
Click to add replication partner					
PROPERTIES					
Host Name					
Target Name					
Mode					
Priority					
Synchronization Status					
Synchronization Channel					
	Clos	e .			

3. Select Synchronous "Two-Way" replication as a replication mode.



		?	×
$\leftarrow$	Replication Wizard		
	Replication Mode		
	Synchronous "Two-Way" Replication Replication Partner must be connected to Client as Source Device as well, MPIO must be enabled, needs dedicated high Performance Network Connection for Synchronization.	on Client	
	Witness Node Witness node doesn't contain user data. In case when Node Majority policy is se Synchronous replication device and there are two storage nodes, Witness Node added to cluster to make number of nodes odd number and enable proper funct Node Majority policy.	must be	
	<u>N</u> ext	Can	cel

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

## **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:

### Heartbeat

1. Select Failover Strategy.



		?	×
←	Replication Wizard		
	Failover Strategy		
	<ul> <li>Heartbeat         Process node and communication failures using additional communication chan (heartbeat). At least one synchronization or heartbeat channel must be funct proper failover processing. Loss of all communication channels may lead to spl issue, so it's recommended to use client iSCSI connection interfaces as heartb channel.     </li> <li>Node Majority         Process node and communication failures using majority policy: node stays act sees more than half of nodes including itself. In case of 2 storage nodes, require onfiguring additional witness node. Does not require additional heartbeat chances and the set of t</li></ul>	ional for it brain eat tive while i uires	it
	Next	Car	icel

2. Select Create new Partner Device and click Next.

3. Select a partner device Location and click Next.

4. 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:

https://knowledgebase.starwindsoftware.com/explanation/reasons-why-full-synchronizati on-may-start/

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 with 2-way replication and 4MB per 1 TB of HA device size for 3-way replication.

#### Failure journal

The strategy 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

The strategy 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 provider IO performance in any scenario.	s good	
	O Disk-based journal Synchronization journal placed on disk.		
	Failure journal The strategy provides good IO performance while all device nodes are in a state.	healthy	
	<ul> <li>Continuous journal</li> <li>The strategy guarantees fast synchronization and data consistency in all c</li> </ul>	ases.	
	Current Node My Computer\C\		
	Partner Node My Computer\C\		
	Next	Canc	el

5. Click Change Network Settings.



		?	×
←	Replication Wizard		
	Network Options for Replication		
	Networks for Synchronization and Heartbeat		
	Press "Change Network Settings" to configure Interfaces		
	Networks for Heartbeat		
	Press "Change Network Settings" to configure Interfaces		
	Change Network Settings		
	ALUA preferred		
	Change ALUA Settings		
	Next	Can	cel

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

Select synchronization channel						
Interfaces	Networks	Synchronization and H	Heartbeat			
Host Name: 192	.168.12.10					
172.16.10.10	172.16.10.0			_		
172.16.12.10	172.16.12.0					
172.16.20.10	172.16.20.0	✓				
172.16.22.10	172.16.22.0					
192.168.12.10	192.168.12.0		<b>V</b>			
Host Name: SW 172.16.10.20 172.16.11.20	2 172.16.10.0 172.16.11.0		<b>v</b>	_		
172.16.20.20	172.16.20.0	✓				
172.16.21.20	172.16.21.0					
192.168.12.20	192.168.12.0		~			
			OK Can			

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

8. Click Create Replica. Click Finish to close the wizard.

The successfully added device appears in StarWind Management Console.

9. Choose device, open Replication Manager and click Add replica again.



😴 Replication Manager for imagefile1					
Refresh Add Replica Remove Replica					
Replication Partner					
Click to add replication partner					
PROPERTIES					
Host Name					
Target Name					
Mode					
Priority					
Synchronization Status					
Synchronization Channel					
	Clos	e			

10. Select Synchronous "Two-Way" Replication as a replication mode. Click Next to proceed.



		?	×
$\leftarrow$	Replication Wizard		
	Replication Mode		
	Synchronous "Two-Way" Replication Replication Partner must be connected to Client as Source Device as well, MPIO on must be enabled, needs dedicated high Performance Network Connection for Synchronization.	Client	
	Witness Node Witness node doesn't contain user data. In case when Node Majority policy is set for Synchronous replication device and there are two storage nodes, Witness Node mu added to duster to make number of nodes odd number and enable proper function Node Majority policy.	ust be	
	Next	Canc	el

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



			?	×
←	Replication Wizard			
	Add Partner Node			
	Specify Partner Host Name	e or IP Address where Replication Node would be created		
	Host Name or IP Address	sw3 ~		
	Port Number	3261		
		Next	Can	cel
		<u>IN</u> EXL	Can	cei

12. Select Failover Strategy.



			?	×
←	Repli	cation Wizard		
	Failove	er Strategy		
		Heartbeat		
		Process node and communication failures using additional communication channel (heartbeat). At least one synchronization or heartbeat channel must be functional proper failover processing. Loss of all communication channels may lead to split braissue, so it's recommended to use client iSCSI connection interfaces as heartbeat channel.		
	0	Node Majority		
		Process node and communication failures using majority policy: node stays active sees more than half of nodes including itself. In case of 2 storage nodes, requires configuring additional witness node. Does not require additional heartbeat channe		:
		Next	Can	cel

13. Select Create new Partner Device and click Next.

14. Select a partner device Location and Synchronization Journal Strategy and click Next.

15. Click Change Network Settings.



		?	×
←	Replication Wizard		
	Network Options for Replication		
	Networks for Synchronization and Heartbeat		1
	Press "Change Network Settings" to configure Interfaces		
	Networks for Heartbeat		1
	Press "Change Network Settings" to configure Interfaces		
	Change Network Settings		
	ALUA preferred SW1, SW2, SW3		
	Change ALUA Settings		
	Next	Can	cel

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



ecify Interfaces for	Synchronization Channe	ls		>
Select synchronizatio	n channel			
Interfaces	Networks	Synchronization and	Heartbeat	^
172.16.20.10	172.16.20.0			
172.16.22.10	172.16.22.0			
192.168.12.10	192.168.12.0		<b>~</b>	- 64
🖃 Host Name: SV	V2.starwind.local			
172.16.10.20	172.16.10.0		<b>V</b>	
172.16.11.20	172.16.11.0		•	
172.16.20.20	172.16.20.0	$\checkmark$		
172.16.21.20	172.16.21.0			
192.168.12.20	192.168.12.0		$\checkmark$	
🖃 Host Name: SV	V3			
172.16.11.30	172.16.11.0		~	
172.16.12.30	172.16.12.0		•	
172.16.21.30	172.16.21.0			
172.16.22.30	172.16.22.0			
192.168.12.30	192.168.12.0			
				$\sim$

NOTE: It is not recommended to configure the Heartbeat and iSCSI channels on the same interfaces to avoid the split-brain issue. If the Synchronization and Heartbeat interfaces are located on the same network adapter, it is recommended to assign one more Heartbeat interface to a separate adapter.

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

18. Click Create Replica. Click Finish to close the wizard.



	?	$\times$
Replication Wizard		
Creation Page		
Creating Device Folder		^
Creating Storage File on Partner Host		
Creating Storage Header on Partner Host		
Creating Storage Device on Partner Host		
Creating Device Header on Partner Host		
Creating Device Header on current Host		
Requesting Device Name		
Updating Target Device on current Host		~
Create Replica	Ca	ncel

The successfully added device appears in StarWind Management Console.

19. Follow the similar procedure for the creation of other virtual disks that will be used as storage repositories.



StarWind Management Const	ole			_	×
FILE HOST TARGET OPTIC	ONS HELP				
	Add Server Remove Server	+ + Add Device (advance	d) Add VTL Device Remove	Target Help	
<ul> <li>Servers</li> <li>SW1 (127.0.0.1):</li> </ul>	♦ DS1				^
▲ ▲ ▲ → DS1     HAlmage1     ▲ ↓ DS2	Target IQN Clustering Group	iqn.2008-08.com.starwin Yes General	dsoftware:sw1-ds1		
HAlmage2	Devices (1)	LUN	Device Type	State	
	📼 HAlmage1	0	HA	Active	
HAlmage1 A C DS2 HAlmage2 A SW3 (192.168.12 A C DS1 HAlmage1 A C DS2 HAlmage2 HAlmage2	ি iqn.2008-08.c ি iqn.2008-08.c ি iqn.2008-08.c ি iqn.2008-08.c ি iqn.2008-08.c ি iqn.2008-08.c ট iqn.2008-08.c	ns (8) com.starwindsoftware:sw2-ds com.starwindsoftware:sw2-ds com.starwindsoftware:sw2-ds com.starwindsoftware:sw3-ds com.starwindsoftware:sw3-ds com.starwindsoftware:sw3-ds com.starwindsoftware:sw3-ds	1 1 1 1 1		
StarWind Software Ready	CHAP Permi	ssions (0) + Add Perr	nission		> <b>*</b>

NOTE: To extend an Image File or a StarWind HA device to the required size, please check the article below:

https://knowledgebase.starwindsoftware.com/maintenance/how-to-extend-image-file-or-high-availability-device/

# **Node Majority**

1. Select the Node Majority failover strategy and click Next.



			?	×
÷	Replic	cation Wizard		
	Failove	r Strategy		
	0	Heartbeat Process node and communication failures using additional communication channel (heartbeat). At least one synchronization or heartbeat channel must be functional proper failover processing. Loss of all communication channels may lead to split be issue, so it's recommended to use client iSCSI connection interfaces as heartbeat channel.	ain	
	۲	<b>Node Majority</b> Process node and communication failures using majority policy: node stays active sees more than half of nodes including itself. In case of 2 storage nodes, requires configuring additional witness node. Does not require additional heartbeat channe	s	
		<u>N</u> ext	Can	cel

2. Choose Create new Partner Device and click Next.

3. Specify the partner device Location and modify the target name if necessary. Click Next.

4. 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:

https://knowledgebase.starwindsoftware.com/explanation/reasons-why-full-synchronizati on-may-start/

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 with 2-way replication and 4MB per 1 TB of HA device size for 3-way replication.

### Failure journal

The strategy 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

The strategy 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.

5. In Network Options for Replication, press the Change network settings button and select the synchronization channel for the HA device.

6. In Specify Interfaces for Synchronization Channels, select the checkboxes with the appropriate networks and click OK. Then click Next.

7. Select Synchronize from existing Device as the partner device initialization mode.

- 8. Press the Create Replica button and close the wizard.
- 9. The added devices will appear in StarWind Management Console.
- 10. Choose device, open Replication Manager and click Add replica again.



😴 Replication Manager for imagefile1	?	×
Refresh Add Replica Remove Replica		
Replication Partner		
Click to add replication partner		
PROPERTIES		
Host Name		
Target Name		
Mode		
Priority		
Synchronization Status		
Synchronization Channel		
	Clos	e

11. Select Synchronous "Two-Way" Replication as a replication mode. Click Next to proceed.



	;	?	×
~	Replication Wizard		
	Replication Mode		
	Synchronous "Two-Way" Replication Replication Partner must be connected to Client as Source Device as well, MPIO on must be enabled, needs dedicated high Performance Network Connection for Synchronization.	Client	
	Witness Node Witness node doesn't contain user data. In case when Node Majority policy is set for Synchronous replication device and there are two storage nodes, Witness Node mu added to cluster to make number of nodes odd number and enable proper functionin Node Majority policy.	st be	
	Next	Canc	el

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



			?	×
←	Replication Wizard			
	Add Partner Node			
	Specify Partner Host Name	e or IP Address where Replication Node would be created		
	Host Name or IP Address	sw3 ~		
	Port Number	3261		
		<u>N</u> ext	Can	cel

13. Select the Node Majority failover strategy and click Next.



			?	×
←	Replie	cation Wizard		
	Failove	r Strategy		
	0	Heartbeat Process node and communication failures using additional communication channel (heartbeat). At least one synchronization or heartbeat channel must be function: proper failover processing. Loss of all communication channels may lead to split bi issue, so it's recommended to use client iSCSI connection interfaces as heartbeat channel.	rain	
	١	<b>Node Majority</b> Process node and communication failures using majority policy: node stays active sees more than half of nodes including itself. In case of 2 storage nodes, require configuring additional witness node. Does not require additional heartbeat chann	s	
		Next	Can	cel

14. Choose Create new Partner Device and click Next.

15. Specify the partner device Location and modify the target name if necessary. Click Next.

16. Select Synchronization Journal Strategy and click Next.

17. In Network Options for Replication, press the Change network settings button and select the synchronization channel for the HA device.

18. In Specify Interfaces for Synchronization Channels, select the checkboxes with the appropriate networks and click OK. Then click Next.

19. Select Synchronize from existing Device as the partner device initialization mode.

20. Press the Create Replica button and close the wizard.

21. The added devices will appear in StarWind Management Console.

Repeat the steps above to create other virtual disks if necessary. NOTE: To extend an Image File or a StarWind HA device to the required size, please check the article below:



https://knowledgebase.starwindsoftware.com/maintenance/how-to-extend-image-file-orhigh-availability-device/

### **Preparing Datastores**

#### **Adding Discover Portals**

1. To connect the previously created devices to the ESXi host, click on the Storage -> Adapters -> Configure iSCSI and choose the Enabled option to enable Software iSCSI storage adapter.

Datastores	Adapters Devices	
Real Configure is	SCSI 💻 Rescan   🧲 Refresh   🕴	Actions
Name	Configure iSCSI - vmhba65	
vmhba0 vmhba1 vmhba64	iSCSI enabled	O Disabled   Enabled
Man Windou	Name & alias	iqn.1998-01.com.vmware:sw-mar-pc3-6fbab48a
	<ul> <li>CHAP authentication</li> </ul>	Do not use CHAP
	<ul> <li>Mutual CHAP authentication</li> </ul>	Do not use CHAP
	Advanced settings	Click to expand
	Network port bindings	Add port binding Remove port binding VMkernel NIC  Vert group  VIPv4 address  V
	Static targets	Add static target Remove static target Sedit settings

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



	Configure i SC SI - vmhba65		
vmhba0 vmhba1	iSCSI enabled	O Disabled   Enabled	
vmhba64	Name & alias	iqn.1998-01.com.vmware:sw-mar-pc3-6fbab48a	
	▶ CHAP authentication	Do not use CHAP	
	Mutual CHAP authentication	Do not use CHAP	
	<ul> <li>Advanced settings</li> </ul>	Click to expand	
	Network port bindings	🕍 Add port binding 🛛 🛒 Remove port binding	
		VMkernel NIC ~ Port group ~	<ul> <li>IPv4 address</li> </ul>
	Static targets	🔯 Add static target 🛛 👰 Remove static target 🥒 Edit se	ttings
			Q Search
		Target ~ Address	~ Port ~

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

	🕎 Remove dynamic target 🏼 🥒 Edit s	ettings	Q Search
Address	~	Port	~
172.16.10.10		3260	
Click to add address		3260	

🙋 Add dynamic target 🛛 👰 Remove dynamic target 🥒 Edit s	settings Q Search
Address ~	Port ~
172.16.10.10	3260
172.16.10.20	3260
	Save configuration Cancel

Confirm the actions by pressing Save configuration.

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



Configure iSCSI						
iSCSI enabled	O Disabled   Enabled					
Name & alias	iqn.1998-01.com.vmware:sw-mar-pc3-6fbab48a					
<ul> <li>CHAP authentication</li> </ul>	Do not use CHAP					
<ul> <li>Mutual CHAP authentication</li> </ul>	Do not use CHAP					
<ul> <li>Advanced settings</li> </ul>	Click to expand					
Network port bindings	http://www.commons.com/www.commons.com/www.commons.com/www.co					
	VMkernel NIC  v Port group	✓ IPv4 addr	ress ~			
	No port bindings					
Static targets	💆 Add static target 🛛 👰 Remove static target 🥒 Edit settings		Q Search			
	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	🔯 Add dynamic target 🛛 👰 Remove dynamic target 🥒 Edit s	ettings	Q Search			
	Address ~	Port	~			
	172.16.10.10	3260				
	172.16.10.20	3260				
			Save configuration Cancel			

5. Click on the Rescan button to rescan storage.

atastores Adapters Devices				
🗐 New datastore 🛛 Increase capacity 📕 Rescan 📔 🤁 Refresh 📔 🏠 Actions				
Name	~ Status	~ Туре	~ Capacity	
STARWIND ISCSI Disk (eui.f8289e52a311c08d)	Normal	Disk	3 GB	
Local NECVMWar CD-ROM (mpx.vmhba64:C0:T0:L0)	Normal	CDROM	Unknown	
STARWIND ISCSI Disk (eui.ccdb82632aff4068)	📀 Normal	Disk	3 GB	
Local VMware Disk (mpx.vmhba0:C0:T0:L0)	Normal	Disk	40 GB	

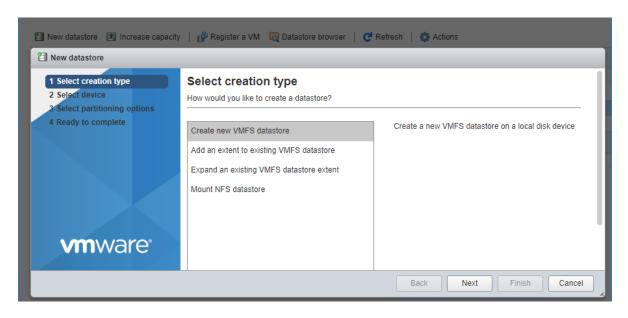
6. Now, the previously created StarWind devices are visible to the system.

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.

省 New datastore 📧 Increase capaci	ty 🕴 💕 Register a VM 🛛 🤯 Datastore browse	r   C Refresi	n   🏠 Act	tions			
Name	~	Drive Type	`	Capacity		~ Provisio	ned
New datastore - DS1							
<ul> <li>1 Select creation type</li> <li>2 Select device</li> <li>3 Select partitioning options</li> <li>4 Ready to complete</li> </ul>	Select device Select a device on which to create a new VMF Name DS1 The following devices are unclaimed and can		e a new VMF	-S datastore			
	Name STARWIND ISCSI Disk (eui.22ae584be2 STARWIND ISCSI Disk (eui.8d6cd81bcc		Type Disk Disk	Capacit 5 GB 6 GB	y ~	Free space 5 GB 6 GB	~
						:	2 items
<b>vm</b> ware <sup>®</sup>				Back	Next	Finish	Cancel

3. Enter datastore size and click Next.



🗐 New datastore - D\$1					
<ul> <li>1 Select creation type</li> <li>2 Select device</li> <li>3 Select partitioning options</li> </ul>	Select partitioning optic				
4 Ready to complete	Use full disk 🔻	VMFS 6	¥		
	Before, select a partition		After		
	Free space (5	GB)	1. X	VMFS (5 GB)	
<b>vm</b> ware <sup>®</sup>					
			Back	Next Finish	Cancel

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.

🖆 New datastore 📧 Increase capacity 🛛 😰 Register a VM 🛛 🧔 Datastore browser 📔 😋 Refresh 🗧 🤹 Actions							
Name ~	Drive Type ~	Capacity ~	Provisioned ~	Free			
atastore1 (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.



		Storage Devices								
Storage	^	🛃 🚊   🗟 🗟 🛋 🥥 🥥 📧   🎆 All Ac	tions ¬	•	-				Q	Filter
Storage Adapters		Name	LUN		Туре	Capacity	Operational State	Hardware Acceleration	Drive Type	Transport
Storage Devices		Local VMware Disk (mpx.vmhba0:C0:T0:L0)		0	disk	40,00 GB	Attached	Not supported	HDD	Parallel SCSI
Datastores	::	Local NECVMWar CD-ROM (mpx.vmhba64:C0:T0		0	cdrom		Attached	Not supported	HDD	Block Adapter
Host Cache Configuration		STARWIND iSCSI Disk (eui.22ae584be2580eda)		0	disk	5,00 GB	Attached	Supported	HDD	iSCSI
Protocol Endpoints		STARWIND iSCSI Disk (eui.8d6cd81bccb9730d)		0	disk	6,00 GB	Attached	Supported	HDD	iSCSI
I/O Filters	H									
Networking		Device Details				=				
Virtual switches		Device Details								
VMkernel adapters		Properties Paths								
Physical adapters		Logical Partitions     U								
TCP/IP configuration										
		Multipathing Policies								Edit Multipathing
Advanced		Path Selection Policy     Most Recently Used (VMware)								
Advanced Virtual Machines		Path Selection Policy     Most Recently Used (VMware)								

Path selection policy:				
Round Robin (VMware)				
Select the preferred path f	for this policy:			
<b>•</b> •			Filter	-
Runtime Name	Status	Target	LUN	Preferred
vmhba65:C0:T3:L0	<ul> <li>Active</li> </ul>	iqn.2008-08.com.starwindsoftware:sw	0	
vmhba65:C0:T1:L0	<ul> <li>Active (I/O)</li> </ul>	iqn.2008-08.com.starwindsoftware:sw	0	

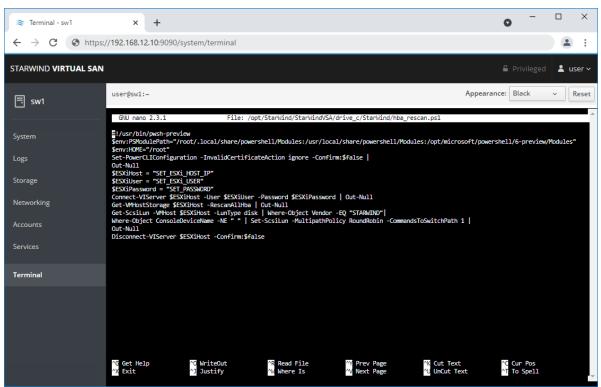
# **Configuring An Automatic Storage Rescan**

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



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 = "Login"
\$ESXiPassword = "Password"

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.

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:

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.



📲 esxi01.starwind.local - VMware E 🗙	+		0	- 0	×
← → C ▲ Not secure   19	92.168.12.225/ui/#/host/manage/secur	ity/users		\$	:
<b>vm</b> ware <sup>,</sup> ESXi <sup>,,</sup>		root@15	92.168.12.225 👻   Help 👻   🔍 Sear	ch	P
E Navigator	esxi01.starwind.local - Manage				
<ul> <li>Bost</li> <li>Manage</li> <li>Monitor</li> <li>Virtual Machines</li> <li>SV1</li> <li>SV1</li> <li>Monitor</li> <li>More VMs</li> <li>Storage</li> <li>with vmhba65</li> <li>More storage</li> <li>Metworking</li> </ul>	Authentication U Certificates U Users ro Roles Lockdown mode	Packages     Services     Security       Add user     Image: Control of the security of the	virity & users  Seer  Refresh  Search  Description  Administrator  rescan  Storage rescan  Multiple  Add Cancel	1 items	
	Recent tasks				

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.

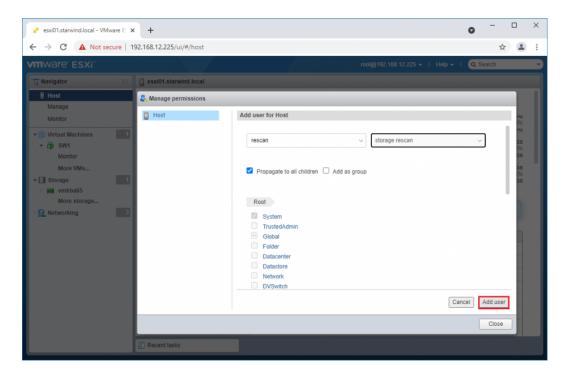
esxi01.starwind.local - VMware E	+			• -		×
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VmWare ESXI Navigator	esxi01.starwind.local - Manage System Hardware Licensin Acceptance level Authentication Certificates Users Roles Lockdown mode	ng Packages Services S + Add role / Edit role X Remove + Add a role Role name (required) Privileges	ecurity & users	Q Search		
			VirtualMachine Resource			
	😨 Recent tasks			Add	Cancel	*



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.

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 /opt/StarWind/StarWindVSA/drive\_c/StarWind/hba\_rescan.ps1

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.



lvanced settings	🥒 Edit option 📔 🤁 Refresh 🛛 🌞 Actions	
utostart	Key 🔺	✓ Name
ap		<ul> <li>Name</li> <li>Delay in miniseconds for completion or commands with a positistature</li> </ul>
Time & date	Disk.DeviceReclaimTime	The number of seconds between device re-claim attempts
	Disk.DisableVSCSIPollInBH	Disable VSCSI_Poll in bottom half. Set to 1 to disable.
	Disk.DiskDelayPDLHelper	Delay PDL helper in secs
	Disk.DiskMaxIOSize	Max Disk READ/WRITE I/O size before splitting (in KB)
	Disk.DiskReservationThreshold	Time window within which refcounted reservations on a device are pe
	Disk.DiskRetryPeriod	Retry period in milliseconds for a command with retry status
	Disk.DumpMaxRetries	Max number of I/O retries during disk dump
	Disk.DumpPollDelay	Number of microseconds to wait between polls during a disk dump.
	Disk.DumpPollMaxRetries	Max number of device poll retries during disk dump
	Disk.EnableNaviReg	Enable automatic NaviAgent registration with EMC CLARiiON and Inv
	Disk.FailDiskRegistration	Fail device registration if disk has only standby paths and supports on
	Disk FastPathRestoreInterval	Time interval (in msec) to monitor the IO latency to evaluate eligibility
	Distri dall'all'intestorentes var	Time interval (in more) to monitor the ro latency to evaluate engineery

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

System	Hardware Li	icensing Packag	ges Services	Security & users				
Advance	d settings	🥒 Edit option	CRefresh	Actions				
Swap			Key 🔺 🗸 🗸					
Time & date			Disk.DeviceReclaimTime					
		Disk.DisableVS	Disk.DisableVSCSIPollInBH					
		Disk.DiskDelay	Disk.DiskDelayPDLHelper					
		Disk.DiskMaxI	Disk.DiskMaxIOSize					
		📝 Edit option	Bedit option - Disk.DiskMaxIOSize					
		New valu	e	512 (long integer)				
						- 1		
				[	Save	Cancel		
		Quick filters.		T				

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

NOTE: Changing Disk.DiskMaxIOSize to 512 might cause startup issues with Windowsbased 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



licensed.

SWVCluster	🛾 🔁 📬 🔠 😂   🎯 Ad	ctions 👻				
Getting Started	Summary Monitor Configure	Permissions Hosts VMs D	atastores Networks Upda	te Manager		
••	SWVCluster - Edit Cluster Set	ttings		? )		
- Services	vSphere DRS	vSphere Availability				
v Sphere Di v Sphere Ar	vSphere Availability	vSphere Availability is compri	sed of vSphere HA and Proact	ive HA. To enable Proactive		
🗸 v SAN	Failures and Responses Proactive HA Failures	Turn ON vSphere HA				
General Disk Mana	and Responses Admission Control	Turn on Proactive HA	1 Turn on DRS to enable			
Fault Doma Cluster	Heartbeat Datastores	Failure	Response	Details		
Health and	Advanced Options	Host failure	<ul> <li>Restart VMs</li> </ul>	Restart VMs using V		
iSCSI Targe		Proactive HA	Disabled	Proactive HA is not e		
iSCSI Initia		Host Isolation	Disabled	VMs on isolated hos		
Configurat Updates		Datastore with Permanent Device Loss	Disabled	Datastore protection disabled.		
<ul> <li>Configurat</li> </ul>		Datastore with All Paths Down	Disabled	Datastore protection disabled.		
General Licensing		Guest not heartbeating	Disabled	VM and application r		
VMware EV						
VM/Host G		4		::		
VM/Host R	4			Þ		
VM Overric				OK Cancel		
Host Optio						

# Conclusion

The Configuration Guide for StarWind Virtual SAN in a 3-node hyperconverged scenario with VMware vSphere offers detailed steps for enhancing virtualized environments through advanced storage solutions. By leveraging StarWind Virtual SAN, organizations can significantly optimize their VMware clusters, ensuring a resilient, efficient, and scalable infrastructure suitable for various virtualization workloads.



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