

StarWind Virtual SAN: Configuration Guide for Proxmox Virtual Environment [KVM], VSAN Deployed as a Controller Virtual Machine (CVM) using Web UI

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TECHNICAL PAPERS



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About StarWind

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

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Annotation

Relevant products

This guide applies to StarWind Virtual SAN, StarWind Virtual SAN Free (starting from version 1.2xxx – Oct. 2023).

Purpose

This document outlines how to configure a Proxmox Cluster using StarWind Virtual SAN (VSAN), with VSAN running as a Controller Virtual Machine (CVM). The guide includes steps to prepare Proxmox hosts for clustering, configure physical and virtual networking, and set up the Virtual SAN Controller Virtual Machine.

For more information about StarWind VSAN architecture and available installation options, please refer to the StarWind Virtual (vSAN) Getting Started Guide.

Audience

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

Expected result

The end result of following this guide will be a fully configured high-availability Proxmox Cluster that includes virtual machine shared storage provided by StarWind VSAN.

Prerequisites

StarWind Virtual SAN system requirements

Prior to installing StarWind Virtual SAN, 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



Solution diagram

The diagrams below illustrate the network and storage configuration of the solution:



2-node cluster





3-node cluster

Preconfiguring cluster nodes

1. ProxMox cluster should be created before deploying any virtual machines.

2. 2-nodes cluster requires quorum. iSCSI/SMB/NFS cannot be used for this purposes. QDevice-Net package must be installed on 3rd Linux server, which will act as a witness. https://pve.proxmox.com/wiki/Cluster_Manager#_corosync_external_vote_support

3. Install qdevice on witness server:

ubuntu# apt install corosync-qnetd

4. Install qdevice on both cluster nodes:

pve# apt install corosync-qdevice

5. Configure quorum running the following command on one of the ProxMox node (change IP address)

```
pve# pvecm qdevice setup %IP_Address_Of_Qdevice%
```

6. Configure network interfaces on each node to make sure that Synchronization and iSCSI/StarWind heartbeat interfaces are in different subnets and connected according to the network diagram above. In this document, 172.16.10.x subnet is used for iSCSI/StarWind heartbeat traffic, while 172.16.20.x subnet is used for the Synchronization traffic. Choose node and open System -> Network page.

	ent 8.1.4 Search						
Server View 🗸 🌣	Node 'sw-demo-node-01'						
✓ ■ Datacenter (sw-demo-cluster) ✓ ■ sw-demo-node-01		Create v	Revert Edit F	Remove	Apply Configura	ation	
localnetwork (sw-demo-node-01)	Summary	Name 个	Туре	Active	Autostart	VLAN a	Por
Sali local-lvm (sw-demo-node-01)	D Notes	eno1	Network Device	No	No	No	
sw-demo-node-02	>_ Shell	eno2 eno3	Network Device	Yes	No	No	
local (sw-demo-node-02)	📽 System 👻	eno4	Network Device	No	No	No	
🛢 🗌 local-lvm (sw-demo-node-02)	≓ Network	ens1f0np0	Network Device	Yes	No	No	
	Certificates	ens1f1np1	Network Device	Yes	No	No	

7. Click Create. Choose Linux Bridge.

	onme	ent 8.1.4 Search					
Server View ~	\$	Node 'sw-demo-node-01'					
∨📰 Datacenter (sw-demo-cluster)			Create	Bouost Edit	Domovo	Apply Configur	otion
∨ 🌄 sw-demo-node-01		O Search	Create	Revent	Remove	Apply Conligu	auon
localnetwork (sw-demo-node-O	1)		Linux Bridge	e	Active	Autostart	VLAN a
🗐 🛛 local (sw-demo-node-01)		🛢 Summary	Linux Bond	work Dovice	No	No	No
🛢 🗌 local-lvm (sw-demo-node-O1)		🖵 Notes	- Linux VLAN	WORK Device	INU	NU	NU
v 🌄 sw-demo-node-02		Chall	OVS Bridge	work Device	No	No	No
localnetwork (sw-demo-node-0)	21	>_ Shell	ovo p	work Device	Yes	No	No
Second (sw-demo-node-02)	-/	📽 System 👻	OVS Bond	work Device	No	No	No
Scal-lvm (sw-demo-node-02)		≓ Network	enamonpo	werwork Device	Yes	No	No
		Certificates	ens1f1np1	Network Device	Yes	No	No

Linux Bridge and set IP address. Set MTU to 9000. Click Create.

Create: Linux Br	idge			\otimes
Name:	vmbr1	Autostart:		
IPv4/CIDR:	172.16.10.1/24	VLAN aware:		
Gateway (IPv4):		Bridge ports:	ens1fOnp0	
IPv6/CIDR:		Comment:		
Gateway (IPv6):				
MTU:	9000 \Diamond			
😧 Help			Advanced 🗹 🗌 Creat	te

9. Repeat step 8 for all network adapters, which will be used for Synchronization and iSCSI/StarWind heartbeat traffic.



10. Verify network configuration in /etc/network/interfaces file. Login to the node via SSH and check the contents of the file.

auto lo
iface lo inet loopback
iface enpls0 inet manual
iface enp7s0 inet manual mtu 9000
iface enp8s0 inet manual mtu 9000
auto vmbr0
iface vmbr0 inet static address 172.16.2.37/24 gateway 172.16.2.1 bridge-ports enp1s0 bridge-stp off bridge-fd 0
auto vmbr1
iface vmbrl inet static
address 172.16.10.1/24
bridg-ports enp/s0
bridge-stp orr
mtu 9000
auto vmbr2
iface vmbr2 inet static
address 172.16.20.1/24
bridge-ports enp8s0
bridge-stp off
bridge-fd 0
meta 9000
INSERT

11. Enable IOMMU support in kernel, if PCIe passthourgh will be used to pass RAID Controller, HBA or NVMe drives to the VM. Update grub configuration file. For Intel CPU:

Add "intel_iommu=on iommu=pt" to GRUB_CMDLINE_LINUX_DEFAULT line in /etc/default/grub file.

For AMD CPU:

Add "iommu=pt" to GRUB_CMDLINE_LINUX_DEFAULT line in /etc/default/grub file.



root@sw-demo-node-01:~# cat /etc/default/grub # If you change this file, run 'update-grub' afterwards to update # /boot/grub/grub.cfg. # For full documentation of the options in this file, see: info -f grub -n 'Simple configuration' fť GRUB DEFAULT=0 GRUB TIMEOUT=5 GRUB_DISTRIBUTOR=`lsb_release -i -s 2> /dev/null || echo Debian` GRUB CMDLINE LINUX DEFAULT="quiet intel iommu=on iommu=pt" GRUB CMDLINE LINUX="" # If your computer has multiple operating systems installed, then you # probably want to run os-prober. However, if your computer is a host # for guest OSes installed via LVM or raw disk devices, running # os-prober can cause damage to those guest OSes as it mounts # filesystems to look for things. #GRUB_DISABLE_OS_PROBER=false # Uncomment to enable BadRAM filtering, modify to suit your needs # This works with Linux (no patch required) and with any kernel that obtains # the memory map information from GRUB (GNU Mach, kernel of FreeBSD ...) #GRUB_BADRAM="0x01234567,0xfefefefe,0x89abcdef,0xefefefef" # Uncomment to disable graphical terminal #GRUB TERMINAL=console # The resolution used on graphical terminal # note that you can use only modes which your graphic card supports via VBE # you can see them in real GRUB with the command `vbeinfo' #GRUB_GFXM0DE=640x480 # Uncomment if you don't want GRUB to pass "root=UUID=xxx" parameter to Linux #GRUB DISABLE LINUX UUID=true # Uncomment to disable generation of recovery mode menu entries #GRUB_DISABLE_RECOVERY="true" # Uncomment to get a beep at grub start #GRUB_INIT_TUNE="480 440 1" root@sw-demo-node-01:~#

Reboot the host.
 Repeat steps 6-12 an all nodes.

Deploying Starwind Virtual San Cvm

1. Download StarWind VSAN CVM KVM: VSAN by StarWind: Overview

2. Extract the VM StarWindAppliance.qcow2 file from the downloaded archive.

3. Upload StarWindAppliance.qcow2 file to the Proxmox Host via any SFTP client (e.g. WinSCP) to /root/ directory.



/root/					
Name	Size	Changed	Rights	Owner	
t_		2/26/2024 8:35:01 AM	rwxr-xr-x	root	
CVM-0.qcow2	10,614,3	3/18/2024 6:13:02 AM	rw-rr	root	

4. Create a VM without OS. Login to Proxmox host via Web GUI. Click Create VM.

	8.0.3 Search				@ Documentation 📮 Create VM	😧 Create CT 🛔 root@pam 🗸
Server View 🗸 🗘	Node 'pve-01'				D Reboot O Shutdown >_ Shell >	I Bulk Actions V @ Help
Datacenter	Q Search	Package versions				Hour (average)
■ local (pve-01)	Summary	pve-01 (Uptime: 02:11:41)				
B (bock-larger-61) B pre-42) B (bock-larger-62) B (bock-larger-62) B (bock-larger-62) B (bock-larger-62) B (bock-larger-62) C S (prime C S (prim C S (prim C S (prime C S (prime C S (pri	Notes Shell	當 CPU usage 罰 Load average	0.11% of 16 CPU(s) 0.05,0.09,0.04	@ 10 delay		0.00%
	RAM usage	9.70% (1.51 GiB of 15.55 GiB) 35 38% (7.70 GiB of 21.17 GiB)	KSM sharing		0 B	
	DNS Hosts Options Time Syslog	CPU(s) Kemal Version PVE Manager Version Repository Status		∠inux 6.2.	16 x Intel(R) Xeon(R) Gold 6136 16-3-pre #1 SMP PREEMPT_DYNAMIC PVE 6. pve-mana rprise repository enabled 🚹 Enterprise reposito	CPU @ 3.00GHz (1 Sockat) 2.16-3 (2023-06-17105-582) gen/8 0.3bb/1993334bfa916 ry needs valid subscription >
	C Updates - C Repositories Firewall - Disks - LVM LVM-Thin	CPU usage			• 0	PU usage • 10 delay

5. Choose node to create VM. Enable Start at boot checkbox and set Start/Shutdown order to 1. Click Next.



Create: Vir	tual M	achine					\otimes
General	OS	System	Disks	CPU	Memory	Network Confir	m
Node: VM ID:		sw-demo-no	ide-01		~	Resource Pool:	~
Name:		CVM01					
Start at boo	it:					Start/Shutdown order:	1
						Startup delay:	default
						Shutdown timeout:	default
No Tags	+						
😧 Help							Advanced 🗹 🛛 Back 🛛 Next
🕑 Help]						Advanced 🗹 Back Next
Help Help Create: Vii	e Do) not use	e any r	media	and ch	noose Guest O	Advanced ≥ Back Next
Help Help C. Choos Create: Vii General	e Do rtual N) not use Aachine System	e any r _{Disks}	media _{CPU}	and ch	Noose Guest O	Advanced ≥ Back Next OS Linux. Click Next. ⊗
Help Help Create: Vil General Use C	ie Do rtual M OS	0 NOT USE Aachine System disc image f	e any r Disks ile (iso)	media CPU	and ch	Network Confi Guest OS:	Advanced ≥ Back Next OS Linux. Click Next. ⊗
Help Help Create: Vil General Use Cl S	ie Do rtual N OS D/DVD	D NOT USE Aachine System disc image f	e any r Disks ile (iso)	media CPU	and ch Memory	Noose Guest O Network Confi Guest OS: Type:	Advanced 🗹 Back Next OS Linux. Click Next. ©
Help Help Create: Vir General Use Cl S	se Do rtual N OS D/DVD Storage	D not use Aachine System disc image f	e any r Disks ile (iso)	media CPU	And ch Memory	Network Confi Guest OS: Type: Version:	Advanced Dack Next OS Linux. Click Next. im Linux ~ 6.x - 2.6 Kernel ~
Help Help Create: Vii General Use C S ISO Use ph	e Do rtual N OS D/DVD Storage Image	D not use Machine System disc image f disc image f colocal	e any r Disks ile (iso)	cpu	Memory	Network Confi Guest OS: Type: [Version: [Advanced Mext Next OS Linux. Click Next. im Linux 6.x - 2.6 Kernel
Help Help Create: Vir General Use C S ISO Use ph O Do not	se Do rtual N OS D/DVD Storage hysical t use a	D not use Aachine System disc image f disc image f colocal colocal colocal	e any r Disks ile (iso) ze	cpu	Memory	Network Confi Guest OS: Type: [Version: [Advanced Veace Next OS Linux. Click Next. Imm Linux 6.x - 2.6 Kernel
Help Help Create: Vil General Use Cl S ISO Use pl Do not	se Do rtual N OS D/DVD Storage hysical t use a	D not use Aachine System disc image f disc image f colocal CD/DVD Driv ny media	e any r Disks ile (iso) /e	media сри	Memory	Network Confi Guest OS: Type: [Version: [Advanced 🕑 Back Next OS Linux. Click Next. im Linux × 6.x - 2.6 Kernel ×
Help Help Create: Vir General Use Cl S ISO Use pr O Do not	se Do rtual N O/DVD Storage Pimage	D not use Machine System disc image f disc image f colocal CD/DVD Driv ny media	e any r Disks ile (iso) 7e	nedia CPU	And ch	Network Confi Guest OS: Type: [Version: [Advanced 🗹 Back Next OS Linux. Click Next. im Linux × 6.x - 2.6 Kernel ×
Help Help Create: Vii General Use C S ISO Use pf Do not	e Do rtual N OS D/DVD Gtorage Himage	D not use Machine System disc image f disc image f colocal CD/DVD Driv ny media	e any r Disks ile (iso) ve	nedia CPU	A and ch	Noose Guest O Network Confi Guest OS: Type: [Version: [Advanced Veac S Linux. Click Next.
Help Help Create: Vii General Use Cl S ISO Use pf Do not	e Do rtual N D/DVD ditorage i image	D not use Aachine System disc image f disc image f disc image f colocal	e any r Disks ile (iso) /e	nedia CPU	Memory	Noose Guest O Network Confi Guest OS: Type: [Version: [Advanced Plack Next. OS Linux. Click Next.
Help Help Create: Vii General Use Cl S ISO Use pt Do not	e Do rtual N D/DVD ditorage i image	D not use Aachine System disc image f disc image f colocal	e any r Disks ile (iso) /e	media CPU	And ch	Noose Guest O Network Confi Guest OS: Type: [Version: [Advanced Veat OS Linux. Click Next. im Linux
Help Help Create: Vii General Use C S ISO Use pt Do not	e Do rtual N D/DVD Gtorage I image	D not use Aachine System disc image f disc image f colocal	e any r Disks ile (iso) /e	nedia CPU	And ch	Noose Guest O Network Confi Guest OS: Type: [Version: [Advanced Veat OS Linux. Click Next. im Linux
Help Help Create: Vii General Use C S ISO Use pt O Do not	e Do rtual N D/DVD Gtorage I image	D not use Aachine System disc image f disc image f colocal	e any r Disks ile (iso) /e	nedia CPU	and ch	Noose Guest O Network Confi Guest OS: Type: [Version: [Advanced Veat OS Linux. Click Next. im Linux 6.x - 2.6 Kernel Veat
Help Create: Vir General Use Create: Vir General Use pr Do not	e Do rtual N D/DVD Gtorage I image hysical t use a	D not use Aachine System disc image f colocal cD/DVD Driv ny media	e any r Disks ile (iso) /e	media CPU	and ch	Noose Guest O Network Confi Guest OS: Type: [Version: [Advanced Veack Next.

6. Specify system options. Choose Machine type q35 and check the Qemu Agent box. Click Next.



Create: Virtual M	achine				\otimes
General OS	System Disks CPU	Memory	Network Cor	ıfirm	
Graphic card:	Default	~	SCSI Controller:	VirtIO SCSI single	\sim
Machine:	q35	\sim	Qemu Agent:		
Firmware					
BIOS:	Default (SeaBIOS)	\sim	Add TPM:		

Help								Advanced 🗹	Back	Next
7. Remo	ve all	disks	from th	e VM.	. Click N	ext.				
Create: Vi	rtual M	achine								\otimes
General	OS	System	Disks	CPU	Memory	Network	Confirm			
No Disks										

8. Assign 8 cores to the VM and choose Host CPU type. Click Next.

🕀 Add

Advanced Back

Next



	ual M	lachine						\otimes
General	os	System	Disks	CPU	Memory	Network C	Confirm	
Sockets: Cores:		1 8			0	Type: Total cores:	host 8	X V
Help Help Create: Virt General	at ual N os	least 8G Machine System	B of R/ Disks	AM to	the VM	. Click Nex	Advanced 🗆 🦷	Back Next
Memory (MiE	i):	8	3192		$\hat{\mathbf{Q}}$			

10. Configure Management network for the VM. Click Next.



Create: Vi	rtual N	lachine							\otimes
General	OS	System	Disks	CPU	Memory	Network	Con	ıfirm	
No netw	ork dev	vice							
Bridge:		vmbr0			\sim	Model:		VirtIO (paravirtualized)	\sim
VLAN Tag:		no VLAN			\bigcirc	MAC addres	S:	auto	
Firewall:		\checkmark							
Help								Advanced 🗌 Back	Next

11. Confirm settings. Click Finish.

Dreate: Vir	rtual M	achine					8
General	OS	System	Disks	CPU	Memory	Network	Confirm
Key ↑		V	alue				
agent		1					A
cores		8					
сри		h	ost				
ide2		n	one,media=	cdrom			
machine		q	35				
memory		8	192				
name		С	VM01				
net0		vi	rtio,bridge=	vmbr0,fir	ewall=1		
nodenam	е	SI	w-demo-no	de-01			
numa		0					
onboot		1					
ostype		12	6				
scsihw		vi	rtio-scsi-sir	ngle			
sockets		1					•
] Start aft	er creat	ted					
							Advanced 🗌 🛛 Back 🛛 Finish

12. Connect to Proxmox host via SSH. Attach StarWindAppliance.qcow2 file to the VM.



qm importdisk 100 /root/StarWindAppliance.qcow2 local-lvm

13. Open VM and go to Hardware page. Add unused SCSI disk to the VM.

14. Attach Network interfaces for Synchronization and iSCSI/Heartbeat traffic.

Add: Network	Device			\otimes
Bridge:	vmbr2	\sim	Model:	VirtIO (paravirtualized)
VLAN Tag:	no VLAN	\bigcirc	MAC address:	auto
Firewall:				
Help				Advanced 🗌 🛛 Add

15. Open Options page of the VM. Select Boot Order and click Edit.

Server View 🗸 🌣	Virtual Machine 100 (0	VMD1) on node 'sw-demo-node-D1' No	Tags 🖋
Sever View C C C C C C C C C C C C C C C C C C C	Virtual Machine 100 (0 Summary Console Hardware Cloud-Init Sopono Task History Monitor Backup	WID1) on node 'sw-demo-node-01' No Edit Revert Start at boot Start/Shutdown order OS Type Boot Order Use tablet for pointer Hotplug ACPI support	Tags 🖍 CVM01 Ves order=1 Linux 6.x - 2.6 Kernel scsi0 Yes Disk, Network, USB Yes
	E Backup E Replication ③ Snapshots ⑦ Firewall → Permissions	ACPI support KVM hardware virtualization Freeze CPU at startup Use local time for RTC RTC start date SMBIOS settings (type1) OEMU Guest Agent Protection Spice Enhancements VM State storage	Yes Yes No Default (Enabled for Windows) now uuid=278343be-974a-46a6-ae99-e03bfc966d20 Enabled No none Automatic

Move scsi0 device as #1 to boot from 1

Help

.6. Move	scsi0 dev	vice as #1 to b	boot from.	
Edit: Boot C	Drder			\otimes
#	Enabled	Device	Description	
≡ 1		🖴 scsiO	local-lvm:vm-100-disk-0,iothread=1,size=30G	
= 2		🖴 hostpciO	0000:88:00.0	
= 3		🖴 hostpci1	0000:89:00.0	
		ide2	none,media=cdrom	
= 5		≓ net0	virtio=BC:24:11:A2:9F:D3,bridge=vmbr0,firewall=1	
Drag and dro	p to reorder			

17. Repeat all the steps from this section on other Proxmox hosts.



Attaching Storage To Starwind Virtual San Cvm

Please follow the steps below to attach desired storage type to the CVM

Attaching Virtual Disk To Starwind Virtual San Cvm

1. Open VM Hardware page in Proxmox and add drive to the VM, which going to be used by StarWind service. Specify size of the Virtual disk and click OK.

					Documentation
Server View 🗸 🔅	Virtual Machine 100	(CVM01) on node 'sw-demo-node	▶ Start 🕐 Shutdown 🐇 🚀 Migrate >_ Cc		
Datacenter (sw-demo-cluster) Sw-demo-node-01	B Summary	Add ~ Remove Edit			
100 (CVM01)	> Console	in Memory	8.00 GIB		
It calanteola (per demonded)) It calanteola (per demonded)) It calanteola (per demonded)) It calanteola (per demonded) It calanteola (per demonded)	Hardwate Cousi-Init Cousi-Init Cousi-Init Task History Montor Backup Schup Schup Schup Filewall Permissions	Processes Display Display Controller SCS Controller CoDUND Drive (de2) Head Disk (ccs0) Network Divice (red0)	6 (1 sockets, 8 cores) (host) Darhad (bac000) Default 435 440 SCS single note, med_ar-cidem localismum, 100 disk-0 interesdr1, sitzer-700; Add: Hard Otok Col: Bandwidth Bus/Device: SCS: v 1 0; Cache: SCSI Controller: Vet0 SCSI single Discad: Storage: Ceck-Im v 1; Disk size (Sci 100;	© Defieit (Ho cache) ~ 	
			Format: Raw disk image (raw)	Advanced 🗌 Add	

Note. It is recommended to use VirtIO SCSI single controller for better performance. If multiple virtual disks are needed to be used in a software RAID inside of the CVM, VirtIO SCSI controller should be used.

- 2. Repeat step 1 to attach additional Virtual Disks.
- 3. Start VM.
- 4. Repeat steps 1-2 on all nodes.

Attaching Pcie Device To Starwind Virtual San Cvm

- 1. Shutdown StarWind VSAN CVM.
- 2. Open VM Hardware page in Proxmox and click Add -> PCI Device.



Server View 🗸 🕸	Virtual Machine 100 (CVM01) on node 'sw-der	no-node-01' No Tags 🖋	•
Datacenter (sw-demo-node-01) Sw-demo-node-01 Uocalinetwork (inw-demo-node-01) Local inverse demo-node-01) Local inverse demo-node-01 Sw-demo-node-02 Licoal (sw-demo-node-02) Licoal (sw-demo-no	Summary Console Hardware Cloud-Init Cloud-Init Cloud-Init Options Task History E Task History E Backup E Replication S Snapshots Firewall Permissions	Add Remove A Hard Disk C DD/VD Drive Drive Mannak Device EFI Disk A TM State B PCI Device B Serial Port Cloudinit Drive Auto Device VirtIO RNG	Edit DiskAction v Revert 8.00 GB 8 (I sockats, 8 cores) [host] Default (SeaBIOS) Default q35 VinID SCSI single 2) Ince_invedia=cdrom Ince_invedia=cdrom Ince_invertice_BC:24:11:A2:9F:D3_bridge=mmbd0_freevall=1	

3. Choose

PCIe Device from drop-down list.

	none,media=cdrom						
	local-lvm:vm-100-dis	k-0.iothread=1.si:	ze=30G				
etO)	Add: PCI Device				\otimes		
	O Mapped Device				~		
	Device:			Primary GPU:			
	Raw Device						
	Device:	0000:88:00.0	~				
	All Functions:	ID ↑	IOMM	Vendor	Device	Medi	
	_	0000:85:1e.6	112	Intel Corporation	Sky Lake-E PCU Registers	No	•
	@ Help	0000:88:00.0	18	Samsung Electro	NVMe SSD Controller 172Xa/172Xb	No	
		0000:89:00.0	19	Samsung Electro	NVMe SSD Controller 172Xa/172Xb	No	
		0000:ae:05.0	113	Intel Corporation	Sky Lake-E VT-d	No	
		0000:ae:05.2	114	Intel Corporation	Sky Lake-E RAS Configuration Registers	No	
		0000:ae:05.4	115	Intel Corporation	Sky Lake-E IOxAPIC Configuration Registers	No	
		0000:ae:08.0	116	Intel Corporation	Sky Lake-E Integrated Memory Controller	No	
		0000:ae:09.0	117	Intel Corporation	Sky Lake-E Integrated Memory Controller	No	
		0000:ae:0a.0	118	Intel Corporation	Sky Lake-E Integrated Memory Controller	No	
im	info	0000:ae:0a.1	119	Intel Corporation	Sky Lake-E Integrated Memory Controller	No	
m	info	0000:ae:0a.2	120	Intel Corporation	Skv Lake-E Integrated Memory Controller	No	• Activate \
im	info	successful aut	h for user 'roo	t@pam'			Go to Setting

4. Click Add.

Add: PCI Device			\otimes
Mapped Device Device:	MDev Type: Primary GPU:		
Device: 0000:88:00.0 ~			
0 Help		Advanced 🗆 📒	Add

5. Edit Memory. Uncheck Ballooning Device. Click OK.



Edit: Memory		\otimes
Memory (MiB):	8192	0
Minimum memory (MiB):	8192	0
Shares:	Default (1000)	
Ballooning Device:		
Help	Advanced 🗹 🛛 OK	Reset

- 6. Start VM.
- 7. Repeat steps 1-6 on all nodes.

Initial Configuration Wizard

1. Start StarWind Virtual SAN CVM.

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

NOTE: in case VM has no IPv4 address obtained from a DHCP server, use the Text-based User Interface (TUI) to set up a Management network. Default credentials for TUI: user/rds123RDS

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





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

Welcome to StarWind Appliance	
Follow the Initial configuration wizard and complete the required steps of the appliance setup	
Start	

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



StarWind Appliance Initial confi	guration	
License	licence	
	Provide StarWind License file to continue	
	If you cannot find the license file, please contact your StarWind Sales Representative or send the request to: sales@starwind.com	
	Upload file StarWind license file (.swk)	
	Back Next	

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

StarWind Appliance Initial configuration	
✓ License Deview and user license agreement	
Review end-user license agreement	
EULA Review and accept the following license agreement to continue	
Static hostname STARWIND LICENSE AGREEMENT FOR COMMERCIAL PRODUCTS	
This Parallic at Linear A second life, of Parameter Mice Lead a second with the second se	
Administrator account page as "Lienses" the liense entry in outsour the liense entry inducted on the signature	
(the "Licensee") and StarWind Software, Inc., a State of Delaware, USA corporation ("StarWind," and collectively with	
Summary Licensee, the "Parties" and each, (a "Party")), that is entered into as of the date of acceptance hereof by both Parties	
hereto (the "Effective Date").	
Configuration Licensee is subject to the terms and conditions of this Agreement whether Licensee accesses or obtains StarWind Product	
directly from Website, or through any other source. By Using, installing, and/or Operating the StarWind Product, Licensee	
agrees to be obuind by the terms of this agreement. If Licensee obes not agree to the terms and conditions of this Arreement. Start/ind is inversitient to the start of the terms start/ind product to Licensee may not this, install.	
and/or Operate the StartWind Product in any way. The StartWind Product will not install and shall not be installed on any	
computers, workstations, personal digital assistants, smartphones, mobile phones, hand-held devices, or other electronic	
devices for which the Product was designed (each a " <i>Client Device</i> "), unless or until Leense accepts the terms of this Arrenement Liensee may also reveive a row of this forement by northering Statistical at inforestancial or on	
THIS DOCUMENT, UNTIL CONFIRMED BY STARWIND, CONSTITUTES AN OFFER BY LICENSEE, AND LICENSEE, BY EXECUTING	
THIS AGREEMENT TO THE TERMIS SET FOR THE TERMIS SET FOR THE TERMIS AND THE UTERS A THE TERMIS AND THE TERMIS AN	
IE EVERITED EL ECTRONICA I VI I CENEEL MILL UNE THE ORDODTINITY TO ACCED DE ACREEVENT	
THROUGH ACLICKTINHOULD PROCEDURE. IT LICENSE TO DOS NOT WIN TO ACCEPT THE STRENG OF THIS AGREEMENT	
I accept the terms of the license agreement	
Back	

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

NOTE: Static network settings are recommended for the configuration.



StarWind Appliance Initial configu	ration						
✓ License	Configure management netw	vork					
Management network	Specify the unique IP address (static is reco The Management network is used to commun	ommended) and icate with service	d configure other netw s such as DNS and NTP an	work settings. nd to access the applianc			
	IP mode Static						
	NIC Model	Bandwidth	MAC address	IP address	Netmask O	Gateway	
	ens160 82574L Gigabit Ne			192.168.12.206	255.255.254.0	192.168.12.1	
	Name servers (optional):						
	192.168.12.17						
	Time settings (optional):		Time zone				
					Back	Next	

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

StarWind Appliance Initial confi	guration	
 License 		
	Verify hostname	
🗸 EULA		
	Check the current appliance hostname and modify it if required	
 Management network 	A Like Little Little Revenues and doch	
	Ose caunteres, numbers, and dash	
 Static hostnamo 		
Statte nostriante		
	SW1	
	Back Next	

9. Create an administrator account. Click Next.



and the second second			
	StarWind Appliance Initial config	uration	
	Starwind Appliance Initiat coming	ulation	
	✓ License		
		Create administrator account	
	✓ EOLA	Specify new credentials for the appliance administrator account	
	 Management network 		
	 Static hostname 	admin	
	Administrator account		
			a second a second s
		Additional information (optional)	
		Full name	
		E-mail	
		Back	

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

StarWind Appliance Initial config	guration			
 License 				
	Review summary			
🗸 EULA				
	License type			
 Management network 	Elective cype			
 Static hostname 	License	Paid 3 Nodes		
 Administrator account 	Management and the second			
	Network settings			
Summary				
	Interface	ens160 (82574L Gigabit Network Connection)		
	Deedwidth			
	Bandwidun			
	MTU			
	IP address	192.168.12.206		
	Appliance bestrame			
	Appliance nostraine			
	Credentials			
	A desta la base de su se se se s			
	Administrator username			
			Back Configure	

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



StarWind Appliance Initial configu	ration		
✓ License	Configuring settings		
✓ EULA	Please wait until all specified settings are applied		
 Management network 			
✓ Static hostname	Progress: 0%	👌 Time remaining: 🛛 - 3 sec	
 Administrator account 	• And the lines		
 Summary Configuration 	Apprying ucense Configuring management network		
• Longuration		×	

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

StarWind Appliance Initial configuration	
Initial configuration completed The essential settings were successfully configured. Press "Finish" to close the wizard and navigate to the login page.	
You can also install the StarWind vSphere plug-in if you want to access the StarWind Appliance web UI from your vSphere console.	
Launch the StarWind vCenter plug-in Installation wizard.	
k	

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



Add Appliance

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

1. Add StarWind appliance(s) in the web console, on the Appliances page. NOTE: The newly added appliance will be linked to already connected partners.

StarWind			
👜 Dashboard	App Add appliance		
🛢 Storage 🔻			
🚠 Network	Credentials	Credentials	
Annliances		Specify the appliance IP address and its administrator credentials	
		The newly added appliance will be linked to already connected partners.	
Lusers			
📋 Tasks and events 🛛 🔻			
		Administrator username	
		Administrator naroword	
		k	
		Cancel	
∢ Minimize			

2. Provide credentials of partner appliance.



StarWind Hyperconvergence			🗐 🌲 🏟 admin 💌
	Add appliance		
	Credentials	Credentials	Q #
		Specify the appliance IP address and its administrator credentials The newly added appliance will be linked to already connected partners.	Raw capacity \$ 0 Bytes
		IP address 192.168.12.166 Administrator username admin Administrator password 	
		Cancel	
< Minimize			

3. Wait for connection and validation of settings.

 App Adaptine (Comparison of the paper of the pap
Cancel

4. Review the summary and click "Add appliance".



StarWind hyperconvergence			🖽 🌲 🎄 admin 💌
	App Add appliance		
	CredentialsSummary	Summary	
		Appliance name SW2 Storage capacity 0.68 Storage pools 0 Volumes 0	
		Back Add appliance	

Configure Ha Networking

1. Launch the "Configure HA Networking" wizard.

StarWind							8	🌲 🔅 adr	min 🔻
🙆 Dashboard	Network								
🗃 Storage 🔻 🔻		Configure HA networking							
Network	🗌 Interface 🖨	Adapter model 🗢	Link status 🗢	Bandwidth 🗘	MAC address 🗘	Role ≑	IP address 🗢	Appliance ≑	
Appliances	🔲 📜 ens160	82574L Gigabit Net	Up		00:50:56:9C:E5:A5	Management			
users	🔲 📜 ens160	82574L Gigabit Net				Management			
🖬 Tasks and events 👻	🗌 📜 ens224	VMXNET3 Ethernet	Up			Unassigned			
	🔲 📜 ens224	VMXNET3 Ethernet				Unassigned			
	🔲 📜 ens256	VMXNET3 Ethernet	Down			Unassigned			
	🔲 📜 ens256	VMXNET3 Ethernet				Unassigned			
 Minimize 									



2. Select appliances for network configuration.

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

StarWind					🗐 🌲 🏠 admin 🔻
💭 Dashboard	Configure HA networking				
 Storage Network Appliances 	Appliances Data network Resultation network	Appliances Select appliances for network configuration. Y	You can configure up to three appliances at a time.		
🚊 Users		Appliance 🗢	Status 💠	Adapters 🗢	
📋 Tasks and events 🛛 🔻		✓ SW1	Online		
		✓ ➡ SW2	Online		
				Close Next	
< Minimize					

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

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

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



Star Hyperco	Wind Invergence										ŧ,	🗘 ac	dmin 🔻
		Configure HA networking											
		 ✓ Appliances Data network 	• Show	sample netw	ork diagram								
				Interface	Model	Bandwidth	MAC address	IP address	Netmask	Link status	SW		
					VMXNET3 Ethernet	10 Gbit	00:50:56:9C:21:E1			Up	SW		
					VMXNET3 Ethernet		00:50:56:9C:C4:73			Down	SW		
			i≣ SW2								SW		
			-	Interface	Model	Bandwidth	MAC address	IP address	Netmask ()	Link status	SW		
				ens224	VMXNET3 Ethernet	10 Gbit	00:50:56:9C:08:13	172.16.20.20		Down	511		
			Cluster M	ATU size:									
			мти 9000										
									Back	Next			

5. Click Next to validate Data network settings.

StarWind		🗐 🐥 🛟 admin 🔻
StartWind Interconverse Dashboard Dashboard Starage INterverk Dashboard Users Users Tasks and events	Store sample network diagram Styl * Interface Model Bandwidth MAC address P address Nietmask @ Link status if thereface Model Bandwidth MAC address P address Nietmask @ Link status if thereface Model Bandwidth MAC address P address Nietmask @ Link status if thereface Model Bandwidth MAC address P address Nietmask @ Link status if thereface Model Bandwidth MAC address P address Nietmask @ Link status if thereface Model Bandwidth MAC address P address Nietmask @ Link status if thereface Model Bandwidth MAC address P address Nietmask @ Link status if thereface Model Bandwidth MAC address P address Nietmask @ Link status if thereface thereface to eliminate a single point of failure if ther	
	Back Next or D	
∢ Minimize		

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

- assign and configure at least one interface on each node
- for redundant configuration, select two interfaces on each node



 ensure interfaces are connected to client hosts directly or through redundant switches

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

StarWind			
Dashboard	Configure HA networking		
Appliances Users	 Appliances Data network Replication network Summary 	Select interfaces to carry data replication traffic, configure them with unique IP addresses, and specify subnet masks. Assign and configure at least one interface on each node	Q ≇ … Appliance ¢ SW1
Tasks and events *		Interface Model Bandwidth MAC address IP address Netmask • Link status Image: ensign constraints VMXNET3 Ethernet 10 Gbit 00:50:36:9C:C4:73 172.16:20:10 24 Down	SW2 SW1 SW2
			SW1 SW2
		Cluster MTU size: MTU 9000	
		Back Next	
< Minimize			

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

StarWind		🗐 🌲 🏟 admin 🔻
🙆 Dashboard		
🗧 Storage 🛛 🔻		
🚑 Network		
Appliances		
Users Tacks and overthe Tacks	SW1 ▲ Non-redundant configuration ×	
asks and events	Inte Only 1 Replication network is configured. Configure more Paddress Netmask I Link status	
	em: Replication networks to eliminate a single point of failure. 72.16.20.10 24 Down	
	SW2 A We recommended assigning at least two data network	
	Interfaces to eliminate a single point of failure. P address Netmask O Link status Acknowledge and continue?	
	en: 12.16.20.20 24 Down	
	Cluster MTU si	
< Minimize		



StarWind		
Dashboard Storage		
Appliances		
💄 Users		
	Interface woods outring data outring data	
< Minimize	•	

9. Review the summary and click Configure.

StarWind					E] 🌲 🍪 admin 🔻
💭 Dashboard	Configure HA networking					
🖶 Storage 👻	✓ Appliances ✓ Data network	Summary				
 Appliances Users 	 Replication network Summary 	Appliance name Data networks Replication networks	₩ SW1 172.16.10.10 172.16.20.10			
		Appliance name Data networks	■ SW2 172.16.10.20			
		Replication networks	112.10.20.20			
				Back		
< Minimize						



Add Physical Disks

Attach physical storage to StarWind Virtual SAN Controller VM:

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

Learn more about storage provisioning guidelines in the KB article.

Create Storage Pool

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

StarWind		🗐 🌲 🏠 admin 🕶
🔹 Dashboard	Storage pools	
Storage File shares	Selected 0 of 0 + Create a new pool pool	
는 LUNs	There are no storage pools yet	
🕒 Volumes	Start building your storage infrastructure by creating a new one	
Storage pools		
Physical disks		
Annliances		
Lusers		
🗖 Tasks and events 🔻		
∢ Minimize		



						a disting an
StarWind hyperconvergence						
	Stol Create storage pool					
	Selecter Appliance	Appliance				
		Select one or more storage nodes	o create a storage pool 📀			
		😑 Node name 🗘	Status 🗢	Available disks 🗢	Available capa 🗢	
		🔽 🖼 SW1	Online			
		🗹 🖼 SW2	Online			
				Cancel	Next	
				Cuncer		
∢ Minimize						

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

StorWend			🗐 🌲 🏠 admin 🕶
HYPERCONVERGENCE			
🙆 Dashboard	Stol Create storage pool		
🗧 Storage 🔺	Selecter of Appliance		
🚊 File shares	Physical disks	Physical disks	
💆 LUNs		Select physical disks to include in storage pools on each node 💿	
🕒 Volumes			
III Storage pools		Disk name	
Physical disks		MDD SAS 5 GB 32:0:1:0 SAS1068 PC	
📮 Network		🗹 📥 sdc HDD SAS 5 GB 32:0:2:0 SAS1068 PC	
Appliances		Z 🔤 sdd HDD SAS 5 GB 32:0:3:0 SAS1068 PC	
🚊 Users		Total raw capacity of selected disks: 15 GB	
🗂 Tacke and ovente 🛛 🔻		₫ 5W2 ▲	
		■ Disk name	
		🗹 🚔 sdb HDD SAS 5 GB 32:0:1:0 SAS1068 PC	
		🗹 🚔 sdc HDD SAS 5 GB 32:0:2:0 SAS1068 PC	
		Selected number of disks is equal Back Next	
∢ Minimize			

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



StarWind hyperconvergence							🗉 🌲 🏠 admin 💌
	Stor	Create storage pool					
		Appliance Physical disks Profile	Profile Choose an optimal storage pool profile. Selected disks	left unused will be assi;	gned to hot spares.		
			Storage pool profile	Usable capacity	Fault tolerance 🖓	Hot spares	
			 High capacity (recommended) Maximize redundancy while maintaining high storage capacity (Software RAID(RAID-5) 	9.9 GB			
			High performance Maximize storage performance while maintaining redundancy (Software RAID(RAID-1)	4.95 GB			
			Manual Allows you to configure the storage pool layout manually.				
					Back	Next La	

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

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

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



StarWind hyperconvergence					🗉 🌲 🎄 admin 💌
	Stol Create storage pool				
	Selector V Appliance V Physical disks V Profile	Summary Review specified settings a 書 SW1	ind create storage pools.		
	• Summary	Storage pool layout Raw capacity Usable capacity			
		Storage pool layout Raw capacity			
		Usable capacity		Back	

Create Volume

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



StarWind		🗐 🌲 🍄 admin 🕶
🍄 Dashboard	Volumes	
Storage 🔺	Selected 0 of 0 + Create a new volume nage VHR user	
LUNs	There are no volumer wet	
🕒 Volumes	Start sharing your storage resources to clients by creating a new one	
Storage pools		
Physical disks A Network		
Appliances		
Lusers		
📋 Tasks and events 🔻		
4 Minimize		

StarWind hyperconvergence			
🙆 Dashboard	Voli Create volume		
Storage A	Selected • Storage pool Settings Filesystem type	Select storage pool Select one or more (in HA configurations) storage pools to create a volume Name Type State Resiliency Free	
Storage pools Physical disks		III SW1:md0 Software RAID Online RAID-5 9.98 GB III SW2:md0 Software RAID Online RAID-5 9.98 GB	
Appliances			
😩 Users			
		Cancel	
∢ Minimize			

3. Specify volume name and capacity.



StarWind hyperconvergence					🗐 🌲 🏠 admin 💌
	Volu Create volume				
	Selector Storage pool • Settings Filesystem type Summary	Specify settings Specify the volume name and size volume0 You can use Latin letters, numbers, and dush Size Available storage pool capacity: 9.98 GB	nt. 3 v		
			Back	Next	
∢ Minimize					

4. Select the Standard volume type.

StarWind hyperconvergence			
😂 Dashboard	Voli Create volume		
 Fileshares UNis UNis Volumes Storage pools Physical disks Hetwork Appliances Users Tasks and events * 	Selector Storage pool Settings In Filesystem type Summary	Choose filesystem settings Choose the preferred filesystem settings for the new volume Image: Standard Back and the Standard Settings: Recommended for general use and the highest performance Image: Standard Back and Standard Settings: Recommended for general use and the highest performance Image: Standard Back and Standard Settings: Recommended for general use and the highest performance Image: Standard Back and Standard Settings: Recommended for general use and the highest performance Image: Standard Back and Standard Settings: Recommended for general use and the highest performance Image: Standard Back and Standard Settings: Recommended for general use and the highest performance Image: Standard Back and Standard Settings: Recommended for general use and the highest performance Image: Standard Back and Standard Settings: Recommended for general use and the highest performance Image: Standard Back and Standard Settings: Recommended for general use and the highest performance Image: Standard Back and Standard Settings: Recommended for general use and the highest performance Image: Standard Back and Standard Settings: Recommended for general use and the highest performance Image: Standard Back and Standard Settings: Recommended for general use and the highest performance Image: Standard Back and Standard Settings: Recommended for general use and the highest performance Image: Standard Back and Standard Settings: Recommended for general use and the highest performance	
< Minimize			

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



StarWind Hyperconvergence			🗐 🌲 🏠 admin 💌
	Voli Create volume		
	Selector 🗸 Storage pool 🗸 Storage pool 🗸 Filesystem type	Review summary Review your settings before creating a volume	Q = = ····
	• Summary	Storage pool SVLmd0 Volume name volume0 Size 5 GB Filesystem settings Standard	
		Eii SW2	
		Storage pool 📑 SW2:md0 Volume name volume0 Size 5 GB Filesystem settings Standard	
		Back Create	
< Minimize			

Create Ha Lun

The LUN availability for StarWind LUN can be Standalone and High availability (2-way or 3-way replication) and is narrowed by your license.

1. To create a virtual disk, click the Add button.



StarWind		é (¢	admin 🔻
🙅 Dashboard	LUNs			
Storage File shares	Selected 0 of 0 + Create a new LUN > LUN			
👮 LUNs	There are no LUNs yet			
🕒 Volumes	Start sharing your storage resources to clients by creating a new one			
Storage pools				
📕 Physical disks				
🏭 Network				
Appliances				
Lusers				
🖹 Tasks and events 🛛 🔻				
◀ Minimize				

2. Select the protocol.

StarWind hyperconvergence			
👛 Dashboard	LUN Create LUN		
 Storage File shares Utis Volumes Storage pools Physical disks Network Applances Users Tasks and events 	Selector Protocol LUN availability Appliances Volumes Failover strategy LUN settings Summary	Protocol Select the required Protocol Image: Contract of the required Protocol Image: Contract of the required Protocol Image: Contract of the required Protocol of the regulation of the high-performance SSD or NVMe setups. Image: Contract of the required Protocol for most HDD based setups or medium performance SSD based setups. Image: Contract of the required Protocol for most HDD based setups or medium performance SSD based setups.	
		Close	
< Minimize			

3. Choose the "High availability" LUN availability type.



StarWind			iii 🖡 🎄 admin ▼
	LUN Create LUN		
	Selecter Protocol LUN availability Appliances Volumes Failover strategy LUN settings Summary	EUCH availability Set the required LUN availability In the availability (two.way replication) Case asynchronosouly replicated LUN hosted on too or three identical appliances. The LUN ways accessible if one of the replication partners becomes unavailable. In stadau C Stada	

4. Select the appliances that will host the LUN. Partner appliances must have identical hardware configurations, including CPU, RAM, storage, and networking.

StarWind									e (¢.	admin 💌
🔮 Dashboard	LUN Cre	ate LUN						×			
Storage +	Selectec v Pro v LU Ap	otocol N availability pliances	Applia Select tw	INCES to or three replication partners that liances must have identical hardw	it should host the HA	LUN ncluding CPU, RAM, storage, and n	etworking				
Votames Storage pools Physical disks	Vo Fai LU Su	umes lover strategy N settings mmary		Appliance	Status Online	Software version 1.5.460.5391+76fc51b	Capacity 15 GB				
🚓 Network Moriances Users				₿ SW2	Online	1.5.460.5391+76fc51b					
Tasks and events 👻											
						Back	Next				
< Minimize											

5. Select a volume to store the LUN data. Selected volumes must have identical storage configurations.



StarWind hyperconvergence			🗉 🌲 🎄 admin 🔻
	LUN Create LUN		
	Selector V Protocol LUN availability Appliances Volumes	Volumes Select one volume on each appliance to store the HA LUN data. Selected volumes must have identical storage configurations. Volumers have identical configurations	
	Failover strategy LUN settings Summary	Volume that a comparations If SW1 ▲ Volume State RAID Ie Capacity Free Sp Type	
		volume0 Mounted RAID-5 5 GB 4.92 GB Standard SW2	
		Volume ÷ State ÷ RAID le ¢ Capacity ÷ Free Sp ÷ Type ÷	
		Back	

6. Select the "Heartbeat" failover strategy.

NOTE: To use the Node witness or the File share witness failover strategies, the appliances should have these features licensed.

StarW:nd		🗐 🌲 🏟 admin 🔻
HYPERCONVERGENCE	LUN Creste LUN X	
File shares	Protocol Failover strategy LUN availability Select the preferred failover strategy. The default is "Heartbeat". However, you can choose another method if you do not have a UPS unit at your disposal.	
Volumes Storage pools Physical disks	Volumes Failover strategy LUN settings LUN settings Summary	
 Appliances Users 	Node witness Arbid appliance acts as a "nouter" for replication partners. The working witness node excludes the possibility of a "split brain" condition.	
Tasks and events *		
	Back	
< Minimize		

7. Specify the HA LUN settings, e.g. name, size, and block size. Click Next.



StarWind			🖽 🌲 🛟 admin 🔻
	LUN Create LUN		
	Setters • Protocol • LUN availability • Appliances • Volumes • Failover strategy • LUN settings Summary	LUN settings Berity the HA LUN settings Lun name Lun Lun <th></th>	
• Minimize			

8. Review "Summary" and click the "Create" button to create the LUN.

StarWind				
🕮 Dashboard	Create LUN			
 torage File shares UNs Volumes Storage pools Physical disks Network Appliances Users Tasks and events 	 Protocol LUN availability Appliances Volumes Failover strategy LUN settings Summary 	Summary Protocol LUN avaitability Appliance 1 Appliance 2 Volume names Volume names Volume sizes Failover strategy LUN name LUN size MPIO Create VMF56 datastore IQNS	iSCSI High availability (two-way replication) S SW1 SW2 volume0, volume0 S G8 Heartbeat Lun0 4 G8 Enabled Faabled No Iqn.2006.08,com.starwindsoftware:192.166.12.206-lun0 jan.2008.08,com.starwindsoftware:192.166.12.166-lun0	
			Back Create LUH	
< Minimize				



Connecting Starwind Ha Storage To Proxmox Hosts

1. Connect to Proxmox host via SSH and install multipathing tools.

```
pve# apt-get install multipath-tools
```



3. Edit /etc/iscsi/iscsid.conf setting the following parameters:

```
node.startup = automatic
node.session.timeo.replacement_timeout = 15
node.session.scan = auto
```

Note. node.startup = manual is the default parameter, it should be changed to node.startup = automatic.

4. Create file /etc/multipath.conf using the following command:

```
touch /etc/multipath.conf
```

5. Edit /etc/multipath.conf adding the following content:

```
devices{
    device{
        vendor "STARWIND"
        product "STARWIND*"
        path_grouping_policy multibus
        path_checker "tur"
        failback immediate
        path_selector "round-robin 0"
        rr_min_io 3
        rr_weight uniform
        hardware_handler "1 alua"
    }
```



}

defaults {	
<pre>polling_interval</pre>	2
path_selector	"round-robin 0"
<pre>path_grouping_policy</pre>	multibus
uid_attribute	ID_SERIAL
rr_min_io	100
failback	immediate
user_friendly_names	yes
1	

6. Run iSCSI discovery on both nodes:

pve# iscsiadm -m discovery -t st -p 10.20.1.10
pve# iscsiadm -m discovery -t st -p 10.20.1.20

7. Connect iSCSI LUNs:

```
pve# iscsiadm -m node -T iqn.2008-08.com.starwindsoftware:swl-
dsl -p 10.20.1.10 -l
pve# iscsiadm -m node -T iqn.2008-08.com.starwindsoftware:sw2-
dsl -p 10.20.1.20 -l
```

8. Get WWID of StarWind HA device:

/lib/udev/scsi_id -g -u -d /dev/sda

9. The wwid must be added to the file '/etc/multipath/wwids'. To do this, run the following command with the appropriate wwid:

multipath -a %WWID%

10. Restart multipath service.

systemctl restart multipath-tools.service

11. Check if multipathing is running correctly:

```
pve# multipath -ll
```



- 12. Repeat steps 1-11 on every Proxmox host.
- 13. Create LVM PV on multipathing device:

pve# pvcreate /dev/mapper/mpatha

where mpatha – alias for StarWind LUN 14. Create VG on LVM PV:

```
pve# vgcreate vg-vms /dev/mapper/mpath0
```

15. Login to Proxmox via Web and go to Datacenter -> Storage. Add new LVM storage based on VG created on top of StarWind HA Device. Enable Shared checkbox. Click Add.

Q Search	Add V Remove Edit						
D Summary							
🗔 Notes	local	Directory	VZDump	backup file,	ISO image, Contain	ner template	/var/lib/vz
🗃 Cluster	local-storage	Directory	Disk ima	ge			/mnt/localstorage
Ceph Ceph	starwind-ha	LVM	Disk ima	ge, Containe	r		
Options							
Storage							
🖺 Backup							
13 Replication							
Permissions 👻							
🛔 Users							
API Tokens		Add: LVM					\otimes
ae Two Factor	General Backup Retention						
🕍 Groups		ID:			Nadasi	All (No contriction	
S Pools		ID:			Nodes:	All (No restriction	s) ~
n Roles		Base storage:	Existing volume g	groups ~	Enable:		
Realms		Volume group:	vg_vms	~	Shared:		
😍 HA 🔹		Content:	Node to scan:	sw-demo-	proxmox-02 ~		
ACME		Help Vg_vms				Add	
Firewall							
Ind Metric Server							
C Support							

16. Login via SSH to all hosts and run the following command:



Conclusion

Following this guide, a Proxmox Cluster 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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