

StarWind Virtual SAN[®] Configuring Log-structured Write Back-Cache (LSWBC) HA device

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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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IMPORTANT NOTE: Starting from 14869 build, the LWC (LSWBC) feature was excluded and deprecated. During the update, all LSWBC devices will be automatically converted to image devices without cache with RAM-based synchronization journals (for HA devices). See more information in the release notes:

https://www.starwindsoftware.com/release-notes-build

Introduction To Log-Structured Write-Back Cache (Lswbc)

Log-structured Write-Back Cache (LSWBC) is a disk storage feature developed for optimizing I/O performance. Data is first written to the RAM cache. Once the cache gets full or some deadline comes, an application finishes the log page that contains both metadata and the written data itself. Log segment flush starts from simply issuing an asynchronous write request to the cache-disk. Once it is finally written to a persistent cache device, no data will be lost in the event of server failure. Then, the log segment finally migrates to the underline storage.

In case of both StarWind servers malfunction, the full synchronization process will be initialized on all devices without LSWBC (follow the link to get more information). But, if the devices are configured with the Write Log feature, all the recent write operations will be identified. In this way, the feature enables to avoid the full synchronization process during data integrity restoration after node or cluster failures.

Log-structured Write-Back Cache requirements:

- The standard scenario implies using HDD drives as the underlying storage and SSD drives as the storage for a cache-disk.
- To collect RAM cache files and their metadata, StarWind requires at least 3GB of RAM per 1TB of storage. In case of the long-term peak loads, required RAM can be over-provisioned.
- For cache-disk, StarWind service needs at least 16 GB of storage, but it can grow up to 20% of the overall HA device size. In case of the long-term peak loads, cache-disk size can be over-provisioned. Size of the storage available for Write log parameter files varies from 10% to 20% of the overall underlying storage capacity.

This guide is intended for StarWind users who would like to configure the StarWind Virtual SAN solution. It provides the detailed instructions on how to set up the Logstructured Write-Back Cache feature in StarWind Virtual SAN running on top of Windows Server 2012 R2 or Windows Server 2016.

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



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

Configuring Starwind Ha Device With The Lswbc Feature

This guide assumes that StarWind Virtual SAN is already installed. Its installation guidelines can be found at the following link:

https://www.starwindsoftware.com/help/InstalIngStarWindVSAN.htm

1. Double-click the StarWind tray icon to launch StarWind Management Console. Then click the Add Server button to connect to a StarWind server.

- 2. Select the StarWind server where the device needs to be created.
- 3. Press the Add Device (advanced) button on the toolbar.

StarWind Management Console				-	×
FILE HOST TARGET OPTIONS HELP					
Refresh Connect Disconnect Add Server Remove Server	Add Device (advanced) Ad	VTL Device Remove Target			
Servers	General Configuration CHA	Permissions Access Rights	Server Log Events	Performance	
SW-LWC-NODE1.STARWIND.LOCAL (192.	SW-LWC-NODE1.STA	RWIND.LOCAL (192.16 re Server Add Target 192.168.12.10 SW-LWC-NODE1.STARWIND.LC 3261 Basic Logged-in Enterprise HA (High Availability Unlimited for single Node Devic Unlimited 2	8.12.10): 3261 SAdd Device Add Groups Manager O DCAL) unlimited Edition res	Device (advanced) Refresh	
StarWind Software Beady					
Starwind Software Ready					

4. Add Device Wizard will appear. Select Hard Disk Device and click Next.



			?	×
~	Ade	d Device Wizard		
	Selec	t Device Type you want to create or export as iSCSI Target		
	۲	Hard Disk Device		
	С	Tape Device		
	С	Optical Disc Drive		
		Next	Car	icel

5. Choose Virtual Disk and click Next.



			?	×
←	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

6. Specify Name, Location, and Size of the virtual disk. Then, click Next to continue.



			?	×
←	Add Device Wizar	rd		
	Virtual Disk Loc	ation		
	Create a New V	/irtual Disk		
	Name:	LWC-device]	
	Location:	My Computer\E\		
	Size:	10 GB ~		
	OUse an Existing	Virtual Disk		
	Location:	~ ~		
	Read-On	ly Mode		
		Next	Cano	:el

7. Select the Thick-provisioned with Write Log (experimental) option and click Next.



		?	×
÷	Add Device Wizard		
	Virtual Disk Options		
	O Thick-provisioned		
	Thick-provisioned with Write Log (experimental)		
	Olsfs		
	Deduplication		
	StarPack Cache Size: 16 MB \sim		
	Block Size		—
	Use 4096 bytes sector size May be incompatible with some clients		
	Sector of the sector and that the mean public with some circles		
	Next	Can	cel

NOTE: 4096-byte block size is recommended for Windows-based hypervisors, while 512byte block size is recommended for Linux-based ones (ESXi/Xen/KVM).

8. Specify the Write Log Parameters location. Click Next to continue.



		?	×
←	Add Device Wizard		
	Write Log Parameters		
	Location:		
	My Computer\F\Write-Log_for_LWC-device\	~	
	<u>N</u> ext	Canc	el

9. Define the caching policy and specify the cache size. Click Next.

NOTE: It is recommended to assign 1 GB of L1 cache in the Write-Through mode per 1 TB of the underlying storage capacity. The cache size should correspond to the storage working set of the servers. The information on L1 cache implementation can be found at the following link:

https://www.starwindsoftware.com/resource-library/starwind-virtual-san-l1-and-l2-caches -operational-prnciples



			?	×
←	Add Dev	vice Wizard		
	Specify [Device RAM Cache Parameters		
	Mode			
	0	Write-Back Writes are performed asynchronously, actual Writes to Disk are delayed, Reads are cached	3	
	0	Write-Through Writes are performed synchronously, Reads are cached		
	۲	N/A Reads and Writes are not cached		
	Set M	laximum available Size		
	Size:	128 MB ~		
		Next	Cano	:el

10. Specify Target Parameters. Select the Target Name checkbox to enter a custom target name. Otherwise, the name will be generated automatically based on the target alias. Click Next to continue.



		?	×
←	Add Device Wizard		
	Target Parameters		
	Choose a Target Attachment Method		
	Create new Target	~]
	Target Alias		_
	LWC-device		
	Target Name		
	iqn.2008-08.com.starwindsoftware:sw-lwc-node1.starwind.local-lwc-device		
	Allow multiple concurrent iSCSI Connections		_
	Next	Can	cel

11. Click Create to add a new device and connect it to the target. Then click Close to complete the Wizard.



		?	×
←	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 LWC header		
	Creating LWC device		
	Creating Target and attaching Device		
			_
	Create	Can	cel

NOTE: Write log configured on a stand-alone device works as L2 cache in the write-back mode. Such design improves both reading and writing performance.

12. Right-click the Servers field and select Add Server. Add a new StarWind server which will be used as the second HA node. Then, click OK.

📑 Ad	d new StarWind Server		?	×
Host:	SW-LWC-NODE2		: 3261	
Advanced >>		ОК	Cano	el

13. Right-click the created device and select Replication manager.



StarWind Management Console				×
				^
FILE HOST TARGET OPTIONS HELP				
Refresh Connect Disconnect Add Server Remove Server	Add Device Add Device (advanced) A	dd VTL Device Remove Device Help		
Servers				
SW-LWC-NODE1.STARWIND.LOCAL (192.	LWC1			
▲ 🔷 LWC-device	Remove Device	Force remove Device 🔄 Attach to Target		
lwc1	◊ × Detach from ion 2008	-08 com stanwindsoftware:sw-lwc-node1.starwind.local-lwc-device		
SW-LWC-NODE2 (Force remove Device				
S+ Attach to Target				
Ex Detach from iqn.2008-0	8.com.starwindsoftware:sw-lwc-node1.	starwind.local-lwc-device		
🖨 Extend Image Size				
😴 Replication manager				
	Log Storage	F:\Write-Log_for_LWC-device\		
	CACHE			
	Mode	N/A	 	
StarWind Software Ready			 	

14. The Replication Manager for lwc1 window will appear. Press the Add Replica button.



🔁 Replication Manager for lwc1	?	×
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

15. Select Synchronous "Two-Way" Replication. Click Next to proceed.



			?	×
~	Replic	cation Wizard		
	Replica	ation Mode		
	۲	Synchronous "Two-Way" Replication Replication Partner must be connected to Client as Source Device as well, MPIO o must be enabled, needs dedicated high Performance Network Connection for Synchronization	n Client	
	0	Asynchronous "One-Way" Replication Replica is used to store replicated Data, Data is stored as Snapshots, Client canno connect to Replication Partner, mount Snapshot from Replica to get Access to rep Data	ot blicated	
	0	Witness Node Witness node doesn't contain user data. In case when Node Majority policy is set Synchronous replication device and there are two storage nodes, Witness Node n added to duster to make number of nodes odd number and enable proper functio Node Majority policy.	for nust be ning of	
		Next	Canc	el

16. Specify the partner Host Name or IP address and Port Number. The default StarWind management port is 3261. If a different port is configured, please, type it into the appropriate field. Click Next.



			?	×
←	Replication Wizard			
	Add Partner Node			
	Specify Partner Host Name	e or IP Address where Replication Node would be created		
	Host Name or IP Address	SW-LWC-NODE2 V		
	Port Number	3261		
		Next	Can	icel

17. Select Heartbeat as the failover strategy. Click Next.



		?	×
←	Replication Wizard		
	Failover Strategy		
	 Heartbeat Process node and communication fr (heartbeat). At least one synchron proper failover processing. Loss of issue, so it's recommended to use o channel. Node Majority Process node and communication fr sees more than half of nodes inclus configuring additional witness node 	ailures using additional communication channel nization or heartbeat channel must be functional for all communication channels may lead to split brain client iSCSI connection interfaces as heartbeat ailures using majority policy: node stays active while ding itself. In case of 2 storage nodes, requires e. Does not require additional heartbeat channel.	: it
		<u>N</u> ext Ca	incel

18. Select Create new Partner Device and click Next.



				?	×
←	Replie	cation Wizard			
	Partner	Device Setup			
	۲	Create new Partner Device Existing Device Parameters would be used as a Template			
	0	Select existing Device Select existing Device on Partner Server			
		Nex	t	Cano	el:

19. Specify the partner device Location and modify the device target name if necessary.



			?	×
←	Replicatio	on Wizard		
	Partner De	evice Setup		
	Location:	My Computer\E\		
	iqn.2008-(08.com.starwindsoftware:sw-lwc-node2-lwc-device		
	Modify	y Target Name		
		Next	Canc	el

20. Select the Synchronization and Heartbeat networks for the HA device. 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 SW-LWC-NODE1, SW-LWC-NODE2		
Change ALUA Settings		
<u>N</u> ext	Ca	ncel

21. Specify the interfaces for the Synchronization and Heartbeat channel. Click OK. Then click Next.



Specify Interfaces for Synchronization Channels							
	Select synchronization channel						
	Interfaces	Networks	Synchronization and H	. Heartbeat			
	Host Name: 127.0.0.1						
	172.16.10.10	172.16.10.0			-		
	172.16.20.10	172.16.20.0					
	192.168.12.10	192.168.12.0		v			
	Host Name: SW-LWC	C-NODE2					
	172.16.10.20	172.16.10.0					
	172.16.20.20	172.16.20.0	V				
	192.168.12.20	192.168.12.0					
	Allow Free Select Interfaces OK Cancel						

NOTE: Use separate network adapters for Heartbeat and Synchronization channels. It is recommended to configure Heartbeat and iSCSI channels on the same interfaces to avoid the split-brain issue.

22. Select Synchronize from existing Device as a partner device initialization mode and click Next.



			7	?	×
←	Repli	cation Wizard			
	Select	Partner Device Initialization Mode			
	۲	Synchronize from existing Device All Data from existing Device would be copied to new Device			
	0	Do not Synchronize Data on HA Nodes remains unchanged.			
		Next		Cance	el

23. In Write Log Parameters, specify the partner Location. Click Next to continue.



		?	×
←	Replication Wizard		
	Write Log Parameters		
	Location:		
	My Computer \F\Write-Log_for_LWC-device \	×	
		<u> </u>	
	Next	Cano	:el

24. Click the Create Replica button.



	? ×
 Replication Wizard 	
Creation Page	
Creating Device Folder	^
Creating Storage File on Partner Host	
Creating Storage Header on Partner Hos	ost
Creating Storage Device on Partner Hos	st
Creating LWC header	
Creating LWC device	
Creating Device Header on Partner Host	st
Creating Device Header on current Host	st 🗸
	Create Replica Cancel

25. The added device will appear in StarWind Management Console.



StarWind Management Console		- 0	×
FILE HOST TARGET OPTIONS HELP			
Refresh Connect Disconnect Add Server Remove Server	Add Device Add Device (advanced) Add	VTL Device Remove Device Help	
▲ 🚺 Servers			^
SW-LWC-NODE1.STARWIND.LOCAL (192.	HAIMAGE1		
▲ 🔶 LWC-device	Remove Device Fo	rce remove Device III Change Partner Authentication Settings	
HAImage1	Change Synchronization	Priority 🔄 Replication Node Interfaces 🛛 🕄 Replication Manager	
SW-LWC-NODE2 (192.168.12.20): 3261	🙋 <u>Snapshot Manager</u> 🛸	Extend Size of HA (High Availability) Device A Enter Maintenance Mode	
	Device	HAlmage1	
	Size	10 GB	
HAlmage1	Target Name	iqn.2008-08.com.starwindsoftware:sw-lwc-node2-lwc-device	
	Virtual Disk	lwc1	
	Serial Id	EC/DF04FAD62FB4	
	Priority	Second	
	Mode	Synchronous	
	Failover Strategy	Heartbeat	
	Auto Synchronization after	Yes	
	Failure Synchronization Status	Synchronized	
	HEALTH STATUS		
	 Storage is working proper 	у	
	STORAGE		
	Device	lwc1	
	Size	10 GB	
	Virtual Disk	imagefile1	
	Sector Size	4096 Bytes	
	2 100	ECTOFO4EAD COED 4	、 ×
StarWind Software Ready			-

26. Discover and connect the created targets in the iSCSI initiator that is used in this environment.



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